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**Sustainable agriculture and rural
development in terms of the republic of
Serbia strategic goals realization within
the Danube region. Achieving regional
competitiveness**

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***„SUSTAINABLE AGRICULTURE AND RURAL
DEVELOPMENT IN TERMS OF THE REPUBLIC OF
SERBIA STRATEGIC GOALS REALIZATION
WITHIN THE DANUBE REGION“***

- achieving regional competitiveness -

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FOREWORD

International Scientific Conference „*SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION - achieving regional competitiveness*“, which was held in period 5-7th December 2013 in Topola, the Republic of Serbia, through number of presented papers mainly provides an overview of results of scientific research on the integrated and interdisciplinary project no. III 46006 „*SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION*“.

Carrier of the Project, where is engaged 68 *scientific-educational workers*, is the *Institute of Agricultural Economics Belgrade*, which collaborates in realization of this project with 8 *scientific-educational institutions*. Project realization involves following Institutions: *Faculty of Agriculture - University of Belgrade; Faculty of Agriculture - University of Novi Sad; Faculty of Economics - University of Belgrade; Faculty of Economics Subotica - University of Novi Sad; Faculty of Biofarming Bačka Topola - Megatrend University, Belgrade; Institute for Science Appliance in Agriculture, Belgrade; Institute of Medicinal Plants Research Dr Josif Pančić, Belgrade; Center for Small Grains, Kragujevac.*

Mentioned Project is implementing within the period 2011-2014, and funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia. Realization of project is carried out through 3 *sub-projects*, having in mind regional specificities of agriculture and rural/peri-urban areas within the Danube Region:

- (1) *Sustainable agriculture and rural development in the Upper Danube Region;*
- (2) *Urban and peri-urban agriculture in the Metropolitan area of Belgrade - Novi Sad;*
- (3) *Sustainable agriculture and rural development in the Carpathians (mountain area within the National Park Đerdap and its protected zone).*

International Scientific Conference „*SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION - achieving regional competitiveness*“, gathered number of scientific workers and experts from many countries. Besides the authors from *Serbia* in *Thematic Proceedings* are also presented the papers of authors from *Bosnia and Herzegovina, Macedonia, Romania, Russia, Moldova, Slovakia, Ukraine, Germany, the Netherlands, Japan and Austria*.

After all 92 *papers* were positively reviewed by the reviewers and presented on the *International Scientific Conference*, they were published in the *Thematic Proceedings*. Proceedings publisher was *Institute of Agricultural Economics Belgrade*, together with 34 *eminent scientific-educational institutions* from Serbia and abroad. In the *Plenary Section* were presented 3 *papers* which gave significant contributions to *International Scientific Conference*.

Rest of the papers are systematized in 3 *thematic sections*:

I KNOWLEDGE ECONOMY AND HUMAN CAPITAL IN THE FUNCTION OF IMPROVING REGIONAL COMPETITIVENESS (section was represented by 45 papers);

II BIOREGIONALISM AND PERMACULTURE AS A CONCEPTS OF CONSERVATION OF ECOLOGICAL SPECIFICITIES OF RURAL AREAS (section was represented by 27 papers);

III THE CONSTRUCTION OF AGRO-REGIONAL IDENTITY THROUGH INSTITUTIONAL REFORM (section was represented by 17 papers).

Belgrade,

December, 2013

Editors:

Prof. Drago Cvijanović, Ph.D.

Jonel Subić, Ph.D.

Andrei Jean Vasile, Ph.D.

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PLENARY SECTION

PAPER BY INVITATION

RUSSIA'S MEAT MARKET: CURRENT STATE AND PERSPECTIVES

Marina Lescheva¹, Anna Ivolga²

Abstract

Analysis of dynamics and current state of the Russia's meat market is presented. The factors determining level of meat domestic consumption are discovered. Regional differences in meat consumption are considered. Tendencies of development of separate livestock industries are determined. It is concluded that an integrated approach to production and infrastructure development problems of meat subcomplex is required. The real-time data on the volume of meat imports in terms of Russia's WTO membership are presented. Directions and size of state support for the livestock industries in 2013-2020 are considered.

Keywords: *meat market, import, production, consumption, livestock industries, wholesale price, consumer price, integration, cooperation, state support*

Introduction

The Food Security Doctrine of the Russian Federation specified the growth of domestic market capacity of food of animal origin as one of the strategic goals. It also set the self-sufficiency ratio for the domestic market of meat and meat products (in meat equivalent) as of above 85%. Nevertheless Russia is still one the world largest importers of meat and meat products. Currently almost 27% of the Russia's domestic meat market is provided by the means of import (which is 12 percentage points above the safe level). The Russia's share in world meat production (about 2%) is well below its potential. It harms the economy and arises the necessity to research the opportunities of increase of meat production and decrease of import dependency of Russia, considering the significance and specifics of separate meat industries. Theoretic, methodical and practical aspects of development of domestic animal production were investigated by such scientists as A. Bagmut, Y. Bershitsky, I. Burobkin, A. Vsyakikh, V.

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Goncharov, S. Dankvert, V. Dupak, A. Magomedov, P. Prokhorenko, M. Romashin, N. Strekozov, V. Fisinin, A. Ulyanov, M. Tsynkov, and others. Researches of those authors cover a wide range of questions related to location, specialization and concentration of animal production, pricing, labour management and compensation, manufacturing processes in animal production. However, opportunities for the separate meat industries to provide meat resources of the country, especially in the conditions of Russia's accession to WTO, are still not clearly understood. That conditions the necessity to investigate that problem.

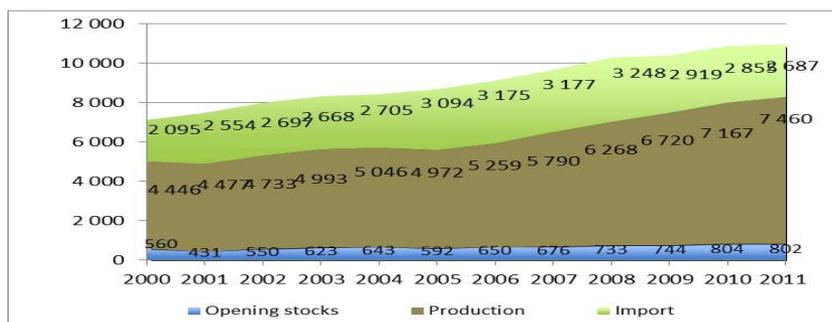
Material and Methods

Research objective is to analyze the state of the Russia's meat market, to discover the roles of the separate industries of animal production in its development, to investigate the directions of their development considering the full use of existing resources in the conditions of the Russia's accession to WTO. Dialectic, abstract, logical and comparative methods were implemented, as well as factor and correlation analysis of the official statistic data, and study of scientific publications.

Results and Discussion

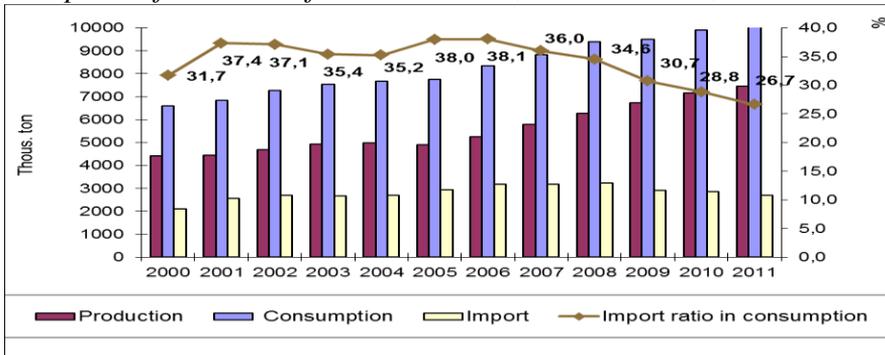
Size of the Russia's meat market is predicated upon the volume of domestic production, import and stocks (Figure 1). Over the last ten years the market has been growing sustainably. In 2011 the absolute addition in comparison with 2000 was 3848 thousand tons; the basis accession rate was 54%; the capacity of the domestic meat market in physical terms reached 10949 thousand tons [1]. Almost all meat produced in the country is distributed on the domestic market. Export of meat is less than 1% of the total volume of resources, besides in some cases export of meat is re-export of previously imported products.

Figure 1. *Development of the Russia's market of meat and meat products, thousand tons*



Since export and carry-over stocks are not significant from year to year, meat market supply is determined by demand, which dynamics follows the fluctuations of resources supply. Growth of meat market is provided by means of domestic production and import. Share of import in consumption during the period of analysis decreased from 31.7% to 26.7%; the share of import in development of domestic meat resources (including stocks) decreased as well, but remained high – 24.5% (Figure 2).

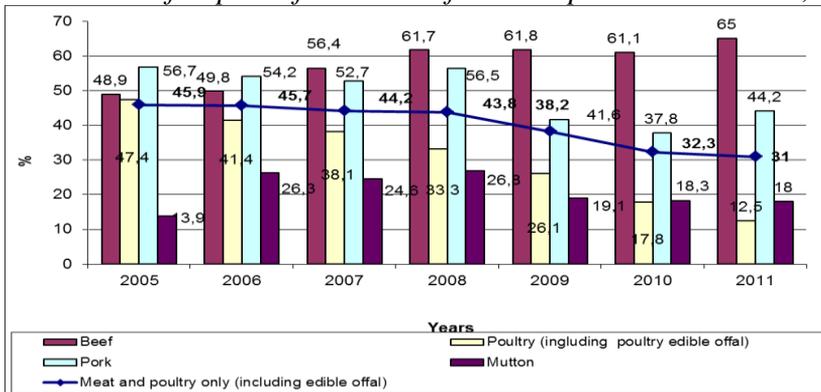
Figure 2. Production, consumption, import and share of import in consumption of all kinds of meat in Russia, thousand tons, %



Source: Federal Service of State Statistics [Electronic Source], calculated based on [1], available at: <http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/>

Russia imports all kinds of meat. The share of import in the structure of beef resources grows from year to year (up to 65% in 2011). Other kinds of meat were imported in lower volumes (pork – 44.2%, poultry – 12.5%, mutton – 18%) (Figure 3).

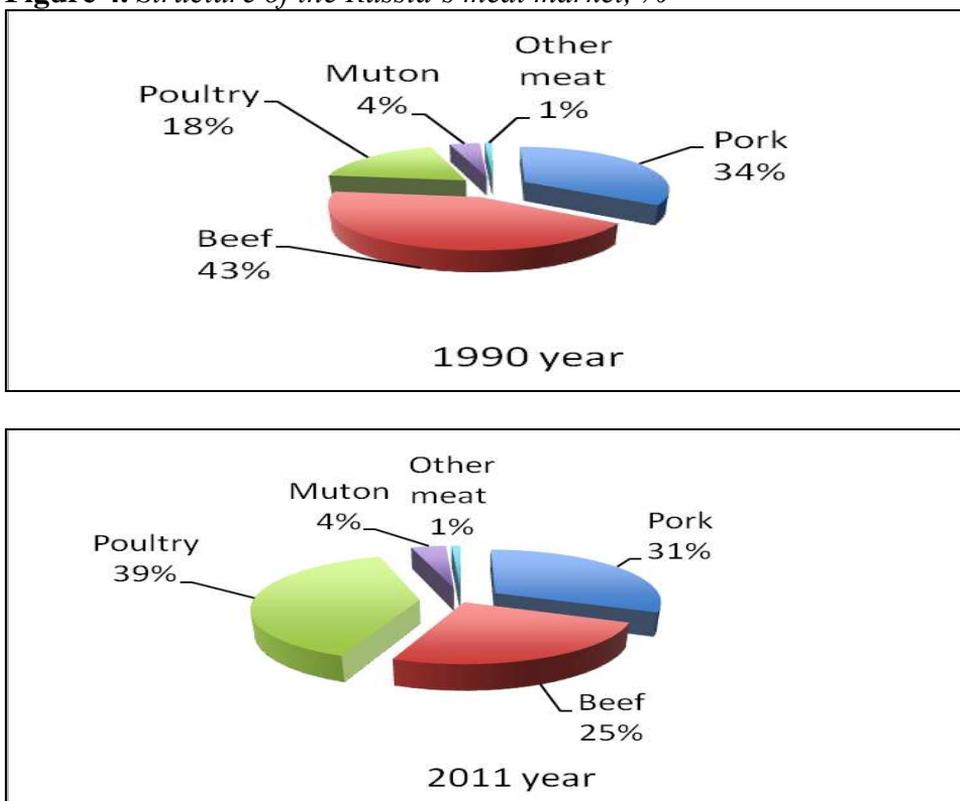
Figure 3. Share of import of all kinds of meat in product resources, %



Source: Federal Service of State Statistics [Electronic Source], calculated based on [1], available at: <http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/>, free

Over the last 20 years supply of various kind of meat on the Russia's market has changed essentially (Figure 4). In 1990 share of beef was 43%, pork – 34%, poultry meat – 18%, mutton – 4%. Today the structure of the Russia's meat market (including import) is as follows: poultry meat – 39%, pork – 31%, beef – 25%, mutton – 4%, other meat – 1%.

Figure 4. *Structure of the Russia's meat market, %*



Structural shifts towards the most economically available meat let to increase the consumption of meat. However, the demand of the Russia's population in meat products on the level of the recommended biological norms is not provided. Consumption of meat and meat products (without sub products of category II and slaughter fat) per capita in 2010 was 63 kg [1]. That is 22 kg more than in 2000, but still 21% under the medical requirements (80 kg per year) and essentially lower than in USA (120 kg per year), Canada (98 kg per year) and EU countries (87 kg per year) [2]. Consumption of meat and meat products vary significantly from one Russia's region to another (Table 1).

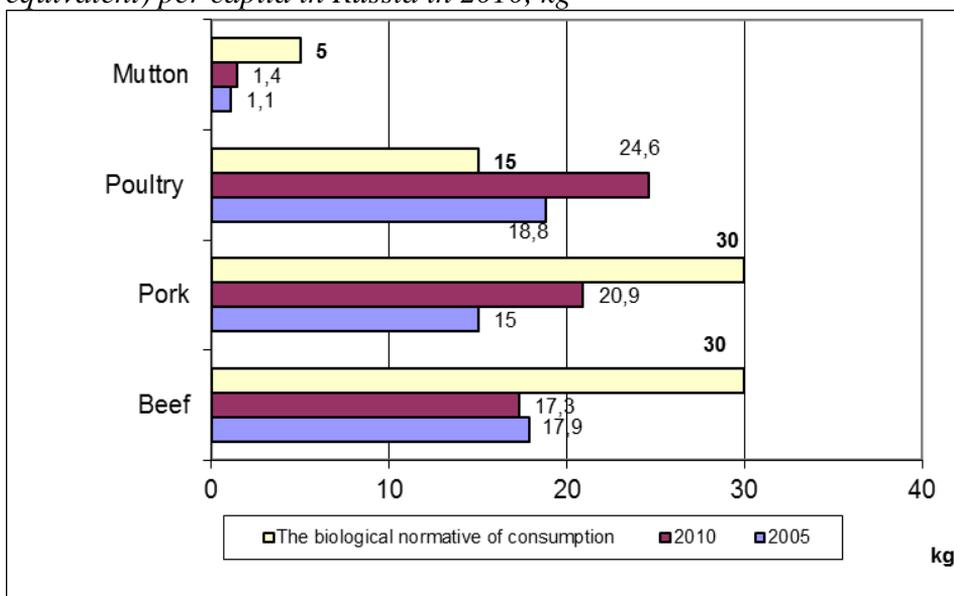
Table 1. Consumption of meat and meat products in the regions of the Russian Federation in 2011

Groups with different levels of meat consumption per capita, kg	Number of regions in the group	Average for the group, kg/person annually	Regions
under 50	9	43.4	Oblasts: Kostromskaya, Tyumenskaya, Smolenskaya, Arkhangel'skaya Republics: Dagestan, Ingushetia, Kabardino-Balkaria, Chechnya Evreyskaya Autonomous Area
50-60	33	55.3	Oblasts: Ulyanovskaya, Vladimirskaya, Ivanovskaya, Ryazanskaya, Bryanskaya, Samarskaya, Tverskaya, Penzenskaya, Tambovskaya, Amurskaya, Tulsкая, Kaluzhskaya, Irkutskaya, Nizhegorodskaya, Orenburgskaya, Saratovskaya, Kirovskaya, Kurskaya, Novgorodskaya, Vologodskaya, Novosibirskaya, Kurganskaya, Kemerovskaya, Rostovskaya Krais: Stavropol, Perm Republics: Tyva, Buryatia, North Osetia-Alania, Adygeya, Udmurtia, Chuvashia Chukotsky Autonomous District
60-70	21	64.3	Oblasts: Tomskaya, Volgogradskaya, Voronezhskaya, Lipetskaya, Astrakhanskaya, Chelyabinskaya, Murmanskaya, Leningradskaya, Pskovskaya, Omskaya Republics: Mariy El, Khakassia, Karachaevo-Cherkesskaya, Mordovia, Karelia, Tatarstan Krais: Krasnodar, Zabaykalsky, Primorsky, Kamchatsky
70-80	11	73.2	Oblasts: Sverdlovskaya, Magadanskaya, Yaroslavskaya, Kaliningradskaya, Orlovskaya, Belgorodskaya Krais: Krasnoyarsky, Khabarovskiy Republics: Komi, Bashkortostan, Altay
above 80	4	91.0	Oblasts: Moskovskaya, Sakhalinskaya Republics: Kalmykia, Sakha (Yakutia)
Total	78	63.0	x

For example, consumption of meat in Kalmykia is threefold higher than in the neighbor Dagestan (99 kg/person and 32 kg/person correspondingly). Variation is determined by the differences in development of domestic production, volumes of incoming deliveries, including import, economic availability and consumer preferences of other kinds of food – milk, vegetables and fruits. Thus, in republics of Kalmykia and Yakutia and Sakhalin Oblast the limited availability of other components of food ration is compensated by the increased meat consumption. The high level of meat consumption in Moscow oblast (with its share of domestic production in consumption equal to 0.2) is explained by the location of the biggest Russia’s city with high share of import in its trade flows, orientation of population to meat products with high added value and developed storage infrastructure.

Biological norms of meat consumption are not met in 95% Russia’s regions. Such situation affects negatively the quality and length of life of Russia’s citizens. In average Russia’s citizen lacks 22 kg of meat annually. That deficit is caused mainly by the lack of beef and mutton. Average citizen consume 17.3 kg of beef annually (normative – 30 kg), 1.4 kg of mutton annually (normative – 5 kg) (Figure 5).

Figure 5. Consumption of meat (cattle and poultry in carcass weight equivalent) per capita in Russia in 2010, kg



The existing segmentation of meat consumption masks its real deficit to a certain extent, since the biological normative of consumption depends on the type of meat, which is essentially different on the protein, fat and mineral content. When the consumption of beef decreases on 1% the poultry meat consumption should grow on 1.2% to secure the biological normative [3].

Development of meat resources as consisted with the scientifically grounded consumption rates based on the increasing domestic production of meat is the keystone of the Food Security Doctrine of the Russian Federation. That is why it is so important to discover the factors which affect that indicator. Econometric analysis became the methodological basis of such investigation. The number of indicators investigated included: meat consumption per capita (y), volume of domestic production (x_1), import of meat (x_2) and disposable income per capita (x_3). Dependence of meat consumption on the listed factors has been analyzed based on the nationwide data of 2000-2010. Interrelation of factors is explained by the following equation:

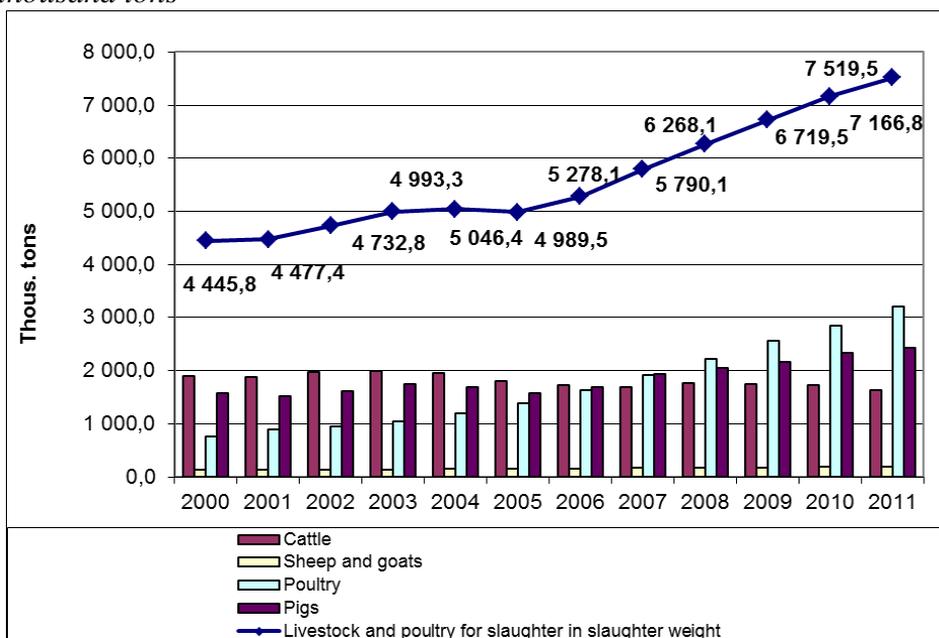
$$Y=3,9+5,0x_1+6,8x_2+0,0023x_3 \quad (1)$$

The factors included into the model settle the variation of the final value almost completely (determination coefficient 0.99). There is the direct correlation between the final and factor indicators. The most evident interrelation is between the level of meat consumption and its import (regression coefficient 6.8). Influence of domestic production on meat consumption is shown in a lower rate (regression coefficient 5.0). The weakest connection is discovered between meat consumption and disposable income (regression coefficient 0.0023). Hence, the main signal from the consumer market to producers is the development of meat supply, not the income of population. The adequate reaction to that signal is the increase of the share of domestic production in the development of national meat resources.

As a result of the implementation of the National Project “Development of Agriculture”, the State Program “Development of Agriculture and Regulation of Markets of Agricultural Products, Raw Materials and Food in 2008-2012”, as well as under the influence of the whole range of other factors the production of livestock and poultry in Russia increased (Figure 6).

In 2011 the production of livestock and poultry for slaughter by all categories of Russia’s animal producers was 7519.5 thousand tons; the absolute addition in comparison with 2000 – 3073.7 thousand tons; basis accession rate – 69%. The role of the separate industries in the development of meat resources is not equal. The most dynamically developing industries are poultry and pork production – the fast-growing branches, which provide the shortest payback of investments and attractive for making fast profit. The volume of poultry meat production has increased fourfold over the last 11 years and has reached 3204 thousand tons in 2011.

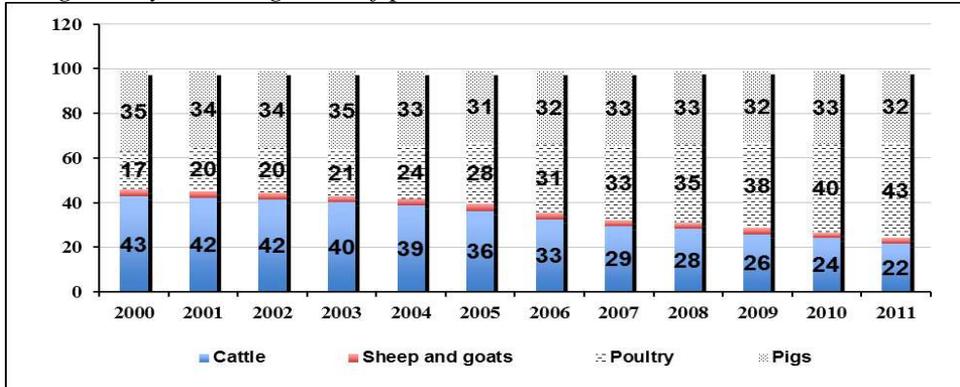
Figure 6. Production of livestock and poultry for slaughter in carcass weight equivalent by all categories of animal producers in Russia, thousand tons



Source: Federal Service of State Statistics [Electronic Source], available at: <http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/>, free

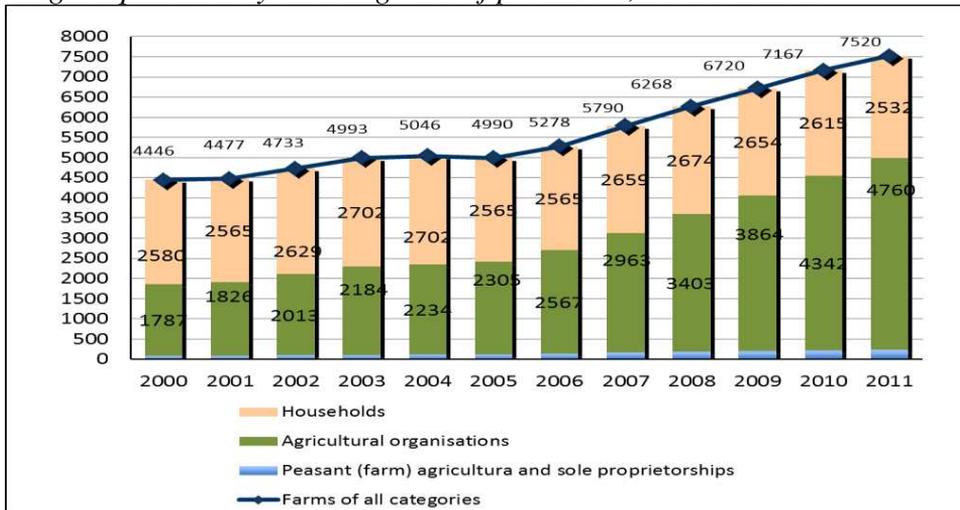
The growth rate in pork production in comparison with 2000 was 153%, the absolute addition – 849 thousand tons. In sheep production the increase of meat production was slower – 134.7%. The production of beef has decreased over the analyzed period on 14.4%. The differences in growth rates of separate industries caused the changes in the structure of meat production (Figure 7).

Figure 7. Dynamics of structure of production of livestock and poultry for slaughter by all categories of producers, %



In 2000 the main kind of meat in Russia was beef (42.7%), the second was pork (35.5%) and the third – poultry meat (17.3%). But today the biggest share in the structure of domestic production of livestock and poultry for slaughter is for the poultry meat (42.6%), share of pork is 32.3%, share of beef – 21.6%, share of mutton and other meat – 3.5%. It is important to note that the bulk of the growth of meat production is provided by the big agricultural producers. Production volumes by farmers are not essential. Production by households is almost permanent over the many years. It is limited by outdated production technologies, low financial and labour abilities of rural families (Figure 8).

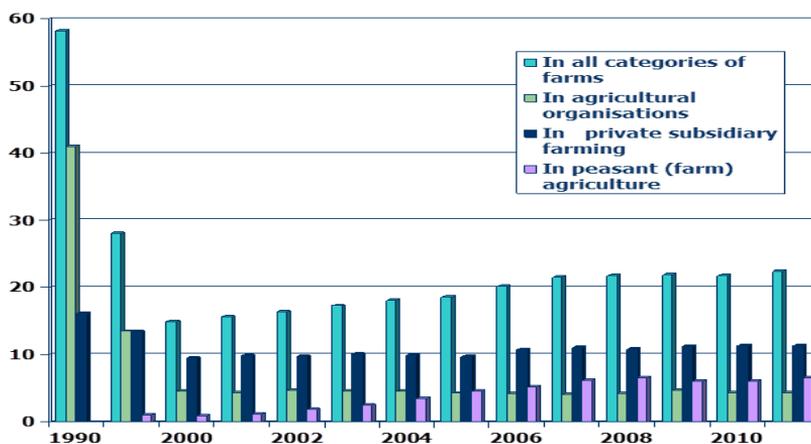
Figure 8. Production of livestock and poultry for slaughter in carcass weight equivalent by all categories of producers, thousand tons



In animal production the growth is the most rapid in the intensive industries. Modern industrial poultry meat production is established almost anew as a complex integrated system, which conditions all processes from poultry reproduction to production of final products, meat processing and distribution. The main part of increase of pork production was provided by industrial production as well, its technological modernization and development of integrated production facilities with captive manufacture. The accelerated development of pork production is provided in the framework of the Program of Development of Pork Production in the regions, where the regional target programs of pork production had been developed – in Krasnodar Krai, Belgorodskaya, Rostovskaya and Omskaya oblasts, and Republic of Tatarstan. Share of those regions in the total volume of pork production in Russia is 27%.

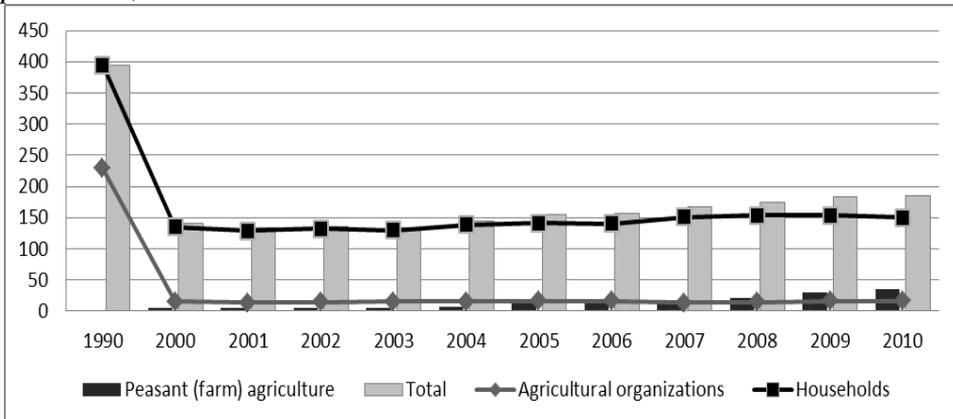
Production of poultry meat and pork provides high income from private investments and total profitability of those industries, which condition the expanded reproduction. In the meantime, the production growth rates are not sufficient to resolve the problem of import substitution. In cattle breeding and sheep production, where reproduction goes on the extensive way, no essential positive changes had been observed.

Figure 9. *Livestock population of sheep in Russia, mln heads*



The role of sheep production in development of meat resources in Russia is unreasonably low. In spite of some positive dynamics – overcoming of the downtrend of livestock population and growth of production (Figures 9, 10), sheep production remains low-profitable or even loss-making (2.3% in 2010; -11.5% in 2011).

Figure 10. *Production of mutton by all categories by all categories of producers, thousand tons*

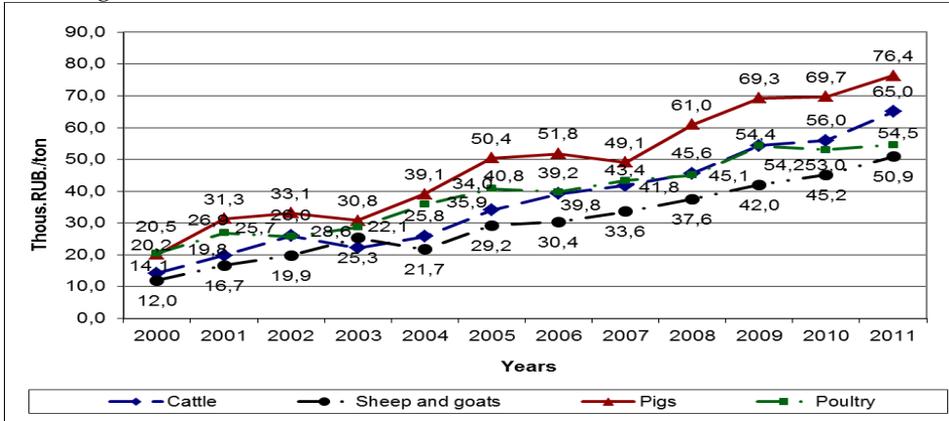


Recovery growth in the industry goes mainly in the extensive basis. The growth of livestock population results more in social sphere (boosting employment and self-production of meat in places of traditional consumption of mutton), than in economic one [4]. Meat cattle breeding suffers from the negative quantitative and qualitative changes. During 1990-2010 the cattle population decreased from 57 mln heads to only 20 mln heads. Volume of beef production goes down from year to year. Currently it is less than 3 mln tons in live weight basis. Almost all beef in the country is provided by the fattening milk herds.

The average weight of market animal is 350 kg. This means that a semi-finished product, not a fattened animal, is marketed. The share of low-quality beef from cull cows slaughtering is high. Meat cattle population in agricultural organizations takes only 2% of their total livestock population. That is one of the world's lowest levels: it is 30% in EU countries, 60% in Canada, 78% in USA and 80% in Argentina [5]. Depressive state of beef production continues despite the state support.

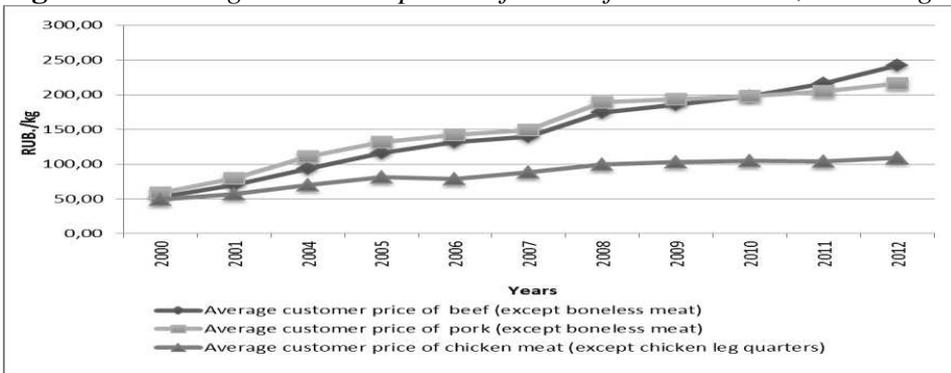
Starting from 2009 the target program “Development of Meat Cattle Breeding in Russia in 2009-2012” is implemented. It stipulates the growth of cattle population, including meat breeds; however, its volumes and forms of state support are not sufficient to change the situation in the industry. Low purchasing prices per ton of live weight of meat cattle (lower than prices for pork) (Figure 11) together with long payback periods of investment projects, caused by long fledging periods of animals, make beef production non-profitable and unattractive for business.

Figure 11. Average prices of agricultural producers, rubles per ton of live weight, thousand rubles



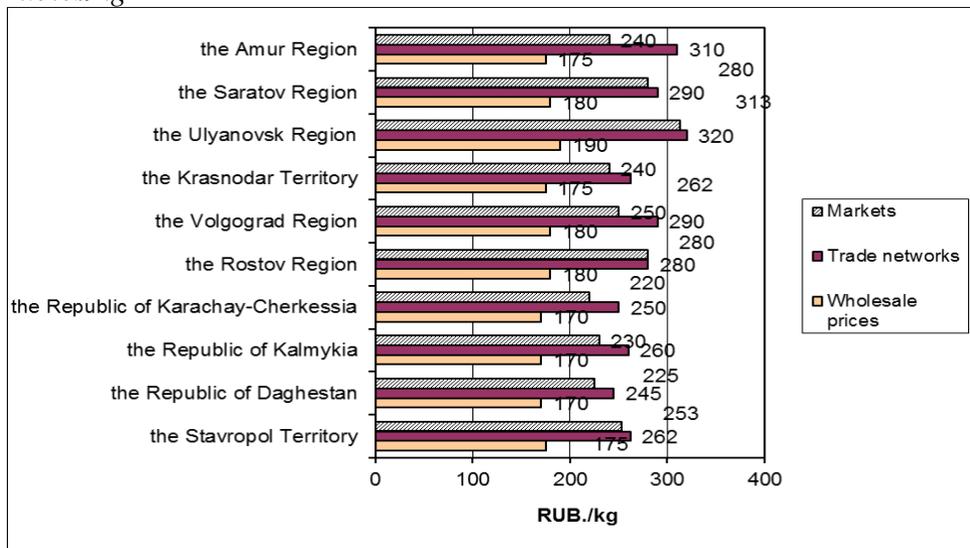
At the same time, average wholesale and consumer prices of beef are slightly higher or equal to the prices of pork (Figure 12). This confirms the consumer preferences of population, as well as the higher share of slaughter, primary processing, distribution and difference in added value of beef in comparison with pork.

Figure 12. Average consumer prices of meat of various kinds, rubles/kg



Average price of 1 kg of cattle in live weight basis in 2011 was 65 rubles; wholesale price of beef (category I) from manufacturers, processors and wholesalers was 161.3 rubles; average consumer price of beef (besides boneless meat) was 197.6 rubles/kg [6]. Thus, agricultural producers get only one third of the final sell price. Wholesale and consumer prices of mutton in the regions of its traditional consumption exceed the prices of all other kinds of meat (Figure 13). Therewith the share of agricultural producers in consumer price of mutton does not exceed 25%.

Figure 13. Average wholesale and consumer prices of mutton in 2012, rubles/kg



Modern poultry factories and pig complexes combine production and primary processing in a single production and technological cycle, reducing expenses in the added value chain, while the general low level of development of meat market infrastructure and high depreciation of meat processing facilities lead to the extra expenses.

The best bargain is earned by producer when he distributes his products by himself, with a minimum of intermediaries. That is why one of the perspectives is the development of integrated establishments, oriented on the maximum processing of meat, including implementation of advanced technologies of processing of biological and technological waste in purpose of its effective use. Complex approach to development of meat industry along the “producer-consumer” chain will help to saturate the market by means of domestic resources [7].

Therefore, one of the factors of accelerated development of meat cattle breeding is expansion and renewal of production and technological base of slaughtering and processing of meat. Distribution, logistics and processing cooperatives can play an important role in problem solution. They will let to unite efforts of small-scale producers at primary processing of meat (slaughter, boning), its delivery to larger enterprises for deeper processing, to outlet chains and catering.

Trade liberalization in the conditions of WTO membership and EU enlargement with its surplus of animal products will cause the growing pressure on Russia as the closest and the most receptive market. That is confirmed by the dynamics of import deliveries of meat during the short period of time after Russia's accession to WTO (since August 23, 2012). Starting from that moment the custom barriers on the way of import animal products and live animals have been officially decreased. Particularly, import duty on live pigs has been decreased from 40% to 5%; import duty on pork under quota has been decreased from 15% to 0%; while deliveries of meat above quota are imposed by the duty of 65% (earlier – 75%, but not less than 1.5 euro per 1 kg). As a result, import volume to Russia in August 2012 was: 59.4 thousand tons of pork, including 29.4 thousand tons before August 23 and another 29.9 thousand tons during the rest 9 days of the months. In total the import volume of pork in August 2012 was 17% higher than in 2011. In September the volume of deliveries reached 71.0 thousand tons, which is 34% more than in 2011. The import volumes of beef increased as well in comparison with the previous year. In such conditions all possibilities have to be mobilized to provide the growth of domestic meat production. Moreover, there is a range of reasons for strengthening of attention to the development of meat cattle breeding and sheep breeding.

Primarily, that is the presence of the necessary bioclimatic potential. Growth of state wealth provides the usage of “natural and absolute advantages” [8]. For Russia in the context of the problem set by us such advantage could be 80.4 mln ha of natural haylands, pastures and fallow lands, which can be involved in the most productive and profitable way into the economic turnover for animal production. Sheep breeding and cattle grazing industry are the main and sometimes the only industries, which provide the most possible usage of natural pastures for production, boosting employment and prosperity of population.

From the standpoint of agricultural producers, production of beef and mutton lose the price competition with pork. However, it always saves its natural economic niche and sustainable natural area, which can be essentially expanded by means of accommodation of regionally adapted innovation technologies of sheep breeding and low-cost intensive grazing system for cattle. Grazing system for cattle and sheep stipulates the lower level of energy intensity of beef and mutton in comparison with other kinds of meat. That is important in the conditions of constantly growing prices for energy resources.

More frequent cases of African swine fever substantially increase production risks. They provoke the necessity to introduce the strict quarantine measures, until the complete ban of deliveries from infected and neighbor regions, slaughtering of infected cattle population. That certainly causes the essential damage not only to agricultural producers, but also to regional budgets. Such situation conditions the measures of smooth reorientation of agricultural producers to breeding of alternative kinds of agricultural animals, primarily meat cattle and sheep. Development of meat cattle production and sheep breeding is indirectly supported by the growth of grain prices. Thus, following the growth of world prices, the grain prices of Russian producers grew from 3008 rubles/ton in 2006 up to 5036 rubles/ton in 2008, and then – to 7000-10000 rubles/ton in 2012. If such a tendency remains valid, the poultry and pork production will suffer in the long term, because the share of grain in feed rations in those industries is higher than in cattle production and sheep breeding.

Conclusions

Measures of support of meat cattle breeding and sheep production are set by the State program of development of agriculture and regulation of markets of agricultural products, raw materials and food in 2013-2020, target program “Development of sheep and goat breeding in Russia in 2012-2014 and in the perspective period till 2020”. Those measures include support of pedigree livestock breeding; subsidies to reimburse a part of costs of increasing of sheep and goat breeding stocks; subsidizing of interest rates of investment and short-term credits and leasing of machinery and equipment for modernization of farms and complexes; support of economically viable regional programs related to development of meat cattle breeding; development of family animal farms on the basis of households; other measures aimed at increasing of livestock population and gross production of meat.

However, according to our opinion and results of researches of other scientists [9], to be able to achieve the level of meat self-sufficiency set by the Food Security Doctrine of the Russian Federation, the direct state donations with implementation of gross growth indicators are necessary. Growing attention to the development of meat cattle breeding and sheep production will let to use the existing resource potential in a fullest extent possible, to expand the meat resources of the country and its meat self-sufficiency be means of domestic production, to develop the domestic market conforming to medical norms of consumption by its structure and volume.

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INDUCING TECHNICAL CHANGE: ASIA AND EUROPE

*Masahiko Gemma*¹

Abstract

The Induced Innovation Hypothesis treats relative scarcity of inputs as the major factor determining the direction of technical change in production activities. Technical change is generally induced for the direction of saving scarce inputs and using abundant inputs. However, there are cases in which institutions and policies determine the direction of technical change. This study examined the time-series data from Asian and European agriculture to derive general conclusions regarding the direction of technical change. Institutions and policies were found to be important determinants for the choice of technology besides relative scarcity of input resources. Policy implications were also derived for the future development of Serbian agriculture.

Key words: *Agricultural Development, Technical Change, Total Factor Productivity, Institutions and Policies, and Government Factor Market Interventions*

Introduction

In Monsoon Asia, the ratios for factor use in agricultural production for staple foods of rice and wheat have been traditionally determined based on the factor endowments following the Induced Innovation Hypothesis (Hayami and Ruttan, 1985). When land is scarce relative to labor, the technology to save the scarce factor of land such as high yielding varieties has been developed. However, as productivity has improved, we have been observing the cases where factor ratios have not been necessarily reflecting the relative scarcity of input materials. In Europe, we have been observing the cases where government factor market interventions, and inherited local technologies, institutions, and production structure have been influencing the changes in total factor

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productivity (TFP) over time. This study is carried out to better understand the mechanism of technical change which generates the improvement in TFP in agriculture and to consider the roles of technical change for agricultural development. Then, from the derived general conclusions, policy implications will be derived for the future development of Serbian agriculture.

Land saving technology has been historically adopted for the improvement of TFP in Asian agriculture (Hayami and Ruttan, 1985). For the case of Japanese agriculture², productivity improvement for the period between 1880 and 1930 is mainly based on the adaptation of high yielding varieties for the major products of rice and cocoons (Yamada and Hayami, 1991). In the post-World War II period, labor saving technology of mechanical technology replaced land saving technology of high yielding varieties. Labor for agricultural production became scarcer than land in Japanese agriculture as production activities of non-agricultural sectors grew much faster, attracting many workers from the rural areas to work in the big cities for higher wages. While the number of workers in agriculture was 15 million in 1961, the same number was declined to 1.5 million in 2009. For rice cultivation, the hours of work per 1 hectare was also reduced to 365 hours in 2009 from 1,750 hours in 1961.

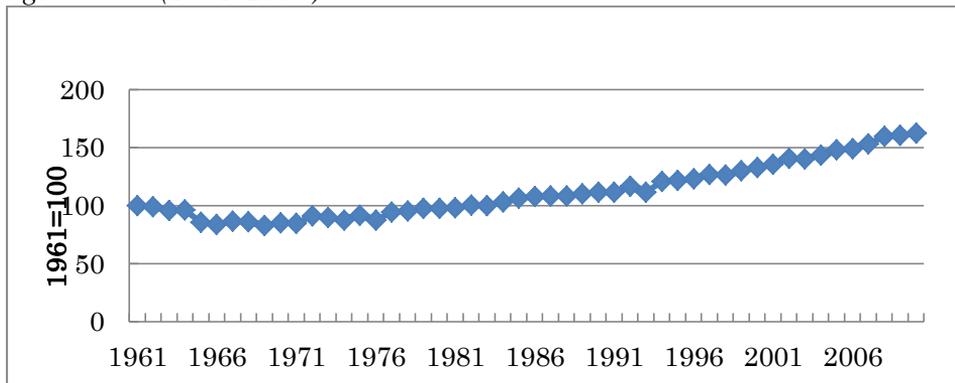
The Japanese government helped the adoption of the mechanical technology through the output market intervention policies of border control and price support as well as direct subsidies for the purchase of expensive machinery and equipment for labor saving. The government supports and protections of the domestic markets have been mainly for the staple food of rice. These policies benefited not only full-time family farms, but also part-time family farms. The needed structural change to make Japanese agriculture more competitive in the international markets through the operation size expansion did not take place, while part-time farmers became dominant as workers in agriculture. Mechanization helped the part-time farmers to stay in agricultural production. Without the government output market interventions to promote mechanization

² Japanese agriculture is characterized by 1) family operation, 2) small sized operation with the average land area of 2.2 hectares per farm (2011), and 3) heavy emphasis on crop production with the its share of 70% in the total value of agricultural production. The share of animal production is 30%.

and market protection, the part-time farmers would not have remained in the activities of agricultural production.

Mechanization helped the improvement of TFP in agricultural production in the post-war period in Japan. However, mechanization would not have been progressed only with the wage increase and government direct subsidy for machinery purchase, border control and price support measures have been also instrumental. We also need to bear in mind that this approach has a drawback to worsen the welfare of consumers and the government.

Table 1. *Changes of Total Factor Productivity (TFP) in Japanese agriculture (1961-2009)*



Source: *Author's calculation using the data from the Food and Agricultural Organization (FAO) of the United Nations (2012)*

Border control and price support policies for staple foods are not commonly practiced in Asia with the exception of the industrialized economies of Japan, Korea and Taiwan³. It is recent when the TFP growth started making significant contributions in agricultural output growth in most Asian economies. International trade policies seem to have been playing important roles for the increase in TFP contributions in these economies. The Uruguay Round GATT agreements in 1994 significantly increased the amounts of international trade.

³ Most countries in Asia have been adopting cheap food policy to keep the prices of wage goods of foods low for the benefits of consumers and non-agricultural sectors. These countries could afford to worsen the welfare of the consumers and to reduce the speed of economic development by limiting the growth of manufacturing sectors through increased wages.

The membership of the Association for Southeast Asian Nations (ASEAN) was expanded to the total of 10 countries in the late 1990s. Free trade among the ASEAN member countries is scheduled to start in 2015. Vietnam, Malaysia and Brunei are part of 10 countries negotiating for the high level of trade and investment partnership under the scheme of the Trans-Pacific Partnership (TPP), which is equivalent to the Trans-Atlantic Trade and Investment Partnership (TTIP) for the European Union (EU) and the United States (US), in the Asian-Pacific region.

If the recent improvements in agricultural TFP through technical change and efficiency increase are caused by changes in the trade policies, the attempt to verify the relationship would produce useful policy implications. In this paper, upon the explanation on the TFP calculation and the review of the development process of Japanese and Korean agriculture, changes in TFP are examined in relation to technical change for the cases of other Asian countries. Then, determinants for TFP changes are discussed for Central European countries. Implications are also derived for Serbian agriculture.

Changes in TFP and Technical Change: Methodology

A simple growth accounting model of the Solow (1957) type is used for the calculation of Total Factor Productivity (TFP) in the framework of a growth accounting study. The agricultural production data are used from the Food and Agricultural Organization (FAO) source. For the period between 1961 and 2009, the changes in TFP are calculated annually. Then, the annual TFP figures were accumulated to produce time-series data showing the TFP changes over time, setting the level of TFP level of 1961 as 100. The time series data for output and total input are also calculated in the same way. TFP is defined as the value of output per unit of total inputs. Total input is calculated as weighted average of five inputs for agricultural production: conventional inputs of labor and land, modern inputs of fertilizer and machinery for crop production, and the stock of animals⁴ measured as livestock for animal production. The cost shares⁵ are used as the weights to

⁴ The horse equivalent values are derived using the FAO utilized weights:

Camels: 1.1, Cattle: 0.8, Chicken:0.01, Goats:0.1, Horse and Mules: 1, Pigs:0.2, Sheep:0.1 and Asses:0.8

⁵ The weights on the input variables can be production elasticities or cost shares of individual inputs under the assumptions of a Cobb-Daglas type production function and the existence of competitive equilibrium. As the available cross-sectional data are limited and the estimation of a production function is difficult, and also the information on cost shares is limited, a set of weights from previous study by Hayami and Ruttan (1985) is used. (.45 for labor, .1 for land, .15 for fertilizer, .1 for machinery and .2 for livestock)

aggregate these five inputs as Hayami and Ruttan (1985) did. The derivation of the growth rate in TFP was carried out using the following formula⁶, as the residual in explaining the output growth by total input growth⁷.

$$\frac{A2 - A1}{A1} * 100 = \frac{Y2 - Y1}{Y1} * 100 - (W_L \frac{L2 - L1}{L1} * 100 + W_N \frac{N2 - N1}{N1} * 100 + W_F \frac{F2 - F1}{F1} * 100 + W_M \frac{M2 - M1}{M1} * 100 + W_S \frac{S2 - S1}{S1} * 100)$$

1: Base Year, 2: Current Year, Y: Output, L: Labor, N: Land, F: Fertilizer, M: Machinery, S: Livestock, A: Total Factor Productivity (Technological Change Factor, residual term) and W: Weights on inputs

Here, the growth rates are expressed in terms of percentage. The changes in TFP can explain the contributions of technical change and efficiency improvement achieved through other miscellaneous factors such as upgrading of management skills.

Agricultural Development and Technical Change

The share of agriculture in Gross Domestic Product (GDP) declines in terms of production over time⁸. The manufacturing sector then takes a lead for a while until the service sector starts growing. The Japanese economy has been following the same path of economic development (Otsuka, 1990). As described for Japanese agriculture, labor becomes scarce as workers move to non-agricultural sectors for higher wages (Figure 2). This labor movement from agriculture was widely observed during the 1960s and 1970s in Japan and during the 1990s in Korea (Figure 3). Machinery has been replacing labor in both economies. The adaption of mechanical technology and the reduction of the use of labor seem to have positive relations to the improvement in TFP for Japan and Korea (Figures 4 and 5).

⁶ A production function is assumed to be in the following form.

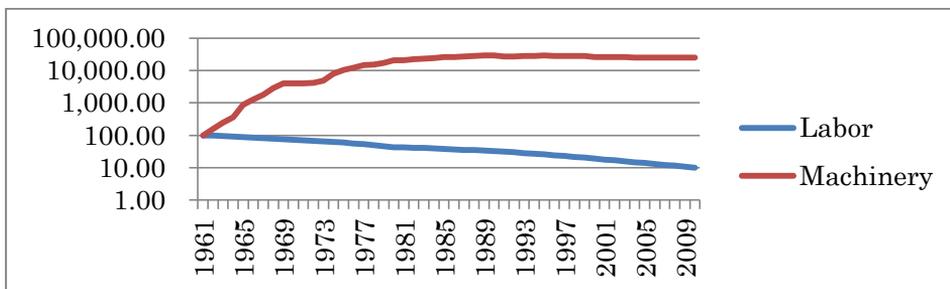
$Y = A(t) F(N, L, M, F, S)$

The growth in output can be approximated and decomposed into in the following form for the discrete data assuming constant return to scale.

⁷ The existence of a linear and homogeneous cross-country production function, a competitive equilibrium and neutral technical change are assumed. Production function was also assumed to hold the technology with constant return to scale, which is the case for most agricultural production practices.

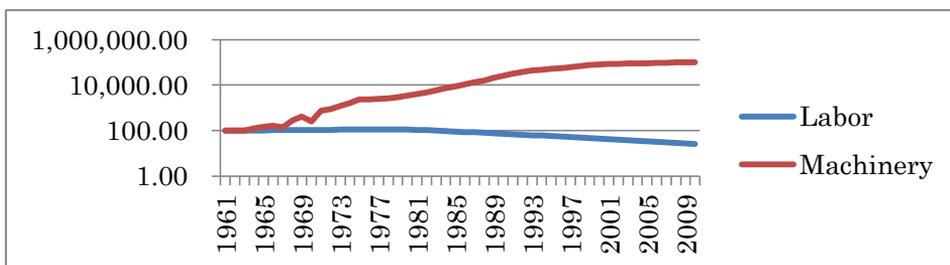
⁸ The declining share of agriculture in the national economy is described as Petty-Clark's Law caused by 1) declining share of food and beverages in the total household expenditure, 2) enhancement of the difference in labor productivity from the non-agricultural sector and 3) decline in terms of trade compared to non-agricultural products.

Figure 2. *Changes in Labor and Machinery Use in Japanese Agriculture (1961-2009)*



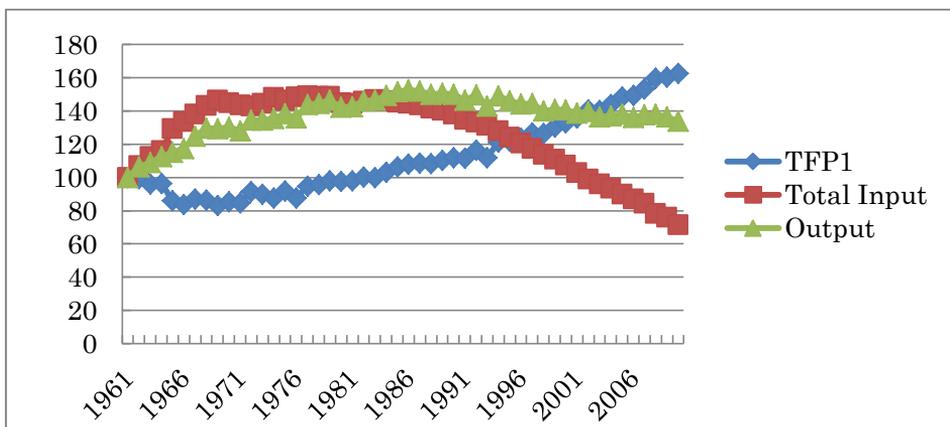
Source: Author's calculation using the data from the FAO (2012)

Figure 3. *Changes in Labor and Machinery Use in Korean Agriculture (1961-2009)*



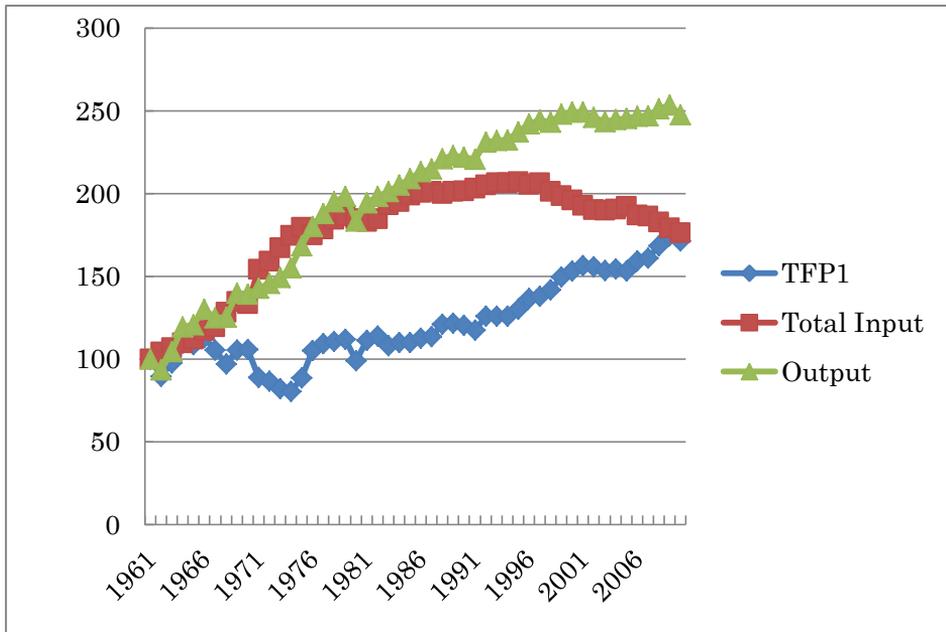
Source: Author's calculation using the data from the FAO (2012)

Figure 4. *Sources of Growth in Japanese Agriculture (1961-2009)*



Source: Author's calculation using the data from the FAO (2012)

Figure 5. Sources of Growth in Korean Agriculture (1961-2009)



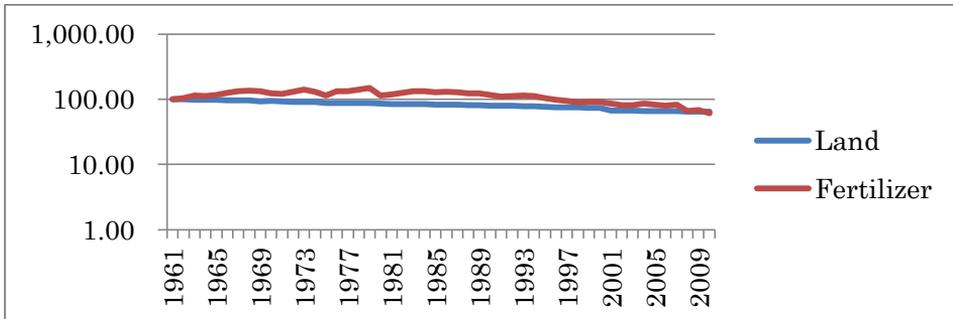
Source: Author's calculation using the data from the FAO (2012)

Regarding technical change, we consider two types of technical change: biological technology to adopt high yielding varieties which are responsive to fertilizer application replacing scarce factor of land, and mechanical technology to substitute for scarce factor of labor. Therefore, we use the figures to examine the relationship between fertilizer and land use and between machinery and labor use over time for the purpose of understanding the direction of technical change.

Biological technology of high yielding varieties was not promoted in Japanese agriculture in the post war period. Staple food of rice became self-sufficient in the early 1960s and production has been always exceeding consumption since the late 1960s. There did not exist reasons to increase the application of fertilizer to gain higher yield with the cost of lower the taste of rice and unit price of the products (Figure 6).

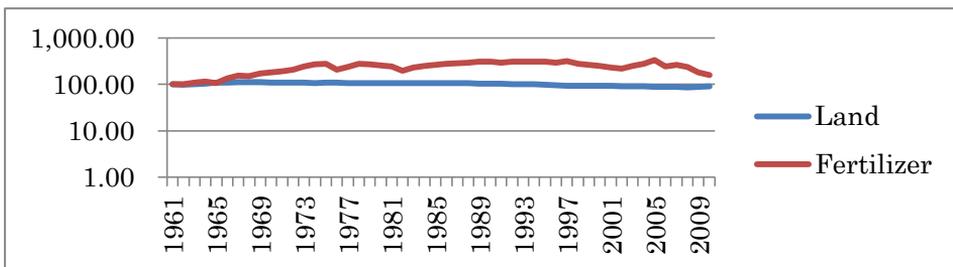
On the other hand, Korea needed to increase yields to meet the demand for rice until the late 1970s. This situation necessitated the introduction of rice high yielding varieties. Chemical fertilizer use then increased in Korea (Figure 7).

Figure 6. *Changes in Land and Fertilizer Use in Japanese Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Figure 7. *Changes in Land and Fertilizer Use in Korean Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Next, the same examination for the relationship between TFP changes and technical change is undertaken using the data from other Asian countries. When TFP growth is observed, types of technical change are identified. When TFP growth is not observed, reasons for stagnation are sought in relation to technical change examining factor ratios between land and fertilizer and between labor and machinery. The roles of economic institutions and international trade frameworks such as the World Trade Organization (WTO) are also studied.

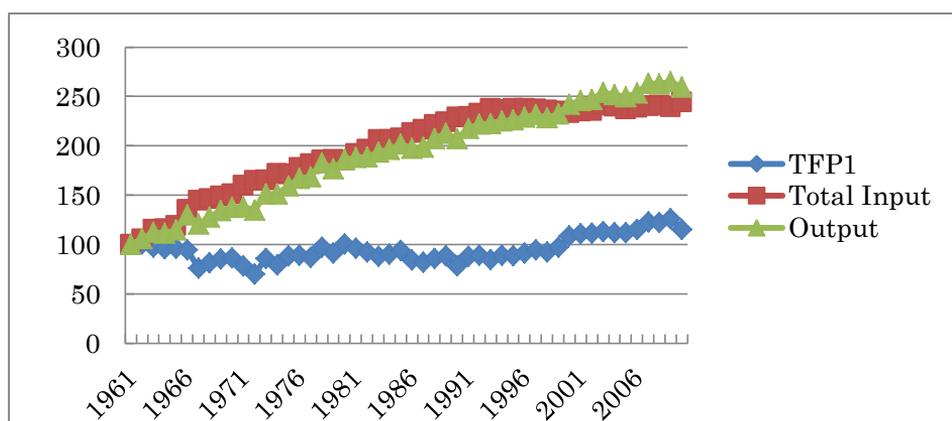
TFP Growth and Technical Change in Asian Countries

Asian countries can be categorized into four groups regarding the changes in TFP over time in agricultural production: 1) countries where continuous improvements in TFP have been observed; 2) countries where a recovery in TFP has been observed; 3) countries with no significant improvement in TFP has been observed; and 4) countries where no reliable data are

available. We examine the changes in agricultural technology in relation to TFP growth for sampled countries from the first three groups in Asian countries. The first group includes Japan, Korea and Malaysia. Institutions to induce technical change have been in existence besides policies to directly promote the adoption of new technology. Contributing institutions comprise research and extension networks and land improvement systems in agriculture and political and macroeconomic stability in the country. Technical change has been taken place for the direction of saving scarce inputs to improve TFP. The second group is represented by Thailand, China, Pakistan, the Philippines and Vietnam. In all the countries, a decline in TFP was observed at the beginning, but a recovery of TFP followed. The shifts of policies to promote technical change and production efficiency improvement have been the reasons for the TFP recovery. I would argue that changes in international trade frameworks helped the TFP improvement in Thai agriculture. The changes of market institutions and production systems have also caused the TFP improvement through the increase in production efficiency in Chinese agriculture.

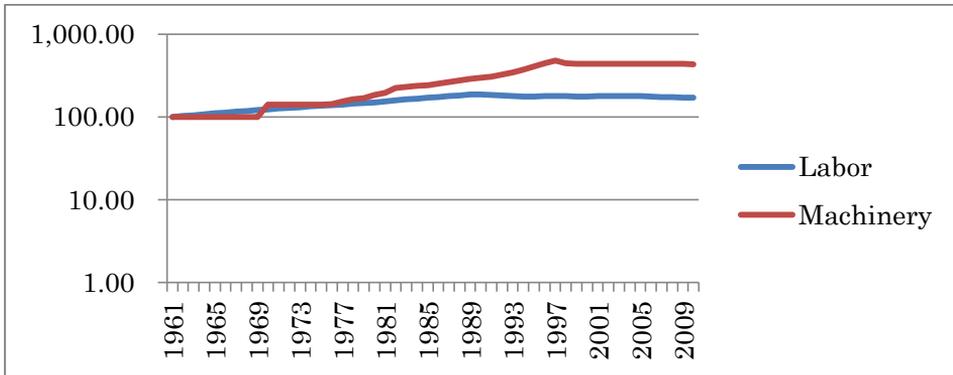
In Thailand, its agricultural TFP started improving in the 1990s (Figure 8). This TFP increase was taken place while the use of machinery stayed constant (Figure 9). Fertilizer use was increasing even at the time of stagnated TFP (Figure 10). The increase of TFP might have come from the rise of production efficiency. The trade liberalization caused by the GATT Uruguay Round agreements might have benefited the country through the operational size enhancement which has been traditionally an exporter of agricultural products.

Figure 8. Sources of Growth in Thai Agriculture (1961-2009)



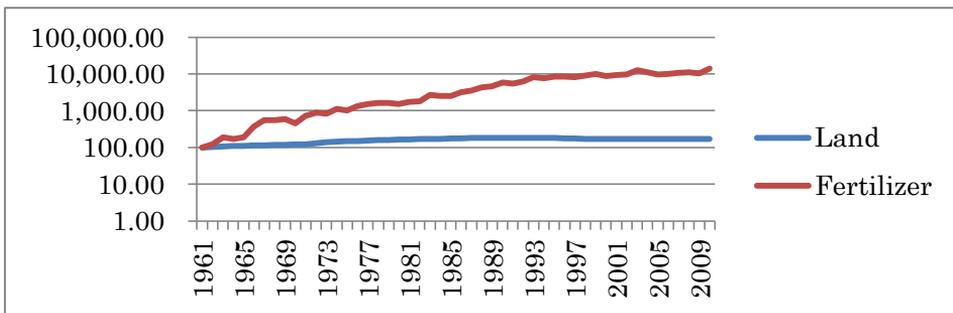
Source: Author's calculation using the data from the FAO (2012)

Figure 9. *Changes in Labor and Machinery Use in Thai Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Figure 10. *Changes in Land and Fertilizer Use in Thai Agriculture (1961-2009)*

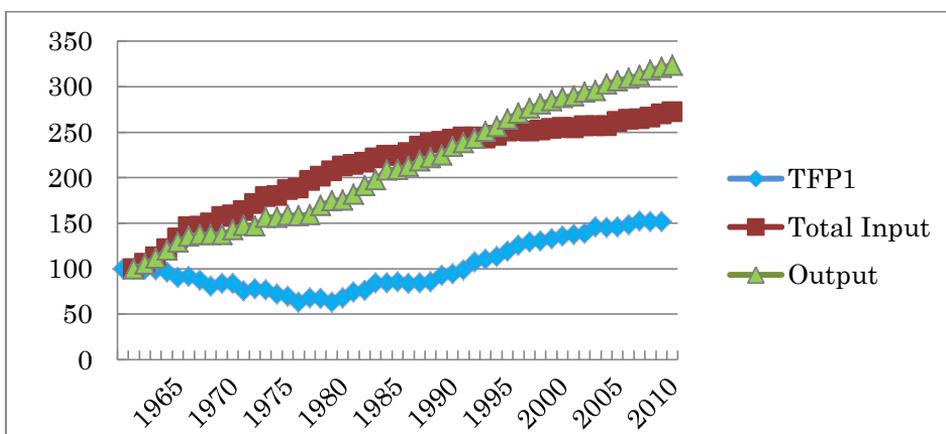


Source: *Author's calculation using the data from the FAO (2012)*

In China, the reform measures introduced in 1978 impacted the TFP growth. The shift from the input using approach to the TFP growth based approach was observed in agriculture (Figure 11). The production responsibility system was introduced to give economic incentives to improve production efficiency. The TFP changes have been always positive since then. However, the growth rates have been uneven. The higher TFP growths were observed in 1978-1983 and 1989-1999, while the growth rates were lower for 1984-1989 and 2004-2009. Machinery has been increasingly used during the 1960s and 1970s in Chinese agriculture (Figure 11). The level of machinery use then stayed constant in the 1980s and 1990s (Figure 12). In the 2000s, a positive growth has been again observed. Mechanical technology introduced in the pre-reform period of the 1960s and 1970s did not lead to a TFP increase, probably because of lack of incentives for

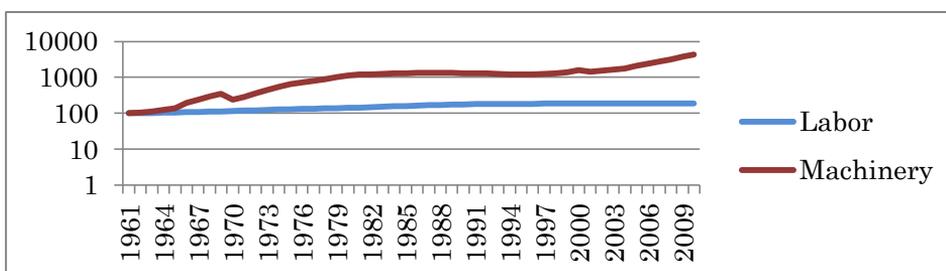
production efficiency improvement. Policy failures by governments can cause the stagnation and even depression in TFP growths. Labor must have been abundant relative to land until the end of 1990s in Chinese agriculture. The policy choice of promoting the use of machinery to replace labor must have been also inappropriate until then. Even in the 2000s, machinery did not seem to induce significant decline in labor use. Biological technology to increase yields per hectare must have contributed to the TFP growth in the 1980s along with the efficiency improvement caused by the institutional change of production systems in Chinese agriculture. The use of fertilizer has been in increase throughout the observation period including the 1980s (Figure 13). However, enhancement of biological technology does not seem to have saved the scarce factor of agricultural land.

Figure 11. Sources of Growth in Chinese Agriculture (1961-2009)



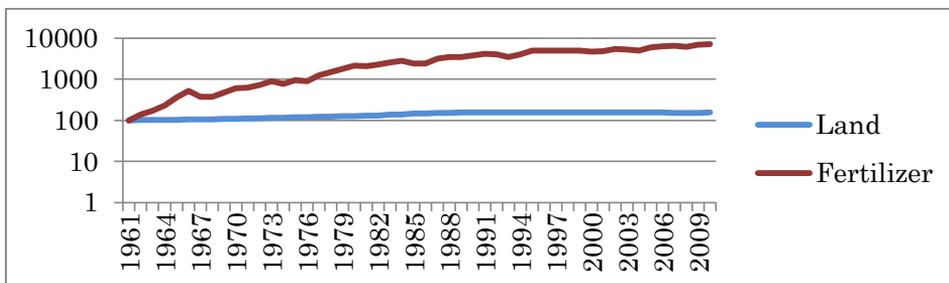
Source: Author's calculation using the data from the FAO (2012)

Figure 12. Changes in Labor and Machinery Use in Chinese Agriculture (1961-2009)



Source: Author's calculation using the data from the FAO (2012)

Figure 13. *Changes in Land and Fertilizer Use in Chinese Agriculture (1961-2009)*

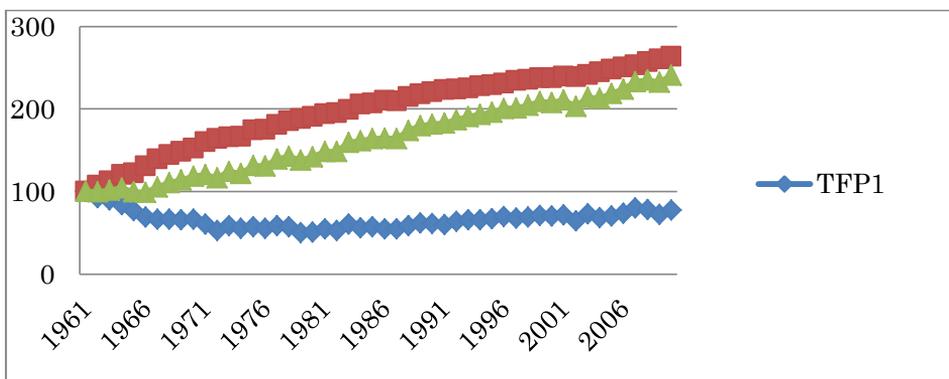


Source: *Author's calculation using the data from the FAO (2012)*

The third group is represented by India and Indonesia. No fast increase in agricultural TFP has been observed over time in this group of countries. Existing institutions and policies have not been effectively influencing the TFP.

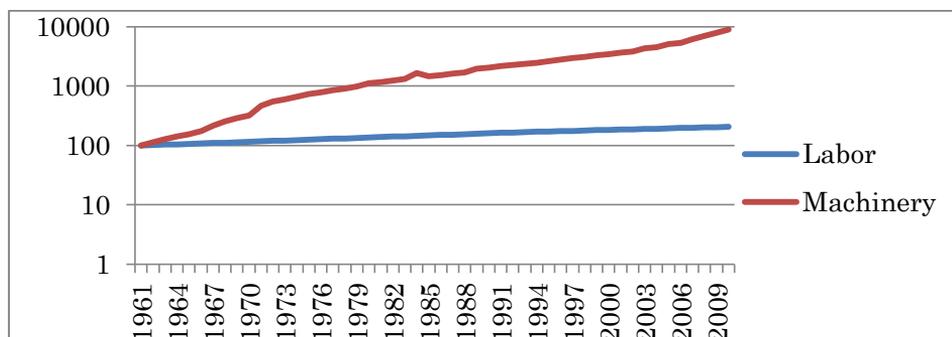
In Indian agriculture, TFP growth from the late 1980s has been positive, but much slower than the second group of the countries in Asia. (Figure 14). Machinery and fertilizer have been increasingly utilized over time (Figures 15 and 16). However, increasing use of these modern inputs has not been inducing fast improvements in agricultural TFP. Poor market institutions and production systems did not allow the TFP to increase in the 1960s and 1970s with the low production efficiency. The gradual increase in the TFP from the early 1990s must have been related to market liberalization policies newly introduced at the beginning of the 1990s.

Figure 14. *Sources of Growth in Indian Agriculture (1961-2009)*



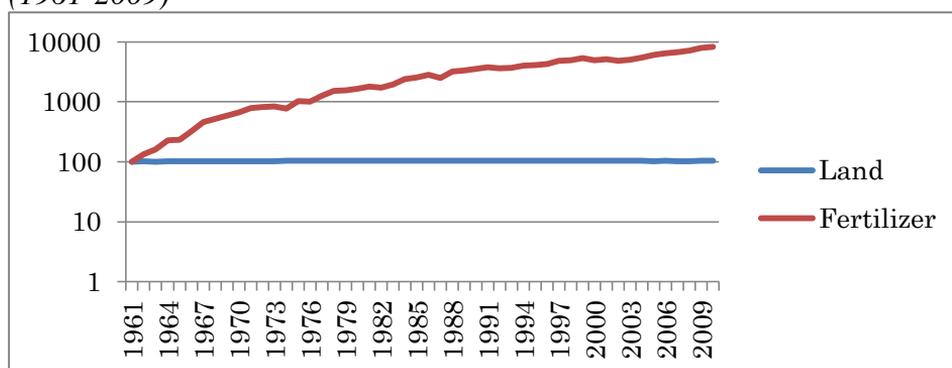
Source: *Author's calculation using the data from the FAO (2012)*

Figure 15. *Changes in Labor and Machinery Use in Indian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Figure 16. *Changes in Land and Fertilizer Use in Indian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Through the examination of sources of growth for Asian agriculture, we found that only a few countries like the countries in the first group followed the paths of technical change to save scarce traditional inputs of land and labor and use modern inputs of machinery and fertilizer. The TFP growth has been achieved through technical change in these economies.

The recovery of agricultural TFP has been also observed in relation to the changes in market institutions, international trade frameworks and production systems. The TFP growth must have been generated by the improvement in production efficiency for the second group of Asian countries. Political and macroeconomic stabilities also seem to be prerequisites for technical change and efficiency improvement.

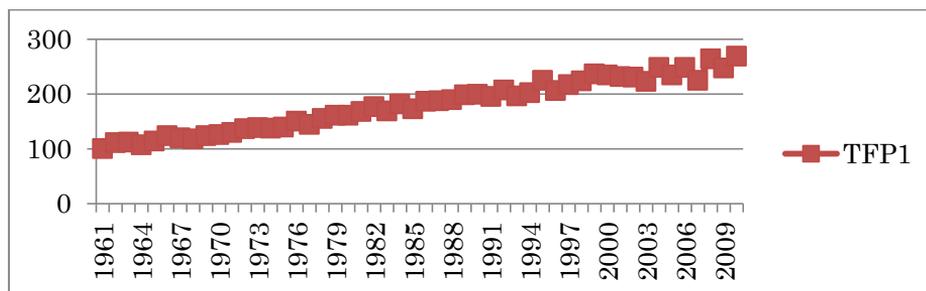
There were not any successful cases of TFP increase without increasing the use of modern inputs of fertilizer or machinery. There existed the cases where modern inputs were used, but the saving of traditional inputs of labor and land did not follow. In these cases, the TFP growth has been limited. Inability to save traditional inputs might have been related to the existence of local customs and institutions which avoid the reduction in the use of traditional inputs of labor and land. As for government market interventions, because externalities and scale economies are not commonly observed in agriculture, the reasons for market interventions are for welfare benefits for consumers in developing countries and for producers in developed countries.

TFP and Technical Change in Agriculture in Central and East European Countries

We examine the impact of the introduction of mechanical technology in Bulgarian agriculture and compare the performance measured in TFP growth with Rumanian agriculture. A comparison is also made to investigate the performance differences of Polish and Hungarian agriculture in relation to production structure.

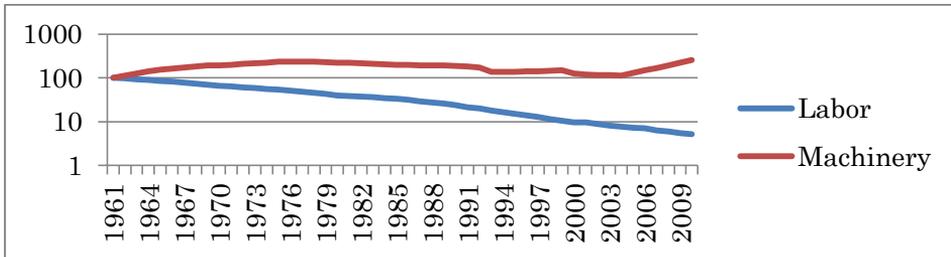
First, a comparison study between Bulgarian agriculture and Rumanian agriculture is carried out. Both countries joined the EU in 2007. Continuous TFP growths have been observed in Bulgarian agriculture (Figure 17). The TFP has been in increase with variability even after 2007. Mechanization accelerated prior to the EU accession (Figure 18). Machinery had substituted for labor. The funding for modernization of the agricultural and food sector from the EU sources such as SAPARD must have supported the introduction of mechanical technology in Bulgarian agriculture.

Figure 17. *TFP Growth in Bulgarian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

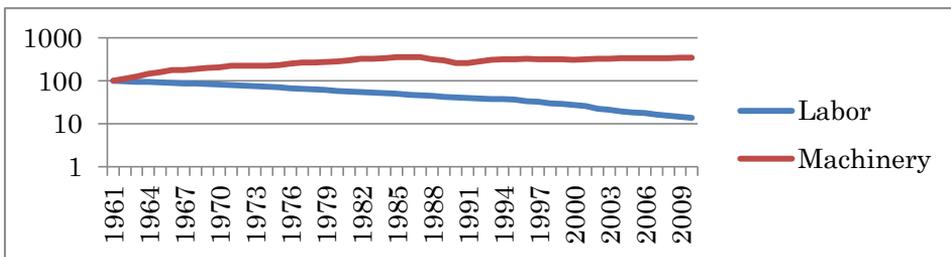
Figure 18. *Changes in Labor and Machinery Use in Bulgarian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

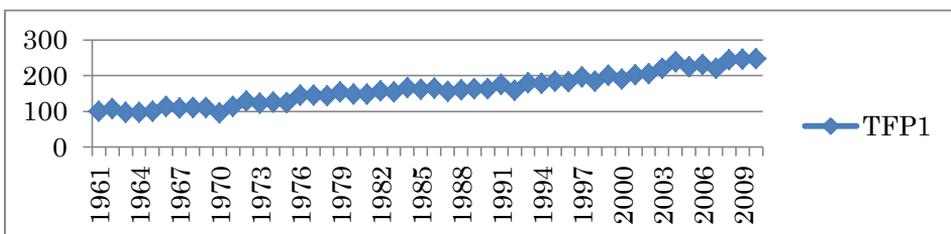
In Rumanian agriculture, on the other hand, the use of mechanical technology did not spread further when the preparation for the EU accession was prepared (Figure 19). The TFP growth was stagnated as a result (Figure 20). Fertilizer use also did not increase, either (Figure 21). The use of modern inputs of machinery and fertilizer seems to be critical for improving the TFP in agriculture. The government intervention to the input markets to promote the use of these modern inputs seems to be important as we have observed in the case of Bulgarian agriculture.

Figure 19. *Changes in Labor and Machinery Use in Bulgarian Agriculture (1961-2009)*



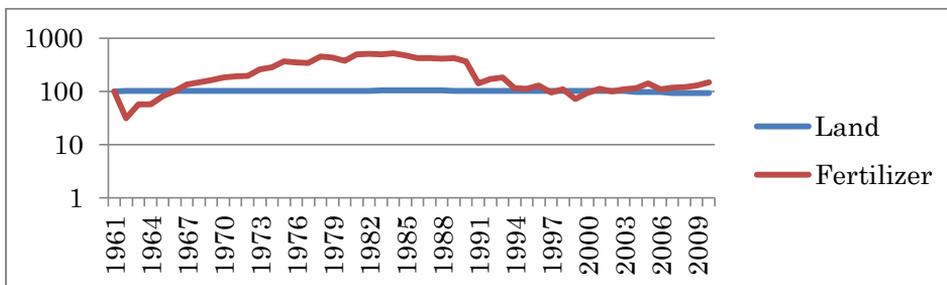
Source: *Author's calculation using the data from the FAO (2012)*

Figure 20. *TFP Growth in Rumanian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

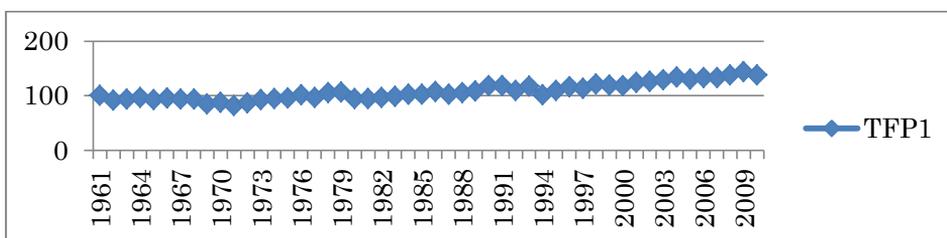
Figure 21. *Changes in Land and Fertilizer Use in Bulgarian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Next, we would like to compare the performance of agriculture for Poland and Hungary. Under the socialist system, Polish agriculture has been able to maintain traditional small scale family farming, while large scale agriculture was predominant in Hungarian agriculture after the collectivization of means of production ended in the early 1950s. Polish agriculture has been maintaining the same production structure even after 1989. Polarization of farm sizes advanced and the average farm size has become larger with the emergence of large scale commercial farms. Hungarian agriculture went through radical institutional reforms in land ownership. Decollectivization took place after the introduction of compensation laws in the early 1990s. Production sizes became much smaller. Both countries joined the EU in May, 2004. A comparison of these two countries would produce interesting comparison results in sources of growth in the post-socialist period. The impacts of the different approaches for agricultural development after 1989 can be assessed. The impacts of the EU integration on agriculture are also evaluated. In Polish agriculture, the TFP hit the bottom in 1994. Since then, the TFP has been growing continuously (Figure 22). The growth in TFP has been about 40 % for 1994-2009, while the growth for 1961-1989 was about 20%. The growth in the post-socialist period has been much faster.

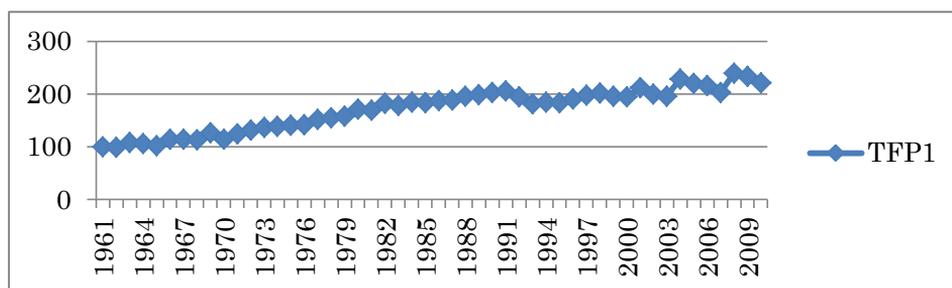
Figure 22. *TFP Growth in Polish Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

In Hungarian agriculture, the progress in the TFP was much faster than Polish agriculture under the socialist system. The growth from the bottom year of 1995 through 2009 is about 25%, which is smaller than Poland.

Figure 23. *TFP Growth in Hungarian Agriculture (1961-2009)*



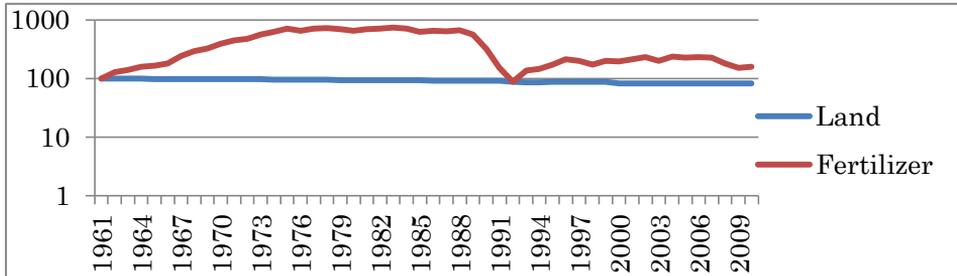
Source: *Author's calculation using the data from the FAO (2012)*

Large scale production system with the support from the government to the cooperative farms must have given Hungarian agriculture a comparative advantage during the central planning system. The faster TFP growth observed in the post-social period in Polish agriculture is because of the liberalization in input and output markets and government policies to modernize agricultural production activities introduced after 1989 and in preparation for the 2004 EU accession. The difference in performances between Polish and Hungarian agriculture in the 1990s and 2000s is probably due to the difference in the approaches to land ownership and production structure. In Poland, the family based production structure has remained effective. In Hungary, smaller scaled farms did not inherit much in technology and management skills from efficient large scaled cooperative farms.

In Hungarian agriculture before 1989, biological technology seemed to have been effective to explain the continuous increase in agricultural TFP (Figure 24). On the other hand, mechanical technology has supported the TFP increase in the post socialist period in Hungary (Figure 25). Machinery replaced labor, which has been declining following the population decrease. Fertilizer use was promoted under the central planning system with artificially low prices. Soil for agricultural production was already fertile by the 1990s in Hungary thanks to the excessive use of chemical fertilizer until the 1980s. Continuous high application of chemical fertilizer was not necessary. Low application of fertilizer and increased use of machinery have been caused by the

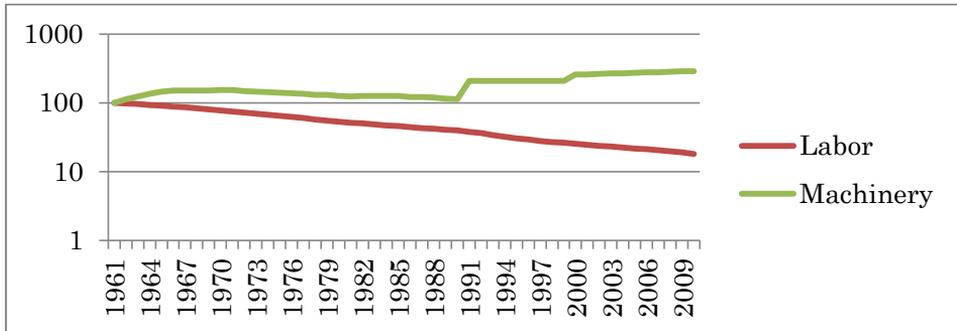
existence of the legacy from the old production system and the demographical change of reduction of national population.

Figure 24. *Changes in Land and Fertilizer Use in Hungarian Agriculture (1961-2009)*



Source: *Author's calculation using the data from the FAO (2012)*

Figure 25. *Changes in Labor and Machinery Use in Hungarian Agriculture (1961-2009)*



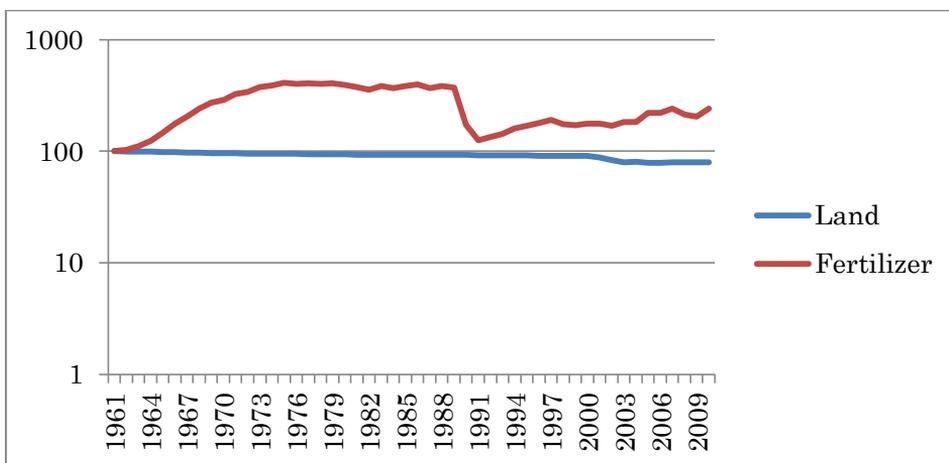
Source: *Author's calculation using the data from the FAO (2012)*

Even after 2004, machinery use has been in increase. Increased volatility in TFP is partly caused by the dominance of crop production, which is vulnerable to climate change, in Hungarian agriculture. Direct payments under the common agricultural policy (CAP) were based on land use in Hungary. Hungarian farms also chose crop production over animal production for the ease with mechanization to cope with the declining availability of farm labor. Animal production has been facing more difficulty in mechanization and in maintenance of its operation.

In Polish agriculture, both biological technology and mechanical technology have been in use under the socialist system (Figures 26 and 27). The TFP growth after the post socialist period has been due to the

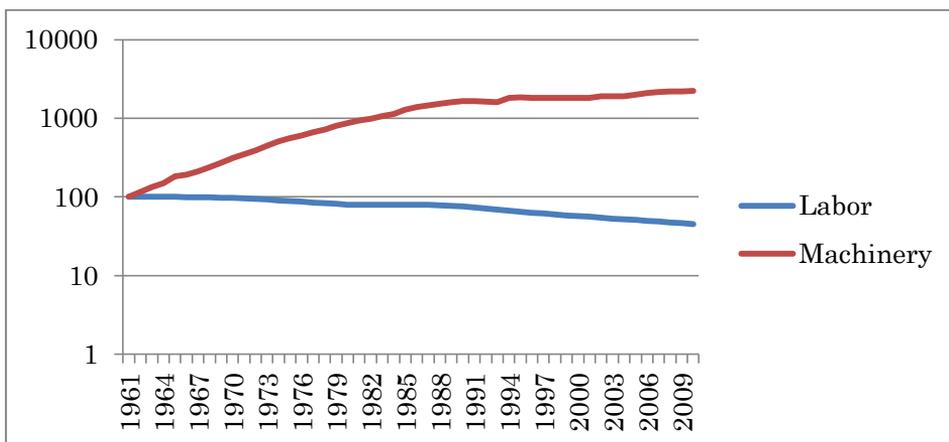
continuous use of biological technology and mechanical technology as well as the reduction of the use of land and labor. The reduction in labor use has been much smaller compared to Hungarian agriculture. This is because of the dominance of family based operations, which are more difficult to reduce the labor use. The share of animal production in the total value of production is also another reason for the slower reduction of labor use in Polish agriculture.

Figure 26. *Changes in Land and Fertilizer Use in Polish Agriculture (1961-2009)*



Source: Author's calculation using the data from the FAO (2012)

Figure 27. *Changes in Labor and Machinery Use in Polish Agriculture (1961-2009)*



Source: Author's calculation using the data from the FAO (2012)

Lessons Learned from the Case Studies on Asian and European Agriculture and Implications to Serbian Agriculture

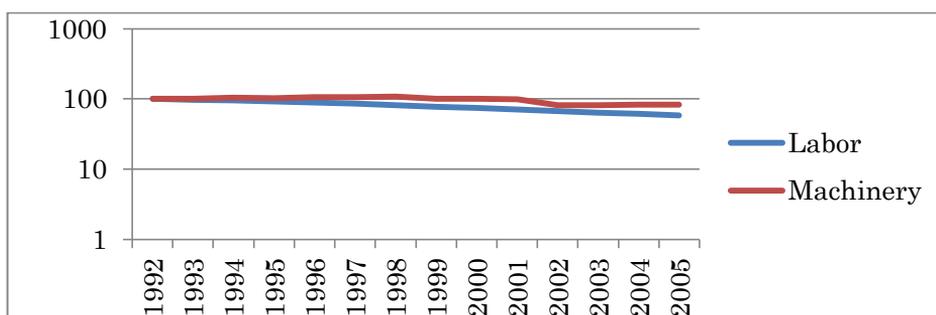
Improvement in TFP is a key for sustainable development in agriculture. Reduction of the use of traditional inputs of labor and land and the increasing use of modern inputs of machinery and fertilizer are needed for the TFP increase. We found that input market interventions by governments are related to the magnitudes of the TFP improvements in Asian agriculture. We also figured out through the European examples that institutions such as centrally planned systems and family operated farming approaches as well as policies like the CAP can determine the choices of technology and resulted improvements in agricultural TFP. In Serbian agriculture, the TFP contribution has been positive in the 2000s (Table 1). Slight declines in the use of traditional inputs of labor and land over time were observed (Figures 28, 29, 30 and 31). The improvement in the agricultural TFP seems to have been caused by the adoption of biological technology along with the increased use of fertilizer, especially in the 1990s (Figure 30). For the future agricultural development, further reduction of traditional inputs of labor and land, and increasing use of machinery and/or fertilizer seem to be needed as we have observed in some Asian and European countries.

Table 1. Average Annual Growth Rates for the Sources of Agricultural Growth in Serbia-Montenegro and Serbia (1992-2010)

	Output	Total Input	TFP
1992-2000	-1.17%	-0.48%	-0.77%
2000-2005	-1.17%	-0.35%	1.58%
2006-2010	1.27%	1.10%	0.17%

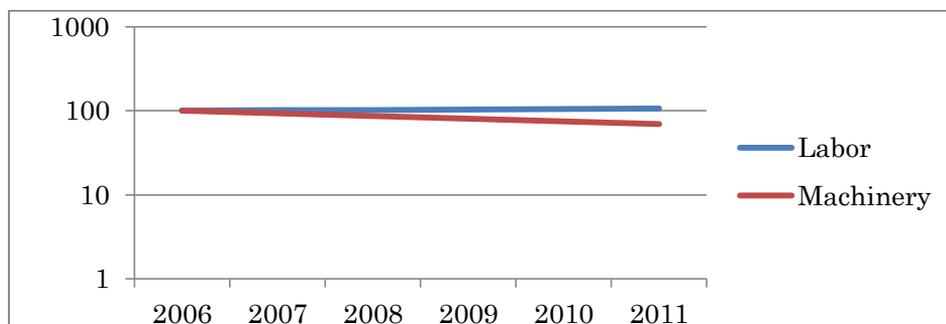
Source: Author's calculation using the data from the FAO (2013)

Figure 28. Changes in Labor and Machinery Use in Serbia - Montenegro Agriculture (1992-2005)



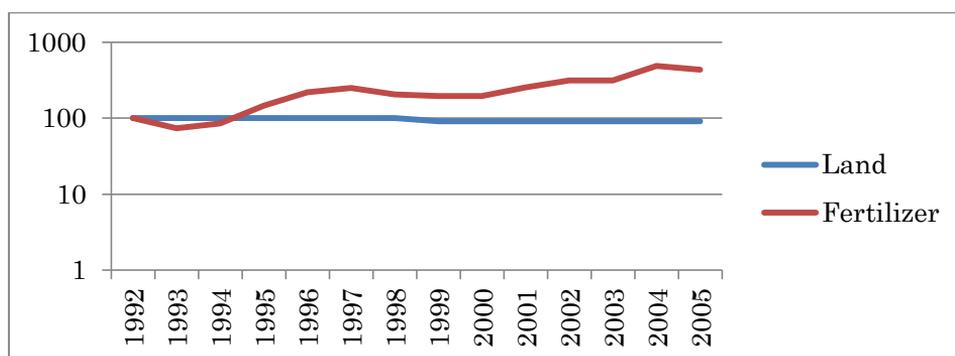
Source: Author's calculation using the data from the FAO (2013)

Figure 29. *Changes in Labor and Machinery Use in Serbian Agriculture (2006-2011)*



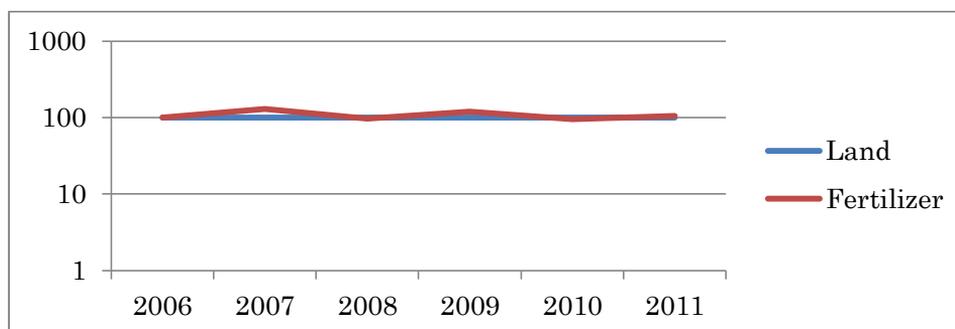
Source: *Author's calculation using the data from the FAO (2013)*

Figure 30. *Changes in Land and Fertilizer Use in Serbian Agriculture (1992-2005)*



Source: *Author's calculation using the data from the FAO (2013)*

Figure 31. *Changes in Land and Fertilizer Use in Serbian Agriculture (2006-2011)*



Source: *Author's calculation using the data from the FAO (2013)*

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PERSPECTIVES OF SOCIAL FARMING FOR IMPROVING REGIONAL COMPETITIVENESS IN AUSTRIA

*Nina Weber*¹

Abstract

In times of structural changes, social farming offers a source for an additional income for smaller family farms. In order to analyse the economic relevance of social farming activities, the structures of social farming in Austria were investigated. Throughout Austria, 600 farms offer social services in the fields of care, pedagogy and integration. Via an online questionnaire, personal, financial, and legal information was collected and analysed. After the evaluation of the collected information, obstacles and potentials for the sector were pointed out. The success of social farming depends on different factors of human capital, such as the personality of the farms' managers, the feedback and communication with the farms' surrounding environment, the relationship with the clients, etc. Other factors for success, such as the legal situation of social farms, the advisory and also the funding structures, are still in need of improvement.

Key words: *Social farming, family farms, competitiveness, diversification*

Introduction

In times of structural changes, smaller family farms have difficulties to compete on the market and therefore to keep up the production of agricultural goods. Nevertheless, small structured agricultural holdings still play an important role for regional production and the regional economy. Equally important is their contribution to biodiversity and the conservation of the landscape by applying traditional production methods on a small scale and diverse patterns of landscape. A major challenge for smaller farms lies in utilizing all possible resources in order to improve competitiveness and survive on the market. Social farming offers one possibility of diversification which may become an important source of income in addition to the agricultural production. This paper investigates the preconditions and factors

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which are necessary to make social farming economically successful and a contribution to regional competitiveness. Besides legal and financial factors also aspects of human-capital need to be regarded.

Methods

In a first step, the project team conducted a profound research in order to establish a detailed database on existing social farming facilities in Austria. Interest groups and unions were contacted, different types of media (newspapers, internet etc.) were scanned and personal contacts approached, in order to collect information on the on-going social farming activities and facilities. For this project, per definition only those farms were accepted as social farming facilities, which, not only offered social activities in combination with agricultural activities, but additionally also were registered as an agricultural holding via a registration number in the LFBIS database (farm register) of the “Statistik Austria” (Institute of Statistics – Austria). This research resulted in a detailed database containing addresses, contacts of farm managers and social farming activities throughout Austria. In a second step, structural information on social farms was compared to structures in the total agricultural sector in Austria (according to Statistik Austria, 2012). Characteristics, such as the number and location of farms within the different provinces, size class of agricultural area, gender of farm managers etc., were analysed. As a consequence, major differences between social farms and an average farm in Austria could be determined. Following this general structural comparison between social farms and the average conventional Austrian farm, detailed research on the financial, legal and social situation of social farms was conducted via a semi open questionnaire. All social farms located in Austria were asked to answer questions concerning their personal, financial and legal situation. The questionnaire could either be answered online, or manually by post. All questionnaires were analysed and evaluated with the programme SPSS (Standard Package for the Social Sciences) whereby the results displayed in the statistical report gave a precise picture of the current situation of social farming in Austria.

The concept of social farming

In order to avoid confusion, the concept of “social farming” needs to be distinguished from the concept of “green care”. “Green care” refers to educational, social or health services and activities in a natural environment. These activities may cover therapeutic, integrative or care approaches and utilise the natural environment as a resource to increase

human well-being. Green care facilities, for example, include therapeutic gardens, or parks in an urban environment, but also farms that offer social activities such as animal therapy or care for the elderly or the disabled. The concept of “social farming”, however, only refers to agricultural holdings which offer social activities, e.g. in the fields of care, integration or pedagogy. Other names for “social farming” are “care farming” or “farming for health” (Landwirtschaftliche Forschungsanstalt Agroscope Reckenholz-Tänikon ART, 2013).

Social farming in Austria

According to Wiesinger et al., 2013, 621 farms, which offer social services, were identified in Austria. Of those farms, 600 were registered as an agricultural holding in the Statistics Austria farm registry. The majority of these social farming facilities are active in the field of pedagogy (71%), whereby most of these offer “school on the farm” activities for children. About 20% of the identified farms offer integration services (people with psychological problems, children or adolescents with special needs etc.), and only about 8% provide care services (care for the disabled or the elderly) (Tab. 1).

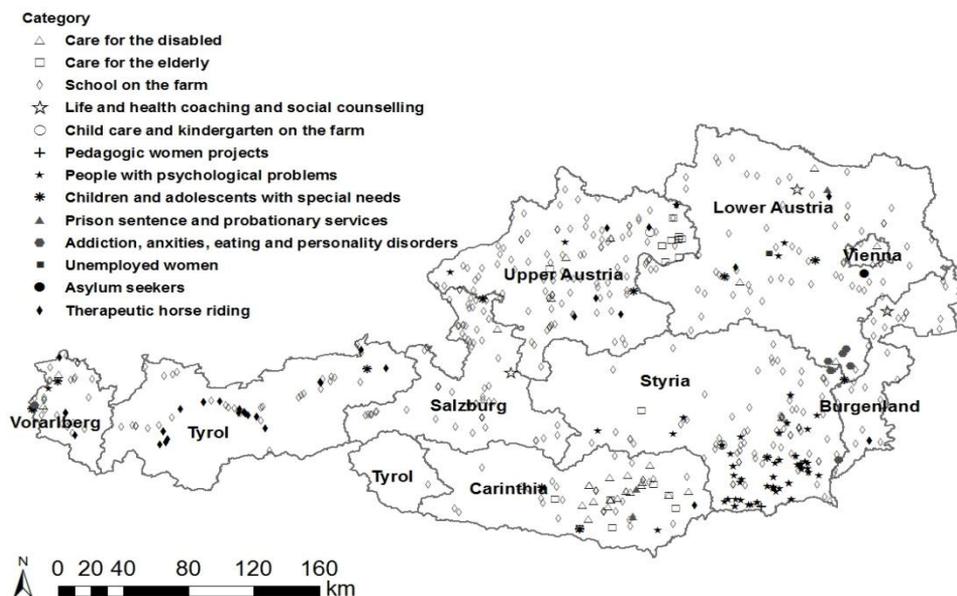
Table 1. *Main activities of Austrian social farms*

Main activities	number	in %
Care	52	8,4
Care for the disabled	34	5,5
Care for the elderly	18	2,9
Pedagogy	442	71,3
School on the farm	436	70,2
Life and health coaching and social counselling	3	0,5
Child care and kindergarten on the farm	2	0,3
Pedagogic women projects	1	0,3
Integration	127	20,5
People with psychological problems	71	11,4
Children and adolescent with special needs	12	1,9
Therapeutical horse riding	31	5,0
Prison sentence and probationary services	3	0,5
Addiciton, anxities, eating and personality disorders	8	1,3
Unemployed women	1	0,2
Asylum seekers	1	0,2
Total	621	100,0

Source: *Adapted from Wiesinger et al., 2013*

A closer look at the spatial distribution of social farming facilities in Austria reveals a few clusters which differ by type of service provided. Integrative activities for people with psychological problems, for example are concentrated in the southern part of Styria. This is due to the fact that farms which offer services for people with psychological problems are highly organised by the “Landesnervenklinik Graz” (mental hospital of Graz). In the northeastern part of Upper Austria a number of farms can be found that offer care for the elderly; these are also organised through a regional network. In Tyrol a number of farms that offer therapeutic horse riding can be found, and in Carinthia farms that offer care for the disabled are quite often (Fig.1).

Figure 1. *Spatial distribution of social farming facilities throughout Austria*



Source: *Adapted from Wiesinger et al., 2013*

When comparing structural characteristics of social farms to the average farm in Austria, a few interesting characteristics could be made out (according to Statistics Austria, 2012).

Social farming facilities in general were:

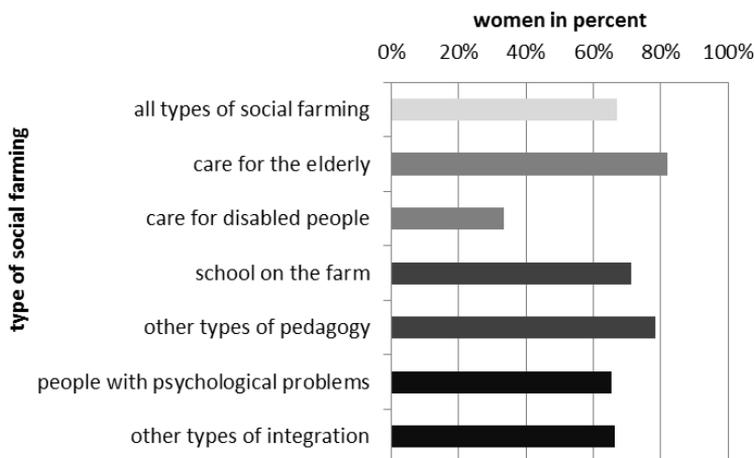
- Larger (with regard to the standard output, held livestock units or the agricultural area)

- Managed more intensively (with regard to the held livestock units per hectare agricultural area)
- The proportion of income from husbandry was higher, whereas the percentage of income from forestry was smaller
- The percentage of farms managed by retirees was smaller and the managers in general were younger.
- More of the farms were organic farms
- The farms employed more workers
- The families were larger

The role of human capital for social farming

A detailed questionnaire investigated aspects of human capital of the managers of social farming facilities. After evaluating the returned questionnaires (with a response rate of about 39%) several interesting findings could be made. Wiesinger et al's results suggest that social farming is female. About two thirds of the managers of social farming facilities in Austria are women. The percentage of female managers is especially high when it comes to taking care for the elderly (80%). The only field where more men than women can be found as main responsible managers, is in the field of taking care for the disabled (fig. 2).

Figure 2. Gender of managers of social farming facilities



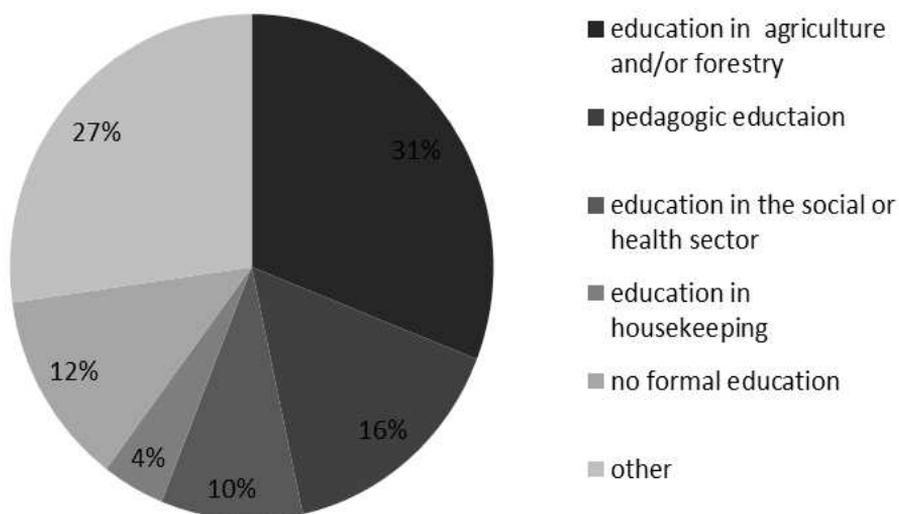
Source: Adapted from Wiesinger et al., 2013

The age distribution of managers of social farming facilities shows that especially in pedagogic services the managers are younger. In comparison, the average age of managers for facilities dealing with people with psychological problems is older (mainly over 50 years).

When it comes to education it can be made out that, 19% of the managers of social farming facilities are graduates, with a university degree. The largest number of graduates is found at farms offering care for the disabled.

31% of the managers have received education in the agricultural or forestry sector and about 16 % of the mainly responsible have some kind of pedagogic education. About 10 % of the managers are educated in the social or health sector and about 12% have no kind of formal education (Fig.3).

Figure 3. *Type of education of managers of social farming facilities*



Source: *Adapted from Wiesinger et al., 2013*

When questioned as to which factors are responsible for the success of their social farming facility, the managers gave diverse responses.

23% named communication as responsible for their success. It was stated that a certain openness and flexibility for farm management was necessary. This included networking and cooperation with teachers, students, clients, interest groups or administrative bodies. Positive feedback and oral propaganda by clients was stated as important as own public relations and promotion at work.

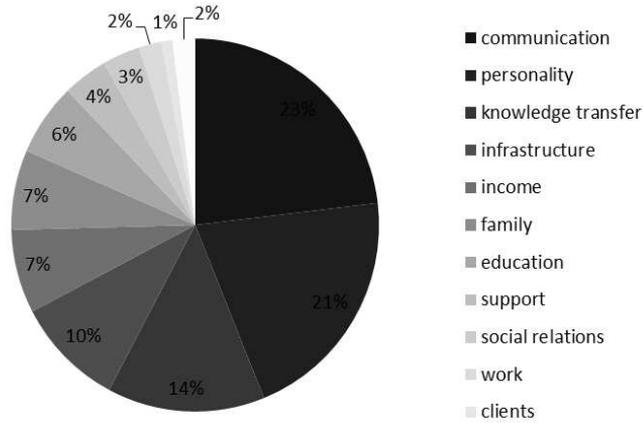
The manager`s personality was named as the second most important success factor (21%). Personal commitment, initiative and enthusiasm were seen as necessary preconditions for success. It was stated that social farming necessitated a positive attitude towards humans and the project itself. Personal skills and qualities such as long practical experience, stamina, courage and rational intelligence alongside with an affection for the natural environment and animals in general were named as helpful attributes.

As the third most important success factor, knowledge transfer was named (14%). This was stated especially important for pedagogic activities. It was seen as a personal mission to pass on experience and know-how about agricultural activities and processes in the natural environment.

Other success factors were the location and infrastructure of the farm. It was also seen as important to utilize all resources of the farm in an optimal way (for example to use empty rooms, to commit workless employees or to train animals for therapeutic use). The income was also named as important for success, though it was not as relevant for all types of social farming (mostly for pedagogic projects, the income was not seen as very relevant).

Many managers see the help and acceptance of their own families as crucial to success. Furthermore a formal education was mentioned as vital to success. Support from friends or advisors through practical help or counselling were seen as helpful. The managers regard their own attitude towards social activities and society as important. Sometimes they also think that their profession can best be practiced within the field of social agriculture (e.g. psychologists). Last but not least the interpersonal relationships between managers and clients were named as an important factor to success (Fig. 4)

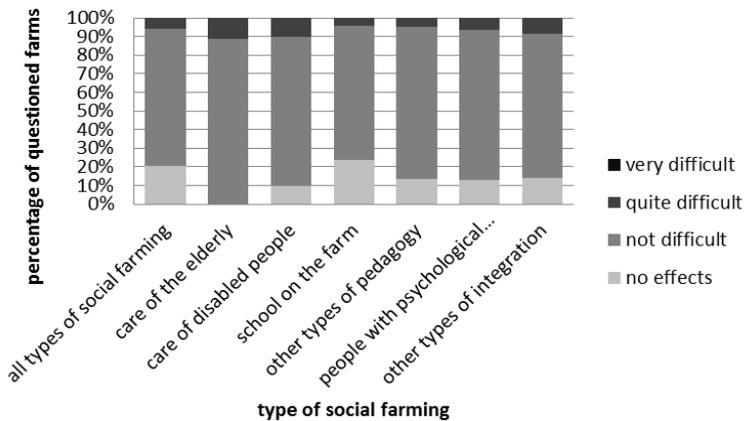
Figure 4. *Factors of success*



Source: *Adapted from Wiesinger et al., 2013*

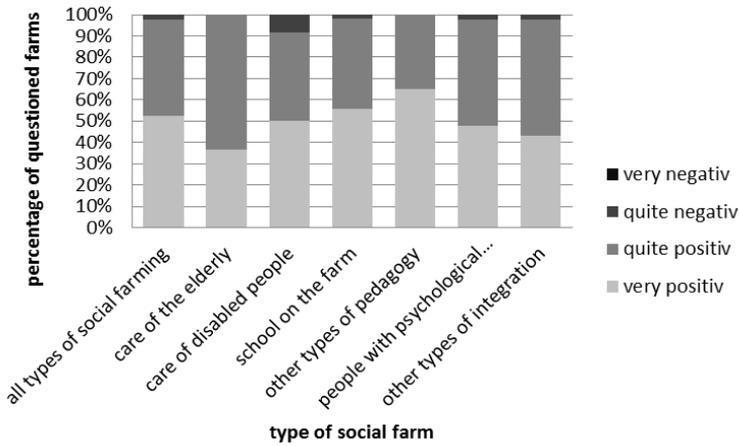
The majority of managers rate the effects of social farming on their social relationships outside the farms (neighbours, surrounding environment) as “not difficult” (Fig.5). The social farms’ managers rate the reactions of their surrounding environment as surprisingly positive. No managers rate the reaction of the neighbourhood as “very negative”. It is also interesting that no major differences occur between potentially unproblematic types of social farming such as “school on the farm” and potentially problematic types such as people with psychological problems (Fig. 6).

Figure 5. *Effects of social farming on the managers’ social relationships outside the farms*



Source: *Adapted from Wiesinger et al., 2013*

Figure 6. Reactions of the surrounding environment to social farms

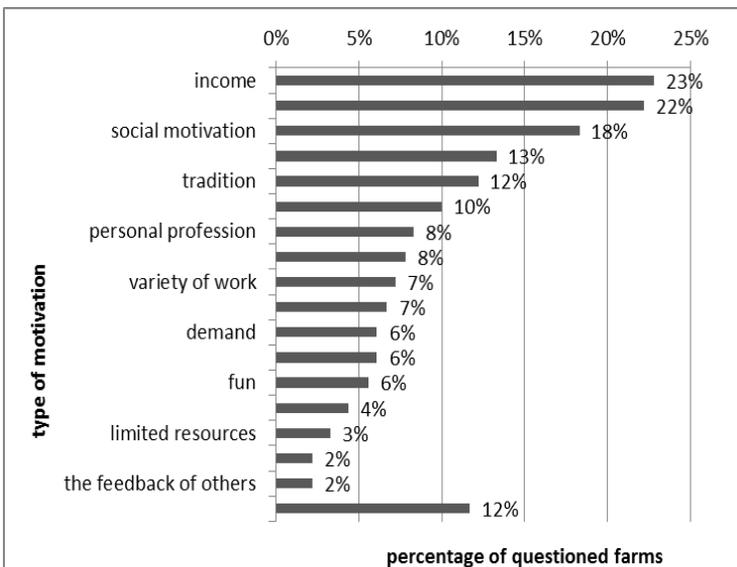


Source: Adapted from Wiesinger et al., 2013

The contribution of social farming to regional competitiveness

According to Wiesinger et al., 2013, the income was named as a main motivation for starting off with social farming (Fig.7). Social farming is regarded as an attractive opportunity for an additional income, but it is rarely thought of as the main source of income.

Figure 7. Motivation for social farming

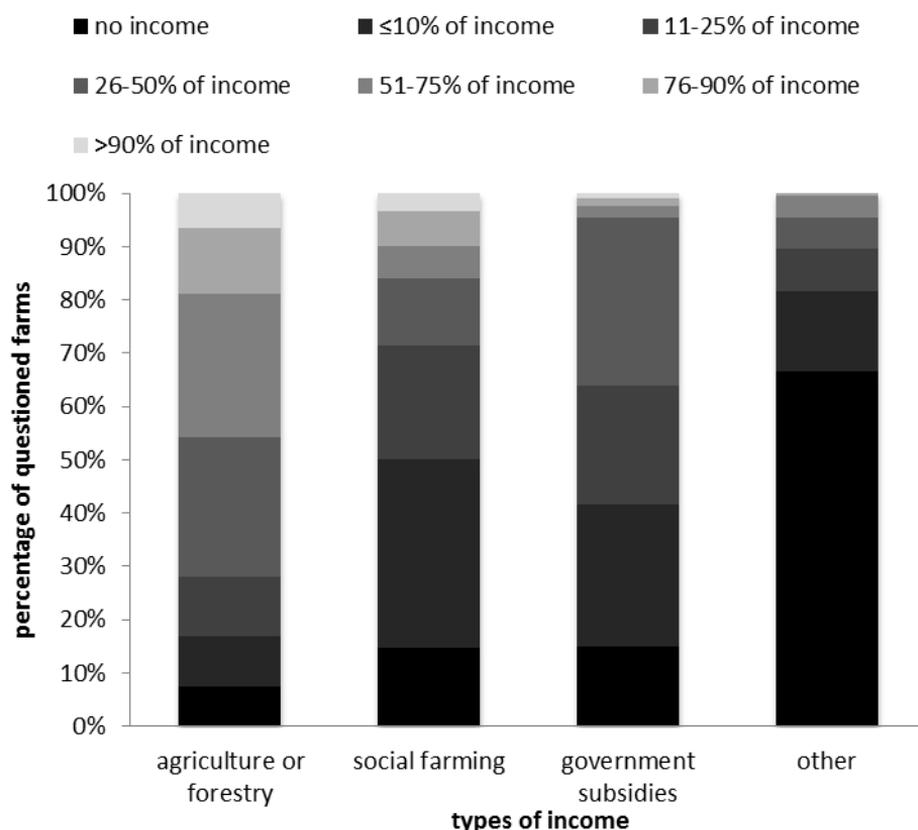


Source: Adapted from Wiesinger et al., 2013

The managers were also asked to estimate the distribution of their income by source of income. The results of this estimate have to be handled with care, as on the one hand this estimated income does not exclude costs, and on the other hand, it should be kept in mind that the results do not display the actual income, but solely present an estimate of the income by the farm managers themselves.

Merely 16% of the managers see their main source of income (>50%) in the field of social farming. About half of all questioned managers earn less than 10% of their income by social farming and 15% do not see social farming as a source of income at all (Fig.8).

Figure 8. *Distribution of estimated income by source of income*



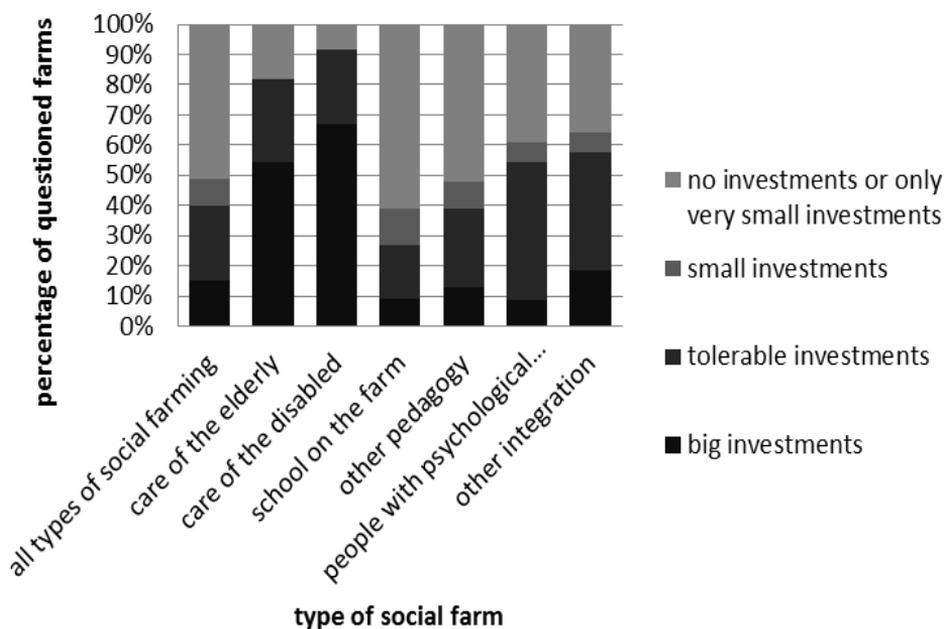
Source: Adapted from Wiesinger et al., 2013

When taking a closer look at the different types of social farming, some types seem more profitable than others. In the “care” sector and especially

“care for disabled people”, social farming mostly presents the main source of income. But also 40% of farms offering “care for the elderly” gain their main income by social farming activities. In contrary, the income gained by “school on the farm” is not seen as relevant by most managers. Only 4% of farms gain more than 50% of their income by “school on the farm” activities. In the sector of “integration” the income was estimated to be distributed quite diversely.

The conversion from conventional agriculture to social farming often requires adaptations on the farm. Buildings need to be adjusted and sometimes big investments need to be made. For this study, the managers were asked to estimate the extent of their necessary investments. The results vary by type of social farming. Especially within the sector of “care”, investments are seen as substantial (fig.9).

Figure 9. Investments by type of social farming



Source: Adapted from Wiesinger, 2013

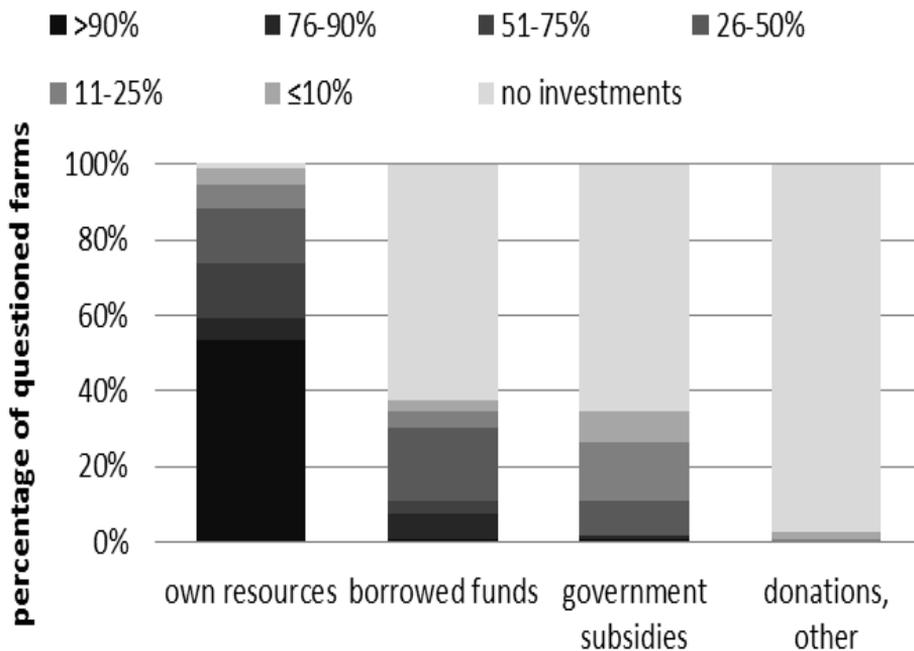
In order to convert to social farming, more than half of the questioned managers invested their own resources. Especially for the social farming types “people with psychological problems” the investment of own resources is common (96%). Only 7% converted without investing own

resources. More than 60% converted without having to take up credits or other kinds of loans.

The social farming type “school on the farm” requires relatively low investments. Government subsidies for social farming are rare which is due to the fact that existing guidelines (e.g. in the programme for rural development) often are not implemented effectively (Fig.10).

About two thirds (73%) of the questioned managers claimed that they did not receive any subsidies for the conversion to social farming. Of those managers who acquired subsidies, most named EU regional programmes (such as the programme for rural development) as their source for funding (54%).

Figure 10. Sources of funding for the conversion to social farming

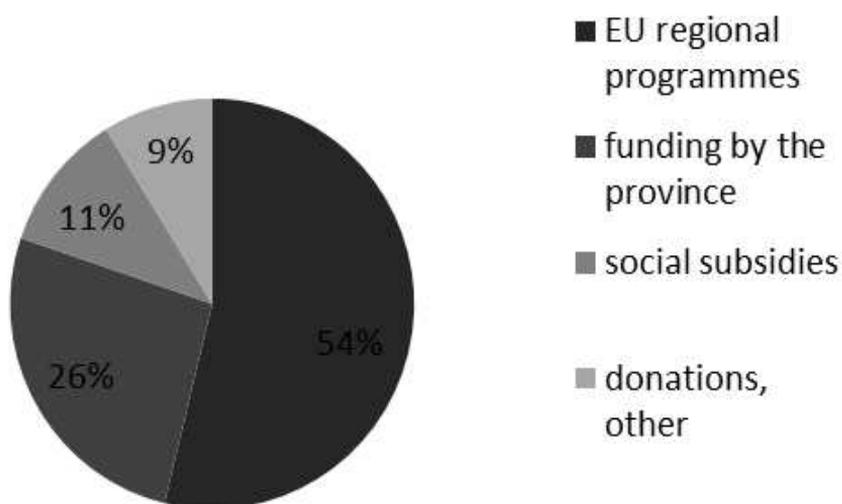


Source: Adapted from Wiesinger et al., 2013

26% of those managers who claimed that they were able to secure funding, received subsidies from the provinces (project funding, renovation of buildings, funding for tourism, etc.). 11% of the managers were able to acquire social kinds of subsidies such as funding by the

federal welfare office, or the AMS (service for the unemployed). The remainder of the funding was acquired through donations (Fig.11).

Figure 11. *Subsidies by type of funding*



Source: *Adapted from Wiesinger et al., 2013*

Obstacles and potentials for social farming in Austria

The managers of the social farms were also questioned as to where they see obstacles and potentials for social farming and how to tackle or improve their current situation.

According to Wiesinger et al., 2013, most managers saw potential in the better organisation of the projects and services on their farms (29%). Effective and foresighted planning would contribute to a better procedure of the activities. Profound research and information in advance and a sophisticated concept including the calculation of costs and time were considered lacking. 25% of managers considered farm infrastructure in need of improvement.

It was seen as important to professionally plan changes and investments in buildings and to strictly separate facilities for social and private purposes. 17% of managers think that some of their personal qualities and

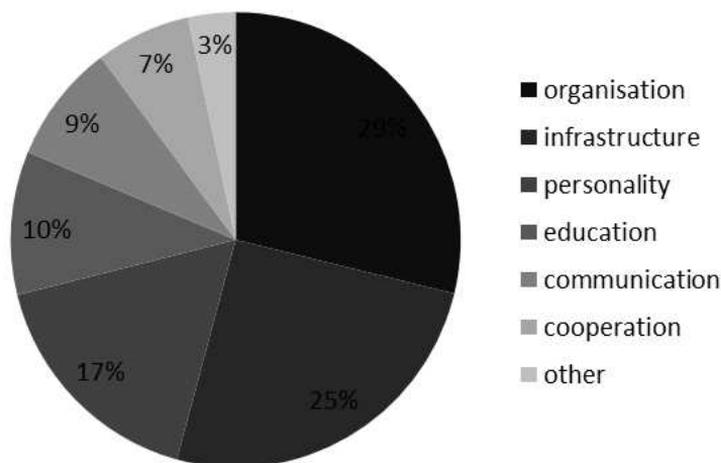
skills are improvable. Some aim to present themselves more self-confident and raise the income of their services.

Others feel they should tackle their tasks more slowly and reduce the pace of their operations, in order to plan more in advance and avoid mistakes. Possibilities for improvement are also seen in the field of education. Education should be professional, and multi-faceted.

Communication skills are also seen as improvable and desirable for advertising and promoting social farming services. Better cooperation with other farms or facilities is suggested to make work easier and closer cooperation with official bodies should create clearer legal structures (Fig. 12).

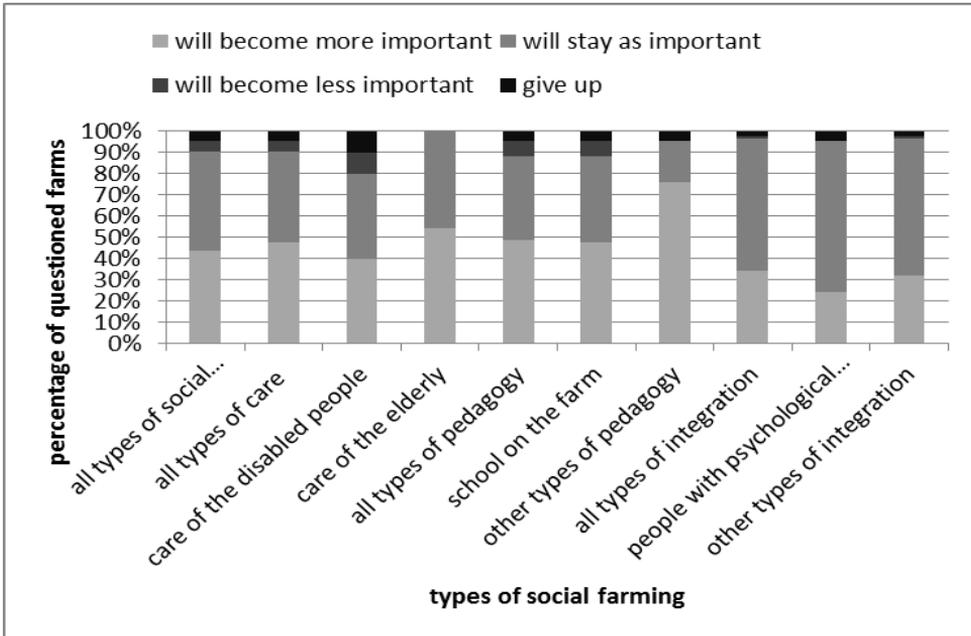
The vast majority of social farms look into the future with optimism. More than 80% of managers think that social farming will either become more important or stay as important. Less than 10% intend to decrease or cease social farming activities. The highest chances for growth are seen for the “kindergarten on the farm” and the “life and health coaching and social counselling” (Fig.13).

Figure 12. *Obstacles and potentials for social farming in Austria*



Source: *Adapted from Wiesinger et al., 2013*

Figure 13. *Future perspectives for social farming*



Source: *Adapted from Wiesinger et al., 2013*

Conclusion

The increasing number of social farming facilities in Austria is representative for the rich potential found in this type of diversification. Nevertheless, the investigated social farming facilities rarely gain their main income through social farming, but are able to obtain an additional income to agricultural production. In order to improve social farming as an economically meaningful source of income, the establishment of effective advisory and funding structures is necessary. Existing structures are often not able to cope with the vast variety of possibilities that social farming offers. Therefore, when it comes to financial or legal aspects, the managers of social farming facilities are often dependent on their own extensive research. Institutional networking platforms could be created with the purpose of assisting social farms with knowledge transfer and ease the workload for single farms.

Besides financial and legal aspects, the personal experience, professional education and skills of the managers are crucial to a successful social service. Although social farming is mostly regarded as a personally demanding work, it is also seen as a fulfilling supplement to agricultural

production. The feedback of the social farms' surrounding environment, facilities and businesses is mostly positive. Last but not least, the relationships between the social farms' managers and the clients themselves play an important role as to whether concepts of social farming are successful or not.

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I SECTION

***KNOWLEDGE ECONOMY AND
HUMAN CAPITAL IN THE FUNCTION
OF IMPROVING REGIONAL
COMPETITIVENESS***

ANALYSIS OF LABOR PRODUCTIVITY IN AGRICULTURAL HOLDINGS IN ROMANIA

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Abstract

This paper aims to analyze how they are dealt with economic and social phenomena and processes in agriculture, using as key productivity. The choice of this indicator was motivated primarily by the qualitative character of influence in the economic efficiency of farms. One reason for choosing this theme is the gap Romanian agriculture to agriculture in the European Union countries, which although is materialized on several levels, it is extremely worrying in this regard, the labor productivity. Labour productivity should be understood as the use of synthetic inputs, of course, given that labor is a variable factor illustrates the effectiveness of using other inputs.

Key words: *productivity, competitiveness, economic efficiency, agricultural exploitation.*

Introduction

Capital and human resources are the main resources that underlie obtain all goods in society. Specialists in economics grouped into four broad categories of agriculture resources: land, capital, labor and management. If we consider that the earth is only a form of capital and management is a 'product' of the organization and management of business, then we can say that in the case of agriculture, capital and labor are the two major production resources.

In many forms of expression most important function of productivity holds labor productivity, primarily due to the role of labor resources in all factors of production.

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According to the "Dictionary of Agricultural Economics" [S. Paper, 1970], "labor productivity in agriculture is the effectiveness of social work in the agricultural production and is expressed by the amount of agricultural work performed or goods acquired in a time unit of work or labor costs per unit of product or work ".

Agricultural labor productivity is influenced by technical and economic structures, as well as organizational ones. One of the peculiarities of the production process is also the disperse over a large area, making it difficult labor productivity management mechanism, and this, in addition to other, more complicated organization and control activity increases production costs and time by labor movements labor and equipment, the transportation of hazardous materials and products, etc..

Systemic approach to labor productivity in agriculture is necessary to use a system of indicators with which to interpret various aspects of relationships that are formed objectively between efforts and results in the production of agricultural holdings.

Labour productivity is influenced by [L. Atkinson, 1982]:

- natural factors: climatic conditions, fertility, natural resources;
- technical factors: the level reached by science, engineering and technology (fleet of tractors and agricultural machinery, seed type used);
- economic factors: the level of organization of production and labor, qualified employees, material incentives;
- social factors: living and working conditions, responsibility, level of knowledge;
- psychological factors: motivation and work satisfaction that it offers, the climate of labor relations, family life, the degree and manner in which social needs are met some etc.;
- structural factors that influence labor productivity by holding the structure of the national economy;
- factors arising from the integration of agriculture: types of specialized technical and / or economic competitiveness of agricultural products marketing, etc..

In economic theory and practice, over time, have emerged indicators of labor productivity at farm level and across sectors. A key feature of the analysis is the complexity of labor productivity in the sense that the

establishment of a system of indicators must take into account the scope covered (at branch level, at farm level, at the level of culture, etc.) and the peculiarities of agricultural production.

Thus, in agriculture, the approach to the system of indicators is dependent on the form of organization and production features obtained. As a result, we can address the issue of labor productivity at farm level, the family or the household crop production, animal production or territorial level, the agricultural areas and administrative units of the territory.

To show the importance and evolution of labor productivity in agriculture in Romania, we will present the performance metrics of agriculture, with direct and indirect effects on labor productivity.

Creating farms economically efficient, competitive requires knowledge of internal and external factors which determine organizational and management characteristics of farms: farm size, complexity of production, the technical material and human endowment, degree of specialization and cooperation, territorial dispersion subunits, information system available, the quality of decision-making system.

Labour productivity in agriculture derives from the effectiveness of using agricultural inputs based on their enhancing quality, while the work is illustrating the efficiency factor other variable inputs.

Material and methods

This paper aims to present an objective analysis of the agricultural sector in Romania, focusing on the directions of its development and the need for the introduction of measures to strengthen and increase farm productivity in Romanian agriculture.

The main elements of the work were to evaluate the situation of Romanian agriculture compared to other EU member states, identifying alternative economic efficiency of farms, as well as ways to boost productivity, focusing on increasing the average size of farms and the changes required in the production structure.

The data used for analyzes in this paper come from various sources, both national origin (National Institute of Statistics, Ministry of Agriculture and Rural Development) and international (Eurostat, European

Commission) and generally include: statistics holdings, production statistics (National Institute of Statistics), Economic Accounts for Agriculture (Eurostat, National Institute of Statistics) National Accounts (National Institute of Statistics), recent structure of holdings (General Agricultural Census 2010, National Commission for Prognosis).

Results and discussion

Agriculture is a sector of prime importance in Romania, both the contribution that is in the national economy and its social role as vital for the production of food for the population. With a contribution of 6.7% to gross value added (GVA) national, reported in 2010, agriculture has always played an important role in the Romanian economy.

Romania's contribution of agriculture Gross Domestic Product (GDP) has always been high. Registered share has declined in the last decade, however, induce oscillations of agricultural production still significant variations in GDP. Thus, if the early 2000s, the contribution of Romanian agriculture in GVA (gross value added of agriculture, forestry and fisheries in the total gross value added) was about 12%, its evolution are currently on a downward curve for the first once falling below 10% in 2005 and reaching the minimum of 6.5% in 2007 and 6.7% in 2010.

Romania shows significant discrepancies with the EU-27 and the productivity of the agricultural sector. Even in the favorable agricultural productivity level is below 50% of the EU-27 situation showing untapped economic potential of Romanian agriculture and rural areas.

This can be explained both by the internal structure of Romanian farms (small size, fragmentation pronounced), improper use of factors of production (including human capital) and the existing poor infrastructure. In particular, the lack of infrastructure to exploit agricultural products is a critical issue for small farms.

According to the Agricultural Census 2010 in the EU27 were recorded in 2010, a total of almost 12 million strong. These farms cover an area of 170 million hectares, the average farm of 14.3 ha. According to the 2010 General Agricultural Census³ In Romania there were 3.86 million farms,

³ General Agricultural Census 2010, National Institute of Statistics (NIS), 2011

employing 13.3 million ha utilized agricultural area that has returned on average per farm is 3.45 ha.

It is noted that of the 12 million existing farms in the European Union in 2010, more than 3.8 million (32%) are in Romania, which shows the scale of fragmentation of agricultural holdings Romanian, with negative consequences on performance economic and general state of evolution and development.

It also notes that the average farm size in the EU-27 is 14.3 ha and 3.45 ha in Romania (more than 4 times lower), which negatively influences the enhancement of agricultural resources and available rural, with adverse effects on the rural economy and farmers' incomes.

According to the RGA in 2010, the total number of 3.859 thousand farms registered in Romania, holding 3,828 thousand (99.2%) are unincorporated farms (farms individual freelancers, sole proprietorships / family) and 31 000 (0.8%) are farms with legal personality (Table 1).

Table 1. Indicators of agricultural holdings in Romania, 2002-2010

Indicators	Year	UM	Total farms	Unincorporated farms	Farms with legal
Farms	2002	thousands	4485	4462	23
	2005	thousands	4256	4238	18
	2007	thousands	3931	3914	17
	2010	thousands	3859	3828	31
The total agricultural area	2002	thousand ha	15706	8454	7254
	2005	thousand ha	15442	9886	5556
	2007	thousand ha	15265	9591	5674
	2010	thousand ha	15694	8307	7387
Agricultural area (UAA)	2002	thousand ha	13931	7709	6222
	2005	thousand ha	13907	9102	4805
	2007	thousand ha	13753	8966	4787
	2010	thousand ha	13305	7449	5856
Or farm	2002	ha	3.11	1.73	274.43
	2005	ha	3.27	2.15	263.08
	2007	ha	3.50	2.29	270.45
	2010	ha	3.45	1.95	190.78

Source: *General Agricultural Census 2010, NIS, 2011*

Performance of agriculture in Romania is severely affected by excessive fragmentation of ownership (3.859 thousand farms in 2010 to 3,931 thousand farms in 2007 - with no less than 2%), while a 93% of the total number of Romanian farms had, in 2010, an area less than 5 hectares and represent 29.6% of the total utilized agricultural area (by comparison, share of farms under 5 hectares in the EU-27 is 69% and the area used by 6%). Therefore, reducing the number of farms that practice subsistence agriculture should be one of the main objectives of rural development policy, if it is intended that Romanian agriculture to exist and to influence EU market.

On the other hand, a large number of 13.740 farms in Romania (0.4% of total) mined in 2010, an area of 6.5 million hectares (48.9% of total UAA), average farm size is 474 ha (265 acres to the European average). Romania is thus a bipolar structure of farms: large farms, competitive, coexist with small farms at subsistence level.

From Table 1 it follows that UAA national agricultural year 2009/2010, was 13.305 thousand hectares, of which 7,449 hectares (56%) fall unincorporated farms and 5,856 hectares (44%), farms with legal personality. Number of farms recorded in 2010 was lower by 14% than that registered in the General Agricultural Census in 2002, due mainly consolidation of unincorporated farms.

In the analyzed period there is a certain trend of decreasing number of farms (with 626 thousand, or 14%), but these structural changes in the sector of agricultural production in Romania remain modest, maintaining the same polarity and the same extreme fragmentation, impediments major increase in the competitiveness of Romanian agriculture.

Regarding employment in agriculture, it is much oversized compared to the EU, employment in rural areas and the agricultural sector remained at a consistently high level in 2007-2011 (Table 2).

The above data reveals the excessive scale of the phenomenon of rural population segment employed in agricultural activities in Romania, which requires finding solutions to the structural change of agricultural holdings, especially since the situation remains almost unchanged in recent years, reflected of labor productivity and economic performance of farms.

Table 2. *Evolution of main indicators of human potential in the Romanian agriculture in 2007-2011*

Specification	2007	2008	2009	2010	2011
Total population:	21565	21529	21499	21462	21414
- In rural areas:	9651	9656	9663	9643	9636
Active population:	9994	9945	9924	9965	9868
- In rural areas:	4500	4473	4449	4427	4305
Employment:	9353	9369	9243	9240	9138
- In rural areas:	4281	4268	4211	4208	4066
- Agriculture*:	2757	2690	2689	2780	2612

* Agriculture, forestry and fishing

Source: *Study "Labour force in Romania: Employment and unemployment", NIS, 2012*

The labor force in agriculture is much oversized compared to the EU-27, aging with a low education level, social vulnerability. In addition, a decrease in the level of education of the rural population occupied workforce young (under 35) has a lower educational level than the employment quotas mature (35-45 years), which is assessed limits the implementation of business initiatives based on advanced technologies [I. Done, Luminita Chivu, J. Andrew and Mirela Matei, 2012].

Employment in agriculture and forestry, was in 2010 about 19% of the employed population in Romania, a huge gap to the EU-27 average (4.7%) and even to the new Member States (eg Poland : 10,1%, Hungary 5.5%, Bulgaria 14.7%), not to mention countries such as France (2.6%), the UK (1.9%) and Germany (1.8%) . The large number of people working in agricultural activities in agriculture and forestry is a first indication of the low level of labor productivity⁴.

Currently, Romania, although efforts are still far behind the European average in terms of the socio-economic development in general and national productivity. One of the fundamental causes at the macroeconomic level, it is still very large gaps separating Romania from the structural situation in advanced countries and the European average in a number of performance indicators. First we refer to the distribution of labor in the three major sectors of the economy: industry, agriculture, services.

⁴ Study *Strengthening agricultural holdings*, the National Commission for Prognosis (NCP), 2012

If the share of employment by industry average is close to that in Europe, where major discrepancies are agriculture and services respectively. Agriculture, as shown is oversized for Romania on employment that has the share of employment in agriculture, forestry and fisheries accounting in the period 2008-2012, about 30% of total employment in the national economy (Table 3).

Table 3. *Employment by economic activity of national civil*

Specification	UM	2008	2009	2010	2011	2012
Total, of which:	%	100	100	100	100	100
Agriculture	%	27.5	28.7	29.1	29.2	29.3
Industry	%	22.7	21.1	20.7	21.0	20.6
Construction	%	7.9	7.4	7.5	7.3	7.1
Other areas	%	41.9	42.8	42.6	42.5	43.0

Source: *Statistical Yearbook of Romania, time series, TEMPO-Online*

In the period under review, with the reduction of civilian employed population (with 177,400 people), it emerges, somewhat surprisingly, as a consequence of the economic crisis, increasing by 1.8 percentage points in the share of agriculture in the employed population (from 27.5% to 29.3%) and in particular reducing the share of industry (-2.1 percentage points) and construction (-0.8 percentage points).

Romania has the high percentage of elderly labor in agriculture, where more than 45 years represent 51.0% of the total (compared to 36.7% nationally) and people over 64 years 14.7 % (compared to 4.5% national average). Practically the entire employed population over 64 years (98.3%) engaged in agriculture (Table 4).

The analysis presented in Table 4 data filtering can be said that the farming population is aging, but at the same time, however, it should be noted that a proportion of 27.9% of the total workforce consists of young, under 35 years, , as is known, with a low skill level, have low possibilities of adaptation to market requirements.

This is the main reason that causes a person very low productivity, being about a quarter of the national average. The consequence of this is that a large part of the rural population produce only for self and achieves a decent income limit.

Table 4. *Structure of agricultural population, by age, Year 2010*

Total (Thousand people)	15-24 year	25-34 years	35-44 years	45-54 years	55-64 years	> 65 years
2780	10.2	17.7	21.1	17.4	18.9	14.7

Source: *Romanian Statistical Yearbook 2011, NIS 2012*

Increasing the number of young farmers through the Common Agricultural Policy instruments available (additional payments corresponding to the establishment of young farmers) should be the focus of rural human resources in Romania⁵.

Restructuring activities at farm level and increased use of capital for commercial farms will lead to improved competitiveness and inevitably the use of a smaller workforce. However, the situation of other EU member states, in Romania, are found a large number of people with self-employed status (unpaid family workers).

They are employed only part-time in agriculture (Proofs are very low income that are officially registered, close to the poverty line) would be practically excluded from the workforce and put into a special category of "unemployment" or whatever the "vacancy ". They, however, by their professional status assigned to them formally and legally not entitled to unemployment benefits, however, are conventionally employed in the statistical system in the category of employed population⁶.

Romania is facing massive reduction trend labor productivity on farms. Labour productivity per person employed is an indicator that measures the level of productivity (Table 5).

As seen, the fundamental problem of farms in Romania, under the sustainable development of their business, ensuring food security and integration in the European Union is the labor productivity.

⁵ *National Strategic Framework for Sustainable Development of the Romanian rural area 2014 - 2020 - 2030*, Presidential Commission for Public Policy for Agricultural Development, 2013

⁶ *Study The labor market prospects of Romania in the context of Europe 2020*, National Commission for Prognosis (NCP), 2013

Table 5. *Evolution of labor productivity per person employed*

Activity	lei / person					
	2005	2006	2007	2008	2009	2010
Total	27541	32609	39 334	48 958	49120	50 938
Agriculture	7885	9420	8448	12198	11684	10315
Industry	31333	37258	44604	53311	60 078	76 906
Construction	37 632	47127	57 295	76 566	72900	68 076
Services	99092	102550	173376	71 832	63 672	81 251

Source: *Statistical Yearbook of Romania, time series, TEMPO-Online*

In terms of labor productivity gap in agriculture between Romania and the EU, an analysis of the average of this indicator of competitiveness, 2007-2009, reveals an alarming situation, it stood at only one quarter of the average at European level- difference tends to widen. Thus, during 2003-2008, labor productivity in the EU-27 increased by an average annual rate of 3.4%, while in Romania the growth rate was only 1.1%, much lower than the other new Member States such as Bulgaria, Estonia, Hungary and Lithuania, with average growth rates between 8.6 and 14.5% (Table 6).

Table 6. *Labour productivity in agriculture (average 2007-2009 at current prices) in Romania and EU countries*

Specification	GVA / AWU (current prices, average 2007-2009)		Average annual growth (%)
	Euro / AWU	EU27 = 100	2003-2007
EU-27	12649	100%	3.4
Hungary	5091	40%	10.6
Poland	3314	26%	5.7
Bulgaria	3316	26%	8.6
Romania	3223	25%	1.1
Estonia	7553	60%	11.4
Latvia	2915	23%	12.0
Lithuania	4613	36%	14.5
Slovakia	5459	43%	6.2

Source: *EC, DG Agri, Rural Development Report, 2011*

According to the RDP Monitoring Strategic Report⁷ Indicator of labor productivity in agriculture has recorded slight increases in the calculation

⁷ *The National Strategic Plan Monitoring Rural Development, Ministry of Agriculture and Rural Development (MARD), 2012*

period (2006-2009), and one of the lowest annual growth rates in Europe (only 1.1% average in the period 2003 - 2007). The indicator of labor productivity in agriculture (GVA / AWU) increased from 9420.92 euro / person in 2006 to 10350.9 lei / person in 2009 and 9.8%.

Besides structural aspects of the farm (small size) and human capital (age, training), low productivity is caused by inadequate access to other factors of production (capital and equipment). All these data show that Romanian rural economy is still poorly integrated into the market economy and its restructuring is slow.

Park farm remains insufficient, most farms in Romania faced with a very low degree of mechanization, and a weak agricultural inventory. The specific structure of agricultural holdings in Romania perpetuates a special situation between countries: 31.1% of farms do not use tractors, while 91.1% of farms have tractors, resulting in a dependence on the services of small farmers who own tractors⁸.

Chronic under-capitalization subsistence farms results in the particular situation in which, although Romania is one of the countries with large areas of cereal (about 5.3 million hectares, ranking 5th in the European Union), yields per unit area are modest (eg, a weak agricultural year 2009, the average yield per hectare was grain, only 2.8 tons / ha, ie 48% of the first six major European and 75% of the level of productivity achieved domestically in 2011).

Fixed and circulating capital is on average 16-17 times lower than that of a farmer in the EU (€ 540 / farmer in Romania, compared to 9000-9200 € / farmer in the EU) and the Romanian bank loans to farms are 15-16 times lower than loans to farmers in the EU (110 € / ha in Romania and 1,700-2,000 € / ha in the EU)⁹.

⁸ Study *Strengthening agricultural holdings*, National Commission for Prognosis (NCP), 2012

⁹ *National Strategic Framework for Sustainable Development of the Romanian rural area 2014 - 2020 - 2030*, Presidential Commission for Public Policy for Agricultural Development, 2013

Conclusions

The rural economy is now largely Romanesque primary agriculture's share to around 60% in its structure (four times higher than the average in the EU), which has negative effects on employment of the rural population active. Most farmers are their own employees, making subsistence agriculture, being necessary to supplement the income they derive income from non-agricultural activities.

Romanian rural economy is dominated by agriculture, whose main feature is the significant proportion of subsistence and semi-subsistence farms that produce for own consumption, they occasionally trading as market products obtained. In this context, the rural economy remains very poorly integrated into the market economy.

Agriculture continues to have substantial growth potential, yet underutilized agricultural restructuring and revitalization of the rural economy representing major levers of economic development of Romania in the future.

The productivity level in agriculture, which is less than 50% of the EU-27 reveals untapped economic potential of Romanian agriculture and rural areas, it can be explained both by the internal structure of Romanian farms (small size), misuse or improper production factors and the existing poor infrastructure.

Labour productivity in agriculture is four times lower than the EU average (2008) and although small increases, has one of the lowest growth rates in the EU, only 1.1%.

Romanian agriculture and rural sector continues to have a substantial growth potential, yet underutilized agricultural restructuring and revitalization of the rural economy representing major levers of economic development of Romania.

Emphasizing the integration process of adoption and implementation of European standards of quality, food security, infrastructure development consistent with the European Union, the development and stabilization of agricultural markets and strengthening cooperatives in agricultural production creates the potential for agricultural labor efficiency at farm level Romanian agriculture.

Small farms need more efficient and targeted in the next period by the market. Creating institutional environment and infrastructure for development of products obtained will be the major element for improving the economic performance of farms¹⁰.

Based on qualitative factors with a role in determining the economic efficiency objectives required for the growth of labor productivity in the vegetable farms can be grouped as¹¹:

- A. to obtain objective physical media per hectare yields much higher and more stable;
- B. targets for improving production quality under competitive market requirements;

I. In terms of getting a higher average yields and stable individuals per hectare required a series of strong measures aimed at:

- a. cultivation of varieties and hybrids in the circumstances to have the highest potential productive by:
 - zoning varieties, which should take into account the correlation between climatic resources of each area and biological peculiarities of each variety;
 - location cultures: pre-plant and crop rotation had a significant influence on the yields to be obtained, which, if properly done, can do and reduce material costs (fertilizers, pesticides, etc.).
 - to be used only certified seed sowing must be respected within the optimum sowing and optimum density;
 - making timely maintenance (fertilization), depending on the specifics of each agrozone and cultures.
- b. application of efficient production technology, according to results of scientific research and experience of other farms with high results
- c. making optimum harvest period, to eliminate any loss of harvest.

II. To improve product quality, to consider a range of appropriate measures aimed at:

¹⁰ G. Popescu, Jean Andrei (2010), *Aspects Regarding the Relationship between Proprietary and Economic Entrepreneurship in the Romanian Agricultural Economics*, The 14th IBIMA Conference on Global Business Transformation through Innovation and Knowledge Management, Istanbul, Turkey 23-24 June 2010

¹¹ C. Cojocaru, Alina Cojoccea, *Factorial study of labor productivity - in the scientific premise of the strategy to increase economic efficiency of labor in agricultural companies*, Economistul, 31 august 1999

- a. cultivation of varieties and hybrids with superior qualities and resistance to pests and diseases;
- b. performing maintenance and control of pests and diseases, according to the rules of science and advanced technology, and the optimal time;
- c. making harvesting at the optimum time and ensure all conditions and measures necessary to maintain the quality of the harvest obtained;
- d. harvesting, loading and transporting the crop to the reception and storage under optimal conditions that do not affect the quality of the harvest obtained etc.

The livestock sector is required for each unit profiled in raising different species or categories of animals, the following requirements:

- a. Programming with rigorously Montee and births, which requires consideration of the fundamentals of:
 - numbers of adult females and young females breeding early which is covered by a program;
 - physiological state of the animal;
 - during pregnancy, which varies depending on the species, the age at which young females are mounted;
 - birth rate, prolificacy (depending on species);
 - correlation Montee situation and births in previous periods.
- b. Tracking livestock movement and evolution influential in organizing both production and labor. This is mainly achieved by:
 - knowledge of the conduct of reproduction, the different species (seasonal calving or staggered);
 - analyzing organizational conditions of the unit, with special reference to breeding technology to be used. This objective aims forecasting of:
 - average and total production;
 - level production costs of turnover and profit, necessary labor (standard care is crucial because differ from species to species, for example, is higher in young animals than in older animals);
 - need for feed and fodder production organization;
 - number of days due to an actual feeding etc.
- c. Output targets "products" and products aimed at:

- shift to higher categories of age, breeding
 - Meat fattening according to the direction of growth. Achieving optimal weight that slaughter the animals depends on: race, class animal ration size and structure, conditions of maintenance and so on, and especially the interest of farmers.
- d. Objectives of ensuring balance is achieved fodder with which you need to create balance between the needs of feed and their insurance options according to technology growth. Getting products, the quality and profitability depends, directly, by providing quantitative and qualitative assortment of the necessary structure for all animal feed.

Restructuring of agriculture, taking into account all these issues will have a major impact on the rural economy in general, given that agriculture remains the most important activity in rural areas and an essential source of income for households.

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THE ANALYSIS OF TECHNICAL AND TECHNOLOGICAL EFFICIENCY OF MUNICIPALITIES IN THE DANUBE REGION

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Abstract

In this paper the authors use the DEA methodology for the evaluation and analysis of the total technical efficiency (TE) which also includes the pure technical efficiency (PTE) and scale efficiency (SE). Changes in the total technical efficiency (CTE) were analyzed using Malmquist's productivity index (MPI). The 25 municipalities that lie on the Danube and 40 municipalities that belong to the same regions, but do not lie on the Danube are analyzed in this paper. The aim of this study was to compare the technical efficiency and changes of the observed municipalities depending on the area to which they belong.

Keywords: *DEA methodology, Malmquist's index of productivity, technical efficiency, scale efficiency, technological changes*

Introduction

For evaluation of efficiency of different types of business Farrell (1957) has recommended efficiency limit analysis and described two types of economic efficiency: technical efficiency (TE) and allocative efficiency or cost-efficiency (*price efficiency*) PE. Technical efficiency is defined as the ability to produce the maximum possible output for the given input and technology, while allocative efficiency reflects the possibility of technically efficient DMU to use the inputs in optimal proportions, given the appropriate marginal cost.

Parametric and non-parametric models can be used to determine the efficiency limit. Since the non-parametric models do not require

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knowledge of functional forms of the relations of the observed inputs and outputs, they have a large application when this relation is difficult to determine. The best known non-parametric models are DEA (Data Envelopment Analysis) models, which are widely used in the banking sector (efficiency rating of one or more banks in the region), health care (evaluation of health and social services, departments of hospital or hospitals in the region), education (comparative analysis of secondary schools, universities, educational programs) and in many other areas. In addition to determination of the technical efficiency and for the analysis of changes in input/output in order to improve the business performance, this methodology is used to rank the organizations, to calculate the index for the change of efficiency coefficients, etc. It is common that the analyzed organization or unit that is being decided are denoted as DMU (*Decision Making Unit*).

There are a number of papers in which the DEA methodology is applied in the analysis of agricultural production. This production is characterized by the input factors that are fixed or quasi-fixed and are very slowly adapting. Such factors are, long term land lease, the share of farmers in production and similar. Existence of such production factors can influence the technical inefficiencies and encourage agricultural policy to correct them.

The largest number of papers refers to the analysis of the farm efficiency for different forms of production and in different organizations. In the analysis and decomposition of the total efficiency of sheep farms in Greece *Fousekis, Spathis and Tsimboukas* (2001) have used data for 101 farms based on data for 1997 from the FADN database, for three mountain regions. Production technology was characterized with the two outputs (meat and milk) and five inputs (labor, capital, cost of feed, produced fodder and herd size). Based on the empirical results, using the input-oriented CRS and VRS DEA model, they have concluded that the average efficiency is about 0.80, that pure technical efficiency and scale efficiency are equally important in determining the total efficiency and there is a difference in total efficiency for three observed regions. The technical and scale efficiency of commercial pig farms in Greece is analyzed in the paper *Galanopoulos and others* (2006). The study used 100 of a total of 358 commercial pig farms in several areas, classified into three groups according to the number of sows. They have used the rate of return of pork as output and four inputs (labor, capital, food costs and other costs). Tobit analysis has shown that the choice of method of

fertilization, the origin of the genotype, the system of food preparation, the mortality rate of piglets and sizes have impact on efficiency coefficients. *Hansson and Öhlmér (2008)* have investigated how managerial practice relating to health, breeding and feeding of animals, may affect the efficiency of farms. The main contribution of this paper is to examine the aspects that can adapt to the daily management for increasing efficiency. In the above mentioned paper, the DEA efficiency is based on 507 Swedish dairy farms, a regression analysis on 169 farms. They have used the input-oriented model for the evaluation of technical and allocative efficiency for longer and shorter time period. Inputs which have been analyzed in the model are the animal feed, fertilizer, seed, labor, capital, and energy, while the outputs are milk, livestock, grain, feed and others. The results showed that changes in diet and breeding can affect the efficiency. The paper of *Bojne and Latruffe (2009)* analyzes the technical efficiency of Slovenian farms during the ten-year period (1994-2003) of transition to a market economy, before joining the European Union. In this paper, the output-oriented model was used with one output (total revenue) and four inputs (land used ha, the annual unit value, total assets as capital and the value of the variable input). For farm specificity, FADN methodology is used: the character of the farm family, farm specialization and reliance on subsidies. In this paper the parametric stochastic frontier and non-parametric DEA method were used and both methods showed that the level of technical efficiency increased during the transition, and that the technological change had the key role. They explained the negative effect on technical efficiency with the gender-specific nature of livestock farms, especially with their intermediate consumption. Hired labor had no effect, but land lease had mixed effect. They have pointed out that the results of the study suggest the possible imperfections of the market for agricultural products. An interesting conclusion is that subsidies had a negative impact on technical efficiency.

Mohamad, N.H. and F. Said (2012) analyzed the technology changes in business in Malaysia. They have analyzed the change in the total technical efficiency of 106 companies in Malaysia for a period from 2008 to 2011 based on a single input (Total Cost of Ownership) and 6 outputs (rates of change: turnover, profit and net assets and rates of return: turnover, profit and net assets expressed as a percentage. They used a standardized data for calculation according to the *United Nation Human Development Index*. Based on the decomposition of the MPI those authors have concluded that the increase in total technical efficiency occurs primarily due to the growth of technical efficiency and not due to

technological changes (innovations). Seven companies have positive indicators in all components. Most companies do not have innovation, which leads to the conclusion that the adaptation of existing technology has priority over the adoption of new technologies. They have pointed out that the disadvantages of their study is the fact that DEA is nonstochastic method and does not take into account the random error, and therefore the inefficiency may be overrated. Also, data used in the analysis are aggregated because it is difficult to obtain data at the firm level.

Mohamad, N.H. and F. Said (2012) have also analyzed the acceptance and adaptation of small and medium-sized enterprises (SMEs) to the new technologies. They observed SMEs from 42 selected economies (29 from EU countries and 13 from APEC countries) for the period from 2004 to 2008. They have used the input-oriented DEA distance function and *Malmquist's* index for the analysis. For the purpose of calculating the efficiency coefficients, the observed countries have been divided into three groups based on the similarity of their economies. They have concluded that the changes of *TE* do not show growth in technological change, which is probably a consequence of the decrease of pure technical efficiency and scale efficiency. The SMEs are operating efficiently only in two countries. The analysis has shown that 25 countries have to improve the efficiency of scale in operations of SME's.

Methodology

Non-parametric DEA method is based on a linear programming model for evaluation of the relative efficiency limits. This method was proposed by *Charnes, Cooper and Rhodes (1978)* and model which they have suggested is denoted with the CCR. By this model, the multiple inputs are reduced to a single 'virtual' input and multiple outputs are reduced to a single 'virtual' output using weights which must be non-negative so that the quotient of 'virtual' input and 'virtual' output can not be greater than 1. The most important feature of DEA method is objectivity, since the subjective opinion of the decision maker on the significance of certain inputs and outputs is not incorporated. When choosing DMU one should take into account (*Cooper, Seiford, & Tone 2000*) that for each DMU all data on inputs and outputs are available and have a positive value, that all the inputs and outputs that are of interest to managers and analysts are included, that the index of efficiency should reflect the principle that aims to reduce inputs and increase outputs and units of measurement of inputs

and outputs may not be the same type (number of working hours, work area space, money, etc.).

The first extension of the CCR model was given by *Banker, Charnes and Cooper* (1984) and is denoted with BCC. The main difference between the CCR and BCC is response patterns of the outputs to the change of inputs. In the CCR model constant return to scale (CRS) is observed, while in the BCC model it is variable return to scale (VRS) and a model non-increasing return to scale (NIRS).

For each of the n DMU $_k$, $k=1,2,\dots,n$ m inputs $x_{jk}>0$; $j=1,2,\dots,m$ and s outputs $y_{rk}>0$; $r=1,2,\dots,s$ are observed and relative efficiency is defined as

$$h_k = \frac{\sum_{r=1}^s u_{rk} y_{rk}}{\sum_{i=1}^m v_{ik} x_{ik}}; k = 1,2,\dots,n$$

where the weights v_{ik} represent the value (quantitatively expressed the importance of the i input for each DMU $_k$, and u_{rk} represents the value (quantitatively expressed important) of the r output for each DMU $_k$. Thus defined, efficiency refers to the set of the observed DMU, hence relative efficiency. It is obtained by solving the input-oriented model. The value of such defined measure of efficiency is a number between 0 and 1. The weights are determined for each DMU $_k$ independently to maximize its efficiency relative to other DMUs under study.

CCR model determines the total technical efficiency (TE) which also includes the pure technical efficiency (PTE) and scale efficiency (SE), which is the result of all sizes of business. BCC model measures pure technical efficiency, i.e., it ignores the volume of business and the k -the DMU is compared only with other DMU with similar scope of business. Small and large organizational units should not be compared using this model, as they are qualitatively different and this can distort comparisons of the efficiency measure. The measure of efficiency obtained by this model is always less than or equal to the one obtained with CCR model.

Dual assignment of output oriented model (the envelopment model)

$$[max] \phi_k + \varepsilon \left(\sum_{r=1}^s s_{rk}^+ + \sum_{i=1}^m s_{ik}^- \right)$$

with constrains

$$\phi_k \cdot y_{rk} - \sum_{j=1}^n \lambda_{jk} y_{rj} + s_{rk}^+ = 0; r = 1, 2, \dots, s$$

$$\sum_{i=1}^m \lambda_{jk} x_{ij} + s_{ik}^- = x_{ik}; i = 1, 2, \dots, m$$

$$\lambda_{jk}, s_{rk}^+, s_{ik}^- \geq 0; j = 1, 2, \dots, n; r = 1, 2, \dots, s; i = 1, 2, \dots, m;$$

ϕ_k - no restrictions

Technical efficiency is obtained as $0 \leq h_k \leq \frac{1}{q_k} \leq 1$. For the optimal solution of output-oriented model is $q_k^* = \phi_k^*$. In addition, the equality $h_k^* \cdot q_k^* = 1$ is true for the CCR model.

The efficiency of volume (scale efficiency) can be obtained as the quotient of efficiency measures obtained by the CCR model and efficiency measures obtained by the BCC model.

$$SE_k = \frac{h_{k(CCR)}^*}{h_{k(BCC)}^*}$$

If the $SE_k = 1$, then the DMU_k is scale efficient, if $SE_k < 1$, then it is scale inefficient.

Such a measure of efficiency is relative because it depends on the number of entities included in the analysis and the number and structure of inputs and outputs. The main disadvantage of this analysis is that the introduction of a new DMU requires re-calculation of the relative efficiency and the previously obtained conclusions may be completely changed. Also, efficiency limit evaluated with DEA is sensitive to measurement errors or other problems that may arise with the data. DEA score does not offer any guidance on statistical inference.

Malmquist's Productivity Index (MPI) recommended by *Caves, Christensen* and *Diewert* (1982) is a productivity index based on the quotient of two distance functions. This index measures the change in

productivity by comparing the observed changes in output for the observed inputs. Its features are useful in empirical research because it can be used in situations where prices do not exist or when the current price has a low economic impact, because it uses only quantitative data and does not require the assumption of efficient production. Besides, it can be decomposed into two components, one of which relates to technical change, and the other to the technological change. *Malmquist's* index does not require any assumptions about the efficiency and functional form.

For each time period $t = 1, 2, \dots, T$ the set of all possible pairs of input / output is known and there is a production technology S^t that transforms X^t in the output Y^t .

$$S^t = \{(x^t, y^t)\}$$

In period t , for each input / output set corresponding to S^t , exists, for the output, a function of distance *Fare*, R . (1988), which is the reciprocal of 'maximum' possible change in output for a given input x^t and it can fully characterize the technology S^t .

Thus defined distance function satisfies the condition $D_o^t(x^t, y^t) \leq 1$ if it is $(x^t, y^t) \in S^t$. In addition, the relation $D_o^t(x^t, y^t) = 1$ is true only if (x^t, y^t) is at the frontier of production possibilities of the observed technology, and it is only in the case when the technology of production is efficient. According to *Farell's* (1957) this means that production is technically efficient, ie. that the inputs are maximally used.

For the definition of *Malmquist's* index it is necessary to define a function of distance for comparison technology in period t with the technology in period $t+1$ as $D_o^t(x^{t+1}, y^{t+1})$. This distance function measures the maximum proportional change in output (x^{t+1}, y^{t+1}) , which is possible with the technology in period t . If this point is outside the production possibility set in period t then a technical change has occurred. Output oriented *Malmquist's* productivity index for technology in period t (S^t) is

$$MPI_o^t = \frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)}$$

the productivity between periods t and $t+1$ has increased.

Other MPI can be defined using the technology from period $t + 1$ (S^{t+1})

$$MPI_O^{t+1} = \frac{D_O^{t+1}(x^{t+1}, y^{t+1})}{D_O^{t+1}(x^t, y^t)}$$

The output-oriented *Malmquist's* index is calculated as the geometric mean of the two indices

$$MPI_O^{t:t+1} = \left[\frac{D_O^t(x^{t+1}, y^{t+1})}{D_O^t(x^t, y^t)} \cdot \frac{D_O^{t+1}(x^{t+1}, y^{t+1})}{D_O^{t+1}(x^t, y^t)} \right]^{1/2}$$

The expression for MPI_O can be divided as follows

$$MPI_O^{t:t+1} = \frac{D_O^{t+1}(x^{t+1}, y^{t+1})}{D_O^t(x^t, y^t)} \left[\frac{D_O^t(x^{t+1}, y^{t+1})}{D_O^{t+1}(x^{t+1}, y^{t+1})} \cdot \frac{D_O^t(x^t, y^t)}{D_O^{t+1}(x^t, y^t)} \right]^{1/2}$$

The term which is not in angle brackets characterizes the change of technical efficiency (CTE), i.e. to which extent are the observed inputs away from the manufacturing capabilities of the period

$$CTE_O = \frac{D_O^{t+1}(x^{t+1}, y^{t+1})}{D_O^t(x^t, y^t)}$$

The expression in angle brackets characterizes technological change (CTH_O)

$$CTH_O = \left[\frac{D_O^t(x^{t+1}, y^{t+1})}{D_O^{t+1}(x^{t+1}, y^{t+1})} \cdot \frac{D_O^t(x^t, y^t)}{D_O^{t+1}(x^t, y^t)} \right]^{1/2}$$

so it is $MPI_O = CTE_O \cdot CTH_O$

MPI_O with the higher value of the unit indicating an increase in productivity, and the value less than one, the deterioration in productivity during the period. Of course, the same refers to the change of its components, i.e. if $CTE_O > 1$ the technical efficiency has increased, and if $CTH_O > 1$ the technological progress in the use of observed inputs has

occurred (education, skills, new technologies, investments, etc.). Also, it is possible that $MPI_o > 1$ and that a single component can be less than one, while the other is greater than one. When $x^t = x^{t+1}$ and $y^t = y^{t+1}$, there is no change in the input and output between periods, so it is $MPI = 1$. In this case the components of efficiency measures are changing and do not have to be equal to one as the change in technical efficiency can be a counterweight to technological change *Färe, R.* and others (1994).

In order to follow changes in productivity of the observed set of *DMU* through the time period t , $t = 1, 2, \dots, T$, the *DEA* methodology *Färe, R.* and others (1985) can be used for calculating *MPI*, by calculating for each DMU_k two measures for a single period $D_{Ok}^t(x_k^t, y_k^t)$ and $D_{Ok}^{t+1}(x_k^{t+1}, y_k^{t+1})$, and two measures for a combined period $D_{Ok}^{t+1}(x_k^t, y_k^t)$ and $D_{Ok}^t(x_k^{t+1}, y_k^{t+1})$. The output-oriented (CCRO) *DEA* model is used for their calculation, taking into account that the output distance function is the reciprocal Farrell's output efficiency measure. For each DMU_k there are two linear problems for the observed period to be solved. For instance, for t :

$$\{D_{Ok}^t(x_k^t, y_k^t)\}^{-1} = \max \theta_k$$

with constrains

$$\sum_{j=1}^n \lambda_j y_{rj}^t \geq \theta_k \cdot y_{rk}^t; r = 1, 2, \dots, s$$

$$\sum_{i=1}^m \lambda_j x_{ij}^t \leq x_{ik}^t; i = 1, 2, \dots, m$$

$$\lambda_j \geq 0; j = 1, 2, \dots, n; \theta_k - \text{no restrictions}$$

and two models for the combined period for example the reference technology in period t is

$$\{D_{Ok}^t(x_k^{t+1}, y_k^{t+1})\}^{-1} = \max \theta_k$$

with constrains

$$\sum_{j=1}^n \lambda_j y_{rj}^t \geq \theta_k \cdot y_{rk}^{t+1}; r = 1, 2, \dots, s$$

$$\sum_{i=1}^m \lambda_j x_{ij}^t \leq x_{ik}^{t+1}; i = 1, 2, \dots, m$$

$$\lambda_j \geq 0; j = 1, 2, \dots, n; \theta_k - \text{no restrictions}$$

With variable scale (VRS) further restriction $\sum_{i=1}^m \lambda_j = 1$ should be added.

In the case of mixed periods it can be obtained that a function of distance is greater than one, because (x_k^{t+1}, y_k^{t+1}) do not belong to technology S^t so it does not have to be below the efficiency limit for period t .

Once the necessary distances are obtained, $MPI_{Ok}^{t:t+1}$ can be calculated. For each period and for each DMUk scale efficiency (SE) can be calculated as a ratio of distance functions obtained by CCR and BCC model. Efficiency change can be calculated as the ratio of distances functions for that period using a variable response. Change of technical efficiency can be calculated as the ratio of distance functions obtained by CCR model.

$$SE_k^t = \frac{D_{Ok}^t(x_k^t, y_k^t)_{CCR}^*}{D_{Ok}^t(x_k^t, y_k^t)_{BCC}^*} = \frac{TE_k^t}{PTE_k^t} \quad CTE_{Ok}^t = \frac{D_{Ok}^{t+1}(x_k^{t+1}, y_k^{t+1})_{CCR}^*}{D_{Ok}^t(x_k^t, y_k^t)_{CCR}^*} = \frac{SE_k^{t+1} \cdot PTE_k^{t+1}}{SE_k^t \cdot PTE_k^t}$$

The index can be decomposed, Färe, R. (1988), the change of scale efficiency of pure technical efficiency (CPTE_O) and the change of scale efficiency (CSE_O), so the *Malmquist's* index can be written as follows

$$MPI_{Ok} = CPTE_{Ok} \cdot CSE_{Ok} \cdot CTH_{Ok}; k = 1, 2, \dots, n$$

To analyze efficiency of two groups of DMU that differ in a property, or the same group before and after an action to change their work, different tests can be used depending on the assumptions regarding the distribution of inefficient rate ($1/h_k^*$). The statistic that has the *F*-distribution for determining the differences between the DEA efficiency for the two groups of DMU (N_1 and N_2) is proposed by *Banker* (1989, 1993, 2010) using two assumptions, that the inefficiency estimate follows either exponential or half-normal distribution. Also, *Banker* (1993) has noted that these tests may be used only for large samples (sample size is not defined). Thus, the total number of observed units must be large ($n_1 + n_2$). In addition, each subgroup (n_1 or n_2) must be large. If the assumption on the distribution of DEA inefficiency ratio is not used, the following tests – *Kolmogorov Smirnov* test, the *Mann-Witney-s* or some other non-parametric test can be used for determining whether there are significant differences in inefficiency ratio of the observed DMU .

Empirical implementation

The data analyzed in this paper refer to the two groups of municipalities for the period 2006-2011. The first group (G1) are municipalities along the Danube - 27, and the second group (G2) are the municipalities that belong to the same region as the municipalities from the first group but do not lie on the Danube, and their number is 40.

The study focused on three inputs and one output:

I1 - the ratio of 'employed in the agricultural sector' and 'number of active residents' in %

I2 - the ratio of arable land under crops in relation to the utilized agricultural area in %

I3-investment in new fixed assets per active citizen in 000RSD

O1 - natural production of wheat and corn (t)

Table 1 presents the average data for the period, and Table 2 descriptive statistics of the observed inputs and outputs in groups.

For calculation of technical efficiency coefficients and Malmquist index's the original data were standardized on a scale [1,101] using the transformation

$$x_{std} = 100 \cdot \frac{x_{act} - x_{min}}{x_{max} - x_{min}} + 1$$

Based on the calculated coefficients of technical efficiency by year it is evident that in the first group - Sombor, Pancevo, Novi Sad, Zrenjanin and Majdanpek, and in the second group Kula, Vrbas and Sremska Mitrovica were efficient in all years. Other municipalities are inefficient, and each have a set of mentioned efficient municipalities for reference.

Due to the large amount of data the mean of the calculated ratios for the period were analyzed. Table 3 gives means of the calculated ratios and the geometric mean of the *Malmquist's* index and its components.

Table 1. Averages of inputs and outputs for the period 2006-2011

Group	District	Municipal (DMU)	I1	I2	I3	O1	
G1	Belgrade	Grocka	10,73	23,877	0,102	17200,33	
	Belgrade	Zemun	0,98	65,59	83,541	28130,17	
	Belgrade	Novi Beograd	0,26	60,958	3966,477	2217,333	
	Belgrade	Palilula	3,68	40,192	308,28	48524,17	
	Belgrade	Apatin	12,65	65,03	62,483	64200	
	West Backa	Odzaci	13,76	54,038	58,242	97835	
	West Backa	Sombor	14,57	60,902	157,81	325793,8	
	West Backa	Bela Crkva	26,57	51,328	140,793	49704,33	
	South Banat	Kovin	24,94	60,552	24,433	143387,3	
	South Banat	Pancevo	5,95	64,518	102,565	223439,8	
	South Banat	Novi Sad	2,38	50,975	312,755	128006,2	
	South Backa	Bac	26,65	33,375	91,351	42799	
	South Backa	Backa Palanka	13,9	53,16	101,687	133212,8	
	South Backa	Backi Petrovac	24,19	64,902	53,633	43403,67	
	South Backa	Beocin	9,51	42,203	0	17674,67	
	South Backa	Sremski Karlovci	3,17	32,542	0	3005,833	
	South Backa	Titel	22,67	55,235	169,368	63131,33	
	South Backa	Zrenjanin	11,21	50,92	81,883	254418	
	Central Banat	Indjija	10,87	64,788	164,828	117930,7	
	Srem	Stara Pazova	8,34	72,01	556,233	110758,5	
	Srem	Kladovo	15,48	23,822	7,9	19156,33	
	Bor	Majdanpek	15,04	19,575	0	6649,667	
	Bor	Veliko Gradiste	58,09	52,162	0	41179	
	Branicevo	Golubac	38,13	32,007	0	11700	
	Podunavlje	Smederevo	14,54	52,392	22,601	69423,83	
	G2	Belgrade	Barajevo	12,76	40,163	0	16721,83
		Belgrade	Vozdovac	0,63	33,255	68,113	8324,833
		Belgrade	Zvezdara	0,49	8,853	9,832	231,333
		Belgrade	Lazarevac	6,46	45,432	6,247	35792,83
		Belgrade	Mladenovac	14,97	44,177	0	47541
		Belgrade	Obrenovac	14,82	56,462	10,789	59821
		Belgrade	Rakovica	0,27	32,788	102,655	535,667
		Belgrade	Sopot	18,17	44,867	0	22714
		Belgrade	Surcin	5,12	50,21	485,676	35269,33
		Belgrade	Cukarica	0,55	39,27	180,449	6591,333
		Belgrade	Kula	7,62	61,772	137,226	135316,3
		Belgrade	Alibunar	32,31	61,963	25,389	151834,2
		West Backa	Vrsac	14,71	49,277	12,358	127918,5
		South Banat	Kovacica	31,09	62,257	11,251	123492,2
South Banat		Opovo	34,54	64,28	19,949	62224,67	
South Banat		Plandiste	19,49	49,282	52,869	72899	
South Banat		Becej	21,58	54,24	43,276	124293,2	
South Banat		Vrbas	5,14	66,153	216,368	122884,8	
South Backa		Zabalj	20,03	55,893	53,986	103341,5	
South Backa		Srbobran	21,09	46,108	19,858	71336	
South Backa		Temerin	7,06	40,357	307,54	42023,83	
South Backa		Zitiste	37,92	58,732	108,47	128559,2	
South Backa		Nova Crnja	35,53	56,1	2,578	58862,67	
Central Banat		Novi Becej	18,47	45,643	9,254	110482,7	
Central Banat		Secanj	28,06	51,038	71,664	110733,2	
Central Banat		Irig	25,5	50,538	6,941	33882	
Central Banat		Pecinci	30,36	63,683	29,631	80937,67	
Srem		Ruma	14,84	66,938	9,737	149064,5	
Srem		Sremska Mitrovica	17,4	61,287	4,447	171263	
Srem		Sid	22,72	54,663	26,576	120636	
Bor		Bor	7,01	19,337	0	21848,5	
Bor		Negotin	35,75	29,175	0,448	53044,67	
Branicevo		Pozarevac(withKostolac)	12,77	56,02	10,952	83779,17	
Branicevo		Zabari	66,4	58,057	0	41032,5	
Branicevo		Zagubica	49,9	13,292	0	18983	
Branicevo		Kucevo	29,29	21,195	0	21839	
Branicevo		Malo Crnice	68,55	57,422	0	42258,17	
Branicevo		Petrovac na Mlavi	59,32	37,41	0	59055,17	
Podunavlje		Velika Plana	24,5	66,39	0,108	67054,67	
Podunavlje		Smederevska Palanka	25,08	49,318	4,02	61992,17	

Source: These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 2007-2012, by Statistical Office of the Republic of Serbia, Belgrade

Table 2. *Descriptive statistics of averages the period 2006-2011*

year		I1	I2	I3	O1
G1	Max	0,26	19,575	0	2217,333
	Min	58,09	72,01	3966,477	325793,8
	Average	15,53	49,882	258,679	82515,27
	SD	0,26	19,575	0	2217,333
G2	Max	0,27	8,853	0	231,333
	Min	68,55	66,938	485,676	171263
	Average	22,457	48,082	51,216	70160,38
	SD	16,957	14,683	97,053	47319,99

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 2007-2012, by Statistical Office of the Republic of Serbia, Belgrade*

Based on the MPI it can be concluded that in this period there was an increase in productivity in the first group only in Grocka and Majdanpek by 19.87% and 4.59% respectively, and in the second group in the municipalities of Zvezdara, Plandiste, Zabalj, Srbobran and Secanj by 21.1%, 2.2%, 8.4%, 2.8% and 3.73% respectively. In all other municipalities average productivity index is less than 1.

When analyzing the changing of MPI components it can be seen that in all municipalities the index of technological change is less than 1, and that in some municipalities the technical efficiency has increased. In the first group those are the municipalities Grocka, Apatin, Odzaci, Beocin, Srem Karlovci, Titel and Indjija with an increase of 0.61% to 36.09%. In the second group there are 18 municipalities with the increase of technical efficiency from 1.46% to 10.15%. Regardless of increase in technical efficiency due to the reduction of technological changes index of productivity in most municipalities was less than 1.

Regarding the change in pure technical efficiency, 10 municipalities of the first and 12 municipalities the second group have pure technical efficiency increased, in 8 municipalities of the first and 7 municipalities of second group there is no change, while in others it has decreased. Scale efficiency has increased in 10 municipalities of the first and 20 municipalities of the second group, in 3 municipalities of the first and 3 municipalities of the second group did not change, while in others it has decreased. In some municipalities scale efficiency increased and pure technical efficiency decreased, and in some municipalities it was vice versa.

Table 3. *The means of the calculated coefficients for the period 2006-2011*

Group	Municipal (DMU)	CCRO	BCCO	SE	MPI	CTH	CTE	CPTe	CSE	
G1	Grocka	0,58907	0,96629	0,59812	1,19886	0,88096	1,36087	1,04612	1,30088	
	Zemun	0,52255	1	0,52255	0,89073	0,92688	0,961	1	0,961	
	Novi Beograd	0,11929	0,99998	0,1193	0,94183	0,94756	0,99395	1	0,99395	
	Palilula	0,40709	0,72625	0,57663	0,88375	0,9027	0,97901	0,87728	1,11596	
	Apatin	0,25646	0,28773	0,89944	0,95301	0,85836	1,11027	1,09134	1,01735	
	Odzaci	0,38624	0,39095	0,98859	0,82285	0,79541	1,03449	1,02965	1,0047	
	Sombor	1	1	1	0,94299	0,94299	1	1	1	
	Bela Crkva	0,19396	0,19672	0,98559	0,86165	0,87133	0,98889	0,99073	0,99814	
	Kovin	0,65708	0,78522	0,84714	0,77275	0,78136	0,98898	0,95787	1,03247	
	Pancevo	1	1	1	0,92214	0,92214	1	1	1	
	Novi Sad	0,99871	1	0,99871	0,91836	0,91836	1	1	1	
	Bac	0,3565	0,36891	0,96554	0,84019	0,86864	0,96725	0,9686	0,9986	
	Backa Palanka	0,51648	0,59412	0,91123	0,86446	0,89249	0,96859	0,87768	1,10358	
	Backi Petrovac	0,15547	0,19742	0,84334	0,88568	0,929	0,95337	0,90949	1,04824	
	Beocin	0,15199	0,81188	0,19317	0,85394	0,83076	1,0279	1,19003	0,86376	
	Sremski Karlovci	0,04975	0,9997	0,04977	0,96911	0,91255	1,06198	1,00003	1,06197	
	Titel	0,22873	0,24445	0,93668	0,93163	0,91415	1,01913	1,01194	1,00711	
	Zrenjanin	0,99896	1	0,99896	0,84969	0,85075	0,99875	1	0,99875	
	Indjija	0,48461	0,69899	0,77318	0,90138	0,84758	1,06347	1,22751	0,86636	
	Stara Pazova	0,41192	0,47022	0,88413	0,94524	0,98175	0,96281	0,97684	0,98563	
	Kladovo	0,50656	0,76099	0,70671	0,66481	0,79847	0,83259	0,99998	0,83261	
	Majdanpek	0,86978	0,99979	0,86984	1,04596	0,8468	1,23519	1,00025	1,23488	
	Veliko Gradiste	0,31572	0,86553	0,363	0,85481	0,8455	1,01102	1,11081	0,91017	
	Golubac	0,14057	0,50975	0,2956	0,91479	0,90318	1,01286	1,11921	0,90498	
	Smederevo	0,37542	0,78643	0,55527	0,66025	0,67285	0,98127	1	0,98128	
	G2	Barajevo	0,18485	0,36815	0,5215	0,92217	0,96944	0,95124	0,86492	1,0998
		Vozdovac	0,68627	0,9988	0,68683	0,96833	0,93744	1,03295	1	1,03295
		Zvezdara	0,61849	1	0,61849	1,21149	0,83947	1,44316	1	1,44316
		Lazarevac	0,50371	0,66375	0,82061	0,97382	0,95978	1,01463	1,11475	0,91019
		Mladenovac	0,45184	0,84471	0,55991	0,93379	0,93969	0,99372	0,90157	1,10221
Obrenovac		0,42606	0,42843	0,99438	0,9511	0,95943	0,99132	0,9912	1,00013	
Rakovica		0,14561	1	0,14562	0,98496	0,95297	1,03357	1	1,03357	
Sopot		0,21724	0,39206	0,59346	0,91464	0,92975	0,98375	0,89069	1,10448	
Surcin		0,36664	0,3746	0,97899	0,85951	0,92502	0,92918	0,92523	1,00427	
Cukarica		0,51861	0,98286	0,52961	0,97668	0,90276	1,08188	1	1,08188	
Kula		0,99411	0,99443	0,99967	0,95573	0,95573	1	1	1	
Alibunar		0,88873	0,92078	0,96231	0,94706	0,94128	1,00614	0,9909	1,01538	
Vrsac		0,95467	0,95611	0,99814	0,94898	0,95192	0,99691	0,99713	0,99977	
Kovacic		0,71513	0,79493	0,9045	0,99455	0,97932	1,01556	1,00005	1,01551	
Opovo		0,36308	0,39055	0,92711	0,9918	0,98803	1,00382	1,01546	0,98854	
Plandiste		0,53463	0,53697	0,99574	1,02252	0,9771	1,04648	1,04751	0,99902	
Becej		0,80332	0,81618	0,98483	0,99656	0,97088	1,02646	1,02415	1,00224	
Vrbas		1	1	1	0,98161	0,98161	1	1	1	
Zabalj		0,71619	0,72611	0,98402	1,08422	0,98428	1,10153	1,10058	1,00087	
Srbobran		0,56375	0,57376	0,98338	1,0279	0,98507	1,04348	1,04703	0,99661	
Temerin		0,4755	0,48984	0,97263	0,98513	0,99398	0,9911	0,98353	1,0077	
Zitiste		0,76856	0,80273	0,95736	0,9872	0,95501	1,03371	1,02653	1,00699	
Nova Crnja		0,41968	0,52323	0,88833	0,98295	0,96739	1,01608	1,01779	0,99832	
Novi Becej		0,88841	0,94665	0,94088	0,99331	0,96527	1,02906	1,02419	1,00475	
Secanj		0,76281	0,77366	0,98577	1,03739	0,97931	1,0593	1,05418	1,00486	
Irig		0,27804	0,32155	0,91587	0,98083	0,95835	1,02346	1,02834	0,99525	
Pecinci		0,46818	0,51342	0,91226	0,94836	0,98196	0,96578	0,9779	0,98761	
Ruma		0,97142	0,97542	0,99594	0,94332	0,94414	0,99913	0,99951	0,99962	
Sremska Mitrovica		1	1	1	0,98944	0,98944	1	1	1	
Sid		0,77666	0,78974	0,98345	0,95276	0,97554	0,97665	0,97729	0,99934	
Bor	0,62142	0,9502	0,65769	0,84302	0,95595	0,88187	0,93186	0,94636		
Negotin	0,74336	0,88161	0,83918	0,88864	0,91031	0,97619	0,96336	1,01331		
Pozarevac(sa Kostolcem)	0,64298	0,72018	0,9177	0,93426	0,94642	0,98715	0,98615	1,00102		
Zabari	0,31317	0,5354	0,61622	0,96346	0,91046	1,05821	0,93727	1,12903		
Zagubica	0,84881	0,96334	0,87551	0,65943	0,71567	0,92142	0,98481	0,93563		
Kucevo	0,49475	0,65319	0,75484	0,87702	0,94147	0,93154	0,94992	0,98065		
Malo Crmice	0,32305	0,55157	0,61803	0,99222	0,92314	1,07484	0,95126	1,12991		
Petrovac na Mlavi	0,64436	0,9175	0,70666	0,94595	0,98243	0,96287	0,95818	1,0049		
Velika Plana	0,48166	0,84256	0,61149	0,89268	0,90927	0,98175	0,87851	1,11752		
Smederevska Palanka	0,47701	0,56059	0,9098	0,88342	0,92553	0,9545	0,95852	0,99581		

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 2007-2012, by Statistical Office of the Republic of Serbia, Belgrade*

Analysis of the total productivity and other specified components must be interpreted with caution considering the available data for inputs and outputs. It is of interest for further analysis to include other inputs such as the amount of spent materials, labor structure, etc. Regretfully, the evidence of these data is not available or does not exist at the municipal level for a longer period of time. Based on the calculated coefficients for observed groups of municipalities, nonparametric test verified the hypotheses of the equality of these parameters in the two groups. Considering the size of the sample ($n < 50$) *Mann-Whitney U* statistic, based on the median was used. The descriptive statistics and results of the comparison of means in the observed groups are given in Table 4 .

Table 4. *Descriptive statistics of the calculated coefficients for the period 2006-2011*

Group	Descriptive statistics	CCRO	BCCO	SE	MPI	CTH	CTE	CPTE	CSE
G1	Mean	0,46772	0,70645	0,71530	0,89163	0,87370	1,02055	1,01541	1,00889
	Std.Dev.	0,30171	0,29136	0,30351	0,10659	0,06548	0,09872	0,08203	0,10391
	Min	0,04975	0,19672	0,04977	0,66025	0,67285	0,83259	0,87728	0,83261
	Max	1,00000	1,00000	1,00000	1,19886	0,98175	1,36087	1,22751	1,30088
	Median	0,40709	0,78522	0,84714	0,89073	0,88096	1,00000	1,00000	1,00000
G2	Mean	0,60132	0,73689	0,83122	0,95821	0,94655	1,01301	0,98751	1,02723
	Std.Dev.	0,23924	0,22430	0,19547	0,07942	0,04850	0,08294	0,05264	0,08335
	Min	0,14561	0,32155	0,14562	0,65943	0,71567	0,88187	0,86492	0,91019
	Max	1,00000	1,00000	1,00000	1,21149	0,99398	1,44316	1,11475	1,44316
	Median	0,59112	0,79234	0,91407	0,96590	0,95584	1,00000	0,99832	1,00163
p	Mean	0,54993	0,72518	0,78663	0,93260	0,91853	1,01591	0,99824	1,02018
	Std.Dev.	0,27074	0,25042	0,24710	0,09576	0,06570	0,08866	0,066326	0,09146
	Min	0,04975	0,19672	0,04977	0,65943	0,67285	0,83259	0,86492	0,83261
	Max	1,00000	1,00000	1,00000	1,21149	0,99398	1,44316	1,22751	1,44316
	Median	0,50656	0,78643	0,89944	0,94524	0,93744	1,00000	1,00000	1,00013
p	Mann-Whitney U	0,045	1,000	0,200	0,000	0,000	0,909	0,169	0,243

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 2007-2012, by Statistical Office of the Republic of Serbia, Belgrade*

Based on the results of testing the hypothesis it can be concluded that at the level of significance of 5% there is the difference in total technical efficiency, and that it is greater in the second group ($0.59112 > 0.40709$). At the level of significance of 1%, there is significant difference in the productivity index ($0.96590 > 0.89073$) and in the technological change ($0.95584 > 0.88096$) in these two groups. Since it is a technological change of MPI components it has led to its increase. Thus, the first group has less reduced technological change, for 4.42%, compared to 10.93% for the second.

Conclusion

In this paper authors analyzed the changes in productivity in 65 municipalities in Serbia in the period 2006-2011. The municipalities were divided in two groups. The first group (G1) comprised the municipalities that lie on the Danube (25), and the second group (G2) municipalities belonging to the same region as the municipalities from group G1 but did not lie on the Danube. The output CCR and BCC model were used in the analysis, based on those models the geometric mean of Malmquist's productivity index and its components were calculated. In most municipalities of these two groups productivity did not increase. There have been no technological changes in any of the analyzed municipalities, while in the number of municipalities there has been an increase in total technical efficiency, but because of the decrease of technological changes, index of productivity in most municipalities was less than 1. Observed groups differed in total technical efficiency and technological change, while the second group had better performance compared to the corresponding coefficients. Considering the available data these conclusions should be taken with caution and further analysis should be initiated taking into account inputs such as the amount of spent materials, labor and similar.

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IMPLEMENTATION OF GLOBALGAP STANDARD AS THE COMPARATIVE ADVANTAGES OF THE SERBIA¹

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Abstract

Increased competition in the domestic market should improve product quality and supply. Implementation of GLOBALGAP type of standard in the agriculture can greatly increase a supply of high quality agricultural and food products and influence the positioning of Serbia as a leader in the production of high quality agricultural products. Foreign trade liberalization and the creation of a free trade zone, excluding the above uses, raises a number of challenges. In fact, there is a significant presence of foreign supply and increased competition in the market of agricultural and food products. It is realistic to expect a decline in the product price, which may be a problem for domestic producers reducing their income.

Keywords: *the Republic of Serbia, Globalgap, Standards, HCCP, CEFTA, EU*

Introduction

Growth in exports of a country is determined by the both natural resources and quality of end products which are considerably determined by the quality standards. The Republic of Serbia must not overlook the fact that in order to fully use the natural resources of the country, it is necessary to substantially increase the intensity of production, or invest in

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current production and development, as well as in the introduction and implementation of the modern standards in agricultural production. GLOBALGAP standard is the standard that can provide to Serbia a long-term preservation of the leadership position in the CEFTA market (primarily), and in other markets such as the EU market. Introduction of *GLOBALGAP* standard and its full implementation is undoubtedly a comparative advantage available to the Serbian agriculture. In order to achieve the growth prospects and the increase in the intensity of the Serbian agro-industrial complex, it is necessary to constantly monitor the market (marketing opportunities and conditions) and the price parity (price ratios: raw material-product, product-product and product-processing). EU and CEFTA markets offer some great opportunities for launching Serbian agricultural products, but also they carry a great risk if the economy of a country falls asleep.

Data sources and methodology

Primary data sources are sources of the Ministry of Agriculture, Chamber of Commerce and other relevant sources. A comparison of regulations for the groups of products was made according to the Standard International Trade Classification (SITC). This research is based on the so-called "Desk research", which implies a processing and comparing of available data. Also, the content analysis of adopted documents has been performed taking into account previous results of the studies discussing this issue.

Research results

There are a number of aggravating measures that directly or indirectly affect the foreign trade, and standards in the food production stand out as particularly sensitive limiting factor in import - export. Many standards have been in force for many years, and some of them (ISO standard or HACCP) do not require further analysis. A food production itself as the production of consumer goods is subject to a specific standardization. It was necessary to standardize the production in order to ensure the consumption of a safe and healthy food product to the end consumer. Food sector makes demands on agriculture as a source of raw materials. As a result, the agriculture already includes modern solutions such as GPP (Good Production Practice), ISO system, HACCP and others. Currently a delay in fulfilling the quality requirements of the market has

been recorded. Quality development is associated with a number of difficulties in the existing organizational and fragmented agriculture. Therefore, it is necessary to gradually introduce quality standards and regulations on packaging and labeling, which would be harmonized with the health and environmental protection standards (ISA) set out in the EU. The GLOBALGAP standard which is under intensive implementation within the EU, may represent an obstacle to the new members of the European Union that come from CEFTA region. In fact, GLOBALGAP (formerly known as EUREPGAP) is a body that has set its own standards of good agricultural practices in order to perform certification of agricultural products around the world. This body was founded in 1997 by *Euro Retailer Produce Working Group* (EUREP) as an initiative of the British and European supermarket chains (*FAOSTATDataBase, 2007*). Due to the successful expansion of the certification scheme, in 2007 changed its name to GLOBALGAP. Today, it is an association of wholesalers and retailers, manufacturers and other participants in the production, distribution and retailing of agricultural products. In all GLOBALGAP decision-making bodies producers and merchants equally participate (www.fao.org, 2008). The basic underlying principles of GLOBALGAP are:

- Limited and controlled use of all types of agricultural chemicals,
- Hygienic handling during production and handling of agricultural products,
- Providing guidance and records of all activities to ensure traceability
- Unique rules allowing impartial verification (confirmation that everything was as it should),
- Mutual communication and exchange of views between producers, merchants and product users,
- Protecting the environment and sustainable development,
- Responsible treatment of employees on the farm,
- Concern for the welfare of animals on farms,

Certification is conducted by the certification bodies, qualified and authorized for product certification by the national accreditation organizations and the GLOBALGAP secretariat that carries out the certification. The product certification is carried out by checking the entire production process from the beginning to the end. This includes

control of all inputs and all activities during the production, storage and transportation. The farms that produce multiple products are checked once a year regularly. The certificate is for the communication between producers and merchants and is not visible to the product end users (www.sme.sr.gov.rs, 2008). Certification includes annual inspections of producers and additional unannounced visits during the year. Certification applies to the registered land and products of individual producer (producer groups, cooperatives), and the certificate is valid for one year. GLOBALGAP is applicable to all types of agricultural products whose production requires development of specialized requirements. Standard of this type functions as a service which provides to its users a reliable general and specific "tools", allowing the positioning to each partner in the supply chain, warehousing, transportation and trade, on the global market in accordance with the requirements of end users (*Zygmunt Janise, 2008*). Complete documentation consists of:

- The general requirements contained in the system: "General Requirements (GR-General Regulations)
- Requirements for good agricultural practices contained in "Control Points and Compliance Criteria" (CPCC Control Points and Compliance Criteria)
- Documents for inspection: " Checklist" (CL - Checklists)
- National requirements for good agricultural practice given as documents that have been developed by some countries (England, France, Germany, Netherlands, Belgium...)
- Tools for standardization of practice given as: Comparison Checklist (Benchmarking Cross Reference Checklist-BMCL)

General requirements contain information about:

- basic rules of certification and certification rules,
- rules for certification bodies,
- certification of producer groups.

The "Control points and compliance criteria" set out the basic guidelines to producers for meeting the requirements set out by standards that will be checked during certification. This document is divided into areas and sub-areas in which are listed:

- all control points that the producer must adhere,
- how to comply with the request,
- conformity criteria for each request.

The checklists contain only the control points. There are three types of checklists:

- for producers, also used by certification bodies, and may be used by producers during self-inspection- internal control,
- list for a quality management system that is used for the certification of producer groups and used by certification bodies as well as by the producers for self-inspection.

In addition to the standards related to the agricultural production, two more standards were developed:

- The production of seed and planting material (PPM- Propagation Material)
- Animal food production (CFM - Compound Feed Manufacturers)

In addition to the basic standards set forth above, there are other useful documents, such as the standard for pesticide content in a product.

Benefits of certification according to the GLOBALGAP requirements

The large supermarket chains that dictate the rules of trade in agricultural products sold to the end-consumers recognize the demands of their customers and pass them to the suppliers - manufacturers in the form of a request of GLOBALGAP standard. The basic requirements of end users are:

- healthy, quality and biologically valuable food,
- manufacturer's responsibility to protect the environment,
- humane treatment of employees on the farm,
- concern for animal welfare.

Knowing how hard is to achieve the reputation among consumers, and very easy to lose, more and more large supermarket chains operating in the CEFTA market, are taking control measures to prevent any possible

compromise to the quality and safety of goods they sell. Economic logic made them become the protectors of their customers. A responsible primary agricultural production is an essential precondition for the safety of agricultural products. Therefore, farmers are increasingly focused on the implementation of guidelines for good agricultural practice, including maximum control of use of agro chemicals and hygienic handling of food.

A product certification system provided by GLOBALGAP is currently no mandatory standard within the CEFTA region, but is considered to be sufficiently reliable control system for agricultural producers, which guarantees to the customer the expected quality of agricultural food products (*World Agriculture, 2004*):

- large supermarket chains are not willing to develop their own services that would control agricultural producers on the field,
- laboratory control of each shipment of agricultural product would raise the end product price to an unacceptable level,
- level of control applied by the certification bodies is sufficient to determine all the serious irregularities in the performance of agricultural manufacturers.

GLOBALGAP is present in 80 countries. By 2008 more than 100,000 manufacturers in the European Union certificated their products in order to ensure its distribution through the large retail chains that preferably distribute such certified products. Some retail chains fully condition shopping by holding these certificates, and it is expected that the GLOBALGAP standard will be binding on CEFTA markets in future, since many of the large retail chains have aspirations to expand in Southeastern Europe. This standard enables producers, regardless of their size and organizational form (individual /cooperative) to appear on the market in any part of the world, if they have the GLOBALGAP certification. In Serbia, certification according to the GLOBALGAP standard has not yet found wide application. But the food industry is the best example of why we should not give it up. A few years ago the HACCP standard represented an enigma, as well as the standard requirements for the production of healthy food products issued by the Codex Alimentarius Commission. Today, all our food manufacturers are conditioned by the large supermarkets in Serbia and foreign customers from the CEFTA and European Union to have a certified food safety

management system - HACCP, which gave priority to those who introduced and certified HACCP system on time (*EBRD Transition Report, 2002*). Implementing the GLOBALGAP standard as a good manufacturing practice, would undoubtedly enable the realization of the competitive advantages of the agricultural food products from the Republic of Serbia in the markets of the CEFTA agreement.

The manner of implementation of GLOBALGAP standard

The manufacturers involved in production of agricultural and food products in the zone covered by the CEFTA agreement would be trained by a competent organization for the implementation of GLOBALGAP standard. A manufacturer or producer groups, independently or with the assistance of the consultants, in line with standards should (*Weidenfeld, W. Wessels, W., 2005*):

- enable facilities and equipment for good agricultural and hygiene practice,
- provide inputs from legal flows supported by the adequate proofs of quality and health safety,
- prepare written work instructions necessary,
- establish necessary records and regularly keep records to provide evidence of applied activities and traceability identifying what is made from which material, how and by which substance the product was treated and where was dispatched,
- provide adequate transportation and storage of inputs and products,
- ensure adequate water supply,
- provide adequate waste management,
- provide conditions for the proper handling of agro chemicals,
- train employees on the rules of good agricultural and hygiene practices and maintenance of personal hygiene,
- establish pest control,
- establish a system of marking everything on the farm,
- establish a system of declaring-labeling prior to delivery,
- establish a system of control at the end of production process and before delivery,

- conduct an internal self-check inspection to determine whether everything is fine and recorded in the checklist.

Producer groups (organization, cooperatives, associations ...) should meet the following requests:

- to document the legality of organization,
- to document the organizational form of organization and relationships between manufacturers,
- to identify contracts made between each manufacturer and organization,
- to establish a register of manufacturers,
- to appoint a management representative with full responsibility,
- to appoint a representative for GLOBALGAP and for QMS Quality Management System,
- to implement QMS
- to organize internal monitoring for GLOBALGAP and for QMS
- to employ agricultural / livestock engineer
- to document the responsibility and tasks of each member in organization,
- to ensure the competence and training of all employees and members in organization,
- to document Rules of quality and procedures,
- to determine and document the manner of conducting control of documents and records (to determine the type of documents and forms, to prepare and distribute).

Model in which the producer groups are applying for certification is specifically interesting to agricultural producers in the Republic of Serbia. In fact, due to lack of funds, this type of organization for the sake of certification significantly facilitates the financing thereof. It should also be borne in mind that the farms in the Republic of Serbia are fragmented, and if individuals are included in the certification process and want to finance through loans, they are often not able to receive the funds due to the small plots on which they put the mortgage. This problem should be primarily located of the local government and it should help manufacturers with FF territories to organize in the form of cooperatives or clusters. On the other side, the other higher forms of government

(Ministry of Agriculture) this form of organization should encourage with subsidies or favorable credits to be spent specifically. If the individual decides for the whole certification, all process as well as the cost of it shall be borne by individual households, that can be a limiting factor in the process.

The manufacturer addresses to the certification body and apply for the certification when he finds that has fulfilled all requests required by the standard. The certification process involves the assessment of practice and registries for the entire production cycle of the product to be certified and therefore the application for certification must be submitted in a timely manner. The certification according to the GLOBALGAP standard shall be implemented through the certification body approved by GLOBALGAP, to which a producer or group of producers of primary agricultural products submit an application for certification (*Ranchev Georgi, 2002*).

Manufacturer's Rights

Manufacturer receives the GLOBALGAP registration number issued by the GLOBALGAP accredited certification body, maximum 14 days from the date of application (*Atkins, P., Bowler, I., 2001*). After obtaining the number, the manufacturer enters into an initial contract with the certification body for at least 3 years. This contract may be later renewed or terminated. Any appeal or petition submitted to the certification body shall be considered by the certification body. If a producer is not satisfied with the response, the appeal may be submitted to the GLOBALGAP Secretariat on a special form, available to the manufacturer which has been registered or has the unique GLOBALGAP number (www.fao.org, 2009). The manufacturer may apply for different certification options, but cannot apply by using more different certification options for the same product. Application can be submitted to the one certification body for one product, and for another product to another certification body in the following cases:

- a) The manufacturer wants to certify more than one product in a variety of certification options;
- b) The manufacturer is a member of several groups of producers;
- c) The manufacturer requires cross-certification of areas and/or sub-areas.

Any group of manufacturers can seek suspension of a certificate from the certification body authority, if, for example, is unable to meet the required criteria.

Obligations of the manufacturer/group

Manufacturer or group of manufacturers that possess certificate are responsible themselves for the compliance of certified products. The manufacturer shall be registered by an accredited certification body, and registration must be completed prior to the inspection. A producer sanctioned by the certification body can change the certification body only when eliminates non-conformities or when the penalty period determined by the certification body expires. When applying for the GLOBALGAP, the manufacturer must report all locations and areas under a product for which certification has been requested (*Kuzman, B., Potrebic, V., 2011*). It is important to note that in checking the areas it is needed to pay special attention to areas that are close to the surface to be certified. It often happens that the areas that are close to, or even have a line of demarcation, contaminated with various chemicals. Particular attention should be given to the use of insecticides, fungicides, herbicides and fertilizers. The use of these products in the near surface for which the manufacturer seeks certification undoubtedly limits the receipt. The movement of these types of chemicals when they are used in the immediate vicinity of land that is certified, it is virtually impossible to limit. All of the above products in a very short period of time contaminate untreated surfaces as through air and through water or due to irrigation. So the areas and the locations for introducing the GLOBALGAP standard have to be free of chemicals. The manufacturer shall inform the certification body on all amendments to internal procedures, such as changes in the areas under a product or in case of the changes in the number of members within the producer group.

Certification process

The standard has been developed in the different modules whereby each covers different areas or activities undertaken during the production:

- **areas:** the entire farm, crops, livestock and aquaculture
- **sub-areas:** covering specific products - fruits and vegetables, coffee, tea, poultry, dairy ...

When applying for the certification of a product a group of manufacturers is required to report all surface areas under such product and to include every manufacturer that produces a product that will be certified.

Crops Certification

Records on the crop must be kept at least 3 months prior to the harvest-picking and after completion of the registration, in order to meet requirements for certification (www.fao.org, 2009).

a) Inspection at the time of harvest

The best time for inspection is when is possible to check all the records and all the control points.

b) The first alternative inspection

When there are no conditions to carry out an inspection at the time of harvest, the first alternative inspection will be performed before or after the harvest. Certification body must provide explanation and include it in the inspection report. In this case the unannounced or subsequent inspections by the certification body are possible.

c) The first inspection when more than one crop that are not harvested at the same time

1. Crops that ripen at the same time

The certification body selects representative crop, as close as possible to the time of harvest, that will be checked and on which basis a conclusion regarding other crops will be made in terms of whether are being cultivated under the same conditions (control points and conformity criteria).The certification body may decide to carry out a subsequent inspection of other non-represented crops.

2. Crops that do not ripen at the same time

The first inspection must be carried out during the harvest of the first crop while the next crops will be checked during the same year and can be included in the certificate if the control points are verified either by checking the places of production or in the harvest.

If the crop or product is not present at the time of the first inspection, the certificate shall be extended for three months, and the total term of the certificate is 15 months. This means that the manufacturer must renew the registration issued by the certification body extending in such a way the validity of the certificate. The following inspections may be conducted at any time, and no earlier than 6 months before the expiry of the first certificate and also 3 months before the expiry of the certificate (www.fao.org, 2009).

Livestock Certification

- a) A registered livestock must be present during the first inspection;
- b) Subsequent inspections are performed in the same way as for the crops except in the case of cattle, sheep and dairy;
- c) For cattle, sheep and dairy production the extension of the certificate can be made every 18 months, but only if the manufacturer has fulfilled all the conditions listed in the specification.

Registration of manufacturers and products must be renewed during the year, and before the expiration. The certificate cannot be issued until all the questions from the evaluation list are checked.

Certification Options

In order to hold certificate, the manufacturer must be registered and certified each year. There are 4 options of certification:

- Option 1-certification of the individual manufacturer or company
- Option 2 - certification of producer groups
- Option 3-comparative certification of individual producers
- Option 4-comparative certification of producer groups (Benchmarking)

Benchmarking certification is applied on request of the clients who check their equivalence by comparing content and criteria in relation to the GLOBALGAP. Each manufacturer has its own unique identification GLOBALGAP number. This number is placed on the packaging of the product for which the manufacturer holds the certificate, and uses it for the purpose of traceability. The term traceability is very indicative about

the product, method of cultivation, land and even about the manufacturer. Choosy market – with stronger purchasing power increasingly insist on traceability of products, both primary agricultural and food products and the produce. European Union market in particular insist on traceability, but we can not overlook the fact that the Republic of Serbia raises another very important markets such as the market of the Russian Federation and China. The Russian Federation in the future should be one of the most interesting markets for the Republic of Serbia, if we take into account the agreement between the two countries on the zero rate of sales of goods produced in Serbia. You should also take into account any significant buying power of the market which is directly proportional to growth in consumption of organic products (certified), where you can clearly demonstrate traceability in manufacturing. It should be payed special attention to the certification and conduct cotrol in the terms provided in order not to violate the postulate of the quality of such products. Organization dealing with certification must be competent in the field of the issued certificate. The certification body determines the registration number which is used for identification together with a manufacturer's number. This is composed of the abbreviated name of the certification body and digits (www.fao.org, 2009). Therefore, it can be clearly concluded that the certification process requires, in addition to time, the considerably material resources. Standardization and certification can be a limiting factor for export and an important tool in gaining competitive advantage when exporting to the developed countries (European Union) or to the market that includes CEFTA agreement. It is important to note that the Republic of Serbia could protect its market of agricultural and food products by the measures of standardization as a form of non-tariff barriers to the uncontrolled import of agricultural and food products. Non-tariff barriers are all forms of controlling imports and exports, with the exception of customs. The World Trade Organization has been notified of more than 2,000 non-tariff barriers (www.siepa.gov.rs, 2007). If the non-tariff barriers are necessary to protect the health and safety of people, animals, plants or the environment, then their introduction is justified. Every government recognizes that some trade restrictions may be necessary to ensure safety food and health protection of plants and animals. But sometimes governments are under pressure to agree on more than what is considered sufficient for the protection of plant and animal health and food security. They are sometimes required to implement sanitary and phytosanitary restrictions to protect domestic producers from economic competition.

Sanitary or phytosanitary restrictions that require the protection of human health can be extremely powerful and effective protectionist tool, and because of its technical complexity can be a barrier to trade of agricultural and food products. Standardization itself is significantly more elegant way to protect the domestic market, and therefore consumers of agricultural and food products.

Conclusion

In order to achieve a better perspective of the results in terms of agricultural production and in terms of foreign trade, it is realistic to consider all the factors that determine the position of the Republic of Serbia in the globalization of trade. If we analyze the competitiveness of the agro-industrial complex of the Republic of Serbia, the same can be seen only integrated (primary agriculture and food industry). This is because the very primary production as raw material sector is not competitive to other areas of the economy because of its specificities (long production process, the major impact of natural factors, slow turnover, production of strategic products, etc..). The output from these fields of agroindustrial complex Serbia should seek in the production of high quality organic food. Namely, with the production of certified agricultural food products which are standardized and recognized as such in the market, the Republic of Serbia can in a very short period of time achieve the leading position in the production of organic food. When introducing the certification of its products the CEFTA countries must implement EU principles. If the Republic of Serbia wants to participate equally in the market of the European Union must have a clear vision for the future implementation of GLOBALGAP standard and other standards required by the very selective EU market. Implementation of GLOBALGAP standard is not only imperative for appearing on the EU market. GLOBALGAP standard allows easier access to CEFTA market and its finicky consumers.

Also, in the future special attention should be paid to Russia and China, where consumers are becoming extremely choosy while purchasing power of this market has a tendency of constant growth. Serbia has a relatively well-preserved natural environment and therefore the implementation of GLOBALGAP should not be a particular problem. However, the funds required for standardization are not low, therefore the manufacturers from the Republic of Serbia must work closely with the administrative authorities. Besides the organization at the highest level, where is primarily the

Government of the Republic of Serbia - Ministry of Agriculture, manufacturers must focus on local government, where this type of standardization must be recognized as a potential opportunity for local development. Local governments should need to recognize these farms and their development to implement in the development strategy of local governments. Fragmentation of land in the Republic of Serbia, which has regarded fallacy of Serbian agriculture, in the future can become a competitive advantage of its agriculture. The introduction of GLOBALGAP small land holdings (from 1 to 10 hetars arable land) can become very prosperous farms for organic food, which are becoming more popular in the world market of agricultural and food products. In regard with this, the Republic of Serbia should recognize this type of production and to support the same as a consultant, through advisory services that would be established at the regional level and through favorable credit lines, subsidies and other measures that are available to individual institutions. Standardized production of agricultural products which is certificated and the product that has traceability in production should easily found their way to the final (more choosy) consumers. These ways of production the state government needs to stimulate only in the early stages of their launching. The practice in Western European countries showed that after four to five years, for the farms with the standardized form of production of agricultural and food products it is very easy to realize the financial support from commercial banks, because they don't have significant problems with the placement of the final product. Developed markets (markets with higher purchasing power) now recognize the certified agricultural and food products. Traceability in the production and sale is undoubtedly a comparative advantage in these markets. The consumer is entitled to have access to the movement and production of food products. A clear path from farm to table is inevitable that more and more imposing to the processing complex which has to guarantee for the final food product by the declaration of origin of the product. The Republic of Serbia, due to the limited natural resources and the fragmentation of agricultural holdings, should see its chance in the production of organic food. Certification of agricultural products in the future should be imperative to higher authorities in the Republic of Serbia (strategic objective). Specifically, if the expediency of introducing the GLOBALGAP is recognized on time, and the government bodies through the subsidies or grants decide to finance producers in order to initiate the process of certification of its products, the future export potential of the Republic of Serbia to the CEFTA market could be greatly improved, and to the European Union market in the future.

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THE WINE MARKET IN COUNTRIES OF THE DANUBE REGION¹

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Abstract

A subject and a goal of the research are to perceive trends in production, export and import of wines in countries of the Danube region. Data source is the FAO and the International Trade Centre (ITC) database, in time period from 2007 to 2011. An average wine production in stated region amounts 2.7 milliard litres with tendency of moderate growth. The average wine export amounts 777 million litres. Export price is 2.2 USD per a litre. Import of wine of the group amounts 1.74 milliard litres. The global market of wine has been passed through a severe crisis, which has been caused, mainly, by climatic conditions. Reduced yield of vineyards and wine production will unavoidably lead to increase of wine price and will significantly impoverish its supply on the market. Besides a saturated international market, the market of wine in the region-countries has been pretty stable and without major fluctuations.

Key words: *Wine, production, export, import, Danube region.*

Introduction

Viticulture and wine production represent significant economic branches in all countries of the Danube region. Those countries have good agro-ecological conditions for grape and wine production (tradition, climatic, edaphic factors etc.). In comparison with other lines of plant production, the viticulture is characterized by outstanding intensity. It employs a great part of working-capable population. If involve supporting branches of this sector, a number of totally employed in wine production is much larger.

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An average income in wine sector changes in wide range, depending on a country, a region and a type of wine which produces. The region-countries have important, but still insufficiently used potential to grow into a serious wine region and to offer a wide fan of quality and top wines, which will be recognizable on the international market.

This paper's subject is researching size, dynamics and trends of production, export, import and foreign trade exchange of wine in the countries of the Danube region, in order to perceive export-import potentials of some countries (*Germany, Bulgaria, Romania, Moldova, Hungary, Croatia, Slovakia, Austria, Ukraine and the Republic of Serbia*). A special emphasis was put on a state and possibilities of the Republic of Serbia's export intensifying.

Data sources and work method

In the paper were used heterogeneous data sources. The basic sources were taken from the database of the United Nations Organization for Food and Agriculture – FAO (*Food and Agriculture Organization*) and the International Trade Centre (ITC), in time period 2007- 2011. The research bases on, so called, “desk research”, which represents analysis of available data along with apply of standard static-mathematical methods. The balance of foreign trade exchange was calculated as a difference between export and import. Changes trends intensity was quantified by calculating the changes rates, by applying functions with the most adjustable trend lines to the original data. Stability of occurrences was calculated by applying a variance coefficient (CV). Also were used the results of previous researches of stated problems. Certain occurrences were shown in form of tables.

Results of the research

Production of wine in the countries of the Danube region

In the researched time period, the average wine production in the countries of the Danube region was amounted 2.7 milliard litres, with tendency of moderate growth by the rate of 5.79% annually. The mentioned group provides 15% of European wine production. The production is very stable, on which points out also the calculated variance coefficient (14.28%).

Table 1. *Production of wines in the countries of the Danube region (2007-2011)*

Country	Average amount (000 lit.)	Participation (%)	Rate of change (%)	CV (%)
Germany	910.360	33,7	-5,84	14,50
Romania	463.994	17,2	-10,20	20,42
Hungary	269.431	10,0	-18,00	14,28
Austria	250.517	9,3	-3,98	19,58
Ukraine	237.108	8,8	-5,24	19,34
Serbia	193.019	7,1	13,84	21,43
Bulgaria	160.859	6,0	-6,26	25,90
Moldova	132.978	4,9	-2,87	11,29
Croatia	53.341	2,0	-6,41	13,77
Slovakia	29.333	1,1	2,24	6,11
Danube region	2.700.939	100,0	5,79	14,28
Source: Calculation based on the data of the FAO Statistical Yearbook				

The most significant wine producer is **Germany**, with average production of 910 million litres (11 litres per capita), which represents one third of the total production of the Danube region countries (*table 1*). In the researched period was present a decreasing production trend by the rate of 5.84% annually. Germany has 13 wine regions; of which every have own wine style, often of same grape sorts. The lightest and the most elegant wine make in the regions Mosel-Saar-Ruwer and Ahr. Fuller and stronger wines produce in the region Mittelrhein, Nahe, Rheingau, Rheinhessen and Saale-Unstrut, while the strongest German wines make in the regions Pfalz, Hessische Bergstrasse, Sachsen, Wurttemberg and Baden. The most of white wines are characterized by noble aromas, low alcohol percentage and very pleasant refreshing taste and good balance of acids and sugars, which is a common phenomenon regarding German wines. Under white sorts is approximately 63%, while 37% is under red sorts. One more typicality distinguishes the German wine production. More than 85% of wine was produced just from one grape sort, and that is a Riesling. A continental climate with hot summers, cold winters and warm springs, enables grapes to ripen longer than it is the case with southern areas. The grape gatherings realizes in October and November, significantly later than in other countries. Exactly owing to long ripening period, the grape is more opulent with aroma and taste, and these wines get stimulative and refreshing note. Rather cold climate is characterized for Germany, when it is about grape growing, and surely represents one of the most important

factors which affect the wine quality. The influence of climate, especially in gathering period, characterize further wine development, quantity and strength of acids, their balance, sugar amount, aroma development and wine fullness (<http://winestyle.rs/2011/nemacka-bela-vina/>).

On the second place is **Romania**, with average production of 464 million litres (20 litres per capita). In the regional production structure it participates with 17.2%. In analyzed period was evident a trend of significant production decrease by the rate of 10.20%, which was, at the same time, the most intensive decrease in regard to other region-countries. Romania, with over 200 hectares under grapevine, is among the top five producers in the European Union and ten producers in the world. Conditions for grape growing and wine production are very favourable, and three factors have the greatest influence: vicinity of Black Sea, Danube watercourse and high Carpathian Mountains. White sorts make 85% of the total vineyards area, while red sorts make the rest (15%). In Romania are mostly grown autochthonous sorts: Feteasca Negra, Feteasca Blanca and Feteasca Regala (white) and Tamaioasa Romanesca (very aromatic wine). Besides domestic, often there are other foreign sorts: Le cabernet sauvignon, Merlot, Sauvignon Blanc and Chardonnay. Although the quality of white and red wines is comparably, there especially stands out Feteasca Negra, recognizable strong, dry red wine with clear aroma and bouquet (www.vinoteka.rs/rumunija/).

In the third place is **Hungary**, with average production of 269 million litres (27 litres per capita). In the regional production structure, it participates with 10%. In analyzed period was evident a prominent decrease of production by the rate of 18%. A slow trend of production decrease is expected in the following period (*Bettini Ornella, 2013*). Thanks to, over a thousand years long tradition of making wines and more than ten thousand registered wine cellars, Hungary is among leading European and world wine producers. There are 22 wine regions and dozens of autochthonous grape sorts. The most significant wine regions are: Tokaji, Kunsag, Csongrad and Hajos-Baja, Eger, Villany and Szekszard. Tokaji, which lies in the north-east part of Hungary, in foot of the Carpathian Mountains, is well known by sweet wine Tokaji Aszú, and also by Furmint, Hárslevelű and Moscatelo. Eger, the region in north of Hungary, produces elegant wines like „bull's blood“ (*Bikavér*). Kunsag, Csongrad and Hajos-Baja regions are located in south part between the rivers Danube and Tisa, in area well known as a vast plain. They occupy large area, and thereby produce more than half of wine reserves. Villany is the so-

thernmost and, at the same time, the warmest Hungarian wine region, where produce the best and the most characteristic red wines. Cabernet sauvignon and Merlot have a key role in this region, as well as Cabernet Franc. What differs the Hungarian wines from other region's wines are clear and strong aromatic floral and fruity notes in white wines and a delicate continuance and aroma plenitude in red wines (http://rs.gotohungary.com/sr_RS_latin/besprekorna-vrednost). Before a political liberalization in 1989, the wine production in Hungary was based on 30 state husbandries and 50 cooperatives on around 150,000 hectares. Today are more than 12,000 producers on over 82,000 hectares. The production has significantly decreased, and this has been caused partly due to reduction of areas under vineyards. The most important are white sorts of grapes (106 sorts), including Velschriesling, Furmint, Chardonnay and Pinot Gris. Red sorts include Blaufrankisch, Cabernet Sauvignon, Merlot, Zveigelt and Portugieser (Farkaš, 2007). In production structure, 70% are white wines, 28% red wines and 2% are rose wines.

The Republic of Serbia, with average production of 193 million litres (26 litres per capita), is on the sixth place among the analyzed region-countries. In analyzed time period were significantly increased the production by the rate of 13.84% per annum, which has been, at the same time, the most intensive growth in regard to the other countries in the region. In the Republic of Serbia is around fifty bigger wineries, where produce 120 types of wines with geographic origin. The regions, in which the best wine produce, are: Palic viticultural region, Knjazevac viticultural region and Zupa viticultural region. In production structure dominate white (61.4%) in regard to red wines (35.0%), while minimum share is of rose, with 3.6%. In Serbia, 83% of parcels under grapevines are on small or medium properties (www.vino.rs/srbija.html). By adopting the Law on Wine was established a viticultural and wine production register according to the EU standards, adjusted to family wineries, which today have the highest share in Serbian wine production. Goal of the measures: increase of areas under vineyards, improvement of wine quality and increase of production of wines with geographic origin. Then, adjustment of standards with demanding EU regulations, as well as improvement of wine quality and production increase and its promotion on the international market. Since 2011, the producers of wine with geographic origin have been released from paying all costs regarding the production control and wine analysis. Those costs take over the Ministry of Agriculture, which is one of the concrete contributions to increase of domestic producers' competitiveness. Ongoing is a reform of geographic origin system and

creation of new zoning. It is necessary that domestic legislation adjusts to the reform of the EU wine market, but also to serious measures, which will be defined by a new law on incentives in agriculture and rural development, stimulates viticulture and wine production development. The aim of Serbia is, before its entering into the EU, to raise as many vineyards as possible, in order to use more assets, while the wine production represents the most attractive business for using the EU funds (www.kom-beg.org.rs/Komora/OpstaA.aspx?veza=1987).

The growth of wine production is present only in the Republic of Serbia and Slovakia. Other countries of the Danube region have a trend of decreasing production. The same is caused by activity of climatic, but economic factors too, which reflect, primarily, in decrease of life standard, saturated international wine market, increasing beer consumption, etc. In next period can expect the reduction of wine grapes and wine production. In the foreground is placed the produced wine quality, by which differentiation will tend to satisfy requirements of the choosiest buyers, first of all, in the EU countries.

In order to improve the wine production, there are necessary significant investments in vineyards and modernization of technological processes in production. A current model, with small wineries, which sell products at prices which cannot cover a cost price of a decent wine, is not sustainable and there are necessary significant changes regarding most of producers. Besides, there is still present a low level of wine consumption, so is needed a permanent education of consumers (*Kokir, 2012*).

Wine export of the Danube region countries

The average wine export of the analyzed group was amounted 777 million litres, and in the analyzed time period was recorded a slight increase by the rate of 1.56%. Low rate of export growth is a result of series of factors activity, primarily, of moderate growth of production volume, decrease of demand on the international market, high competition by the ‘traditional’ wine countries: France, Italy and Spain, etc. Of the total production exports 29% of wine which represents a significant part. It means that wine industry of the mentioned group of countries is significantly export-oriented. The export value is 1.7 milliard USD. The average export price amounts 2.2 USD/l. It points out that, in export structure, dominate wines of better quality. The export price of the EU is 2.8 USD/litre. Italy, as the most important world exporter, realizes the export price of 3.4 USD/litre.

The market of the European Union demands mostly wines of red sorts, like Cabernet Sauvignon, Merlot, and of white sorts – Chardonnay, Sauvignon Blanc. It is evident that all countries of the Danube region do not have the same importance in wine export.

Table 2. *Export of wines from the countries of the Danube region (2007-2011)*

Country	Average amount (000 lit.)	Participation (%)	Rate of change (%)	Average value (mil. \$)
Germany	371.023	47,7	4,53	1.129
Moldova	113.648	14,6	3,41	165
Bulgaria	71.859	9,2	-18,73	132
Hungary	66.903	8,6	5,82	93
Austria	62.232	8,0	-2,57	86
Ukraine	51.056	6,6	16,86	55
Romania	13.483	1,7	-13,69	26
Slovakia	12.643	1,6	-5,44	21
Serbia	11.345	1,5	11,49	14
Croatia	2.925	0,4	4,27	13
Danube region	777.116	100,0	1,56	1.733

Source: Calculation based on the data of the FAO Statistical Yearbook

Far the most important wine exporter in the region is **Germany** (table 2). It represents also the biggest wine producer in the mentioned countries. Its average export is 371 million litres, which is almost a half of the total export of the Danube region's countries. In the observed period has been present a trend of moderate growth by the rate of 4.53% annually. Progress in export is certainly in connection with efforts of German wine industry to improve the quality and to focus its marketing strategy to leading German sort – Riesling (www.germanwineusa.com/news-event-s/news/german-wine-exports-boom.html). Of the total production exports 41%, this means a high export-orientation of wine sector of this country. Valuably, the export is 1.1 milliard USD. It is far the most significant in regard to the other region-countries. The average export price is 3.04 USD/l, which is more than the average export price in the region. In export structure, a dominant place has white wines (88%), while significantly less are red wines (12%). The most important export (2011) was in the Netherlands (18.2%), Great Britain (15.3%), Russian federation (8.1%), USA (7.7%), and Sweden (6.9%). These countries had absorbed more than half of the total wine export (56.2%). It is evident that the highest export was directed to the European Union countries. German wine

exporters have increased their income from sale on almost all important foreign markets during 2010. The average price of exported wine from Germany was increased for 11.8% in 2011, in regard to the previous year, i.e. it was amounted 2.27 euro per a litre (www.deutscheweine.de). In USA, export value was almost doubled during last years. A new, important buyer is China. There can be concluded that export in Great Britain decreases, and increases in USA and Russian Federation. *Gering* (2006) states that, there is a potential for additional increase of export, due to a wide range of modern wines, first of all, in medium and premium-price segments. The goal is that Germany became an international leader regarding the quality in white wines sector and to generate more interest for red wines among consumers on export markets, as well as in retail trade.

In the second place is **Moldova** with 114 million litres. It participates with 14% in the total wine export of the region-countries. Of the total wine production, 85% export. The export has a slightly increasing trend (rate 3.41%). Valuably, the export amounts 165 million USD. The wine export is 15% of Moldavian GDP (*Blau, 2013.*). The average export price amounts 1.45 USD/l, which is less than the average export price in the region. Moldavian wines export in more than 50 countries worldwide. Around 40 wineries produce wine which is exclusively meant for export. In the beginning of nineties, 90% of wine was exported to Russia. In March 2006, Russia had introduced a total prohibition of Moldavian wines import, according to claims that they are contaminated with pesticides and heavy metals. The prohibition was cancelled at the end of 2007. During the previous decade, the producers had focused at quality improvement and changes in style of Moldavian wines for the international markets, aiming to satisfy different segments of consumers (www.moldovawineguild.md/wine_industry/index.html). The highest export was achieved in Byelorussia (30.4%), Ukraine (22.2%), Russian Federation (20.9%), Kazakhstan (5.8%) and Georgia (4.3%). The stated countries have absorbed more than three quarters of total wine export (83.6%). It is evident that the most of export was directed to surrounding countries. Since 2008, the European Union has assigned Moldova, so called, autonomous preferential regime, which provides Moldavian export in the EU countries on more than ten thousand products without customs (including wine). In accordance to it, there expects increase of export into the European Union countries.

In the third place is **Bulgaria**, with 72 million litres. In the region's export participates with 9.2%. Of the total production, it exports 45% of wine.

Export has a trend of significant decrease (rate -18.73%). One of the reasons is also decrease of wine production. The wine industry is the most competitive sector of Bulgarian food industry. It consists of more than 50 registered wineries (www.bulgarianjourney.com/bulgarian-wine.html). Valuably, the export amounts 132 millions of USD. The average export price is 1.84 USD/l, which is less than the average export price of the region. Bulgaria is significant exporter of red wines, which have a potential to broad to new markets. A main problem, the Bulgarian producers face, is in this moment connected to insufficient presentation and bad wine marketing abroad (*Harizanova, Tanja, 2013*). The highest export realizes in Russian Federation (33.5%), Poland (26.3%), Romania (12.1%), Czech Republic (7.9%) and Great Britain (4.5%). The stated countries have absorbed something more than three-quarters of the total wine export (84.3%). There are great interests for Bulgarian wines in Canada, India and Singapore. Aspirations for export are even linked to the most attractive wine markets – USA, Japan, Hong Kong, India, Brazil, even Mexico. European market is too saturated and therefore is hard to increase the market share. Also is interesting the export in Scandinavian countries, Belgium, Germany and Great Britain, but not as much as earlier. The wine which exports onto the market of Poland, and Czech Republic belongs to low price segment, and the same case is with Bulgarian wines, which export on the market of Russian Federation. This is the reason for change of the Bulgarian wines' image and positioning in higher price segment (www.bnr.bg/sites/en/Economy/Pages/090513Bulgariaexports65ofitstotalwineproduction.aspx).

The fourth regional exporter is **Hungary**, with volume of 66 million litres. In the region's export participates with 8.6%. Of the total production, it exports 39% of wines. Export has moderate growth trend (rate 5.82%). One of the reasons why the export is not higher is bad marketing for Hungarian wines, too (*Horvat, 2004*). Valuably, the export is approximately 93 million USD. The average export price amounts 1.39 USD/litre, which is significantly less than the average export price of the region. The most famous among the Hungarian wines is white sweet dessert wine „Tokaj“, which mostly produces in north-east Hungary and which is comparable with the wine Porto. It is very popular abroad. The highest export realizes in Germany, which absorbs one-fourth of the total export (25.2%), Czech Republic (19.6%), Slovakia (19.7%), Great Britain (7.2%) and Poland (4.2%). The stated countries had absorbed three-quarters of the total wine export (75.9%). Besides to Great Britain, it is evidently that the highest export is directed to the region-countries.

Important regional wine exporter is also **Austria**, with volume of 62 million litres. In the region's export participates with 8% and it exports one-fourth of the total wine production. The export has a trend of moderate decrease (rate – 2.57%), which is partly caused by decrease of production. Valuably, the export is approximately 86 million USD. Although Austria produces only one percentage of wine in the world, it has significant international reputation in last two decades. The average export price amounts 1.38 USD/l, which is less than the average export price of the region. The Austrian wine is a synonym for quality, diversity of local sorts of grapevine, as Gruner Veltliner or Zweigelt. The most of the best Austrian wines is from the regions Burgenland, then follow Neusiedler See – Hugelland, Donauland (Danube region), Wienviertel (the biggest region and a producer of dry white wines), Carnuntum and Traisental, Steiermark (Styria) and Vienna (*Sajmon, 2009*). The wine exports in more than fifty countries worldwide. The highest export realizes in Germany (71.6%), Switzerland (6.1%), Czech Republic (4.5%), USA (3.9%) and the Netherlands (2.8%). Those countries had absorbed over three-quarters of the total wine export (88.9%). The most important export region is the European Union, which absorbs almost 90% of all Austrian wines. Except to USA, it is evidently that the highest export is directed to the region countries. It is interesting that the export wine price in Switzerland is more than 6 € per a litre. The export in USA is increasing, while the average price is achieved 4 € per a litre. As new markets appear Japan and China (www.austrianwine.com).

The export of wine from the **Republic of Serbia** can be characterized as very modest. It was approximately 11 million litres, which is valuably 14 million USD. It is positive that export records the significant increase tendency (rate of 11.49% per annum). The average export price is 1.23 USD/l, and it is the lowest in regard to other exporters in the region. It has been caused by the export structure and poor competitive position on the international market. The most important foreign trade partner is Bosnia and Herzegovina, where to realize more than half of the total wine export. There is an agreement on free trade with this country, which has been applied since 2002, while full liberalization has been in force since 2004, except that Bosnia and Herzegovina since then has often introduced various limitations for export from Serbia. Then follows Montenegro with 16%. Slightly less buy buyers from Germany, Austria and Croatia (*Vlahović, Puškarić, Maksimović, Branka, 2009*). In 2011, the biggest wine quantity, i.e. more than 5.6 million litres, where was delivered to consumers in Bosnia and Herzegovina around 3.5 million litres, and in Montenegro

around two million litres. Growth of 17.6% records also export of wine in Russian Federation, where was placed around 3.3. million litres. However, the wine export result was realized on the EU market, where was placed around 5.6 million litres, which is, in regard to the previous year, even 5.3 times bigger quantity. There evaluates that the trend of increasing export will continue in the following period, too, taking into consideration a possibility of duty-free export of wine on the markets of Russian Federation and the European Union (*Jakšić, 2012*).

If it is about the export, there should take into consideration that, on the EU market, for years has been present a trend of greater supply of wine in regard to consumption, which causes decrease of average price per a bottle and stocks surplus in leading countries by wine production. Such state disables more significant wine export on these markets, but leads to a fact that the west Balkan countries are awash by wines from France, Italy and Spain, which are of suspicious quality. Today arise new markets which are significant wine importers, primarily Russia and China, but entering those markets is extremely expensive and wineries without support of mother-countries have no chance to success (*Kokir, 2012*). We think that the chance in export should not search in quantity, because we are relatively small wine producer, but in top-quality towards selected market segments. There should direct to the production specialization, on smaller series with high quality (*Vlahović, Tomić, Puškarić, 2008*).

Limiting factors for higher export are small areas under grapevine, inappropriate production structure, i.e. lack of quality and top wines. In domestic production structure dominate table wines with 65%, then quality wines with 20%, while top wines participate with only 15%. Growth and change of production structure represent a base for increasing export of wine (*Vlahović, Tomić, Puškarić, 2008*).

The wine producers in Serbia still have a problem to offer increasingly selective market the wine of satisfying quality, made of carefully selected and required grape sorts, the wine which has acceptable price, good marketing and to be available to a buyer. Those are basic conditions-parameters for realizing a favourable position on the market. It is noticeable on the domestic market, in last five years, that is improved the wine quality some wise, which is surely not without significance, but it is, however, insufficient. The second parameter relates on a right sort selection and an adequate clone of grapevine. Of primary significance are climatic conditions and soil composition on which is vineyard, and surely, respect of

what experts recommend. Otherwise, the quality will not be satisfying. Unfortunately, some producers realize it too late and then show problems regarding their wines sale. In this test many producers fall. The wine producers often cannot free themselves from of subjectivity in evaluation of a product. The main criteria in wine selection are price and quality. At the same time, they are not in a patriotic mood to give priority to domestic wine. On the market it shows quickly. The producers which hope that they will succeed to return quickly invested capital in their wineries and vineyards, through higher wine price, obviously are wrong. Good marketing and a complete approach on the market are extremely important and it costs a winery a lot. There showed that there is no success and survival on the market without marketing. From creativity of the people who deal with this business and available assets depend in which extent will be the winery present within a scope of, primarily, foreign consumers (vina-rija.com/393-srbija-kuda-sa-vinom).

There is inevitable knowing and adjusting to the European Union standards. „Privileges for wine export from Serbia in the European Union were got, but at this moment are not possible to be a serious supplier of the European market, especially not owing to a price, and the problem is also because nobody deals with marketing of Serbian wine. Great role in it could have the Serbian Vintners Association (*Radovanović, 2008*).

Except Bulgaria, Austria, Romania and Slovakia, all other countries of the region increase their wine export. The most intensive export increase was realized by Ukraine (rate of 16.86%), first of all, owing to a low baseline. All region-countries, if they want to increase their export, should pay more attention to making and strengthening of autochthonous brands of wine. It represents one of the strongest and the most important factors in competitive fight for the market. Currently is higher demand for red wines in the world, while in our supply dominate white wines. For example, in France, the country which is the biggest world producer, dominate red wines with share of 73%, while white wines participate with 27% (*Ribero-Gajon, 2004*). There is necessary to research consumers' preferences in some countries and to adjust production according to them. It is inevitable to make more efforts regarding a visual look of a wine bottle. That is to say, during past years, consumers have increasing requirements regarding the look, i.e. the visual aspect of a product (bottle, label, etc.).

Wine import of the Danube region countries

The average wine import of the analyzed countries, the group of Danube region countries, was amounted 1.8 milliard litres and the same in the observed time period was amounted moderate growth per by the rate of 3.90% per annum. The import value amounts 3.4 milliard USD. The average import price of wine amounts 1.9 \$/l. Today can say that is trendy consumption of light, muscat, aromatic white wines, and regarding red wine, consumers often take fresh, aromatic, fruit wines. The important trend is also decrease of *rose* wine consumption (*Kokir, 2012*).

The most important wine importer is **Germany**. The average import amounts 1.5 milliard litres, with tendency of slight increase, by the rate of 3.06%. In the total regional import, Germany participates most of the part, i.e. 83%. It practically determines import of the region-countries and represents the biggest world wine importer (*Vlahović, Puškarić, Tomašević, 2013*). The average import value was amounted 2.9 milliard USD (*table 3*). Import is a resultant of domestic production decrease and high purchasing power and consumption of 26 l per capita in 2010, as well as expansion of assortment by various quality wines. In 2010, in consumption structure, dominant place had red wines (63%); share of white wines was amounted 29%, while rose was on the level of around 8% (www.wineinstitute.org/resources/statistics). The most of import anticipates from the EU countries, Italy dominates with share of 42.5%, follows Spain with 18.6%, France 15.8%, South-African Republic with 5.3% and USA with 3.5%. In import structure dominates red wine (60%), significantly less white wine (25%), while minimum participation is of rose wine (7%) (*Ammerman, Danieliane Illma, 2013*).

Second, by importance, regional wine importer is **Austria**. The average import amounts 74 million litres with increasing tendency, by the rate of 4.90%. In the total import participates with 4.3%. The average import value was amounted 238 million USD. Import is a resultant of high demand and consumption of 30.3 litres per capita (www.wineinstitute.org/resources/statistics). The resultant of import, among other, is also addition of assortment on domestic market of, primarily, quality red wines. The most of import is from the European Union countries. Italy dominates with almost two-third of import (63.7%), then Germany with 20.6%, Spain with 5.8%, France with 4.9% and Australia with 1.5%. The above mentioned countries are main suppliers of Austrian market with share of 96.5%.

Table 3. Import of wines in the countries of the Danube region (2007-2011)

Country	Average amount (000 lit.)	Participation (%)	Rate of change (%)	Average value (mil. \$)
Germany	1.453.594	83,1	3,06	2.891
Austria	74.539	4,3	4,90	238
Slovakia	55.233	3,2	12,22	89
Ukraine	48.721	2,8	-0,59	76
Romania	40.820	2,3	12,18	50
Serbia	25.929	1,5	-0,13	36
Hungary	23.512	1,3	36,87	28
Croatia	14.586	0,8	0,57	24
Bulgaria	8.868	0,5	-14,42	17
Moldova	2.443	0,1	6,96	2
Danube region	1.748.245	100,0	3,90	3.450

Source: Calculation based on the data of the FAO Statistical Yearbook

Important regional importer of wine is *Slovakia*. The average import amounts 55 million litres, with significant increasing tendency, by the rate of 12.22%. It is, at the same time, the most intensive growth in regard to other region-countries. In the total regional import participates with 3.2%. The average value of import was amounted 89 million USD. The consumption, expressed per capita, amounts 12 litres annually (www.wineinstitute.org/resources/statistics). The biggest part of import originates from the European Union countries; Italy dominates with 36.5%, Hungary with 24.6%, Czech Republic with 8.5%, Spain with 5.8% and the Republic of Macedonia with 5.1%. The above mentioned countries provide more than three-quarters of the total wine import (80.5%).

In the fourth place by the wine import is *Ukraine*. The average import amounts 49 million litres, with slight decrease tendency, by the rate of 0.59% annually. In the total regional import participates with 2.8%. The average import value was 76 million USD. The wine consumption is quite low, it amounts only 4.4. litre per capita (www.wineinstitute.org/resources/statistics), and is the lowest in regard to other region-countries. The most of import anticipates from the region-countries; Moldova dominates with almost half of the total import (47.6%), Georgia with 20.0%, Italy with 7.8%, the Republic of Macedonia with 6.6% and France with 5.3%. The above mentioned countries provide more than three-quarters of the total wine import (87.3%).

In the fifth place, by the average wine import, is **Romania**. The average import amounts 41 million litres, with significant growth tendency, by the rate of 12.12% annually. The resultant of import is significantly reduced domestic production. In the total regional import participates with 2.3%. The average value of wine import was amounted 50 million USD. Import is a resultant of relatively high demand and consumption of 22 litres per capita (www.wineinstitute.org/resources/statistics). The most of import is from the European Union countries; there dominates Spain with 67.9%, Italy with 15.0%, Bulgaria with 6.1%, Moldova with 3.5% and Germany with 2.3%. The above mentioned countries provide more than 90% of the total wine import (94.8%).

The wine import of the **Republic of Serbia** amounts 26 million litres, which is 1.5% of the average regional import of the Danube region countries. In the researched period, it slightly decreases import, by the rate of 0.13% annually. Valuably, import amounts 36 million USD. Absolutely the most import is from the Republic of Macedonia (75%). The wine imports partly in a bulk (cisterns) and partly in bottles. A part of domestic wineries import, mainly, red wine, where it protects and preserves, and later fill in bottles and sell on the market. The most of wine import is of the producers „Tikveš“ Kavadarci, less „Stobi“, „Skovin“, „Bovin“ and „Elenov“. Regarding import of bottled wine, there dominate quality red wines of different trademarks. The Trade Agreement with the Republic of Macedonia was signed in 1996, and at the end of 2005 it was outgrown in the Free Trade Agreement and, as such is applied since 1st January 2006. Then follows Montenegro, out of which the most import red wines from the winery „Plantaže 13. juli“ Podgorica.

The Danube region countries realize a negative balance of foreign trade exchange of wine in amount of 971 million litres. In the total research period is evident that there is a negative balance of foreign trade exchange of the region. A positive exchange balance realizes Moldova (111 million litres), Bulgaria (63 million), Hungary (43 million) and Ukraine (2.3 million). All other countries of the region realize a negative balance of foreign trade exchange of wine. The highest negative balance has Germany of around 1 milliard litres, then Slovakia with 43 million, Romania with 28 million, Austria with 12 million and Croatia with 11 million litres. The Republic of Serbia realizes a negative balance of foreign trade exchange in amount of 15 million litres.

Conclusion

The countries of the Danube region represent a significant wine producer. The average production in this region amounts 2.7 milliard litres with tendency of moderate increase, by average annual rate of 5.79%. The average wine export of this group amounts 777 million litres, with slight growth tendency, by the rate of 1.56%. Export price amounts 2.2 USD/l, which points out that export, mainly, top-quality wines (wines with protected designation of origin). The most important exporter is Germany, with share of 47.7% of the total export from the region. The wine import in the mentioned region amounts 1.74 milliard litres and records a trend of significant increase, by the average rate of 3.90% annually. The biggest importer is also Germany, which participates with 83.8% of the total import of the region. The region-countries realize a negative balance of foreign trade exchange of wine, approximately over 970 million litres. Moldova, Bulgaria, Hungary and Ukraine realize a positive exchange balance. The Republic of Serbia realizes a negative balance of foreign trade exchange (15 million litres). Reduced yield of vineyards and wine production will inevitably lead to increase of wine price, and will significantly impoverish supply on the market. Besides saturated international market, the wine market in these countries is pretty stable and without major fluctuations.

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THE MARKETING ORIENTATION ANALYSIS OF FRUIT AND VEGETABLE PRODUCERS IN BIH

Dalibor Dončić¹, Nenad Perić²

Abstract

This paper analyzes the business orientation of the producers of fruits and vegetables in BiH with the special emphasis and high attention to the marketing orientation. The study hypothesis is based on the fact that fruit and vegetable producers in BiH have outdated business concept and that they have no marketing orientation. The inadequate business concept significantly affects the weaker regional competitiveness. The paper traces the development of the business orientation of the fruit and vegetable producers in Bosnia since the war have ended in 1995. until today. The paper concludes that the fruit and vegetable producers in Bosnia, since the war ended, have passed through all stages rapidly, concerning developing business orientation, from the orientation of production, to the orientation to the product, but they failed to adopt and become masters of the marketing orientation and that is the main cause of their stagnation and also the main cause of the loss of competitive advantage in the region.

Keywords: *business concept, marketing orientation, manufacturers, competition*

Introduction

The most developed fruit and vegetable sector of BiH is the territory of Banja Luka, with two locations, Lijevo field for the vegetable production and Potkozarje for fruit production. Unfortunately, the most developed regions have shown marked stagnation in production of fruit and vegetables. The research problem was that the fruit and vegetable production in BiH in 1995. until today, was characterized by large

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fluctuations in price and placement opportunities. Manufacturers were often forced to throw away fruits and vegetables, or sell them far below the production cost, while the supermarkets in Bosnia were selling fruit and vegetables that were imported. All this occurred at constant rising of the cost of fruit and vegetables in the worst economic position for the the fruit and vegetable producers. The case of high price volatility and lack of fruits and vegetables investments in Bosnia and Herzegovina, in the combination with the continuous increase in prices of raw materials, is causing the weak operating results and the weak income for producers of fruits and vegetables. This phenomenon in fruit and vegetable production, have particularly difficult reflection to the standard of not only fruit and vegetable producers, but also to all citizens, because the import of fruit and vegetables is growing, which makes the whole thing pretty expensive and often of poorer quality. The causes of the business problems of fruit and vegetable producers have made great controversy in society and some opposing opinions of some participants in the public debate. The public debate in the media gathers totally opposing views. For example, the representatives of some farmers' associations argue that the agreements on free trade, and also on the low level of the stimulus compared to the region, are the one to blame for the weak position of farmers. But, some representatives have the opinion that farmers in BiH do not adopt new technology, have low yields, which makes them the most uncompetitive in the region.

The aim of the research is to determine the business orientation of the fruit and vegetable producers in BiH with the special attention to the relation between fruit and vegetable producers to marketing orientation. This asserts the research question: What is the business concept of fruit and vegetable producers in BiH? That opens an additional question of how much fruit and vegetable producers in BiH have accepted the marketing orientation in order to increase regional competitiveness, through the development and improvement of the elements of the marketing mix.

The research methodology applied in this study was conditioned by the possibility of gathering more complete information basis for drawing conclusions. The intention was to gather as much information in order to explain the relation of the fruit and vegetable producers towards the business orientation and knowledge of marketing business orientation. Questions in the survey were designed to provide answers about the

product, price, distribution, promotion and the people in the production of fruits and vegetables. The research combines different methods and techniques, so there are qualitative technique, in-depth interview with a focused group of food producers in BiH, as well as a quantitative method. The qualitative method represents the survey which was conducted on a sample of the fruit and vegetable producers in the region of Banja Luka.

The important result of the research presented in this paper showed that fruit and vegetable producers in BiH did not adopt and did not become masters in the marketing orientation. They used only small fragments of marketing orientation, in the best case, which significantly had the negative affect on the level of their regional competition.

The conclusions could be useful in designing programs for supporting the producers of fruits and vegetables, and for both, the governmental institutions and the private sector producers of fruits and vegetables. All this, with the aim of strengthening regional competitiveness of fruit and vegetable producers with a better understanding of business orientation, identifying weaknesses and doing the continuous work on upgrading and improving the business concept of marketing orientation, especially marketing orientation for fruit and vegetable producers in Bosnia and Herzegovina.

Review of the Literature

To understand the context's need for this research, it is important to emphasize the common theories about the stages that mark the development of business orientation or of the business concept: The concept of production or production orientation is further explained. The main premise of this business concept, or business orientation, is that consumers will prefer products that are available and cheap. The production orientation has a local or regional character, the production is limited by the extent, and it often supplies the local market by ordering. The concept of the product or the product orientation is further explained. Manufacturers give all their hope into the formation of a superior product, but the reality has refuted this concept and it shows that such a superior product may not be successful and it will lead to marketing myopia because it ignores the needs of the customers. The concept of sale or sales orientation is further explained. The main premise of the concept of selling is that the customers won't buy enough products if they are left

alone. Manufacturers and companies need to take an aggressive sales formation and do promotional efforts. The concept of marketing or marketing orientation is further explained. In the world, the marketing concept appears in the 1950s. The consumer was the center of the concept and philosophy of "produce and sell" which was changed into the "sense and respond", aimed at consumers. Manufacturers put the customers first in their plans and actions. Customers with their habits, desires, needs, purchasing capabilities, became the main premise of the concept of marketing (Keith, 1960).

The importance of successful marketing in a dynamic world, that is rapidly changing, is of critical matters for farmers, especially for fruit and vegetable producers. This concept became especially important in the late eighties, of the previous century, when the USDA published a recommendation acceptance of the marketing concept in the operation of business entities that were engaged in agriculture (Lyng, Wilson, 1988). How U.S. Department of Agriculture gave the importance to the marketing orientation in agriculture, proved the concept of a specially developed marketing strategies for individual agricultural producers which dealt with what and how to produce, where to sell, how to sell, how to develop a marketing plan (Ferris, 1988). Direct Marketing Guide for fruit and vegetables, in which the methods of direct selling are explained and studied, and which is also setting up for long term relation with customers developing a business plan, represent the subject of interest, research and publishing scientist research in the western world. (Bills, 2000; Hall, Lloyd, Renee, Nelson, Tilly, 2002).

The unavoidable thread in agribusiness is to meet the needs of consumers, which are realized through the usage of agricultural products, with the marketing activities as one of the key activities (Vasiljev, 2005). The marketing of fruit and vegetables as a subject, have the access to specialization marketing studies of agricultural products as its origin, among the oldest approaches (Sudarević, 1999). The importance of the marketing of agricultural products, in the process of development of the national economy and the agricultural sector, is that we have a marketing analysis applications in agriculture. They make special focus on the specifics of agricultural manufacture of the products, which condition a specific approach to marketing mix instruments (Sudarević, 1999; Cvijanović, 2002; Božidarević, 2002; Vlahović, 2011). The emphasis is especially on the research importance of the marketing business

orientation of small and medium agro-industrial enterprises and also on the promotion of association and marketing for creating a competitive agricultural sector (Cvijanović and others, 2002, 2007).

The business activities of the fruit and vegetable producers in BiH were generally analyzed in the terms of quantitative indicators, based on official statistical data from the relevant institutions, such as the "Bureau of Statistics" and "Foreign Trade Chamber", then the distribution of agricultural products according to the data of "Indirect taxation" , which included export and import of goods by customs procedures (eg. Čejvanović, et al., 2009). Agricultural market and general conditions in agricultural area were also investigated, including the structure of crop production, vegetable production, livestock production, with an analysis of the demand for agricultural products (Vukmirović, 2004). The unbalanced supply, the demand and varying selling prices of fruits were also important for research and for better understanding the business problems of the fruit in BiH (Vaško et. al. 2010). On the other side, the business orientation and the attitude towards the marketing concept of the elements of marketing mix and of product pricing, distribution, promotion, the people in agricultural production represent the main elements in the study of the competitiveness of fruit and vegetable in Western scientific literature. The literature review revealed a lack of qualitative and quantitative research on the business orientation and on the marketing concept, with the elements of marketing mix. Fruit and vegetable producers in Bosnia and Herzegovina should function in a way of better understanding and improvement of regional competitiveness of fruit and vegetable producers in BiH.

Research Methodology

The research methodology analyses, for the business and marketing orientation of fruit and vegetable producers, is a combination of qualitative and quantitative research. Qualitative research prior to quantitative research and it aims to gather sufficient information first, about the elements and characteristics of business and marketing orientation of the fruit and vegetable producers. Doing further verification of this information on a representative sample means further research with quantitative methods (Creswell, 2003) . The research which is presented in this paper is based on findings obtained in qualitative research techniques, using directed structured interviews (Stamatović,

2008). A structured questionnaire is used as an instrument and it included a list of questions, mostly open-ended but also investigative issues that deepen into the essence of the problem (Božidarević, 2009). Questionnaire respondents were put in a free conversation between the interviewer and the selected eligible respondents, then the data collection and communication with respondents were conducted in households in which the products of fruits and vegetables were produced. In-depth interviews were organized in Lijevo field and Potkozarje, the most important regions for the production of fruits and vegetables in Bosnia and Herzegovina. The research, using in-depth interviews, included a total of ten participants from the population of agricultural producers of fruits and vegetables, because the goal of the qualitative research was not supposed to be representative for the population. The amount of the information, which they could get from the research, was of the crucial significance to them. The survey, as a quantitative technique, was performed on a sample of a hundred respondents because they wanted to come to a better representation for the studied population. The respondents were selected using the Intentional Sample (Tihi, 2008). The Intentional Sample method, that was not based on probability, had been accepted because we believed that respondents who were included in the sample, represented the future of fruit and vegetable production in Bosnia and Herzegovina and that they were sufficiently representative for the fruit and vegetable producers that could survive in the upcoming liberalization of the market for agricultural products in the united Europe. The interviewed agricultural producers were selected based on the size of land that they cultivated (from 10 to 20 ha) and also on the medium-sized manufacturers in Bosnia and Herzegovina, who represented the most vital part of farmers, then the availability of modernity and mechanization, irrigation systems, and the need for providing quality information on the conduct of its business.

The hypothesis study states that farmers who produce fruits and vegetables in the region of Banja Luka have inadequate and outdated business concept. The inadequate business concept in modern conditions of production of fruits and vegetables, limit the further development of the producers in Banja Luka and also in Bosnia and Herzegovina.

Business concept of fruit and vegetable producers in Banja Luka was assessed on the basis of behavior and business activity that farmers apply to their economic activity. Business conduct and business activities are

explored by testing. Questions, which were asked to farmers, were designed to identify the business activities of the fruit and vegetable producers. The established attitudes and business activities in the study, based on the criteria and principles of professional conduct, have put farmers in some of the business concepts.

Definitions of business orientation provide basic determinants and characteristics on which basis the list of issues were formed, and there was also the primary data on which fruit and vegetable producers were analyzed in Banja Luka region:

Production orientation is characterized by: Local distribution, small manufacturing, small assortment. The most important problems in the work – How to produce, a price-only competing, focus on the cost reduction, neglecting changes in the market, low level of marketing research, one-way giving information. The orientation on the product is characterized by: Products in front of customers, focus on the characteristics of the product, neglecting changes in the market, low level of marketing research, one-way giving information. Sales orientation represents: Aggressive selling, sales, weak relations with distributors, poor customer relations, low level of marketing research, one-way giving information. Marketing orientation represents: Exploring the needs, desires, purchase options, user's behavior, market research, market segmentation, environment research, creation of marketing networks, associations, high level of marketing research, high level of product innovation, one-way giving information.

The research, by examining the in-depth interview technique, has been done for many years until a survey happened in the 2013 , which was among the producers of fruits and vegetables in the Banja Luka.

Results and discussion

Questions which were included in the following parameters of the agricultural business entities:

1. On which basis do you decide what kinds and varieties of fruit and vegetables will be grown? Answer and comments: EXPERIENCE 20%, MARKET 30 % ; MERCHANTABILITY 24% , QUALITY 18%, EXPERIMENTS 8%.

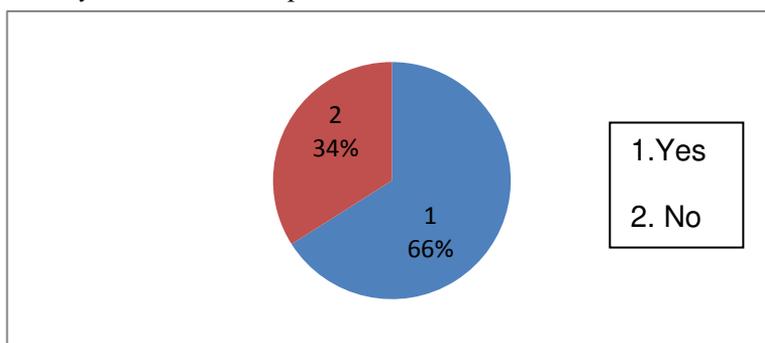
In most cases, the basic plant species for growing are potatoes, onion, cabbage, watermelons, tomatoes, peppers, cucumbers within vegetable producers, but in fruit production there are apples, pears and plums. These responses clearly indicate that in the selection of species, hybrids and varieties, the land is of big importance. 30 % of the farmer's responses show that the source of the information is the market, then after the market in the second place there is merchantability with 24% of responses, which altogether, with the market, represents over 50 % of responses, which indicates that manufacturers are aware of the influence of customers on their sales

2. Do you receive information about the technology or varieties over the Internet? Answer and comment: YES 34%, NO 66%.

The percentage of 34 % of producers who receive information about the technology or the assortment over the Internet indicates a very high level of the computer usage in the production of fruits and vegetables.

3. Do you cut down the price to sell? Answer and comment: YES 66%, NO 34%. Behavior problems, during the placement, clearly indicates that producers of fruits and vegetables in a high percentage (66 %) lower the price and that the most important instrument, of the marketing mix instruments, is the price which points out to orientation of the fruit and vegetables in Banja Luka.

Figure 1. *Do you cut down the price to sell?*



Source: *Data from the field research.*

4. Do you keep evidence of costs and income? Answer and comment: YES 90%, NO 10%. Interestingly, the vast majority keep records of expenses and income but the astonishing thing is that nobody keeps clear records of expenses and income in advance formed forms, which is

unique for each year, but they are mainly placed in various notebooks that are not related to each other. They do not give clear answers to what happens to costs or revenues from year to year. The responses clearly indicate the lack of marketing orientation and also every other business concepts, because precise and clear business records are important in every business concept.

5. Do you analyze the needs of consumers? Answer and comment: YES 88%, NO 12%. The answer to this question is very interesting and it suggests that the vast majority of advanced manufacturers have contact with the consumers of their goods. The main questions are the assortment and consumer packaging, and the answers to those questions the consumers shall find. The problem occurs when the products from producers are bought by the middlemen who buy the products sold in retail stores, retail stores sell to the customer or consumer of vegetables. In the second case, products are sold to wholesale markets again to the middlemen or retail stores so there is no contact with the producer and the consumer of vegetables. The lack of the producer's contact with the consumer of fruits and vegetables is a great obstacle to the further development of production and it slows down the product innovation and the offer of new products.

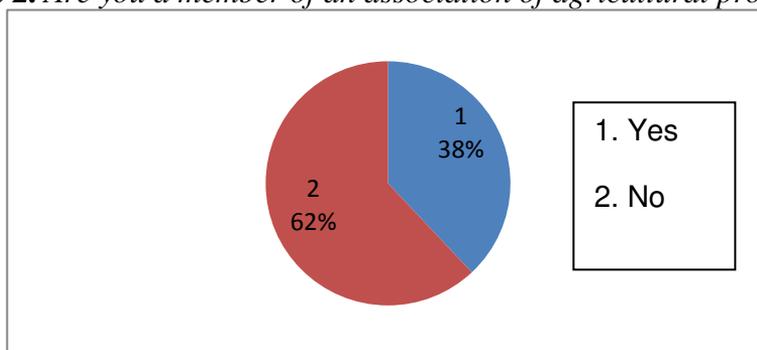
6. Do you monitor changes in the market environment? Answer and comment: YES 62%, NO 38%. Fruit and vegetable producers monitor changes in the environment by using information from television, radio, public presentations and education that one like to follow. The problem is the lack of awareness about the importance of changes in the environment especially in legal reforms, export policies, certificates, and others and also the impact that these changes have on the production of fruits and vegetables.

7. Do you have a constant supplier of raw materials? Answer and comment: YES 40%, NO 60%. Producers of fruits and vegetables here also show the evidence of the formation of the network marketing because they say that they have 40 % of respondents as regular suppliers of raw materials, with whom they are working for many years, particularly in the area of supplying the seed material. The responses indicate that we have a minimal element of forming the network marketing by the manufacturer of vegetable greenhouses but not enough

8. What are the reviews of the biggest problems in business? Answer and comment : PLACEMENT 44 %, MARKET 12%, CHARGING 12 %, PACKING 6%, SMALL PROFIT 12%, LACK OF MONEY 14%. Very indicative and fully supportive for the hypothesis of this paper is the fact that of all the listed major business problems could be gathered into marketing problems. The placement of 44 % of the respondents is considered to be the biggest business problem. In unregulated market 12 % of the respondents is considered to be a major problem, then charging 12 % of the respondents could also be classified into major problem. Therefore, low wages and product prices are the main issues that create uncertainty in production. Wide fluctuations in the price and quantity that can be sold, remained untouched. Unregulated market, disorganized and insecure purchase middlemen are causing uncertainty and major problems in production.

9. Are you a member of an association of agricultural producers? Answer and comment: YES 38%, NO 62%. The tested manufacturers are members of the association in a modest percentage of 38%. We believe that this is one of the most limiting factors for the development of the fruits and vegetables production in Banja Luka.

Figure 2. *Are you a member of an association of agricultural producers?*

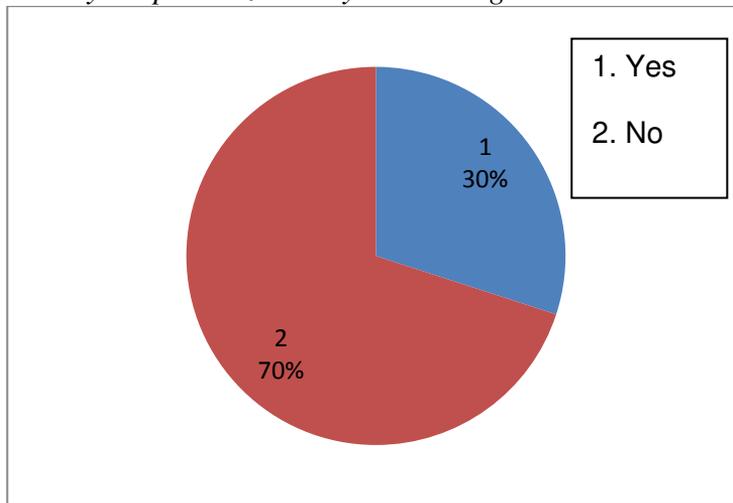


Source: *Data from the field research.*

10. Do you use a computer at work, and how? Answer and comment: YES 78%, NO 22%. The test results are encouraging by indicating that 78 % of the fruit and vegetable producers use a computer in their work. These responses, when analyzing the issue of the usage of the Internet, indicate that the computer is used more than the Internet, which suggests that people actually own and use a computer but not the Internet.

11. Did you specialize in any market segment? Answer and comment: YES 30%, NO 70%. The responses indicated that there were certain segments of the market that were provided with products. But this kind of supply is reduced so that today there are no market segments whose needs will be satisfied in a special way, with their products. The responses indicate, in the vast majority of farmers, the absence of market segmentation as an important element of the marketing orientation.

Figure 3. *Did you specialize in any market segment?*



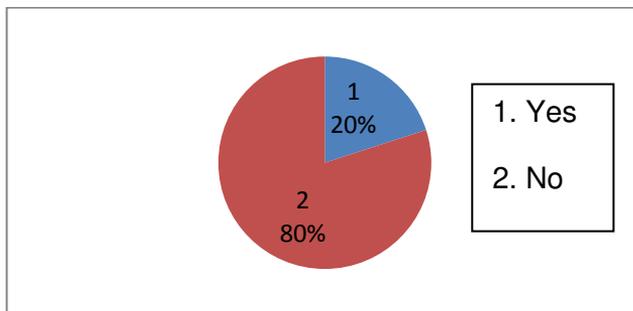
Source: *Data from the field research.*

12. Is agricultural production your main activity? Answer and comment: YES 92%, NO 8%. A large percentage of respondents, whose main activity is farming, once again points to the importance of agriculture in terms of the population employment and the sole source of income for the vast majority (92%) of the surveyed farmers.

13. Do you have a contract for production with a famous customer? Answer and comment: YES 18%, NO 82%. Manufacturers don't have the agreement for producing for a known customer of the vast majority of 82% , and if they have a long-term cooperation for individual customers, it still remains uncertain why one have no contracted production.

The responses indicate that in this part of the business activities, there is no marketing network and there is no marketing orientation.

Figure 4. *Do you have a contract for production with a famous customer?*



Source: *Data from the field research.*

14. Do you need the Internet or a computer? Answer and comment: YES 90%, NO 10%. Very encouraging are the responses to the question of whether you need the Internet or computer for your work, because 90 % of the respondents stated that they need them.

15. Have you ever found a buyer for vegetables over the Internet? Response and comment: YES 0%, NO 100%. Notwithstanding the awareness that show a desire to use the Internet, this response indicates to a great job which is standing in front of the agricultural manufacturers in order to try to open another channel for its products.

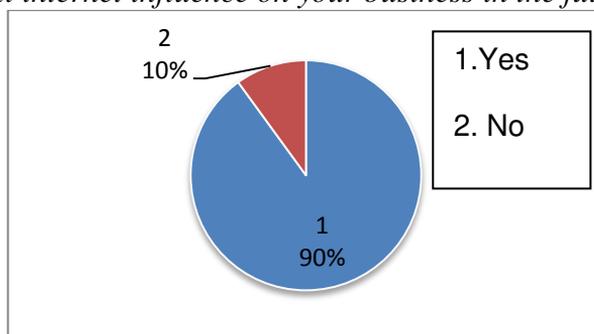
16. What would be your biggest help in business? Answer and comment : ORGANIZED PURCHASE 32%; THE ARRANGED DOMESTIC MARKET 20%; INCENTIVES 20%, PRICE STABILITY 10%; STRONG ASSOCIATION 10%, PACKING 8%. Manufacturers pop up the organized purchase as one of the greatest help in the regulation of business. So, with the arranged market it is already over 50 % of the producers who think that was the most helpful in their work. Stimulation with 20 % takes high place, but it is also good for the producers to see that they can't solve their problem only with the incentives. Stable price, strong unions and packaging are the further details that manufacturers emphasis as an area that is most applicable for helping business.

17. What is more difficult for you, production or sale? Answer and comment: PRODUCTION 6%, SALE 66% and the same 28%. Most manufacturers, 66 % of them think that it is the sale that is harder than production, which directly supports the hypothesis of this paper that the

problems of placement has significantly affected the uncertainty of the fruits and vegetable production in Banja Luka.

18. Will the Internet influence on your business in the future? Answer and comment: YES 90%, NO 10%. There is a great awareness of the fruit and vegetable producers in Banja Luka about the Internet, which will have the influence on their business in the future.

Figure 5. Will internet influence on your business in the future?



Source: Data from the field research.

19. How to contact customers or suppliers? Answer and comment: With customers: PERSONAL - MARKET 60%, JOINED 20%; TELEPHONE 10%; PERSONAL AT HOME 10%. With suppliers: PHARMACY 44%, PRESENTATIONS 30%, COMMERCIALS 16%, FAIRS 10%. Contacts with customers are the most important when you are in the market, it is also important where the sale of agricultural products happen, and joined contacts happen mostly in informal associations with a neighbor, friend or godfather. Speaking generally, when a customer needs to be delivered a large quantity of goods, help and association is usually offered to satisfy the customer in the short term.

With the suppliers, the main form of contact is done in agricultural pharmacies that are selling raw materials of agriculture. Presentations are highly-placed and they take place mostly in the winter when the producers have the time to educate themselves. Marketing and Trade are at the end by the importance of contacts with suppliers.

20. Types of information that you are looking for on the Internet? Answer and comment: WEATHER FORECAST 30%; PRODUCTION OF

TECHNOLOGY 20 % , NEW MACHINES 14%, NEWS FOR SEED, EXPERIENCES 14%; NEWS FOR VEGETABLES 14%, NOTHING 8%. We see that at the highest place, of what farmers are looking for on the Internet, are weather forecasts, which is a logical thing because the climate, over time, became the most important factor of agricultural production. In the second place, there are various production technologies, while the equipment, varieties and news cause the same interest.

Conclusions and recommendations for further research

The general conclusions given from the answers, as well as the established business activities of the fruit and vegetable producers, that were tested and observed over the years, are: Research's needs, desires, purchase options, customer's habits, for better satisfying customers, were not registered. Market research, in order to conquer new markets or to protect existing markets, was not registered. Market segmentation and planned product offering to the particular segment, were not registered. Research of the environment and overestimating the legal, technological or other changes were not registered. Creating marketing networks in order to increase competitiveness, was not registered .An association, in order to enrich the offer with quantity and quality, was not registered. A high level of marketing research, in order to differentiate products, then search for new distributive channels, and adjusting the promotion to the requirements of customers, were not registered. A high level of product innovation was not registered. Crosscutting was not registered.

In the conduct of business, there are the beginnings of the formation of network marketing, with the help of the activities by vegetable farmers. They secure the regular suppliers of raw materials and ensure the finished goods of the customers, so we find that it is not enough for a business entity just to be classified in the marketing business orientation. Nevertheless, the basic characteristics of the registered business marketing orientation are not registered, so our opinion is that there is no marketing orientation in business within the fruit and vegetable producers in Banja Luka. Business orientation of the producers, based on responses and business conduct, is the orientation on production and the product, and also on the combination of these orientations depending on the given conditions in the observed year.

The concept of production or production orientation is further analyzed. The production orientation is in many ways characterized by the production of fruits and vegetable producers in Banja Luka, in the period from the end of the war 1995. year until 2000. Due to the limited development and communication, all production was for local or regional market . Due to the broken trade links, the withdrawal from the market of producers of raw materials of the country was affected by war (in 1992. untill 1995.). The main concern of the fruit and vegetable producers was how to establish production and to provide high-quality raw materials.

The concept of the product or orientation on the product.. The concept of the product fruit and vegetable producers in the Banja Luka was predominantly accepted at some point in year 2000. The communication, freedom of people, and also ideas and goods, became much better just a few years after the war. On the market, quality suppliers or raw materials in agriculture were brought back (hybrid seeds, modern fertilizers, pesticides, etc.). Scientists brought this new technology of production, so the fruit and vegetable producers could master the production technology and come to the superior products. This phase of the orientation of the product or business concept of the product exists, to my estimation since 2000. until the 2005 but it intertwines in some regions with a production concept. According to that, there is no visible clear transition from concept to concept, but the process is obvious and logical, and visible to all who are involved in the production of fruits and vegetables.

The concept of sale or sale orientation is further explained. For fruit and vegetable producers in the Banja Luka region, the sale orientation is dominated. The concept of sales or sales orientation, have started in 2005 and it lasts until today. In the period after 2005., 10 years after war, we got the process of establishing trade networks started. The closer and distant , and also the foreign manufacturers and distributors of fruits and vegetables, have observed the saturation of the market of Bosnia and Herzegovina and the opportunity to win a fruit and vegetable market of Bosnia and Herzegovina. The production of fruits and vegetables in Bosnia was increased under the influence of diffusion of the new technologies and of more efficient work of producers of fruits and vegetables in BiH. The problem is that the demand for fruits and vegetable producers in BiH is constant with a slight increase, which was significantly lagged behind the increasing offer of fruits and vegetables

which were home-made and also from abroad. The concept of marketing or marketing orientation is further explained. The producers of fruit and vegetable, who were analyzed in the Banja Luka region and across the country, in 99% of cases did not accept the marketing orientation. None of the observed business organization for fruit and vegetables, did not use tools for marketing orientation. They were analyzed as a single producer of fruits and vegetables. The analyzed fruit and vegetable producers, did not explore customer's needs, or tried to meet customer needs in a complex way

The importance of the research for decision makers in the public and private sectors

Our results on the business orientation of the fruit and vegetable producers in BiH can be used in order to strengthen regional competitiveness of these producers, through the detection of weaknesses and proposed activities to overcome the identified barriers. Suggestions for improving the competitiveness of food producers in BiH are primarily training and education: Training on the use of computers, training on the possibilities of marketing concept in business, training on detecting the market segments; training on the development of cooperation with scientific institutions, training in contracting production with distributors of fruits and vegetables; Education on cooperatives and producer associations; Education on sources of loan funds; Education on how to build a marketing network; Education on business records; Education on the changes in the market and environment. Changes that occur in the fruit and vegetable market are too complex for manufacturers too notice them and to develop the tools for adjustment. The help from Ministries is truly needed to fruit and vegetable producers, in order to be able to adopt a marketing orientation in the function of improving the regional competitiveness.

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FACTORS OF AGRIBUSINESS COMPETITIVENESS OF THE REPUBLIC OF SERBIA

Danica Glavaš-Trbić, Goran Maksimović¹

Abstract

The authors first analyze the factors of agribusiness competitiveness of the Republic of Serbia and define the current competitive position of this sector in the global market. At the beginning of this paper, the authors provide an overview of the theory of competition and competitive advantage of companies, analyze some of the most important price and non-price factors that increase competitiveness, and finally, present the results of analysis of agribusiness sector in Serbia. The authors believe that the development of competitive advantages of individual agrarian subjects may improve long-term competitive position, and that the current bad situation of agribusiness is a reflection of the deep socio-economic crisis of the whole economy and society of the Republic of Serbia. Reforms are necessary at all levels, from individual products, individual industries, to the changes at sectoral and national levels. In this context, the authors emphasize the role of the state and suggest important measures to increase competitiveness and solve problems at the micro and macro levels.

Keywords: *Factors of Competitiveness, Competition, Competitive Advantage, Agribusiness, the Republic of Serbia.*

Introduction

Competition is a necessary condition for the functioning of a modern market economy and competitiveness is the key of the international and domestic success. Although there are many factors that have the impact on the competitiveness, it can be increased only if there are competitive

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companies (Pejanović et al., 2005). Each company needs to see its possibilities and the factors affecting their business, and relying on positive factors to develop a strategy to improve its market position. Competitiveness sets the basis for success or failure of a business or the economy in general. Competitiveness is synonymous with productivity and efficiency and means the ability of companies to involve and sustain on the global market in the long-terms. Economic entities operate in specific environments and conditions. Critical success factors of business are very different in certain industries. Increase of competitiveness may be based on different elements: product prices, costs of production, new technology, innovation, knowledge, human resources, entrepreneurship, the brand and the quality of the product, etc. But one must always bear in mind, that there is no just one optimal solution or one combination of factors which guarantee the success of all competing entities.

In Serbia, agricultural production is the dominant activity, the most important agro-economic sector and a basis for development of other non-agrarian activities. The role of agribusiness in the development of a country is different. If a country has a lower level of economic development traditional agricultural production becomes a major part of it. The industrialization of agriculture strengthens the links and interdependence of the field with other manufacturing and service industries. Considering the available natural resources, created manufacturing capacities, developed human capital, agribusiness is the foundation of economic development and food security in Serbia. Significant changes in the nature of international competitiveness happened under the influence of globalization and internationalization. This fact puts in foreground the need for redefining the strategic assumptions and macro-organizational structure of agribusiness companies. In this sense, the further development of Serbia must paid special attention to the current competitive position of the agribusiness sector, identify incentives and limiting factors and based on all of that give prepositions strategies and measures to improve the competitiveness of the agribusiness in Serbia.

Overview of the theory of competitiveness

The theory of competitiveness becomes more important during the eighties, after a major disruption of the world economy that raised the issue of export competitiveness to the priority level. At the same time

happened large changes in technique and technology in the so-called “The third technological revolution”, which had a strong impact on the change in the structure of industrial production, professional qualifications of the labor force and thus the export specialization of businesses in the international market. These changes opened the door for the development of a new theory that would explain the multidimensional aspect of contemporary trends on the international level. The American economist Michael E. Porter, leading contemporary theorist in the field of competition, points out that there is no single internationally accepted definition of *competitiveness*. At the firm level competitiveness is the ability to compete in world markets with the use of a global strategy. For others, means that the country has positive trade balance. For a number of economists competitiveness can be expressed by low unit labor costs adjusted with exchange rate (Porter, 1990). It is a multidisciplinary concept that includes different areas of economics. Depending on the goals and levels of observation (micro, meso, macro) there is a difference in the definition of this term. *Competition* really is a play between entities that have the same or similar economic goals and it encourages subjects to enhance their efficiency and thus allows them to better prepare for the competition on domestic and foreign markets. It is beneficial to all actors in the market economy, because it involves fairly (fair) competition (Pejanović et al., 2005). Micro-economic interpretation of this concept places focus primarily on the company's ability to compete and based on the success secure market share, increase profits and achieve growth. Competitiveness means improving the position of individuals, companies and countries in comparison with other similar entities. It is basically a synonym for productivity and can be enhanced through the use of new knowledge, investment and increased efficiency (Njegovan and Bošković, 2006). Contemporary studies indicate that competitiveness can no longer be viewed just through the prism of prices and cost of inputs. Buyers in the market decide choosing between the lower prices, good product quality and after-sales service, but also between various non-price factors. At the same time, *competitive advantage* is the main indicator of the quality control. Gaining and maintaining a competitive advantage is a very complex and delicate process, due to the development of new sources and the dynamics of consumer preferences and competitor activity. Productivity growth will increase the quality of business or the ability to make superior products, discovering new ways to use resources and advanced technological processes (Pejanović et al., 2005).

Defining and analysis of competitiveness at the macro-economic level becomes more complex. For many years in the economic literature dominated two main approaches: *a) the traditionalist*, which is a macro-economic competitiveness defined and determined only by the prices, costs and exchange rates, and *b) an empirical*, based on the results of empirical studies of foreign trade. Porter develops a new concept of macro-competitiveness of the so-called *structural competitiveness*. He believes that the competitiveness of the nation cannot be seen only from one or a few isolated indicators of business success. Starting from the fact that the main objective of each country is the living standards increase, he points out that the most important resources of national productivity are labor and capital. International trade encourages national productivity by allowing specialization of production in each country in which it has a competitive advantage. There is no country that has a competitive advantage in all areas of economy, so the solution for each country is use of available limited resources in the most productive way.

Also, attempt to analysis competitiveness only at the national level is wrong, because the companies actually compete on the world market, not the nation, and, consequently, competition should be estimated at the level of individual industries or sectors. Chesnais points out that the micro and macro dimensions of competitiveness are complementary. This means that the international competitiveness of the national economy is built on the competitiveness of companies, which doing business in the country and outside its borders. It represents the will of the company to compete and dynamically develop, and their ability to invest and innovate as a result of its own research and successful application of imported technology (Chesnais, 1986). In his opinion, the most important elements in the analysis of competitiveness are: market size, the structure of domestic production by sectors and production branches, volume of distribution and exporters power in the market.

Some modern economists, instead of sharing the micro-, meso- and macro-competitiveness, in its analysis use four levels of competition: national competitiveness, competitiveness of industry, the competitiveness of the company and product competitiveness. *National competitiveness* depends on many factors, grouped into: *a) external factors* (natural conditions, labor and capital) and *b) internal factors* (knowledge, strategy, management, labor quality, technological resources, innovation, quality of the business environment, etc). External factors

have long been decisive, because they affect the cost of production, which set the price of a commodity. Over time, the importance of these factors become relative and puts the internal factors of competitiveness at the first place. An important indicator of national competitiveness is the trade balance. Besides constant foreign trade deficit, for Serbian agribusiness is characterized by a high share of raw materials and low-tech products in our exports. Also, at national competitiveness great impact has non-economic factors such as political stability and legal security of the state, which are unfavorable in Serbia (Pejanović et al., 2005). For national competitiveness particularly important role has the state, through economic and agricultural policy, a stable business environment, legal system and developed legislation, free trade agreements with countries in the region, the establishment of sectoral clusters, as well as in the field of EU integrations. In addition to the above factors, *industry competitiveness* depends on: economic position of the branches, prices and costs among the branches, the degree of monopolization of the market, economic policies (monetary, credit, foreign trade, investment), and especially on agricultural policy when it comes to agriculture (Pejanović et al., 2005). The main instrument for achieving a high level of development of certain industries is state regulation of the sector. So, for example, strong state support of agriculture motivated by strategic and economic objectives leads, besides the development of the agricultural sector, and job development to the whole country. Unfortunately, in Serbia this is not the case. State, rather than to support the development of agribusiness and to appreciate the specificities of agricultural production, the needs of agriculture are often ignored and ruthlessly exploited. Wrong agricultural policy permanently held unfavorable economic situation of agriculture, taking from it an enormous added value and spilling into other activities. New agricultural policy is needed that will have radically different approach to agricultural development, directing it into a modern, competitive, export-oriented and profitable activity (Pejanović et al., 2005).

Porter believes that international competitiveness requires from companies to transfer their domestic competitive position to the international level. *Competitiveness of the company* includes its ability to survive in the market and to face and compete with the competition. In order to achieve that company has to continually improve, to operate with the lowest possible cost, to be as productive as possible and to achieve the highest possible quality with available resources. To achieve *product competitiveness*, company must work on product standardization,

increasing quality and unification of export program into a single brand. It is necessary to develop a positive image of our products, which will be recognized by consumers. To be competitive today means to be present at all points of the dynamic markets worldwide. This is possible with the provision of increasing quality of goods and services for all consumers in the world market (Pejanović et al., 2005).

Globalization brings, therefore, a new dynamic in the world economy and gives every company and country a chance to change his position. From the variety of the functions of the competition some of the most important are (Pejanović et al., 2005): *promotion* of the efficient use of resources; *motivation* of actors to develop new products and to find cheaper methods of doing business; *stimulation* of cost efficiency. Competitiveness is a method for improving the quality of life and well-being of people, through improvement of offer, reduction of costs and enhancement of quality. The two main forms of competition are *loyal competition* and *disloyal competition*. Loyal competition implies a fair match between contestants and business transactions by the principle of fairness and diligence. It is acceptable way of market competition. Loyal competition needs to meet conditions of equity, equality and independence. These are the minimum requirements needed to be ensured to complete economic and social estimation of rationality, productivity and efficiency of business. Only in market conditions, where there is no privileged, and where all market actors are equal, more favorable offer will result in increased productivity, higher product quality, lower production costs and greater adaptation to the needs and tastes of consumers (Pejanović et al., 2005). Disloyal competition is opposite of loyal competition and manifests itself in a variety of forms, from the formation of monopolies, cartels, various internal agreements and the like.

The experience of the EU shows that the market mechanism is the most effective instrument to meet the demand of consumers for goods and services, allowing company expansion, productivity increase, innovation and job creation. Thus, a market that relies on competition provides maximum business freedom (Pejanović et al., 2004). Every country competes in the international market with those products and services that was previously developed in the domestic market. If the market in this country is under competitive, if it takes place in the match between a small number of large companies that compete with each other on the

basis of non-price characteristics of its offer, then these properties become the dominant characteristic of their export.

Factors of competitiveness

Each industry and each sector has its specific stimulating and limiting factors that affect the level of their competitiveness. Increasing competition may be based on different elements, depending on the resources that are available. For example, in some cases attention is centered on education, entrepreneurship and the creation of new and dynamic company, in other cases, on the innovation, import of modern technology and modernization of the domestic economy. But, for all the same applies - if you're not competitive in the local market, you cannot be competitive in international market.

Factors that may influence the competitive position of some parts of the economy, and hence the agribusiness, can be classified into two categories: price and non-price factors. The first group affects the competitiveness of the primary sector or product through price and second through qualitative factors. Some of the major cost factors are the exchange rate, the relative rates of inflation and unit labor costs, which together affect the amount of the product price. Some of non-price factors are: the income elasticity, quality, design and packaging of the products offered, marketing activities, organization of delivery and after sales service roles. Price competition is a very important aspect of competitive battle in the market economy. Price forms through offer and demand, but it has to be both market- and cost-oriented, high enough to cover the total costs and at the same time low enough to attract more consumers. Interest of producers and traders is to achieve the higher level of sales prices to maximize total profit and operating efficiency, while the interest of customers is to pay for goods and services as cheaply as possible. The experience of developed countries shows that the pricing policy of agricultural and food products is the most appropriate instrument to encourage the development of agriculture and agribusiness. The current pricing policy of agricultural products in Serbia didn't have positive effect on the development of this sector. It is a policy that has only short-term, low economic and political benefits. The price to be paid is many times larger and the negative consequences have long-term character. The rate of exchange is one of the most frequently mentioned factors of competitiveness. If the national currency of a country's strengths in

comparison to other national currencies, its export products become relatively more expensive in foreign markets. At the same time, foreign goods become cheaper in the domestic market. Exporters and domestic export companies are at a loss, and importers are gaining extra profit. Another important factor is the relative rate of inflation that indicates how many percentages of export product of the country with higher inflation became relatively more expensive on the market of the country with lower inflation and vice versa. It shows how the imported products from countries with lower price increase became relatively cheaper in the market of the country where prices expressed partial growth. And finally, an important price competitiveness factor is unit labor costs or company labor costs per unit of production. Higher costs of this type can affect the price growth of a certain company offers. For unit labor costs analysis, it is essential to monitor the changes in labor productivity. If you increase the amount of product per worker, then increase of labor costs through wage increase will not necessarily lead to an increase in unit labor costs. On the other hand, the non-price factors of competitiveness are a key element to promote exports, especially in the case of the imperfect competition. Prices are often less important factor of international competitiveness in comparison to the non-price factors. The traditional approach of the dominant role of price competitiveness factors is still used in the interpretation of trade in the lower stages of processing and standardized goods, while in developed countries with a greater range of products and increased market shares, non-price factors play a stronger role in determining its international competitiveness. Non price competition is competition in which prices are generally held steady, while trying to increase the sales volume through the other elements of the marketing mix, such as wider range of products, better product quality, shorter distribution channels, offensive sales strategies, advertising, etc. Today, in the time of available information, developed financial market, widespread transfer of technology, labor mobility, sophisticated and spoiled customers, non-material components of competitive advantage sources become more. In a globalized competitive environment quality is an essential element of business strategy, or even closer, product differentiation strategies. Based on the results of monitoring and analysis segmentation of export markets can be performed on those where the quality dominates and the markets dominated by the prices. Accordingly, certain products according to their unit values can be divided into specific segments. Based on these results it is possible to define scenarios of competitiveness. The fulfillment of quality

expectations of our customers is an important way to the target competitive position of the company. The case is similar with the design. Successful product design improves its quality and increases sales. Both the quality and design depend on the willingness of exporting companies or the government to invest in research and development. Also, any company that operates in an oligopolistic market must be aware of the importance of marketing activities. Marketing has to investigate and choose the markets in which new products will be offered and to contribute to maintaining and increasing the participation of the observed products in selected markets. This can be achieved through a variety of promotional activities, discounts, advertising, trade fairs, exhibitions, etc. In addition to quality and design, technology is one of the important non-price factors of competitiveness. Form of the technology used depends on the degree of development of the country. Since the creation of the new technology is very expensive, in the middle and especially in less developed countries it is imported and integrated into the production process. For Serbia and its agribusiness is important successful adoption and diffusion of new technologies and innovations. Although Serbia is lagging behind the other countries, the interest is in the use of modern technologies at a high level. Companies realize the importance of the application of innovation. However, the lack of innovation in enterprises is not a consequence of lack of knowledge, but also the financial and organizational reasons. Therefore, stimulating research and development projects, as well as encouraging the use of modern technology in the production process involves a special role for the state. Finally, the organization of after-sales functions of the company play an important role. Through the good organization of this function company is acquiring appropriate reputation that has positive effects on future business arrangements.

The competitive position of agribusiness of the Republic of Serbia

Rural areas in Serbia have over 40% of the population and of the total working population over 30% are employed in agriculture. The employment rate in agriculture is one of the highest in Europe. Consequently, agriculture is a very important activity, not only in rural areas but also for the national economy as a whole (Glavas Trbic et al., 2010). Because of its available natural and human resources Serbia has great agricultural potential. Primary agricultural production from 2002-2013 participated in the GDP of the Republic of Serbia in the range of 15.5 to 11.8%. If we look at the overall contribution of agriculture to

other sectors of the economy it exceeds 40% of gross domestic product. Agro-industry is still one of the most important industries in the area of Serbia, its share in the GDP accounts for about 20 percent, and with related activities with more than 40 percent. The agricultural budget was only 2.2 to 2.6 percent of total state budget.

Going into the process of European integration Serbia has a chance to exploit their comparative advantage, improve its position and increase the export of its agricultural products. Agribusiness has not only direct but indirect effect on the level of economic development. For Serbia, as of all countries with low market potential, the international market is an important element in the analysis of competitiveness, as foreign markets are much larger than domestic and thus crucial to its development. Therefore, the analysis of international trade plays an important role in the competitiveness of the agribusiness of Serbia. Agribusiness of Serbia is one of the areas that in the last decade had a permanent trade deficit till last few years. Last few year recorded a substantial surplus in foreign trade of agro-industrial products, which in the 2011 amounted to 1.4 billion dollars. Exports of agricultural and food products in the 2008 amounted to 2 billion dollars, imports 1.5 billion dollars and the surplus was 500 million dollars. The rate of coverage of imports with exports was 1.35, and the same trend continued in the following years. Export of agricultural products in 2011 was 2.7 billion dollars in total, imports 1.4 billion dollars and surplus of 1.3 billion dollars. Next year, the total gross value of agricultural production achieved is estimated at 3.9 billion dollars, which is 24 percent less than the production in the 2011 year. According to the Statistical Office of Serbia total trade of agriculture with the world in 2012 amounted to 4.1 billion dollars, of which exports 2.7 billion dollars and 1.4 billion dollars imports. Achieved trade surplus was of 1.2 billion dollars, but it was 3.5% less than in the previous year. The most important agricultural export products in the 2012 were: corn (541 million dollars), white sugar (164 million dollars), roland frozen raspberries (136 million dollars), sunflower oil (96 million dollars), non-alcoholic beverages (64 million dollars) and soybeans oil (55 million dollars). According to the agricultural structure of export in the 2012 the biggest share had cereals with 30.86%, fruit and vegetables with 19.85%, drinks with 7.84% and oil with 7.21%.

Despite an unfavorable trade balance, which has for many years determined the agrarian economy of Serbia, the indicators of

competitiveness lack in this area are also unfavorable structure of exports and imports, as well as the worsening of coverage of imports by exports, high prices, the fall of qualitative factors, and others. Serbia should strive to grow from a net importer to a net exporter of agricultural inputs, the primary agricultural products, as well as exporters of technology and knowledge. Of the input it could increase the export of seeds and planting materials, chemicals, fertilizers and pesticides, tractors and agricultural machinery and equipment. For now, Serbia is a significant exporter of seed and planting material, but there is potential to further increase production and exports. Our country is a small producer and consumer of fertilizer, but the practice in the past few years changed and production increased slightly but remains insufficient to meet the needs of the domestic market or export. The current export of agricultural machinery was small scale and was based on the tractors and combines of lower categories. The potential lies in the production and export of machinery for additional tillage, crop cultivation and processing equipment: cultivators, seeders, sprayers, incubators, equipment for mini dairies, breweries, oil mills, wineries, slaughterhouses, etc. In addition to inputs, primary agricultural products are often the subject of foreign exchange. In the future we should focus on the development of processing facilities and export the processed products (processing of grain and industrial crops; processing of vegetables, fruits and grapes; processing of livestock products). This would include the development of higher level of final processing, hiring more workers, accelerate economic growth and specialization in line with market requirements. The correlation between GDP and exports is slightly less if exports increase due to lower costs and higher if exports increase due to higher quality. This leads to the conclusion that Serbia only by increasing the quality of agricultural production and export supply can lead to greater overall export and growth of GDP. A significant factor in the competitiveness of agrarian products is also a degree of utilization of production capacity. Analysis of the state of Serbian agribusiness indicates a low level of utilization of installed capacity. Exceptions are the tobacco industry with about 80% capacity utilization, the beer industry and the oil industry for over 50% capacity utilization, while all other industries are working with smaller capacities. For example, feed industry has a capacity utilization of less than 20%. The share of technology in agriculture exports should be mentioned as an important factor in establishing a more competitive position at the aggregate level. The opening of the market of the Republic of Serbia there was an increase in rivalry. At the same time, participation

of technology in actual exports of agricultural products didn't rise, which goes against the participation of the main factors. It happened the other way around, and it does not go into the hands of the tendency in Central Europe. The largest export share has agricultural products such as sugar beet, mercantile and seed wheat and corn, raspberries and cherries. This confirms the fact that Serbia mainly exports agricultural products with low technology content. The reason for this is the lack of investment in research and development, primarily due to lack of funds. Increasing volume and changing the agricultural production structure with the adoption and implementation of appropriate measures of agricultural policy, it is possible for Serbian agriculture to fully meet domestic demand till 2015 and to realize more than three billion dollars of foreign exchange earnings from exports. By the 2020 years, agriculture in Serbia should satisfy domestic demand at a higher level and provide foreign exchange earnings of about six billion dollars and till 2030 the foreign income of 9-10 billion dollars (Gulan B, 2013).

Assessing the current competitive position of Serbian agribusiness can be concluded that Serbia still largely relies on the basic factors, in the structure of exports have the largest share of primary agricultural products, that small investments are into the factors that create added value and that this leads to the development of complex products and services that can be competitive in the international market. Under the influence of scientific and technological progress is increasingly coming to the fore the need for a change in strategy development, coordination of the various forms of cooperation and the system of production of agricultural and food products rotates towards achieving the synthesis of agricultural and industrial production and centered "modern enterprise". That is the model that Serbia should follow.

Measures to improve the competitive position of agribusiness of the Republic of Serbia

The role of the state in the further development of the agribusiness of Serbia and increase of its competitiveness is directly related to the overall economic development policy. The prosperity of a nation depends on the competitiveness of its economy. On the other hand, it is based on the level of its productivity. Also, competitiveness at the national level depends on the level of competitiveness of individual companies. Serbia needs to go in the direction of the transition from short- to long-term measures to

improve competitiveness (Glavas Trbic, 2012). The government must recognize its role and provide the conditions and the proper functioning of markets. The private producers, processors and traders in those terms should alone find the most efficient ways of production and method of survival in a free market. Strategies to improve the competitive position of Serbian agribusiness must include production - technological innovation, business - market orientation, product quality and brand and marketing orientation. In this sense, a change of ownership, production and market structures is necessary.

Analyzing the current state of Serbian agribusiness can be concluded that one of the reasons for the lack of competitiveness in the international market is in the wrong economic and political measures of the state. Government policy did not sufficiently encourage the functioning of the free market and its principles, which led to the low competitiveness of agricultural products in the domestic and international markets. Spread the opinion that domestic producers cannot compete with their products in foreign markets and do not enjoy sufficient support their country as opposed to foreign competitors. However, in practice, the opposite cases occur. Some sectors of the economy, which have the lowest state support, in the global market proved to be far more competitive because they were forced to adapt to the demands of the world market. Individual producers should compete to each other in a free market, finding themselves the most effective methods for gaining a better competitive position. The state needs only to create and develop a favorable environment for the play and equal conditions for all participants. The market does not tolerate government intervention in order to achieve specific social objectives. They are justified when the government does not cross the line and begins to suppress the role of the market and independently decide on the fate of certain sectors of the economy. The government needs to build institutions that will stimulate the development of competitiveness, create an adequate legal basis, to construct the judicial system and efficient administration of clear procedures and rules. Also, state in its strategy has to work on the development of international economic co-operation as the basis of export-oriented concept of development of agro-industry in Serbia. This includes stable and sustainable growth in production, adapting the structure of export to demand from foreign markets and the use of comparative advantages in export based on agro-ecological potential, technological modernization, knowledge management and organizational skills as well as the quality of the product.

The role of government in enhancing the competitiveness of certain sectors of the economy can be stimulating or limiting. In the agricultural sector in Serbia it has so far proved more stimulating than the limiting factor. The state has intervened in the agricultural sector, mainly in two directions, in the direction of providing cheap food for the population and maintenance of social peace, or to protect income of producers. To achieve this state has introduced price controls and safeguards public (social) rights. Price control is implemented through the minimum, maximum and fixed prices of certain goods and services, which proved to be the least popular and least efficient form of state intervention. On the other hand, the entrepreneurial activities of public (social) subjects were less successful, irrational and inefficient compared to the private sector and the government intervened with its measures to protect and develop these entities. In addition to these, state acts through indirect measures, such as measures of fiscal policy, budgetary policy measures, tariff measures (foreign trade) policies and measures of credit - monetary policy. A special form of outside market activity of the state is state planning, which was also applied in the agricultural sector of our economy. They were "consciously correcting spontaneous market flows" for the "general public interest". The effort to market forces replace national directives, has left us with catastrophic consequences for the subjects in agribusiness, making them dependent on the state and unqualified competitors (Pejanović et al, 2005).

Conclusion

Globally, the competition is day by day growing and strengthening. Many developed countries of Europe are moving their production facilities to other countries in order to ensure cost-effective production and lower prices of finished goods and occupied a better position in the global market from its competitors. There is a change in the structure of production with the specific aim to improve the competitive position. It is no longer enough to know their customers well, but it is necessary to know its competitors in order to survive in the global competition. Serbia, as a small country, was forced to support export-oriented growth strategy, in which the problem of competitiveness is of crucial importance.

To encourage the export performance of the agricultural sector, Serbia has to effectively use the existing comparative advantages, promote them and build new ones. Although Serbia has great natural and human resources

for the development of agribusiness, they are not fully utilized. Agricultural sector still has many factors that limit its further development and reduce competitiveness in the global market. Unfortunately, after a decade of the transitional reforms, Serbia has not made an institutional framework that would encourage development and attract investment in the agricultural sector. The privatization of the processing industry was based largely on layoffs as a model for increased productivity, while investment in new techniques and technology, investment in new skills, education and training of workers, innovation, development of marketing initiatives, improve management and organization, as well as improving the quality and product design are still at a low level. Agro-industry is losing its competitive position. Serbian companies are in a state of crisis, the agricultural companies are in the process of incomplete and ineffective privatization, individual households are not farmerized and agricultural cooperatives create a false picture of the developed system of association in agriculture. The role of the state in the development of our agriculture is inadequate and ineffective.

Solution must be found in changes of the philosophy of development, at the level of individual industries, certain segments of the economy and of the entire country. Each competitor-oriented company wants to achieve a superior position compared to the competition, and this could be achieved through a series of actions taken during the production, design, marketing, delivery and support to its customers. Companies that have a long-term competitive superiority usually generate huge profits in the business. In order to achieve this it is essential that the company has good management able to recognize the potential and the efficient and effective use of its sources of competitiveness. The main direction of the future development of Serbian agribusiness is optimum utilization and conservation of available production capacity, increase of agriculture production, changing the production structure in favor of intensive agriculture for export and production high finalized and high quality products to meet the needs of domestic and international markets. Regarding to this, the necessary changes to the competitiveness strategy has to be made, that would mean subsidizing the export, an active exchange rate policy, changing the profile and structure of agriculture, greater investments in technology, technology and innovation, attracting foreign direct investment through the creation of a favorable investment climate, investment in knowledge and strengthening of human resources, improvement of management systems, etc. Enterprises in agribusiness

must be trained on all subtle segments/operations where opportunities to increase productivity/competitiveness are bigger. In this sense, a logical solution offers the concept of structuring the level of competitive advantage of agribusiness companies based on increase of national productivity and the segment ever increasing product quality, the creation of their new features, improving the technology of their production or raising production efficiency. In all this, the state has an important role. There are a number of measures that the government can implement to create a favorable economic environment and thus to help the subjects of the agricultural sector to gain better position in the international market. These measures should primarily go towards the improvement of human resources, by adapting qualification structure of workers and their continuous learning; the introduction of new techniques, technology and innovation and greater investment in research and development; establishment of an favorable environment to attract investment; establishment of an effective legal system by strengthening the efficiency of public institutions and the development of adequate legislation; development of the financial sector, easing credit conditions, completing the privatization of agricultural enterprises; promotion of special interest associations through clusters and other measures and actions.

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THE ROLE OF SCIENCE TO DEVELOPMENT OF ECONOMY AND AGRICULTURE

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Abstract

At the beginning of civilization, man has used plants from the nature, and collected plants with the largest fruit or roots, of which one of the seeds used for cultivation and domestication. On the base experience man developed methods for selection of improved species plants and agricultural technology. Discoveries of Mendel's law of traits inheritance, discoveries of inorganic fertilizers and its application are important scientific base for developing scientific farming technology and breeding enhanced genotypes. Discovery of structure DNA has influence to precisely plant breeding and led to developing of transgenic plants in the aim of increasing food production. Developing biotechnology directed to improve yield, quality and adaptability of crops under changeable climatic factor in the aim to solving problems of hunger, medicaments and power of economy.

Key words: *science, methodology, development, economy, agriculture.*

Introduction

Development of science indicating society, economy, culture, education etc. All economy branches have interaction and influence to each other. The level of development economy as well as agriculture depends from accomplishment of sciences, research methodologies, from knowledge and technology transfer. The high importance for development of agriculture had discovery of sex in plants which first wrote Cammerarius 1694th. Sexual reproduction of plants is accepted after papers of Carl Linnaeus in 1760. in which he described the sexual organs of many plant

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species and their hybrids produced by crossing. Also, important event was hybridization which made Körleuter, J.G. (1760) and produced inter- and intra-genus hybrids. The important support to breeding gave Darwin 1859. In his book „Origin of the species“. Agriculturalists began conducting breeding of crops before having a thorough understanding of the basis of genetics. Between 1856 and 1864 Gregor Mendel conducted experimental research of 29.000 pea plants (*Pisum sativum*) and discover type of inheritance of seed traits. In that time Djordje Radic, 1874. conducted experiments of with maize crossing and studied inheritance of its traits. Gregor Mendel's discovery revolutionized agriculture by the development of cross breeding.

During industrial revolution the chemically synthesis of inorganic fertilizers were widely developed. Inorganic fertilizer use has significantly supported increasing of food plant production as well as global population growth. Crop yields are increased from 30-50% by applied natural or synthetic fertilizer. John Bennet Lawes began to experiment on the effects of various manures on plants growing in pots in 1837, and a year or two later the experiments were extended to crops in the field. By research of effect widely applied inorganic fertilizers in agricultural production were increased understanding of plant physiology mineral nutrition. Plants can only absorb their required nutrients if they are present in easily dissolved chemical compounds. The science in agricultural of USA started by Hatch Act of 1887. - gave federal funds to create a series of agricultural experiment stations, as well as exchanges new information, especially in the areas of soil minerals and plant growth. After 1906, public expenditures on agricultural research in the US exceeded private expenditures for the next 44 years (Huffman and Evenson, 2006). Agricultural science continuously developed and rapidly developed in developing countries from the 1960s known under the name as the Green Revolution, was closely tied to progress made in selecting and improving crops and animals for high productivity, as well as to developing additional inputs such as artificial fertilizers and phytosanitary products. Scientists are creating new cultivars or hybrids that can resist pests, diseases, and environmental stresses and need to know molecular base of breeding (Karp et al., 1997). “Green revolution” varieties have increased yields 2 to 3 fold (Mifflin, 2000). The industrial agriculture opened many questions among agronomists that concerning to development and emergence of new fields: integrated pest management, waste treatment technologies, genomics etc.

Development of new technologies, such as biotechnology and computer science have made it possible to develop new research fields, including genetic engineering, improved statistical analysis, and precision farming. The aim of this article is analysis and estimation of relationships between progress in science and technology and contribution of plant breeding to developments of agriculture and economy.

Improvement of agricultural connected to science development

In recent decades altogether, developed and undeveloped countries looking for how to increase agricultural production. However, advancement has been far from even. In at least 90 countries, a significant portion of the population - some 800 million people worldwide - continues to suffer from deficient diets. How is possible accelerate progress of food security under conditions:

- *the rate of growth in agricultural production is declining,*
- *world grain reserves have fallen to record lows,*
- *the demand for imported grain is increasing and*
- *commitments of aid to agricultural development have decreased.*

This requires intensifying demands on agricultural resources, and an immediate action at the national and international levels to attack the "root causes" of persistent food insecurity (environmental, technical and social causes of food shortages). The increasing production and yield influenced by water-supply, (irrigation) applied nitrogen fertilizer (Kovacevic et al., 2009, Knezevic et al., 2011).

Science in agriculture directed to support activities and institutions to reduce hunger and poverty, improve rural livelihoods, protect biodiversity and environment and contribute to social and economic sustainable development. The science in agriculture summarized related knowledge in climate changes, biotechnology, energy, to develop human health, natural resources, innovation in agriculture etc. The challenges is to identify the current condition propose measures based on knowledge a science technologies. In the breeding practice man used heterosis in plants, induced mutations, and nowadays new techniques in biotechnology (Knezevic et al., 2012).

For improvement productivity in agriculture, high influence has delivering new technologies, legislative, market and consumers need. The general model has been to continuously innovate, reduce farm gate prices and externalize costs. The achievement of science and technologies in agriculture provide conduction more intensive and profitable worldwide production. On the base of knowledge, science and technology in frame of economy level of development, organized the local, regional and global agricultural strategies for actions enabling to the multiple functions of agriculture. The industrial revolution and after 1960. year Green revolution spread rapidly to solve optimal scientific farming agriculture and creation cultivars with increased yield, biomass production by the choice the most adaptive cultivars in different region.

At the global, regional, local levels human meet opportunities to develop model of sustainable agriculture. One of the aims of science and technology is to increase the productivity of agriculture in a sustainable manner. How to achieve in different ecosystems? For that is necessary intensive interaction and cooperation among scientist and farmers to create realistic opportunities for their development where the potential for improved area productivity is low and where climate change may have its most adverse consequences.

The main challenge for knowledge, science and technology in agriculture is to make able multifunctional agricultural systems. For that is necessary solving many tasks:

- *improve social welfare and personal livelihoods in the rural sector and enhance multiplier effects of agriculture*
- *sustain the diversity of agriculture and food systems, including their cultural dimensions*
- *enhance environmental and cultural services*
- *increasing sustainable productivity and diversity of food, fiber and biofuel production.*
- *improving selection of sources of knowledge, science and technologies (old, modern, public and private).*
- *linkage the outputs from marginalized, rain fed lands into local, national and global markets.*

Effect of methodology and created cultivars to agricultural progress

Traditional plant breeding has produced numerous high yielding and quality new cultivars of crops during the last centuries. In traditional breeding, crosses are often made in a relatively uncontrolled manner, and new improved cultivars created. The breeder chooses the parents to cross, but at the genetic level, the results are unpredictable. DNA from the parents recombines randomly, and desirable traits such as pest resistance may be combined with undesirable traits, such as lower yield or poor quality. The parent plants must be closely related to produce offspring. Traditional breeding programs are long time selection process that often taking decade to produce new crop cultivars. Traditional plant breeding takes on average 12-15 years to produce a new crop cultivar. A great deal of effort is required to separate undesirable from desirable traits, and this is not always economically practical.

The growing of adaptive cultivars of all edible plant species in different environmental condition is very important for food production in the world. For the human being the most important cereal crops are wheat, rice, corn, barley etc., (FAO, 2002). The products from them consumed roasted, fermented, boiled, fried or baked (Enujeke, 2013). In developed countries, it provides such industrial products as corn oil, flour, syrup, (Dutt, 2005). Maize is cherished by several livestock species, including cattle, pigs, goats, sheep and rabbits as it supplies them energy (Iken *et al.*, 2001).

The numerous uses and high demand for wheat, maize, rice, barley, oat, to identify high yielding cultivars and hybrids adapted to each agro-ecological zone (Zeidan, *et al.*, 2006). Tolera *et al.* (1999) suggested that breeders should select cereal cultivars and hybrids that characterized high grain yield and desirable traits because of large differences that exist between cultivars. To create such cultivars and hybrids breeders must use the best parents as the most promising combiners in their breeding programs (Knežević *et al.*, 2006). For successful selection is necessary produce and grown optimum plant population, conduct analysis of productive, physiological and quality traits as well testing on different regime of nutrition, drought.

Mutations are changes in the genetic material of a plant and could be natural and induced. Sometimes the changes of genetic materials could be useful, while often have negative effects.

In 1940, plant breeders learned that they could make mutations happen faster with a process called mutagenesis. Radiation or chemicals are used to change the plant's DNA, the basic molecular system of all organisms' genetic material. The goal is to cause changes in the sequence of the base pairs of DNA, which provide biochemical instructions for the development of plants with new and desirable characteristics. For the efficient breeding is significant to know whether a single mutation or multiple mutations of independent origins were involved in this domestication transition (Clark et al., 2006). The location of genes and other markers in DNA fragments is necessary determine to make physical maps of genes along a chromosome. Physical maps are important for gene cloning, the development of genetic markers for tagging genes during breeding.

Over the 2000 plant cultivars (including rice, wheat, grapefruit, lettuce and many fruits) have been developed using radiation mutagenesis (FAO/IAEA, 2008). Induced mutation breeding was widely used in before four decades, but today rarely, a few cultivars are produced using this technique. Later, new genetics methods and new technologies developed in the aim of plant cultivar creation. Today very efficiently used genetic marker assisted breeding, where molecular markers associated with specific traits could be used to direct breeding programs, and genetic engineering.

Discovery of DNA structure in 1953. by Watson and Crick contributed to understanding of genetics and how genes function and what genes were. Barbara McLintock (1950) discovered that genes move from one location to another on a chromosome (transposons or jumping genes). By this discovering was possible explain how the changes in DNA caused by transposons affected the color of maize kernels.

For plant breeding was very important the development of micropropagation techniques, known as tissue culture (Thorpe 2007). Using of this techniques breeders can developed new plants with genetic information of interest from the small amounts of tissue. Desired plant could be produced without depending on pollinators and very fast.

Also, the development of embryo rescue technology permitted crop breeders to make crosses among distantly related plant cultivars, and then to grow embryos into whole plants through tissue culture. This is very important to solving the problem known as abortion embryos.

For transferring genes of plants can use protoplasts i.e. cell without cell walls. The cell walls can be removed either by mechanical means, or by the action of enzymes. Use of protoplast to make hybrid cells know as cell fusion, which can then be grown using tissue culture techniques (Thorpe 2007). In plant breeding plant breeding is the efficient method to introduce new genes into plant cells. Conventional biotechnologies, such as breeding techniques, tissue culture, cultivation practices are accepted and used. Changes in characteristics of the plants in the cross breeding process have been carried out on the basis of reproductive compatibility (Kondic et al., 2012).

The developing techniques in the field of molecular biology provided scientists to transfer DNA between organisms, whether closely or distantly related. This approach known as genetic engineering. The purpose of transferring new DNA (new genes) is to create organism with one or more new traits that are not already found in that organism. This approach gives potentially beneficial advancement in crop breeding, but has also been very controversial. Plants that have genes from other organisms are referred to as transgenic. There are a lot of transgenic plants with resistance to some insects, plants that can tolerate herbicides, and crops with modified oil content. While the benefits of transgenic crop cultivars have been estimated, there has been extensive opposition to this technology, because of novel risk for environment.

The using genes originated within same species or a closely related one, we create cisgenic plants. The breeders are arguing that cisgenic modification is useful for plants that are difficult to crossbreed by conventional means (such as potatoes). Also, plants in the cisgenic category should not require the same level of legal regulation as other genetically modified organisms.

Base of progress in food production

The yield ncreasing of crops is the main task of the breeder, in order to provide enough food for animal and human consumption. According to some estimations, in 2020 we should expect the number to over 8 billion for the global population of people for whom it is necessary to produce sufficient amounts of bread, pasta, milk, meat, fruits, and other of products that are essential to achieve proper nutrition and sufficient quantities of mineral elements, vitamins, essential amino acids.

For human consumption it is necessary to provide the required amount of protein, carbohydrates and fats of vegetable and animal origin. Due to limited resources of the land, the breeders need intensify work on the improvement of plant species in the aims to improve the utilization of biological potential for increasing yields and the creation of new cultivars with increased yield, quality and adaptability. In terms of global climate change, as well as permanent human population fluctuation is necessary to provide sufficient food to suit the characteristics and culture of food standards of human population that is heterogeneous geonacional origin. For the provision of adequate food, is necessary provide sources for these products, ie. cultivated crops cultivated plant species that are desirable food source for the local inhabitants. Parallely is necessary to perform properly selecting organisms for processing in order to achieve efficiency in food production with less error.

Evidently man need protect arable land areas and has solved the problem of increasing food production under the condition of water deficit. The water sources are essential for the development of irrigation systems to a greater production of food. In terms of irrational behavior in the biosphere, man has to perform an important role in protecting the environment from a number of factors that disrupt the balance of the ecosystem, as well as to perform the repair of damaged ecosystems and also the land is degraded, saline or contaminated. Creating adaptive varieties to specific environmental conditions, the implementation of measures of calcification and neutralization of land and optimization of chemicals use for plant protection (Dyson, 1996, Kovacevic et al. 2006) man constantly conducted in order to achieve higher crop yields and the possibility of growing crops on degraded land. This indicates that it is very important to develop continious investigation in agriculture. How are plant crops direct or indirect sources of food to food security in the future will depend in large measure on the success achieved studying plant systems and crops and the environment and increasing the adaptability of crops to environmental conditions and eliminating limited factors of growing plants.

Today in the field of agriculture and food production play an important role art technology. Food production is being developed on a global scale, because the world is connected with education, market and at the same time faced with the same problem - food security. Food as a basic need and a human right to be dazadovolji existing population, the quantity and quality.

Reducing the amount of food in one region leads to an increase in prices and increased demand in another region. The damaged and loose of crops due to pests and diseases attack in one part of the world is the cause for the lack of food in the other part of the world. Production of safe food requires a unique approach to all residents in the manufacture and trade of safe food, necessary nutritional value and health safe way of consuming. Genetically modified plants are the raw materials in the food production industry, which in comparison to natural plants of the same species have a higher content of protein, oil and starch with a specific structure. Products obtained from genetically modified plants have a specific biochemical composition, and some of them may have different effects on human health from uncontrolled use.

Between 1950 and 1980, the aim scientific investigation was development of genetically modified organisms, with increased yield and quality. The first genetically modified plant was produced in 1982, using an antibiotic-resistant tobacco plant (Fraley, et al. 1983). So, the yield of modern cultivars of wheat increased up to 33% even in the absence of fertilizer. However, data based on some years and some GM crops indicate highly variable 10-33% yield gains in some places and yield declines in others.

The People's Republic of China was the first country to allow commercialized transgenic plants, introducing a virus-resistant tobacco in 1992 (James, 1997). The first genetically modified crop approved for sale in the U.S., in 1994, was the *FlavrSavr* tomato, which had a longer shelf life. (Bruening and Lyons, 2000). In 1994, the European Union approved tobacco engineered to be resistant to the herbicide bromoxynil making it the first commercially genetically engineered crop marketed in Europe. Future time be able to answer whether the genetically modified plants have a higher yield than the cultivars originated in the breeding process by using traditional methods.

However, the cultivation of genetically modified plants will significantly contribute to the reduction of yield losses caused by plant diseases and pests, and weeds. Increased plant resistance to specific pests and diseases, including the viruses is very important for reducing the use of pesticides, as well as reduced crop damage and thus increase the yield. As an example one can cite the increase of yield of sweet potato in Africa with the introduction of transgenic potato cultivars with built-in resistance to Feathery Mottle virus. Growing potatoes neotporng this virus without the use of pesticides would have a 60% lower yield.

Increasing resistance to specific pests and diseases and viruses contribute to reduced spending for pesticides, reducing yield losses and a high probability of getting healthy and safer food. Increased adaptation to extreme environmental conditions (drought, saline soils, extreme temperatures) will allow the cultivation of some plant species in the wider area (Dodig et al., 2007). For example, transgenic plants with high content of linoleic acid expressed improved tolerance of low temperatures and frost. Resistance to herbicides favorable ecotoxicological properties allows effective weed control while reducing the effects to cultivated plants. Creating plants with desirable functional properties helps to reduce allergenicity, toxicity, extension of maturity of certain plant species, increasing the starch content etc.

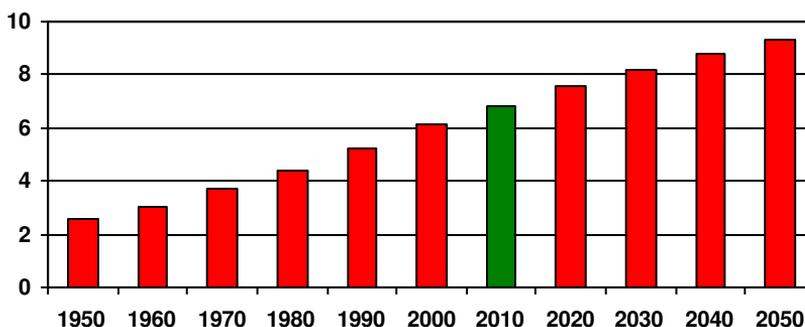
The Biotech Companies financially supported approval of transgenic plant cultivars in 1996 and had been granted to commercially grow 8 transgenic crops and one flower crop of carnations, with 8 different traits in 6 countries plus the EU. (James, 1996). In 2000, with the production of golden rice, scientists genetically modified food to increase its nutrient value for the first time. The great importance have desirable nutritional properties eg. modified protein or fat content, etc.. which in turn means that the genetically modified rice that contains more beta carotene and iron will help in addressing their lack in countries where rice is the main food (Institute of Food Technologists, 1999).

Agricultural production of plants

The human population increasing and according to dynamics 0.85% per year (approximately 60 million per year). There is estimation that by the year 2050, the number of people around the world will increase by 2.3 billion people as compared to the year 2009, namely it will increase by nearly 34% (OECD, 2010). The changes in the population demand increasing of agricultural production. The way of increasing of agricultural production is important from the perspective of the impact on the natural environment. Therefore, two basic methods in this respect are present. One method is the enlargement of arable surface under crops growing for direct consumption by people and animals. The second is to use of present surface of crop able lands and changes in plant production technology (Bruinsma, 2003). Both genetically improved cultivars for yield and better scientific farming cultural methods have contributed to the yield increases (Zecevic et al., 2010).

Acknowledging that the private sector is the major investor in biotechnology, progressing public-private sector partnerships in agricultural research and development to maximize access to the new technologies and to optimize limited and inadequate global R&D agricultural resources in both the industrial and developing countries is also considered important (James 1996 and 1997). The testing of transgenic crops is regulated by governments in both industrialized and developing countries because of the need to safeguard the environment and the fact that transgenic represent new products that, until recently, were unfamiliar to the scientific community and the lay public. All produced transgenic plants and genetically modified organisms are in focus of discussion, question and dilemma of scientist, politicians, consumers, producers, salvers, public media wide and specific population (Konstatinov, 2006; Knezevic *et al.*, 2012).

Figure 1. *The statement and predicting human population on the world 1950-2050*

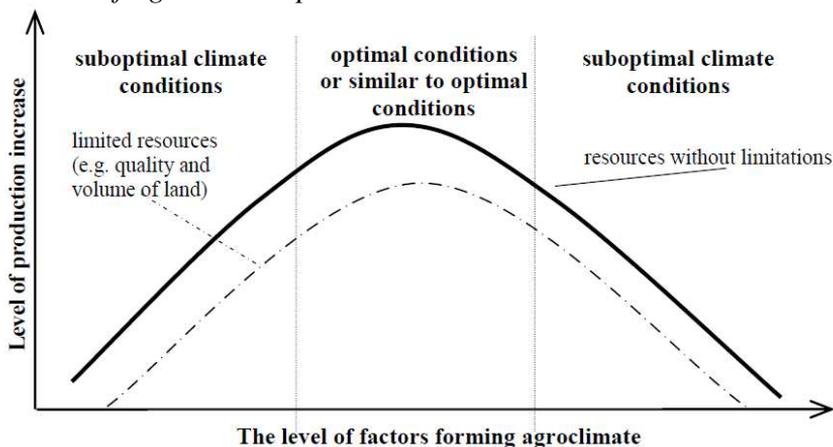


Source: *OECD (2010).*

The first field trials of transgenic crops were conducted in 1986 in the United States and France, and featured herbicide tolerance, as a marker gene in tobacco. In the decade 1986 to 1995 more than 3.500 field trials of transgenic crops were conducted on more than 15.000 individual sites in 34 countries with at least 56 crops, mostly in North America and Europe (James and Krattiger 1996). Ninety-one percent of these trials were conducted in industrialized countries, and one percent in Eastern Europe and Russia; the balance of eight percent were conducted in developing countries, mostly in Latin America, with only two percent of trials conducted in the developing countries of Asia, almost exclusively in the Peoples Republic of China.

The majority of commercialized transgenic plants, carried genes controlling resistance to insect pests and herbicides. For example Insect resistant plants created by transferring a gene from *Bacillus thuringiensis* (*Bt*) that encodes a protein that is toxic to some insects. Herbicides usually work by binding to certain plant enzymes inhibiting their action. In the case of herbicide resistance crops with achieved a version of target site protein that is not inhibited by the herbicide were produced glyphosate resistant crop plants.

Figure 2. *The impact of climate and its interactions with resources for increases in of agricultural production*



Source: based on (Mendelsohn and Dinar, 2009).

One of the key reasons for this widespread adoption is the perceived economic benefit the technology brings to farmers. For example, the system of planting glyphosate-resistant seed and then applying glyphosate once plants emerged provided farmers to increase the yield of crops. Without it, farmers had to plant rows far enough apart to control post-emergent weeds with mechanical tillage. Using *Bt* seeds means that farmers do not have to purchase insecticides, and then invest time, fuel, and equipment in applying them.

The new step in genetic modification is creation plants that can produce pharmaceuticals and industrial chemicals. This represents new area of breeding which sometimes called pharmacrops.

The agricultural production for the increasing of human population, need adapt to climatic conditions, natural and environmental effects of agriculture. Agro climate is specific according to the insolation of land,

the content of carbon dioxide in the atmosphere, number of days of vegetation, humidity, temperature. Changes in characteristics of the plants in the cross breeding process have been carried out on the basis of reproductive compatibility (Kondic et al., 2012). The increased intensity of particular elements with different factors combination directed to the achievement of higher yields and, consequently, higher global production. For example the increase in the temperature and content of carbon dioxide that at the suitable humidification increases the photosynthesis process, and in consequence, potential production of organic matter (Agrawala et al., 2010). However, the excess of a limit point results in the opposite effect the potential plant production yield (Figure 2).

Mainly, climate changes estimated independently from the aim of predicting of plant production under global significant increases of temperature. An increase in the average annual temperature from 2 to 4°C for many places all over the world, it means significant excess in the limit of optimum climatic conditions barrier for growth in the production output (Mendelsohn and Dinar 2009).

The limitation in the productivity resulting from climate changes and insufficient natural resources, especially agricultural land, may be an important barrier for the economic development of a region or world. To escape this barrier is necessary conducted protection of agricultural land and its productive capacities, as well as the adjustment processes to the new agro climate, social and economic conditions (Mitchell, 2012).

Conclusion

Considering the economic and social environmental effects, progress in agriculture can achieve with effective research and knowledge by utilization of resources and save natural biodiversity. Agricultural research can identify potential areas with regard to the following: a) more productive procedures, b) better planting, growing, harvest and storage of food products, c) the supply of hybrid seeds and young trees that are resistant to harsh environments.

Research and development in biotechnology, including development, field testing and commercialization of transgenic crops. To achieve future global food security the international scientific community required high respect in estimation both conventional and biotechnology approach of plant creation and food production.

For the solving hunger of human population very important is fact that by many accounts, overall world food production is currently enough to provide everyone with a healthy and well balanced diet. This fact needs appreciation and use as a base for cooperation among nations, politicians and country governments all over the world.

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THE YIELD VALUE OF BIOGAS POWER PLANTS*

*Dragan Milić, Nedeljko Tica***

Abstract

The use of energy originating from biomass beyond agricultural complex and the affirmation of agricultural sector, as an energy producer is only possible if the energy is transformed in a shape convenient for transport. As a rule biomass is not economic for transport and therefore is rarely a part of merchandise trade. The analysis given in this paper shows how effective are the investments made in the plants for biogas production. Yield value of the plant is much lower than the total investment amount. Regardless of the unfavorable relation between the yield value and the investment value, the conclusion should be brought only after a detailed analysis, a conducted feasibility study for each plant and the examination of a wider social interest and a contribution to agriculture, since this process also contributes the reduction of environmental pollution and creating organic nutrients for crop production.

Keywords: *biogas, investment, yield value, protect the environment*

Introduction

Nowadays the problems of the energy crisis are not only seen as the rise in energy price and a potential lack of energy sources but there are also the problems of the environmental pollution. With the accelerated economic development of Asian countries, especially China, this problem is becoming bigger every day. On the one hand the future solutions should be founded on the increased efficiency of energy and minimal consequences on the environment on the other hand. One of the possible ways of solving this issue is the use of the renewable sources of energy. In order to solve the problem of the energy production on the

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environmentally friendly way, the Government of the Republic of Serbia has taken measures which determine that by the end of 2012 the share of electricity produced from the renewable energy sources in the entire consumption should be increased by 2,2%. According to the estimation of the renewable sources potential in Serbia, up to 63% are organic raw materials that correspond to 2,4 million of equivalent oil.¹ Biomass energy potential coming from forestry and wood industry is estimated at approximately million tones of equivalent oil, while the rest goes to agricultural wastes and crop residues. In order to achieve the goals, the Serbian Government has adopted a Regulation about incentives for electricity generation using renewable energy sources and combined heat and electrical energy, as well as the Decree amending the development strategy of energy of the Republic of Serbia.² This Decree defines guaranteed purchase prices for the electricity generated using the renewable energy sources. Also, the Serbian Government has adopted the Regulation about requirements for the status of privileged producer of electricity and the Criteria for assessing compliance with requirements.³ The lack of investment funds that could be directed in this type of economic activity make the realization of mentioned regulations doubtful.

During 2009 and 2010 it was created and adopted the Action plan for biomass in the period of 2010-2012 for the Republic of Serbia, where the strategy of the use of biomass as a renewable energy source was defined, according to the current domestic legislation and European directives. The supervision of the plan realization is the duty of the National Council for sustainable development. In this plan is specified that from the total amount of plant renewable energy source in the Republic of Serbia, biomass takes 63%. The potential of 2/3 refers to biomass originating from the agriculture. Besides the crop residues that are being used, this potential can be increased by dedicated biomass cultivation that will not be competitive to the manufacture of food products (e.g. cultivation of genetically modified plants on less fertile land plots as it is the soy used for the production of biodiesel). This plan shows the most promising

¹Program primene Strategije razvoja energetike u Srbiji za 2007-2012., Sektor o obnovljivim izvorima energije.

²Uredba o merama podsticaja za proizvodnju električne energije korišćenjem OIE i kombinovanom proizvodnjom električne i toplotne energije, Službeni glasnik Republike Srbije, 99/09.

³ Uredba o uslovima za sticanje statusa povlašćenog proizvođača električne energije i kriterijumima za ocenu ispunjenosti tih uslova, Službeni glasnik Republike Srbije, 72/09.

possibility of the use of biomass in Serbia:

- space heating in homes and buildings using wood pellets or briquettes,
- the replacement of coal and heavy fuel oils in power stations,
- electricity generation using the crop residues and wood,
- production of biodiesel for transport.

Signing above-mentioned agreements and adopting legal and other acts related to this issue, represents a group of factors that motivate the use of renewable energy sources. Another group of factors shows the need for changing the structure of energy balance in order to substitute the import of energy sources and diminish the energy dependence of the country. Next to the increase of participation of own energy sources in the energy balance, an important measure in terms of diminishing the need for energy due to the increase of economic activity is also the augmentation of the energy efficiency. The augmentation of energy efficiency has an aim to alleviate the increase of energy consumption that is caused by the growth of economic activity as a consequence of the economic development. Changes in the concept of production and consumption of energy in Serbia are yet to be made, which is conditioned by ensuring the sufficient amount of energy and the need for environmental care. Having in mind all the mentioned factors and the need for change in the energy balance in aim to diminish the use of traditional sources of energy, the Republic of Serbia has to orientate to the use of renewable energy sources, especially those sources that have the greatest potential and are economically justified, therefore they require the lowest investment and cause the lowest exploitation expenses. The experiences of other countries show that the participation of renewable sources, especially biomass, can be brought to a much higher level. According to the data published by International Energy Agency (IEA) 70% of the domestic generation of energy in Austria comes from the renewable energy sources. Total primary supply of energy in Austria consists of 11,2% of biomass, while 21% of produced heat energy comes from biomass. Having in mind the tendencies of the development of the regional energy sector and the fact the Serbia owns significant biomass resources, biomass is considered to be one of the most important sources of energy for our country.⁴

⁴ Milić, D., Tica, N., “Troškovi prikupljanja kukuruzovine kao izvora energije” *Ekonomika poljoprivrede*, Tematski zbornik, Naučno društvo agrarnih ekonomista Balkana, Beograd, 2012.

Recent research around the world shows that biomass is not the most convenient fuel for energy generation in industrial and urban area. Predominant consumer of the energy produced from biomass is the agricultural sector, as well as the small consumers that do not require bigger amounts of fuel. For consumption beyond the agricultural complex it comes into consideration only the briquetted biomass. Therefore in order to enable the wider use of energy produced in the agricultural complex it is necessary to consider the production of biomass energy that can be transported and used by other consumers beyond that complex. Power energy generated in a biogas power plant is one of the possibilities. Regarding recent results in this area it is clear that the changes in the approach and the realization of the production and consumption of energy in Serbia are yet to come. The goals of paper is determined the relation of investment and yield value of plants for the production of biogas, what is a prerequisite for making right investment decisions.

Working methods and data sources

Methods of evaluation rely on the data shown in the balance sheet. Yield methods can be static and dynamic. The estimation of capital value applying the static methods is achieved by the capitalization of the expected future net profits, while in terms of dynamic methods the capital value is estimated using discounted future earnings or cash flow to the present value. In this paper it was made a calculation of economic results of the generation of power and heat energy using the biomass. Energy conversion is made through the production of biogas. The estimation of financial results is made calculating the yield value as one of the methods for determination of value of investments, since nowadays the development of the financial and capital market there is greater need for analysis of capital value based on its ability to create new value, in terms of expected future benefits of the invested funds. Beside the formal reasons that explain the necessity of making evaluations in terms of determination of the transaction value, it is also necessary to check the economic justification of investments made in a certain company or assets. During the estimation of investment in a certain plant all the peculiarities of the agricultural production should be taken into consideration, no matter which method of evaluation is being used.⁵On the other side, if the value of a company is shown in its possibility to

⁵Tica, N., Jovanović, M.: „Metode procene vrednosti preduzeća“, Agroekonomika, br. 26, Poljoprivredni fakultet Novi Sad, 1997.

make profits, the yield value represents an objective method of evaluation. The value of the investment is equal to the total of present value of future net income, which potential owners can obtain in the projected period. Therefore, the net cash flow is the amount that can belong to capital owners without influencing the business.⁶ Numerous domestic and foreign authors stand out the importance of the use of the method of yield value during the evaluation of the assets and capital.⁷

Determination of the value of plants for generation of power and heat energy from biomass has been done applying the method of yield value. Next to this method, the plant value can be estimated on the basis of the amount of investments that have to be made for the construction and starting up the plant. Comparing the values obtained from these two methods it is possible to make a conclusion about the economic justification of investment in this type of business. In these terms the method of yield value was used in this paper. For the evaluation of yield value of the observed plant discounted net cash flow or cash flow after servicing the debts was used. In the cash flow are included all the inflows and outflows of funds. Residue value is estimated on the basis of the net cash flow after the flow of period of projection using the Gordon model:

$$RV = (DNNTTr \times (1 + SRr)) / (DS - SRr)$$

Where:

- RV – Residue value,
- DNNTTr – Discount net cash flow
- DS – Discount rate
- SRr – Growth rate in residue

For settling the cash flow on present value it is used a discount rate that represents the price of employed capital. In the model for determination of the yield value of investment current prices on the day of calculation are used as fixed prices. The projection of cash flows enables the coherence and compliance among certain parts of the projection. Discount cash flow with the neutral debt servicing is used. Discount rate is calculated having into consideration the crucial factors on the position

⁶Leko, Vera, Vlahović, A., Poznanić, V.: „Procena vrednosti kapitala-metodologija i primeri“, Ekonomski institut Beograd, 1997.

⁷Milić, D. „Prinosna vrednost kapitala poljoprivrednog preduzeća primenom metoda prinosne vrednosti“ Magistarska teza, Poljoprivredni fakultet, Novi Sad, 2010.

and business of the company that operates in this sector. The application of this method has been made on the basis of the projection of the business results, defined capacities, production volume and projected costs that follow the business. As a basis for the estimate of economic effects projected data for certain plant are used. The calculation of income is based on determination of total plant income and the financial result represents the profit of the company, the biogas of the plant. Next to mentioned indicators, the calculation of the results includes the cash flow balance and the calculation of the basic indicators of efficiency and effectiveness of the investment. The costs of the generation of power and heat energy are calculated on the basis of the biogas production and the energy conversion of biogas.

The main raw material for biogas production represents the waste biomass obtained during the processing of crop and vegetable cultivation. Moreover, as an additional raw material is used ensiled mass of corn and barley. Determination of the total cost of raw materials was made according to the selling prices of waste biomass and cost price of ensiled mass. The calculation of the cost price of ensiled biomass includes the production based on two crops a year, while the harvesting and transport are done with the standard mechanization. The costs of other used raw material are calculated according to normative consumption. Investments in facilities and equipment are calculated on the basis of projected amount for this type of investment. The calculation of amortization of facilities and equipment was made in terms of the predicted service life of the mentioned means. The cost of salaries are calculated as the projected costs having into consideration the number of employees and recompense for their engagement according to not only their qualifications and level of education and training, but the level of responsibility as well. It is predicted an internal consumption of a part of produced energy. Besides, in the calculation are included all other costs necessary for successful plant operation.

Research results with argument

In terms of providing the raw materials basis, it can be concluded that any organic substance that represents the source of necessary ingredients in the process of biogas production such as carbon, nitrogen, phosphorus, potassium, magnesium etc., can be used as a raw material for the production of biogas. The most convenient is to use municipal and industrial wastewater and substances, human and animal excrement and

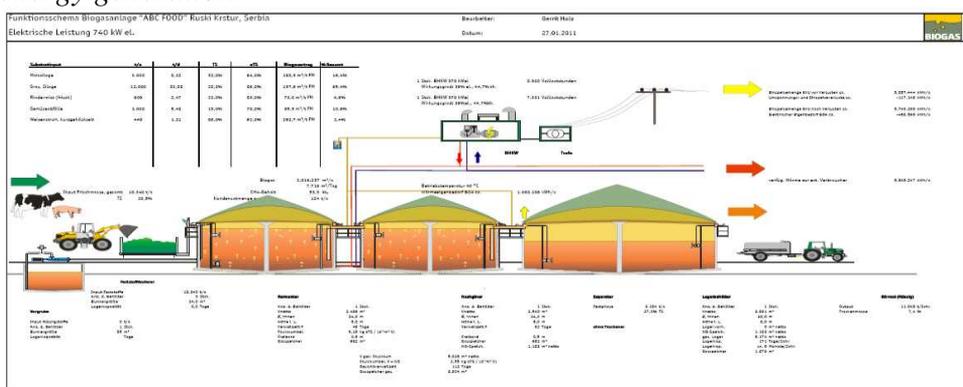
plant biomass. Only in the area of agriculture estimated potential gives the possibility of production equal to 1,4 billion kWh.⁸

The main preconditions for the use of substance in the profitable biogas production are:

1. Availability in sufficient amount
2. Structure that enables efficient and economic biogas production
3. The absence of toxic substances in the process of biogas production

In case of plants which yield value is determined in this paper, it is estimated that the waste mass on the annual basis equals up to 20.000 tones, from which 15.000 tones goes to industrial processing of agricultural products and 5.000 tones of ensiled mass. According to the estimated amount of residues it is planned the construction of plant for common generation of power and heat energy. The total estimated plant capacity equals to 740 kW of power energy and 888 kW of heat energy. Total investment in land, facilities, equipment and technical documentation, according to the project documentation amounts 3.587.500,00 €. In order to examine the production and technology process of energy generation on this way, schematic overview of project plant is given down:

Picture 1. Schematic overview of projected plant for power and heat energy generation



⁸Milić, D., Zekić, V., Tica, N., Brkić, M. (2011): Potentials of livestock production in Serbia in relation to production of biogas, 22. International symposium »Safe food production«, 160-162

The calculation of the generation of power and heat energy is made according to the predicted volume of 8.000 hours a year and is shown in the next table.

Table 1. *The calculation of production volume of power and heat energy*

No.	Description	Measure unit	Value	
			Power energy	Heat energy
1	Plant capacity	kW	740	888
2	Annual volume of capacity use	h	8.000	8.000
3	Planned energy generation	kWh	5.920.000	7.104.000

Since there is a necessity for consumption of one part of energy for own needs, due to the fact that in terms of moderate climate zone around 1/5 of produced biogas must be used for sustaining the necessary energy, it is predicted the internal consumption of 10% of power energy and 20% of heat energy. ⁹The calculation was made according to the installed power of the equipment and is shown in the next table.

Table 2. *The calculation of annual income of the plant*

No.	Description	Measure unit	Value
1	Planned generation of power energy	kWh	5.920.000
2	Predicted percentage of marketability	%	90
3	The amount intended for sale	kWh	5.328.000
4	Price	€/kWh	0,1480
5	Planned sales income of power energy	€	788.544
6	Planned generation of heat energy	kWh	7.104.000
7	Predicted percentage of marketability	%	80
8	The amount intended for sale	kWh	5.683.200
9	Price	€/kWh	0,0300
10	Planned sales income of heat energy	€	170.496
	Total income	€	959.040

As a result of biogas production besides the energy appear also mineral fertilizers that can partially or completely replace the mineral fertilizers bought on the market. Economic valorization of the fertilizers obtained in the production process of biogas is founded on the use of concept of relative buying value (method of replacement), the value that should be determined using the purchase value of nutrients that replace. Since the

⁹Mulić, R.: "Strateški značaj biogoriva u poljoprivredi" Zbornik radova: Biomasa, bioenergetska reprodukcija u poljoprivredi, IP "Mladost", Ekološki pokret Jugoslavije, Beograd, 1995

mentioned method has indirect nature and the produced fertilizer is mostly appropriate for internal use, its value is not included in the calculation of income.

The calculation of costs includes the costs of acquisition equal to 15.000 tons of processing waste and 5.000 tones of ensiled mass. This calculation was made according to the average selling price of waste and cost price of ensiled mass. Other costs of materials are projected on the basis of experience normative or the normative valid during the projection of plants. The calculation of amortization costs is made according to the value of planned investment and adopted amortization rates that represent the service life. The calculation of labor force costs is made on the basis of the average salaries for the certain level of education and the predicted number of 4 employees. The calculation of traveling expenses is made according to the planned number of employees and an average compensation for traveling expenses. The projection of the costs of communication services and other nonmaterial costs is done according to the evaluation of those costs. Financing costs are not predicted. Other cost categories were not subject of this projection since all the costs were satisfactory included on the place where they were made. The overview of the cost calculation is shown in the next table.

Table 3. *The overview of annual costs*

No.	Elements	Value (€)
I	Costs of material and energy	
1	-raw materials	258.650
2	-power energy	0
3	-fuel	0
4	-other material costs	19.100
	Total I	277.750
II	Other costs	
1	-amortization	262.000
2	-labor force	31.872
3	-rent and services	171.298
4	-interest on loans	0
5	-advertising	0
6	-legal services	0
7	-travelling expenses	2.600
8	-communication services	2.500
9	-other nonmaterial costs	18.500
	Total II	488.770
	TOTAL	766.520

The calculation of results made on the presented way shows that with the generation of power and heat energy from the waste biomass positive financial results can be achieved. The calculation of total incomes and expenses shows that the plant of capacity 740 kW can make non taxable profit of 192.521 € on annual basis. In terms of incomes and expenses it is determined a high economic efficiency over 1,25. On the other side due to the high initial investment, the rentability is 5,28% and it cannot be evaluated as high, therefore the mentioned investment is not possible to be financed from loan sources that are founded on interest rates valid in commercial business. Given financial results should be taken with reserve since the calculation does not include all the benefits that come out of the process. In fact, next to energy, the biogas production has two more significant effects: getting quality stable fertilizers with the improved value, as well as the contribution of the environmental care.¹⁰ The biogas production shows a lot of environmental benefits. Using the waste raw materials in the process of biogas production, significant results are achieved also from the aspect of diminishing the bacteriological pollution. In wasted raw materials in agriculture, especially in cattle breeding there are various microorganisms that can be toxic and cause the expansion of diseases, even epidemic.¹¹ In the process of anaerobic fermentation most of the toxic organisms are being destroyed. Therefore, the assesment of financial results of biogas production is very complex and requires a specific approach. The total result is possible to analyse only on the level of society and value according to the financial support that in use of renewable energy source must be given from the state.¹² The planned volume of production is projected under the technical capacity of the plant so it is possible to project the increase of the volume of 2% annually. Therefore according to the augmentation the material costs change while other expense categories stay fixed. In the next table the projection of incomes and expenses of the plant is shown.

¹⁰ Tešić, M., Bukurov M., Brkić, M.: Biogas u Srbiji - stanje i perspektive, Zbornik radova sa Savetovanja "Biomasa za energiju", Agencija za energetsku efikasnost Republike Srbije, Vrnjačka Banja, 2005.

¹¹ Đatkov, Đ.: "Energetsko, ekonomsko i ekološko vrednovanje rada potencijalnog biogas postrojenja u PK Mitrosrem, na farmi svinja u Velikim Radincima", Master rad, FTN Novi Sad, 2006.

^{11a} Đulbić, M.: Biogas - Dobijanje, korišćenje i gradnja uređaja, Tehnička knjiga, Beograd, 1986

¹² Zekić, V., Jovanović, M. (2007): "Utvrđivanje kriterijuma za sagledavanje ekonomskih aspekata proizvodnje biogasa radi daljnje proizvodnje toplotne i/ili električne energije na AD Mitrosrem", Revija agronomska saznanja, UDK 631.6, ISSN 0354-5865, br. 5, Novi Sad, str. 33-36.

Table 4. *Profit and loss statement*

Position	Year				
	1	2	3	4	5
INCOME AND EXPENSES AND OPERATING INCOME	959.040	978.221	997.785	1.017.741	1.038.096
1 Revenues from sales	959.040	978.221	997.785	1.017.741	1.038.096
2 Income from work and goods	0	0	0	0	0
3 Increase in inventories	0	0	0	0	0
4 Decrease in inventories	0	0	0	0	0
5 Operating income	0	0	0	0	0
OPERATING EXPENSES	766.520	775.973	785.615	795.450	805.481
1 Cost of goods sold	0	0	0	0	0
2 Cost of materials	277.750	283.305	288.971	294.751	300.646
3 Wages, salaries and other personnel expenses	31.872	31.872	31.872	31.872	31.872
4 Depreciation and amortization	262.000	262.000	262.000	262.000	262.000
5 Other operating expenses	194.898	198.796	202.772	206.827	210.964
OPERATING PROFIT	192.520	202.248	212.170	222.291	232.614
OPERATING LOSS	0	0	0	0	0
FINANCIAL INCOME	0	0	0	0	0
FINANCIAL EXPENSES	0	0	0	0	0
OTHER INCOME	0	0	0	0	0
OTHER EXPENSES	0	0	0	0	0
Profit from operations	192.520	202.248	212.170	222.291	232.614
PROFIT BEFORE TAX	192.520	202.248	212.170	222.291	232.614
LOSS BEFORE TAX	0	0	0	0	0
INCOME TAX	24.546	17.191	18.034	18.895	19.772
NET PROFIT	167.974	185.057	194.136	203.396	212.842
NET LOSS	0	0	0	0	0

Discount rate as a price of own capital that is being used in the discount net cash flow for the plant is 13,95%. It consists of the rate without risk and risk rate of investing in Serbia (total amount of 4,5%) and the risk of investment in the plant estimated 9,45%.

Table 5. *The calculation of the risk rate of investment in the plant*

Description	Risk scale			
	0	1	2	3
Quality of organization, management and work force				
Organization structure			2	
Coherence of the management team		1		
Strategic planning		1		
Production program		1		
Specialized knowledge of an expert		1		
Ponder	0	4	2	0
Sum	6			
Number of parameters	5			
Specific risk	1,2			
The size of the company				
Number of employees		1		
Value of business funds				3
Competition score			2	
Ponder	0	1	2	3
Sum	6			
Number of parameters	3			
Specific risk	2,00			
Financial position				
Fixed assets/capital			2	
Fixed assets and goods/Long-term capital			2	
Own capital/Total capital			2	
Contribution gain/Revenue			2	
Financial expense/Profit			2	
Ponder	0	0	10	0
Sum	10			
Number of parameters	5			
Specific risk	2			
Production-sales potential				
Contribution of some products to the revenue				3
Long-term contracts			2	
Significance of the product for the consumers			2	
Access to the EU market			2	

Description	Risk scale			
	0	1	2	3
Ponder	0	0	6	3
Sum	9			
Number of parameters	4			
Specific risk	2,25			
The possibility of prediction				
Age of the company			2	
Stability of financial results			2	
Discontinuity in business			2	
Change of economic activity of the branch			2	
Ponder	0	0	8	0
Sum	8			
Number of parameters	4			
Specific risk	2			
Final rate(%)	9,45			

Before the projection of cash flow the calculation of the necessary level of working assets and sources from current business is made, as well as their changes during the service life. The mentioned calculation serves as the foundation for the creation of planned projection changes in the balance sheet and profit and loss statement. The projection of cash flow is given in the table 6.

Table 6. *Projection of cash flow (€)*

Position	Year				
	1	2	3	4	5
Total revenue	959.040	978.221	997.785	1.017.741	1.038.096
Operating expenses	504.520	513.973	523.615	533.450	543.481
Profit	454.520	464.248	474.170	484.291	494.614
Amortization	262.000	262.000	262.000	262.000	262.000
The operating profit	192.520	202.248	212.170	222.291	232.614
Interest Expense	0	0	0	0	0
Profit before tax	192.520	202.248	212.170	222.291	232.614
Income tax	24.546	17.191	18.034	18.895	19.772
Net profit	167.974	185.057	194.136	203.396	212.842
Amortization	262.000	262.000	262.000	262.000	262.000
Gross cash flow	429.974	447.057	456.136	465.396	474.842
Increasing supplier	39.387	788	804	820	836

Position	Year				
	1	2	3	4	5
Increase in other current liabilities	24.489	0	0	0	0
Decrease in receivables	0	0	0	0	0
Decrease in cash	0	0	0	0	0
Decrease in inventories	0	0	0	0	0
Total inflow	63.877	788	804	820	836
Reducing supplier	0	0	0	0	0
Increase in cash	7.992	160	163	166	170
Increase in receivables	79.920	1.598	1.630	1.663	1.696
Increase in inventories	45.099	641	654	667	680
Investments	262.000	262.000	262.000	262.000	262.000
Decrease in other current liabilities	0	0	0	0	0
Repayment of term loan	0	0	0	0	0
The total outflow	395.011	264.399	264.447	264.496	264.546
Net cash flow	98.839	183.446	192.492	201.720	211.132
Discount factor	0,87758	0,77014	0,67586	0,59312	0,52051
The net present value	86.739	141.279	130.098	119.644	109.896
The total net present value					587.657

According to the given indicators on the basis of Gordon model, the calculation of residue value is given.

Table 7. *The calculation of residue value*

Position	Value (€)
Net cash flow of the last year	211.132
Growth rate in the residue year	0,02
Net cash flow of the residue year	215.355
Discount factor	0,5205091
Present value of net cash flow	112.094
Capitalization rate (discount factor-0,02)	0,120
Residue value	938.027

Total present value of discount cash flow for the five year period, in the moment of evaluation of value is equal to 587.657 € and the present value of residue value amounts 938.027 €. On the basis of the initially described methodology, the yield value of the plant using the method of discount rate is 1.525.683 €.

Conclusion

The projected results of business in form of the income statement show that with the generation of power and heat energy using the wasted biomass positive financial results can be achieved. In terms of incomes and expenses it is determined a high economic efficiency over 1,25. However, these results are not sufficient for the economic justification of the predicted investment. The yield value of the plant for generation of power and heat energy from biogas using the method of discount rate is 1.525.683 €. As initially mentioned, the total investment in land, buildings, equipment and technological documentation is 3.587.500, which is 2.061.817 € more than the yield value of the plant.

These results show that economic benefits of the generation of power and heat energy with the supposed incomes and expenses are not sufficient to justify the required investment in their construction. Due to the high initial investment, the rentability is 5,28% and it cannot be evaluated as high, therefore the mentioned investment is not possible to finance from loan sources that are founded on interest rates valid in commercial business.

The technology of biogas production at the moment does not enable efficient production, but has a long-term perspective and must be evaluated in the wider social interest, due to need for environmental preservation. In order to increase the level of economic justification for plant construction that serve for production of this type of energy, there must be found support systems on the state level, especially through the price and tax policies that could make these investment projects get an economic justification.

Regardless of the financial results in the production of biomass nowadays, the increase of energy prices and the abundant needs for energy, show that biomass production has long-term perspective. Besides the fact that currently there is an unfavourable relation between the yield value and the value of required investments, the final conclusion should be brought after a detailed analysis and a feasibility study for each plant, as well as the evaluation of the wider social interest and the contribution to agriculture, because this process also contributes to the decrease of environmental pollution and the creation of nutrients necessary for plant cultivation.

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HUMAN RESOURCES MANAGEMENT IN IMT A.D. NEW BELGRADE¹

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Abstract

This paper considers management of human resources in company IMT New Belgrade. Human resources are the most important factor of production which has planned and creative ability to create and should be managed in a wise, rational and humane way. Organizational structure of IMT imposes need to human resources as an integral element of planning and organization offices and linked properly. Intensive development to the 90s marked this company as a national manufacturer of tractors and implements. Rapid decline in production caused 2012th the nationalization of company. All this has led to need for proper definition of functions of human resource management, through all it's elements such as: planning, recruitment, selection, socialization, training, evaluation of quality of staff training, staff development, salary systems and components of earnings, labor relations and collective bargaining, union organization of employees and their health, safety and welfare, complaints, discipline, retention and leaving company.

Keywords: *human resources management, recruitment and selection, training and salary system, health, safety and security, retaining staff.*

Introduction

Regarding conclusion that the human factor is decisive and only thought element in business process affirms the human resource management to

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motivate all members of the business system to actively participate in decision-making and operational activities and to be responsible for the achieved results.

Modern business practices around the world shows that human resources are the most important factor of production, and they have to be the highest attention and interests. With these resources should be managed in a wise, rational and humane way.

As the economy hit by the hard crisis, layoffs became everyday occurrence. So workers are between poor financial status on the one hand and violations of labor rights, on the other hand.

Objectives, methodology, and data sources

The aim of this paper is that, based on the analysis and description, most important activities of human resource management theory and a practical example of IMT New Belgrade point out the role and importance of human resource management has on the performance of this system.

For this paper were used: the method of analysis, induction and deduction method and systematic approach to looking at the enterprise as part of interacting with the environment.

Data sources are based on observation, tour companies and review of documentation and discussion with the employees and especially with the management of the company. Data sources served as and archival journals, data from the Internet, and was consulted by domestic and foreign professional literature in the field of human resources.

Elaboration

Organizational structure of the company IMT

History of IMT, starting in 1947 by founding the **Central Foundry**, and already in 1949, the newly formed company **Metal Institutes Aleksandar Rankovic**. Its name changed to **Industry of tractors and machinery** in 1954 and just a year before the company bought a license from **Massey Ferguson**.

During the period in 1959 - 1961 performed the first reconstruction of IMT, that the annual production of 4,000 tractors with 20% of spare parts and an appropriate number of connection machines. In this period was produced the first tractor called IMT-533 of 35 HP. Its present name, **Industry of machine and tractor** get's in 1965. For 20 years, the factory produced 4,000 tractors and 16,000 machines and tools, as well as 120,000 tons of castings.

Second reconstruction made in 1967, when the capacity of the production of tractors has increased to 10,000 per year. With the company **AGRIA-WERBE** from Republic of Germany begins joint production of small single and double-axle tractors (motocultivators) and related tools designed for mountain areas.

The third reconstruction is made in 1970 when the increased capacity of 26,000 tons of foundry castings. Purchased a license from the English metallurgical companies **Mehanite**, IMT in a short time become a contender renowned international manufacturer.

In year 1973 approached the fourth reconstruction, technical and technological modernization, building a new production plant with capacity of 40.000 tractors.

On his thirtieth birthday, i.e. in 1977, were produced 33,500 tractors, 24,300 of implements, 43,400 tons of castings, 10,400 cultivators, 3,800 motor cultivators and all that with 8,576 employees.

Intensive development of IMT still continues so that at the end of its 40-year development company produced 39,790 tractors, 30,303 cultivators, 25,750 motor cultivators, connecting more than 100,000 pieces, and 50,000 tons of castings. Then it worked 13.000 workers.

Of 1993 the number of produced tractors was decreasing, and the disintegration of Yugoslavia did not bypass the company IMT. In mid-2004th IMT becomes property of the Privatization Agency, and for end of 2012 the management of the company has signed an agreement with the Government of the Republic of Serbia on nationalization, in which the state became the owner of 95.5%, and the rest are small shareholders.

The scope of company work and equipment of the means of production

Company IMT New Belgrade is intended for the production of agricultural tractors, tractors for forest program and implements for tractors. It is situated in New Belgrade and occupies an area of 38 hectares, of which 50% were actively employed. Standard types of tractors witch produced are:

- IMT-539 (power 29.5 kW),
- IMT-549 (power 34.5 kW),
- IMT-550.11 and IMT-2050 (power 36.9 kW),
- IMT-565/569 and IMT-2065 (power 46.5 kW),
- IMT-577 (power 51.5 kW).

Summary of production and export tractors by age is given in Table 1.

Table 1. *Production and export of tractors by years*

Year	Production (pieces) Domestic + exports = total	Year	Production (pieces) Domestic + exports = total
1956-59	11.411 (import)	1986.	38.321 + 1.463 = 39.784
1960.	3.001 + 1.500 = 4.501	1987.	36.849 + 3.503 = 40.352
1961.	1.675 + 754 = 2.429	1988.	35.995 + 5.514 = 41.509
1962.	2.259 + 1.048 = 3.307	1989.	34.512 + 6.371 = 40.883
1963.	2.592 + 1.573 = 4.165	1990.	24.620 + 1.744 = 26.364
1964.	3.385 + 1.958 = 5.343	1991.	18.109 + 2.065 = 20.174
1965.	2.791 + 2.446 = 5.237	1992.	11.773 + 702 = 12.475
1966.	2.867 + 3.285 = 6.152	1993.	4.073 + 471 = 4.544
1967.	3.274 + 3.646 = 6.920	1994.	3.020 + 484 = 3.504
1968.	4.425 + 4.459 = 8.884	1995.	1.230 + 395 = 1.625
1969.	6.594 + 2.611 = 9.205	1996.	1.284 + 251 = 1.535
1970.	8.615 + 2.112 = 10.727	1997.	2.234 + 427 = 2.661
1971.	10.739 + 1.859 = 12.598	1998.	532 + 532 = 3.007
1972.	13.256 + 1.156 = 14.412	1999.	1.088 + 231 = 1.319
1973.	13.833 + 2.140 = 15.973	2000.	1.959 + 265 = 2.224
1974.	15.501 + 2.216 = 17.717	2001.	1.150 + 407 = 1.557
1975.	17.437 + 3.422 = 20.859	2002.	2.139 + 677 = 2.816
1976.	19.664 + 7.679 = 27.343	2003.	2.439 + 588 = 3.027
1977.	28.160 + 5.358 = 33.518	2004.	2.581 + 635 = 3.216
1978.	30.538 + 4.254 = 34.792	2005.	1.415 + 757 = 2.172
1979.	30.204 + 3.606 = 33.810	2006.	696 + 770 = 1.466
1980.	26.551 + 7.064 = 33.615	2007.	572 + 708 = 1.280
1981.	28.421 + 8.857 = 37.278	2008.	390 + 353 = 743
1982.	30.054 + 5.400 = 35.454	2009.	1.937 + 340 = 2.277
1983.	35.295 + 2.736 = 38.031	2010.	952 + 450 = 1.402
1984.	37.137 + 2.641 = 39.778	2011.	550 + 170 = 720
1985.	37.221 + 878 = 38.099	2012.	536 + 77 = 613
TOTAL 659.799 + 115.008 = 774.807			

Source: *Archive of IMT New Belgrade*

In factory's yard there is a facility for production implements, which produces:

- various types of plows and chisel plows,
- wheat (17, 25 and 52 lines) and seed drills (2,4,6 and 8 rows),
- cultivators (3, 5, 7 and 9 section) and rotary tiller,
- Rear tractor forklifts and front tractor loaders.

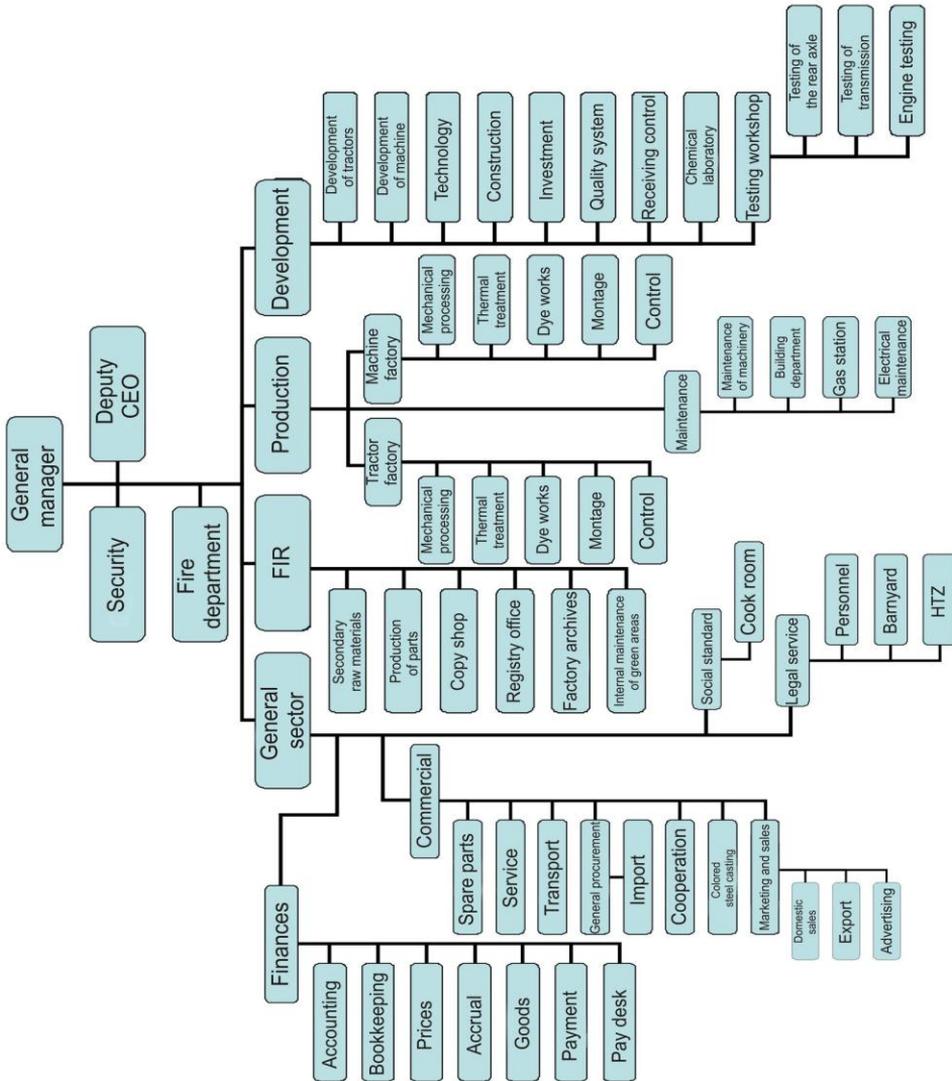
When it comes to exporting tractors across the continents it is necessary to noted that IMT exported of the American continent 6.131 tractors, European 25.582, Asian 65.145, African 17.403 and Australian 50. As for implements exports of the continents: America 397, Europe 17.167, Asia 18.258, Africa 3.427 and Australia 16. Within the organizational structure of IMT New Belgrade is necessary to show changes in the number of employees (Table 2) and organizational structure (Scheme 1).

Table 2. *Number of full-time employees of the establishment*

1. Central Foundry, Combined Company, Tool and Company "ELIP"					
1947	Unofficially, it worked on the construction around 500-600 people (different types of workers).				
1948					
Year	New Belgrade	Footnote	Outside Belgrade	Dobanovci	Total
2. Seduces Aleksandar Rankovic - ZAR:					
1949	639	(all 4 company)	-	-	639
1953	1.281	- -	-	-	1.281
3. Industry of tractors and machine - ITM:					
1954	1.602	- -	-	-	1.602
1960	3.893	- -	-	84	3.977
4. Industry of motors and tractors - IMT:					
1961	3.596	ITM + IMR = 5.823	-	104	5.927
1965	3.371	3.371 + 2.145 = 5.516	-	116	5.632
5. Industry of machine and tractors - IMT:					
1966	3.477	- -	-	114	3.591
1970	4.017	IMT, FMM, FOP, Jaša Tomić, Trgoservis, Jarkovac	341	138	4.496
1980	4.953	- -	1.911	230	7.094
1986	9.321	(with FOM)	3.119	236	12.676
1987	9.613	- -	3.269	236	13.118
1988	9.553	- -	3.228	228	13.009
1990	8.836	- -	3.326	213	12.375
2000	3.663	- -	-	-	3.663
2001	3.478	- -	-	-	3.478
2002	1.772	(fired 1.706 workers)	-	-	1.772
2010	879	- -	-	33	912
2011	810	Only IMT	-	33	843
2012	807	- -	-	31	838

Source: *Archive of IMT New Belgrade*

Scheme 1. Organizational scheme of IMT New Belgrade



Source: Archive of IMT New Belgrade

Defining the field of science and functions of human resource management, planning models and demand forecasts

On the human resource management is often seen as a personnel management, which in modern theories is overcome, and is viewed more broadly as the process of managing and developing people in the framework of business systems. The main objectives that are the

foundation of the entire activities in the science of human resource management are:

- objectives relating to employees,
- objectives regarding the work,
- objectives relating to management changes,
- Administrative objectives.

The functions of human resource management are reflected in: business analysis, planning, supply and demand for human resources, recruitment of candidates for the vacancies, selection of the best candidate for the job, employee training, staff development evaluation of employee performance that is rewarding i.e. system salaries to employees, regulation of labor relations between employers and employees (collective bargaining), health and safety of employees and the management of leaving the organization.

Human resource planning must be carried out in accordance with the vision and strategy of the organization, and to ensure timely provision of human resources necessary for future business activities.

Traditional planning model focuses on the balance between anticipated demand and supply of labor, in order to ensure the right number of the right employees in the right place and at the right time.

Integrated planning model indicates where we are, where we want to be and what you need to take to achieve the transition.

Forecasting of demand for human resources is the process of assessing the number of employees and their relevant knowledge, skills and abilities, which will require the organization to achieve the planned objectives.

Objective methods of forecasting of demand for human resources can be a statistical method and work studies. Statistical methods observe future trends in demand for human resources through the prism of past trends. Methods of work studies based on the study of time and labor required to obtain units of production. Subjective methods predicting of demand for human resource managers use knowledge relies on intuition and subjective judgment.

In the literature is characterized by two indices that measure and analyze personnel that are leaving organization. These are:
 Annual turnover index of employees (downsizing employee's rate) and is calculated according to the formula:

$$\frac{\text{Number of those who leave the organization}}{\text{Average number of employees during the year}} \times 100$$

Observed year is 2001 number of persons who have left the job was 1,706, and average number of employees during the year was 3,478.

$$\text{Rate of decrease in the number of employees} = \frac{1.706}{3.478} \times 100 = 49,05\%$$

Very high percentage rate or reducing the number of employees (49.05%) compared to the total number employees.

Stability index - based on the number of employees who have worked for the organization for a specified period and is calculated by the formula:

Number of employees with one year work	x 100 =	Stability expressed in percentage
Number of employees a year ago		
Stability index 1987. = $\frac{9.613}{9.321}$	x 100 =	103,1%
Stability index 2002. = $\frac{1.772}{3.478}$	x 100 =	50,9%
Stability index 2012. = $\frac{807}{810}$	x 100 =	99,6%

Stability index for 1987, when was the most employees, was 103.1%, for 2002, when the majority of employees fired, index was half the size, 50.9%, and for 2012 was 99.6%.

Recruitment, selection, socialization, training and evaluation of the quality of staff training

An activity that continues naturally to the planning of human resources is the recruitment of human resources. It is defined as the process of identification, attracting and securing qualified candidates in such

numbers that the organization to select those that most appropriate to fill the jobs.

Vacant position the organization may be filled by: organization of work, the use of overtime, mechanization of work, adjustment of working hours, the introduction of part-time work and the transfer of part of the work. They use the following primary recruitment methods:

- traditional approach,
- realistic approach,
- internal recruitment and,
- External recruitment (advertising, agency and mediation, recruitment through educational institutions, affirmative recruitment, etc.).

In company IMT New Belgrade to the 90s of the twentieth century were mainly used: traditional approach, realistic job descriptions, internal and external recruitment. In difficult business conditions, the 90s, there is supernumerary number of workers, which leads to large-scale layoffs and restructuring. The last 10 years, if there was a need, carried out mainly internal recruitment.

Selection is the process by which the application of predetermined and standardized methods, techniques and rules, to choose between several qualified candidates to those that best suit the requirements of a particular job employment commenced. The selection process takes place in four main steps:

- estimate the demand for candidates to define criteria,
- Personality profiles in order to identify predictors,
- choice of selection method,
- Synthesis of the information gathered and decisions on the selection of candidates.

Standard sources of information about candidates (the application form, biography, references) is the most common methods used in the selection. One common form used today in every country of the application form biography, known as CV (so called "flow of life").

Tests are a measuring instrument by which people compare the specific feature that is subject to measurement. Tests are standardized in terms of content, scoring and administration, on the basis of which provide comparable data on candidates.

Throughout the history of companies IMT New Belgrade the most need was in hiring KV workers (the masters, welders, lathe, tool makers, milling, sander, hardening shop and mechanics). There was an unwritten rule that priority in employment given to children workers and young people which is a very positive attitude. Today, if there is a need for new workers, points out public competition, CV is required from interested candidates for the job, determined by the person who will be in conversation (it is mostly the immediate superior or head of) which he provides a final assessment that the candidate will be admitted.

As a commonly used agent for the selection is **interview**, with objectives were to gather information about the candidate, give him information about the job, to assist him in making decisions and to determine the applicant's ability to successfully perform the job. According to strategy of interviewing there are following types of interviews:

- honest and friendly strategy,
- problem solving strategies,
- strategy of biography,
- Stress strategy.

In process of the business of IMT New Belgrade it is proved that the most important method of selection for employment is interview. The most used is honest and friendly strategy that aims to achieve a benevolent relationship between the candidate and the person in charge of the selection. If it is a manager position, then it is performed a series of interviews with the candidate, who is better known as a panel interview.

Sincere and friendly strategy is used for jobs (commercial, acquisition, finance and import-export) and the problem solving strategies is used for jobs in the direct production and development. For special tasks, such as working in annulments, painters, gas stations etc. conducted a separate and detailed interview with the candidates, which included a special intelligence test, and psychological health and physical fitness. The recruitment process does not end with selecting of the best candidates, already they must go through a socialization which is defined as a continuous process familiarize them with the dominant values, norms of behavior and attitudes in the organization.

Socialization of new employees in the company IMT New Belgrade varies by sector and takes a day or two up to two weeks. In both cases the immediate superior accepts employee, interviewing with him, and after

visiting the company, meets workplace and colleagues with whom to work, and eventually comes to work. Learning does not stop after the introduction of the new employee to work. Work in the company is ongoing process of learning, and learning is the heart of the education and development activities.

Employee **training** can be defined as a planned effort of organizations to improve the performance of employees in their workplace, through changes in the specific knowledge, attitudes, and behavior. According to the organization there is training on the workplace and the training in the organization, outside of the workplace and training outside the organization.

IMT New Belgrade is attached great importance to training and staff training. Planning and implementation of training was related to:

- Design and construction sector, the advent of computers,
- Manufacturing sector purchasing the latest machinery, new ways of processing components, manufacturing process improvement,
- Communication sector, the introduction of electronic computer center, which has greatly facilitated the operation of the companies.

Each of these innovations demanded the training of workers through seminars and visits of trained instructors from the companies, which are sold and delivered the equipment for production.

Evaluating employee **performance** is a process of behavior in order to achieve organizational goals, based on the appropriate criteria, methods and systems evaluation. In practice, the most commonly used were six dimensions of work: quality, quantity, respect for deadlines, cost efficiency, need for supervision and coaching, interpersonal influence.

Evaluating employee performance in IMT New Belgrade was performed by line managers, looking at the work of employees, evaluates their performance and the end of the month gave proposals for salary increase. In one period, certain plants are working in three shifts, and employees of these establishments have been working on performance, so that those who are passing the norm effect the payment of salaries received higher salary even by certain directors. Evaluation of quality assessment performance is done through principles: validity, reliability, impartiality and practicality.

The goal of **staff development** is to improve their ability to successfully download the broader responsibility in the company. Development usually refers to the improvement of intellectual and socio-psychological abilities necessary for better performance of tasks and duties. The staff development in practice using four approaches:

- traditional form of education,
- assessment of the development potential of employees whose instruments Meyer-Brigzov standard indicator (MBTI) and the standards for comparison (Benchmark),
- work experience and
- Interpersonal relationships.

The IMT New Belgrade process development staff had such a course as the founding of companies until the nineties, the strategy was not just enough to have the latest technology, but they need to succeed and modern experts. But later due to the economic crisis, development of employees is reduced to a minimum. The period since 2000 - 2004 was characterized as a period when the survival of companies is producing a new series of tractors was revived and staff development. Various group courses related to language learning, new design, new technologies, business methods, marketing products in the global market, were organized at that time. This period marked the failure the Privatization Agency of IMT. After the year 2004 and with the transfer of the factory to the restructuring, the development process of employees decreased again and comes down to the individuals, and they were mostly members of the management structure.

In the process of career development each employee goes through five developmental stages:

- occupational choice and preparation for job (from birth to 25 years),
- entry into the organization, to the age of 18 to 25 years,
- early career, covers the period from 25 to 40 years,
- medium (mature) career which is the most productive period of his career between 40 and 55 years,
- Known (late) acting career of 55 years until retirement.

Most of the staff at IMT New Belgrade is between 40 and 55 years, which make the participation of 59.6%. Young workers have a share of only 3.2% of total employment. The reasons for this situation are poor working conditions, low and irregular incomes, insecurity existence of the company and so on.

Systems of wages (salary) and the elements of earnings

Rewarding employees is considered the most complex and most sensitive of all activities of human resource management. Only employees who are motivated and satisfied with their job and position in the organization, can successfully perform a given job while achieving organizational and individual goals. Employment offers specific skills; knowledge and behaviors needed an organization to achieve its goals in exchange for money. Main components of earnings are: basic salary, part of work salary for performance and salary increase. Earnings (salary) of an individual are made up of fixed and variable elements. Elements of salaries are:

- basic price work (determined by the law, it's minimum wage),
- addition (paid for exceptional dedication and hard conditions),
- benefits (coupons for lunch, additional health insurance),
- premiums (perform work at night, in shifts),
- overtime (extra money for overtime hours),
- stimulus (are paid out achieved remarkable results of the work),
- Bonus (payment that is not regulated by the contract).

Employees at IMT New Belgrade with the payment of personal income receiving enveloped report, like protection of confidentiality of the employee of his salary, as provided for by law. In addition to salary, employees can increase their monthly income by going on a business trip, field trips for service, going to fairs, etc.

Salaries are based on actual performance occur as:

1. short term stimulation,
2. individual stimulation,
3. group stimulation,
4. Long term stimulation.

One form of stimulation in IMT New Belgrade is share purchases. The first share issue was for companies, while employees in the company could participate in the second and third issue. Shares purchased during the second emission, had a greater value and importance in relation to the shares of the third issue, which is affecting inflationary period. And as such, impaired, were bought by individual workers who had to pay the valuation every three months. Those who held their shares belong to the group of 4.5% of the physical part of the capital, was remaining after the process of nationalization.

From the point of view of motivation and expression - the employed measure of motivation and legal frameworks of diversity, workers must not unlawfully discriminate on the following bases; sex, ethnicity, disability, union membership, worker part time, employed ex-convict who served a sentence, marital status, origin, religion, political affiliation and other.

Position IMT New Belgrade as initiator of economic development of the country and the company of national importance for the industry, created the need for the head of companies to be politically engaged. This did not mean that the employees must be political preference.

Company's policy through the history of its existence has always been the first production and achieves better results. It was not surprising that women working in the plant operations usually by men and a woman to be the head of the sector.

Labor relations and collective negotiations, union organizing of employees and their health, safety and profit

The rights, responsibilities and obligations based on work shall be regulated by law in accordance with ratified international conventions and the collective agreement and employment contract. The most important areas that are regulated by the Labor Law are fundamental rights, employment, duties and responsibilities of employees, termination of employment, working hours, holidays and absences, the realization and protection of the rights of employees, salaries and other benefits, area of collective negotiations and temporary service. In Table 3 are a preview number of workers, depending on type of contract.

Table 3. *Number of employees depending on type of employment contract*

Types of contract	Number of workers	Share in %
Working for a specified time	25	3.1
Permanent job	782	96.9
Temporary and occasional jobs	0	0
Total	807	100.0

Source: *Archive of IMT New Belgrade*

Trade union organization of employees is done because of a desire to influence the working conditions, the perception of the work environment and employee beliefs about the power and influence of trade unions. To become the Union's member employee voluntarily signing the application, and the financing is done by refusing certain amount of salary employee. Trade union becomes representative character when:

- operates on the principle of freedom of trade union organization and activity,
- when it is independent of the public organizations and employers,
- has a sufficient number of members (minimum of 15% of total employment),
- When is registered in accordance with the law and other regulations.

In IMT New Belgrade operates five trade unions: Standalone, ASNS, Independence, Industry and Our union. The most members (219) have Independence union, which makes the 27.2%. Industry union has only a 55 members (6.8%), which means they no required number of members (15%) that would be representative. There are employees who are not members of any trade union because they do not work in the interests of employees but to their favor. Company IMT New Belgrade renewed collective agreement with the union representative in 2011. Under this Agreement, there are determined the rights and obligations of the signatories. A collective agreement was written on 20 pages and includes 60 members. At the end of the contract is the table of coefficients and qualifications of employees, as well as tables of stimulation in relation to workplace.

Health, safety and welfare of employees are not only a legal and moral obligation, but also an activity that substantially affects the individual and organizational performance and achieve business goals. Only employees who are healthy and safe on workplace can be satisfied with their position in the organization, and thus succeed in work. There are four main problems related to the health of employees, which are important for human resource management:

- physical illnesses,
- emotional illnesses,
- alcoholism,
- Drug abuse.

In most states the area of health and safety is regulated by the law. The law regulates and controls: fire prevention, violence and safety, staff training, sanitation, ventilation and illumination work premises and other. The law on health and safety at work can be divided into two parts representing his criminal and civil matters.

IMT New Belgrade has the security service, which is compulsory that the company provides 24 hours of the burglary, unauthorized entry and exit of employees of alcohol, firearms and edged weapons. Security is required to carry out the procedure on arrival of foreign entities in factory. If it is a group arrival (practice, trips, delegation), a week before are submit a letter to the precisely specify the date and time of arrival, number and list of people who come.

Due to its needs, IMT New Belgrade sponsored construction of health facilities i.e. building of occupational medicine in the immediate vicinity, and owned a car for out-patient and emergency.

Complaints and discipline, staff retention and leaving the company

Complaints of employees express a legitimate right of the individual to express dissatisfaction. Complaints may be oral or written, transferred direct supervisor or senior management. Discipline involves regulation of human activities in order to achieve the controlled results. There are several of types:

- manager discipline (depends on leaders),
- teamwork discipline (’’failure is a failure for all’’),
- self-discipline (individual depends on training, self-control and skills).

In relation to the different types of behavior, there are different rules that apply to employees, such as: negligence, unreliability, insubordination, threatening the rights of others, theft and security. Violation of a rule entails typical forms of punishment such as: warning drawing attention, monition, disciplinary transfer, suspension and fined. Resolving the appeal requires the injured party processor would mean the inevitable appeals, which are key elements: justice, advocacy, procedures, and speed of resolving complaints. IMT New Belgrade new employee immediately met with the working rules and obligations and disciplinary measures to be implemented if a worker is penalized. In the company has been plagued by violations of rules, so that by punishing the most common disciplinary measure was reduction in salary, then transfer, and right behind them and dismissals.

Retention of personnel is an important activity of management of human resources and refers to attempts to keep quality operating personnel, thereby providing a number of benefits. Employees that leaving the company are lost resource, and is besides retention employees needed and the renewal of the labor force with young experts.

Besides staff retention in IMT New Belgrade, there is the problem of **leaving the organization** that may be willing (termination of employment and retirement) and involuntarily (firing and dismissal employees who are technological surplus).

Pensions are a form of voluntary abandonment of companies and are the most important benefits. Pensions are long-service awards. They are not a gift given by the employer, but it earned assets whose payment is deferred. Pension contributions in most countries achieved in three ways:

- Social security (minimal social security),
- Pension insurance based on employment (paid contributions),
- Individual pension insurance (supplementary and voluntarily).

Since the transition to IMT New Belgrade in the process of restructuring, there is a tendency of the voluntary abandonment of factories due to low income, poor working conditions, or finding a better job. By the early 90's human resources department is led by a strict control over compliance with the requirements for retirement, which is related to the timely replacement of finding a person who would in a short period of time are eligible to retire. Replacing would part of the time spent with an experienced worker, gradually taking over his job as the production process would not feel the change of worker. This procedure begins to break apart after 90s.

Conclusion

In order to IMT New Belgrade surpassed existing problems, stabilized and began to make positive that it operates, it is necessary to improve the management of human resources through:

Recruitment - addition to the existing need to use mediation and agency recruitment and the education institutions.

Selection - with existing, introduce new ways of selection to be able to select qualified candidates for the job.

Training of employees - need to keep up with global trends, through scientific meetings, visits to world's fairs, etc.

Measuring employee performance - perform up the basis of the results of performance evaluation which will affect the motivation of employees to successfully conducting their jobs.

Trade union organizing - unions to be refreshed and agree on, to improve the status of employees, and therefore the company.

Health, safety and welfare of employees - provide more frequent systematic examinations, especially those on dangerous occupations.

Discipline - appropriate measures to raise discipline to a higher level.

Retention of staff - best workers should be motivated to stay and bring in new workers instead of those that harm the company.

The best solution for IMT New Belgrade is:

- complete nationalization and improve of human resources management,
- relocate the factory and get a certificate for EU exports,
- Find strategic partners and modernize the production process.

Only a professional, modern planned and organized management of human resources can implement this solution and make company stable.

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APPLYING THE MARKETING CONCEPT IN MODERN BUSINESS¹

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Abstract

Marketing is a discipline which deals with market issues, needs on the market and ways of satisfying the needs. Marketing, as a business philosophy of intensive production, puts in a focus of its interests analyzing and recognizing all problems, which refer to turnover and sale of goods from producers to consumers. This field keeps developing and expanding with the market development, and aims to set a theoretical basis for business strategies on the market. In marketing theory, success on the market mostly brings together with understanding and satisfying the market needs (needs of consumers), but increasingly appear also new, more progressive concepts. In this concept of products and services projecting, starts from the consumers' needs and the consumers' satisfaction sets as a goal. In enterprises, in which has been completely applied the marketing concept, on consumers needs does not take care only the marketing department, but every employee, working with awareness that it is for the consumers' welfare.

Key words: *marketing concept, marketing management, marketing mix, organizational marketing design.*

Introduction

Word *marketing* is of Anglo-Saxon origin and is derived from the word *market* and a suffix *ing*, which has several meanings and means “placing on the market” or “creating a market”. There were attempts in our country

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to translate a term as “market opportunities”, “market business” and so on, but none of the mentioned terms was adapted, so there is no adequate term in our language. Today, the original form of this term is generally accepted and has a clear meaningful interpretation. In the professional literature are present many definitions, by which marketing is:

- Process of planning and realizing a price concept, promotion and distribution of ideas, goods and services, aiming to make an exchange which satisfies individual and organizational goals.⁴
- Management process, by which individuals and groups ensure what is necessary to them, and what they desire through creation and exchange of products and values with the others.⁵
- Total system of mutually connected activities meant for planning, prices determination, promotion and distribution of products and services which satisfy needs of current and potential buyers.⁶

According to the mentioned definitions, marketing represents a sum of activities which are used in order to direct courses of products and services from a producer to a consumer (user, buyer, client).⁷ Marketing can be presented through a four step process, which starts with analysis and definition of potential users' or buyers' “universe”. After the first phase of marketing process, follows a process of charming the users ready to buy, from the target population “universe”. In the third phase, influences systematically on potential users to take an interest and accept the existing concepts or offers, which have been created according to marketing activities of the organization. Finally, a success of the previous three phases should lead to a transition of potential buyers to the “real ones”, by activities conducted in order the potential users to make a desired action – purchase, call, downloading documents, subscription, membership, sale, etc.

The four steps process (attention, interest, desire, action) mostly refers to a beginning of marketing process for some product, a service or an organization. Most of present marketing processes in organizations refer to a task of keeping the regular clients through creating a relation with a client, improving the customer service, better representation of product

⁴ Definition of the American Marketing Association (AMA).

⁵ Kotler, P., Keller, K. L. (2006): *Marketing management*, Data status, Belgrade.

⁶ Stenton, V.J. (1967): *Osnove marketinga*, Mejdnhed: McGraw-Hill

⁷ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade.

and services' advantages, etc. Marketing has emerged due to production and producers problems solving, when supply is higher than demand, and the final goal has been placing a produced merchandise and realization of profit for an enterprise. Today, marketing essence is in solving the consumers' problems – faster and better than the competition. Accordingly, there rightly points out that “having the competitive advantage is the same as having a gun in knife fight”.⁸ To what extent has marketing changed from its origin until today, speaks also the fact that there are two terms for marketing in a literature:

1. Business marketing is connected to material goods, i.e. products and services meant for solving some economic problem of a man or an organization.
2. Social marketing is directed to solving some non-economic issues of the society connected to quality and safety of life.

Besides the mentioned, today are also present:

- Ecological marketing – which aims the environment preservation, and then the profit. It develops on the plan of a *recycling* process.
- Intellectual marketing – comprises creation and sale of information. It does not refer to the material goods, but to new values for people and societies.
- Relationship marketing – a central place occupies orientation to relationships with target groups, i.e. a buyer/user indirectly brings into the organization, through a specific value chain.

Marketing is a process, which primary significance reflects in setting up a communication course between producers and buyers, i.e. consumers. Marketing, as an economic process, develops continually and is an integral part of reproduction in an enterprise. Marketing is not a promotion or a performance at the fair or sale – but it is a process which lasts and encircles marketing research, strategic planning of marketing, goals definition, formulating marketing strategy, creating the marketing mix program, market analysis, control and revision. Thus, there is a whole system and every its part is comparably important.

Scientific field and business orientation of marketing

Marketing, as a business philosophy of intensive production, puts in a focus of its interest analyzing and perceiving all problems which refer to

⁸ Kotler, P. (2003): *How to create, win and dominate markets*, Adizes, Novi Sad, p. 121

turnover and sale of goods from producers to consumers.⁹ This field keeps developing and expanding with development of market, and aims to set a theoretical ground for business strategies on the market. In other words, in marketing theory, the market success often connects with understanding and satisfying the market needs, but more and more appear also more progressive concepts. Different aspects of marketing have appeared in time, among which especially emphasize the next:

- *Business-philosophic aspect of marketing* starts from a fact that, in market conditions, is possible enterprises' survival only if takes care on the environment changes, needs and requirements of the market and if focuses on a buyer. This aspect represents a creative way of thinking, determining and realizing the business activity. It bases on an idea to do the process of the environment adjustment before, and not after the appeared changes. None of capital decisions make without previous determination of effects which will have on the market and buyers behaviour and business of an enterprise. The marketing process does not end with the goods sold to a consumer, but follows further what is happening with the goods in the exploitation process by a consumer.
- *Business-conceptual aspect of marketing* basis on an idea that the buyers/consumers' needs should be mainly anticipated, in order to satisfy them in complex manner. It rests upon an old truth "Only an enterprise which knows how to sell will produce". Problems which appear are in domain of the marketing research: changes in the consumers' behaviour, occurrence of new competitors and aggressive behaviour of the existing ones. The most problems in firms which apply this marketing aspect appear while sudden conjunctural changes and political events.
- The essence of *systematic aspect of marketing* is to observe the marketing as a sub-system of total enterprise's business system. There are input elements, then a process of marketing system and, at the end, output elements. However, the process does not end here! From the output elements, information over again goes to the input elements and in that way creates a circle.
- In *functional aspect of marketing* often happens that enterprises create the needs of buyers/users. Maybe the most famous is a walkman case. Who thought, at that time, that anyone could need something like walkman? Although, talented individuals have

⁹ Cvijanović, D., Popović, V., Katić, B. (2005): "Marketing i multifunkcionalna poljoprivreda", *Traktori i pogonske mašine*, 2005, vol. 10, no. 2, pp 295-301

created the walkman at first, and then has been created the need for it in public. With aggressive advertising campaigns, excellent marketing they had achieved that people suddenly consider the walkman as necessary, although until then they had never heard of it.

Marketing is a concept of business, oriented toward buyers. In this concept, projecting products and services starts from the consumers' needs, and as acting goal puts the consumers' satisfaction. In enterprises where has been completely applied the marketing concept, not only a marketing department takes care on consumers, but all employees. Commitment to consumers in these enterprises refers especially to employees, who are in direct contact with them.¹⁰ The marketing concept gets more and more followers, due to its good results, and many adding and improvements of a basic idea appear. The marketing concept has four basic elements (well known as 4P):

- Product – it should be projected to satisfy the needs of consumers and to be competitive,
- Price – refers to a price of a product or a service,
- Placement – placement of products and services to the consumers,
- Promotion – besides advertising includes also other forms of promotion: promotional sale, prize contests, personal sale, etc.

Combination of these elements is called the marketing mix. The goal is to achieve such elements combination (4P) to make the competitive advantage (a positive characteristic which separates a product/service from the competitive ones) and thereby satisfy the consumers, i.e. achieve better sale and a higher profit.

Elements of marketing mix

Nowadays affirms increasingly the marketing relationship approach among buyers, competition, partners in business and internal relations between workers and a manager. The accent is on recognizing the connections with:

1. buyers, in order to ensure an effective and a superior servicing, i.e. maximization of their satisfactions, through adequate market segmentation, products' differentiation and communication courses with the consumers,

¹⁰ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade.

2. competitors, in sense of relations and strategies orientation, which will provide the best capitalization of strong points in benchmarking with competitors,
3. partners, in order to maximize the competitive advantages through various forms of business cooperation,
4. creators and executors of the marketing strategy, by which will realize the competitive advantage in delivering values for the buyers.¹¹

While defining the marketing program, often uses so called 4P – marketing mix, which includes a product, a price, a placement and a promotion. In the marketing mix 4P, Kotler suggests adding two more Ps, which starts to be more and more significant in international marketing. Those are a policy and a public opinion.¹² The sale of enterprise will depend on them, since they can use for entering some international markets and developing own supply. A decision on the marketing mix must be made also for distribution channels and for the final users. The marketing program should provide the orientation toward realistic and anticipated needs of economy and society and efficient sale of products on the international market.

I Product. The first element of the marketing concept – 4P refers to a product. It is necessary to be familiar with the product's characteristics, especially those which make it specific toward other products, because on them should base the product's promotion, i.e. its competitive advantage.¹³ Differentiation possibilities are in form of several important aspects of products, such as: packing, labelling, quality and a brand. Modern package is much more than a wrapping or a cartoon for the products' transport. Packaging problems in the international marketing are connected to: overcoming major geographic distances, overcoming numerous cultural differences, facing different ecological standards in the world.¹⁴ Materials which use within the package have to be new, clean and of such quality to stop the external and the internal damage to the product. There should mention several mutual package elements:¹⁵

¹¹ Todorović, J. (2003): *Strategijski i operativni menadžment*, Konzit, Belgrade.

¹² Kotler, P. (2003): *How to create, win and dominate markets*, Adizes, Novi Sad, p. 122

¹³ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade

¹⁴ Rakita, B. (2001): *Međunarodni marketing*, Faculty of Economics, Belgrade, p.352

¹⁵ Presna, M., B., Branković, A., Savčić, R. (2006): *Sveže voće i povrće 2006: Konkurentnost privrede Srbije*, Jefferson Institute, Belgrade, p. 30.

- Buyers requires packing which does not jeopardize health and which recycles; this is the item more and more expressed in the world, because the buyers take care on the environment protection,
- Variability is the next packing characteristic, while there is no packing standards in the world and there are numerous different packing, which differ for small and big consumers,
- In retail trade are more present printed packing in different colours with a visible logo, which attracts the buyers and connect with the local brand of a producer,
- Modern packing should be made especially for every type of products in order to reduce losses, but to adjust simultaneously to the needs and demand,
- Packing should be practical, with very little free space, and simultaneously to protect a product from mechanical damage during transport.

Marking the products is significant characteristic of packing (trade mark, declaration on origin and quality of products), which significantly contribute to the products' differentiation. On the other hand, the quality of products represents *conditio sine qua non* for making business success on the international market. Providing quality and respecting the quality standards ISO 9000-2000, ISO 14000, TQM, etc. is one of the most important strategic elements of competitiveness on the international market. At the same time, a brand identifies a seller or a producer, gives it more freedom and power in forming the price, it is unique warranty of quality.

II Price. The next element of the marketing program is price, as an indicator of investments profitability in some economic sectors and, at the same time, the indicator of cost effectiveness of the enterprise. It is one of the marketing mix instruments which, used individually or in combination with other instruments, should provide the business goals realization. The price is strategic and tactical variable, by which affects, as to the realization of sale size and profit in short-term, as well as on a growth and development of an enterprise in long-term. The marketing aim is not the highest price for products and services, but the price which will, in combination with other marketing mix elements, contribute to realization of short-term and long-term business goals. While making decision on prices, it is necessary to take into consideration impact of numerous various factors and the impact intensity, of which are many beyond the enterprise's control. In most of cases, the factors which have their effect are complex and dynamic. A number of factors which impact on pricing

policy have been theoretically limitless. However, costs, demand, competition, economic policy and governmental price control are basic determinants, which analysis cannot evade during the price decision-making.

III Placement. The placement, as an activity, comprises all activities necessary that the products deliver from a producer to a consumer, i.e. a product user. Distribution channels are the marketing mix instruments, which use as a mean to get in contact with the buyers. While making the decisions on sales channels, takes into consideration the current policies of products, prices and promotion, but, at the same time, every decision on the sales channel affects to latter decisions on the product, the price and the promotion. Consequentially, the decisions on specific instruments of the marketing mix must make coordinated. A purpose of the sales channel is to provide delivering goods from the producer to the buyer in time and in form to be used. They make a bridge between the producers and the buyers. Middlemen – the sales channel members – must not be owners of the goods, so a legal aspect (ownership) is not their important characteristic, but functions they perform in economy. The sales channels have to provide the products and services assortment, required by the buyers, and to supply them by the price they are willing to pay.

IV Promotion. The promotion is the only instrument of communicative character; it is the most elastic instrument, which is directly related to making an image and a reputation on the market. A role of the promotion reflects in informing the potential buyers, developing aptitudes and encouraging to action, i.e. to buy the products. It encircles personal sale, sale improvement, public relations, economic propaganda, direct marketing and national promotion of export. The promotion in international frames has an additional form, which could be marked as a national identity promotion, i.e. the national promotion of export. The marketing program should contain an interactive marketing system, which uses one or more economic propaganda media, in order to affect to the market demand. That is to say, it is about a direct marketing, which represents an effort to attract and keep the consumers based on direct contact. The goal is to realize a direct reacting in form of:¹⁶ 1. Buying by telephone or by post; 2. Requirement for catalogue or literature on products; 3. Permission to visit some location, event, fair or exhibition; 4. Participation in some form of action; 5. Requirement for demonstration of

¹⁶ Jobber, D. (1995): *Principles and Practice of Marketing*, McGraw-Hill Book Company, London, p. 44

products, requirement for visiting the enterprise. More favourable positioning can realize also by more adequate public relations. That is to say, the public relations actions have been directed to making a specific public opinion on a product and its characteristics. In order to have a positive influence on the public opinion, messages must be harmonized with the existing value system in society or in specific part of public, to which the message was addressed to. Audience for which are interested the public relations is not consisted only from the existing and potential buyers, but also employees, co-operators, suppliers and the entire society. Correct or false image of an enterprise directs and forms behaviour of people, as the buyers. It is necessary to identify strong and weak sides of an image and undertakes adequate and timely measures, in order to maintain and adjust the image.¹⁷

Managing marketing

Managing the marketing represents a process, by which regulates the marketing activity of an enterprise. It is about a dynamic process, because conditions, as in economy, as well as in an enterprise, constantly change. Accordingly, it is necessary to adapt the marketing activities as business functions to changed conditions of business environment and new business goals. In such conditions, managing the marketing is a process by which starts and directs the marketing activity, aiming to satisfy the population needs, as the consumers, economy and society in products and services, along with the profit realization.¹⁸ Prior defined activity of the marketing management can divide analytically on: planning, organizing and control. In the planning phase makes decisions on goals, policies, strategies, programs and plans of the marketing activities. During the organization phase makes the organization structure and organizes a direct activity of the marketing sector. Finally, in the control phase measures realization of planning decisions and organization efficiency and undertake the corrective actions in organization and functioning of the enterprise's marketing sector. The process of marketing management is efficient if all three management phases are continual. Some phases of marketing management should synchronize in a way that they provide a synergistic effect, to complement and encourage each other. The

¹⁷ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade.

¹⁸ Milisavljević, M. (1999): *Marketing*, Faculty of Economics, Belgrade, p.21

marketing management essentially means managing a level, “timing” and composition of demand, in a way that will help in organization of goals achievement.¹⁹ The process of marketing management contains the analysis of market possibilities (existing or potential market), formulation of the goals to be achieved on the market, definition of supply and allocation of resources to the selected actions direction, making the efficient organizational structure, which will conduct the programs and plans on the market, a permanent control of realized marketing activities and a review of undertaken actions' rationality on the market.²⁰ Taking into consideration the indicated elements of marketing management, it is obvious that the process, first of all, should provide an identification of market possibilities, their adjustment with the enterprise's business and a creation of action programs to use a distinctive competence for creating relatively permanent competitive advantage on the market.²¹

Marketing activities organization

The enterprise which uses in its business the marketing concept must be focused on its role in satisfying the consumers' needs. Good business results, unless they are a result of some monopoly, are always a reflection of good organizational design. Characteristic for the marketing concept is that it puts an emphasis more on human factor than on the system. Accordingly must start from a confidence in man and his skills and abilities to do his work efficiently. In such conditions, organizing the marketing sector and its integration in organizational structure of the enterprise is a complex task. The existing literature from the marketing field offers some organization forms of marketing activities, which are given below.

Organization by functions. In situation when the enterprise has relatively small number of products in the production program, which sell on small number of markets and to limited number of buyers, then the accent puts on expertness in doing specific functions. That is to say, the more is similarity of products, markets and buyers, the more are reasons in favour of organization of the marketing activities by functions and vice versa. The organization by functions provides grouping people by

¹⁹ Kotler, P., Keler, K. L. (2006): *Marketing menadžment*, Data status, Belgrade.

²⁰ Milisavljević, M. (1999): *Marketing*, Faculty of Economics, Belgrade, p.21

²¹ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade.

expertness, so the accent is on specialization in performing working tasks. A marketing manager unites the most all functions by direct management, and rarely the sections in big companies group, for example, in those operationally directed to sale and these of analytical character, so the marketing manager has assistants which unite these two groups of sections or sections grouped by some other criteria, which unite in services.²² If change some of assumptions on which bases a functional form of the marketing organization, then searches for other organization models. Basic advantages of this marketing organization form reflect in contribution of economies of scale and creation of superior expertness. On the other hand, imperfections manifest in inadequate reaction to the local markets requirements and owing to limitation of possibilities of making general managers.²³

Organization by products. It is not unusual to select the specialization by products and product lines. It uses the most often in enterprises with more strategic business units (in which every strategic business unit is responsible for a specific line of products). Since the enterprise sells different product lines, there are necessary also different procedures and marketing methods. In big companies with diversified production program, the organization by SBU offers very wide range of possibilities for solving the organizational problems in the marketing sector, as well as in its integration in the organization structure. There are many forms in which this form manifests. For example, some of them are the organization of specific marketing sectors for every individual production unit, which can form as the strategic business unit. The basic advantage of this organization form reflects in a fact that every strategic business unit directs to the specific target market, so there is a clear division of responsibilities for the realization of the marketing activities program. A shortage manifests in form of insufficient number of the strategic business units, which leads to duplication of the marketing activities, etc.

Organization by markets. Organization by markets uses in conditions when there is a certain number of products among which can be both similarities and dissimilarities, focused on different markets, along with support of many distribution channels. Since there are differences in

²² Milisavljević, M. (1999): *Marketing*, Faculty of Economics, p. 393

²³ Cvijanović, D., Mihailović, B., Simonović, Z. (2009): *Uloga i značaj marketinga u razvoju agrarnog sektora Srbije*, monograph, Institute of Agricultural Economics, Belgrade.

consumers' behaviour on some markets, it is logical to require also different marketing approaches, which success depends on adjustment of the marketing mix elements with the consumers' needs. When the enterprise orients its production program toward special markets, which buy specific products in large amounts, a form of marketing organization by markets (regions) can be desirable.²⁴ The specific markets are sufficiently different and enough significant for the enterprise's business, so there is inevitable the specialization. The concept of a market manager uses when different markets require different marketing strategies, so he is required to coordinate all marketing activities on the selected market.

Organization by buyers. For organization by buyers, the most important are the consumers' needs. The marketing mix elements are integrated in a way to meet segments of the consumers with related characteristics. However, there is a threat that might come to functions duplication and to create more levels in organization. Such defects minimize when market possibilities are significant and there are no essential differences between some markets needs. Generally, the marketing organization by buyers is the most related to a consistent application of the marketing concept. That is to say, if the buyers really differ by preferences and the way of using products, they represent a valuable support for the marketing sector organization. A main advantage of this marketing organization form is providing necessary specialization, regardless it is often about the product, which is basically identical. This form's imperfection is that it leads to increase of marketing costs in the enterprise.

Mixed forms of marketing organization. Mixed forms of the marketing organization provide creating the specific model, which meets the needs and possibilities of the enterprise. If it is about the enterprise which does business in a turbulent environment, where impacts have been intertwined and events of poor predictability, appear a need for a stencil marketing organization. This organization example is enterprises of high technology, where simultaneously mix two or three marketing organization principles, at the same hierarchical level. This organization form contributes to better harmonization of integration and specialization. This is very complicated principle for implementation and, in some cases, leads to costs increase in the enterprise.

²⁴ Milisavljević, M. (1999): *Marketing*, Faculty of Economics, Belgrade, p. 395

By applying the stencil marketing organization model comes to a form of organization by products and functions, where every product manager has a group of functional advisers only for his product. This model uses when the products differ a lot, realize on different markets and cannot efficiently sell to the buyers of the same team which sell other products. When the enterprise chooses the products manager concept, then it is a person responsible for a product, i.e. a product line on different markets, over different sales channels.²⁵ However, a problem occurs – it is hard to assume that one person can sufficiently know peculiarities of many markets on which the product is selling.

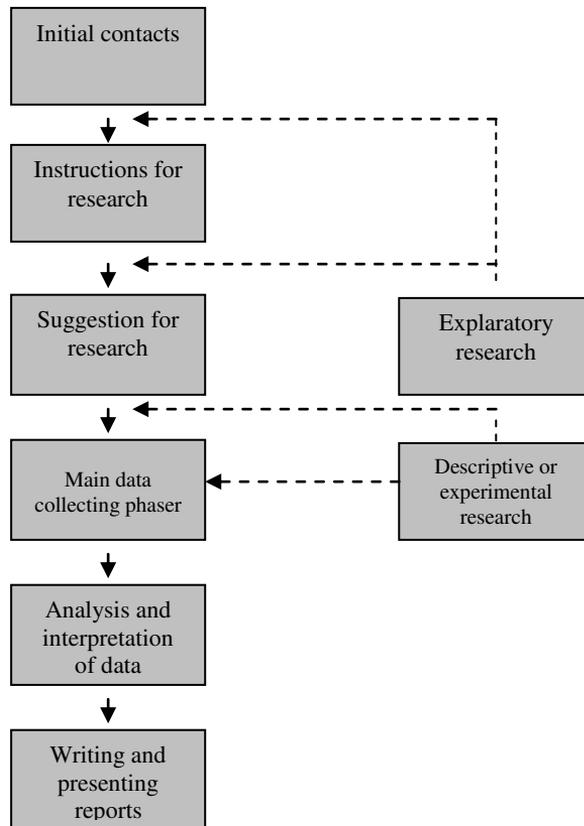
Approach and methods of marketing research

In modern business conditions almost all management decisions base on adequate and timely market information, provided exactly by market research. Information which provides the market research helps the management decision-makers to adjust to the market risk and to realize simultaneously the optimal business results. That is to say, in the market economy the enterprise cannot relate ignorantly toward the market research results. What makes the market research inevitable is a fact that a risk cannot be ever eliminated completely from the market economy system, but obtaining certain information the risk in business decision-making becomes lesser, and in some cases, even eliminates. One of the most efficient ways of risk decrease is exactly the market research, because the most of risk originate from conditions change on the market.

A product of the market research is information necessary for making optimal decisions regarding a tactics and a policy of the enterprise. The market research projects should serve as an analytically-documentation and analytically-projection material for evaluation of market permeability of the specific business project. Consequentially, primary goals of the market research are: analysis of supply and demand on domestic market, determination of consumption assortment structure, analysis of foreign trade exchange flows, identification of basic segments of consumers, determination of used distribution channels, and determination of placement possibilities. *In picture 1* was described a typical process of marketing research. Each of the presented phases was fully considered.

²⁵ Milisavljević, M. (1999): *Marketing* Faculty of Economics, Belgrade, p. 397

Picture 1. *Process of marketing research*



Sources: *Jobber, D., Fahy, J. (2006): Osnovi marketinga, Reviser of the Serbian edition: Professor Hasan Hanić, Ph.D, Belgrade Banking Academy, Data status, Belgrade, p 95.*

Initial contact. A process usually starts when a company ascertains that it needs information necessary for solving some marketing problem. The marketing management can contact internal personnel, responsible for marketing research or external agency. Let's start from the assumption that research requires support of the agency for the market research. There arranges a meeting in which considers the essence of a problem or a client's need. Relation between the client's manager and the researcher is similar to the relation between a lawyer and his client.²⁶

²⁶ Hanić, H. (2001): *Istraživanje marketinga i marketing informacijski sistem*, Faculty of Economics, Belgrade.

Instructions for research. In the meeting, in which decides what will be the research form, the client explains his marketing issue and demonstrates basic research goals. The client should submit, in written form, the instructions for research to the agency. They can submit before the meeting, in which can modify. Nevertheless, in any case, the instructions should be reported to the agency before it comes out with the research suggestion.

Proposal for research. The same as the research instructions, the proposal should be written in a way not to make any misunderstandings. The client expects that the following items will be involved in the proposal: formulating the goals, description of the research project, time frame and costs. During the proposals evaluation, the client should assure that the proposal was precisely presented, without incomprehensible expressions and that all issues were covered. Before the phases in which collect main qualitative data, conducts an exploratory research, which aims to make a preliminary research of a research area. In the project can be involved all or some of the exploratory research activities: secondary research, qualitative research²⁷ (group discussions and in-depth interview); observation.

Data collecting phase. After done exploratory research, realizes the planning procedure for main data collecting. This approach implies the research which goal is to describe beliefs, attitudes, aptitudes and behaviour of the consumers. The research plan should be based on: sampling process, sampling method and a questionnaire creation. A process starts with defying the population, i.e. the group which represents a subject of the research in specific research. The research goal is to provide the results, characteristic for the group. While choosing the research method, the most often are available four options: personal interview, telephone interview, questioning by post and questioning by internet. As for the questionnaire creation, it is necessary to fulfil three conditions to get a right answer to a question: respondents must understand a question; they must be able to give the required information and must be ready to give them.

Analysis and interpretation of data. In this phase of marketing research use computers, almost without exception, for making the quantitative data

²⁷ This kind of research tends to establish attitudes, values, behavior and beliefs of consumers.

analysis, got by filling out the questionnaire. The basic marketing analysis can conduct by using software packages for analysis, like SNAP and MARQUIS on personal computers.

Marketing information systems

Information technology faster and faster changes a mode in which business firms recognize the significance of marketing information systems. New business models represent new challenges and new possibilities, while organizations, in search for the competitive advantage, tend to adopt an “electronic trade” methodology. The organizations of all sizes feel overall impact of internet users, supply chains and competition. This pressure is extremely strong in the marketing sector, where information technology comes into contact with the user and substantially becomes a key for making greater user value. The significance of marketing information is especially visible in knowledge and information based economies, in which an emphasis was put on services, as a primary value resource.

The modern marketing organizations, with their focus on the internet, show different characteristics in regard to their „older economic“ brothers. They create and control their relation with users, which is closer and more direct. They adopt the information technology in order to unite and harmonize with users and business partners and realize measurable business results fast. There was emphasized a fast transformation of knowledge into the user value, which depends on capability to develop, use and control powerful new marketing information systems. A key in realizing the competitive advantage lies in ability of firm to transform knowledge into the relation with users, to reduce a time of placement to the market and costs. The marketing information system (MIS), in simple words, is a computerized system, projected to provide arranged information flow, in order to ensure and support the marketing activities in the organization. The MIS enables satisfaction of cooperative, analytical and business needs. Regarding the cooperation, the MIS provides managers to share information and to cooperate virtually. Besides, the MIS enables employees in marketing to cooperate with the users on projecting products and own satisfaction.

In literature, the marketing information systems often defines as...*a system in which the marketing information formally collect, keep, analyze and distribute to the managers in accordance with their needs for*

*information, regularly and by a set plan.*²⁸ This system has been based on understanding the needs of marketing management for information and it passes the information to the managers when, where in what form are needed. Thereby, the analytical function is done by applications which represent a support to decision making, which provides the employees in marketing to analyze the marketing data on users, competition, technology and common conditions which rule the market. This form is becoming a base for the marketing strategies and plans development. The MIS satisfies business needs by the users' management system, which focuses on daily analysis of transactions with the users, from initial sale to the user service. The MIS systems have been projected in a way to be comprehensive and flexible, and to mutually unite functionally. They are formal, oriented to future events and ability of a firm to make the competitive advantage. The MIS has been “window to the world” for the firm and substantially a primary connection with the users.

Conclusion

Redefining market and competitive space has been a consistent task, primarily marketing of an enterprise's management. Accordingly, there is expecting of marketing to make contacts with external actors, i.e. competition and clients, which are independent. Survival of an enterprise, by itself, depends on how well the management adjusts to market conditions, which are affected by activities influence of numerous market actors. The marketing business manifests in two forms – in formulation of strategy and management organization of various market-oriented sale activities, advertising, production and market research, physical distribution, etc.

Accordingly, it is necessary to reconsider the existence of the current and development of new business and marketing strategies of enterprises in Serbia, based on developmental abilities and powers of the enterprises, but also on being well informed on consumers' preferences, modern technologies, marketing approaches and other modern market business postulates. At the same time, respecting the market approach, i.e. the constant and intensive changes on the market, represents a first and a basic assumption, on which would be rational to formulate new strategies, different from the competitive ones, exactly by inventiveness, technology and quality.

²⁸ Jobber, D., Rainbow, C. (1977): “A Study of the Development and Implementation of Marketing Information Systems in British Industry“, *Journal of the Marketing Research Society*, 19 (3), pp. 104-111

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THE IMPORTANCE OF INNOVATIVENESS AND KNOWLEDGE MANAGEMENT FOR DEVELOPMENT OF RURAL TOURISM IN VOJVODINA

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Abstract

The objective of the paper is to highlight the importance of knowledge management and innovativeness for the development of rural tourism in Vojvodina. Farmsteads in Vojvodina are representative facilities of rural tourism and innovative business ventures which have exceptional, though under-utilized tourism potential. Research methods used in the study include desk research, as well as an interview with the representative sample of farmstead managers. The results show that the majority of farms are planning to innovate the business in the future, where most ideas are acquired from guests, competition, and/or employees. According to the research results, farmsteads in Vojvodina still do not recognize the importance of knowledge management, due to the fact that a surprisingly large percentage of the respondents had never participated in educational activities that are important for business growth.

Key words: *Knowledge management, innovativeness, farmstead, rural tourism, Vojvodina.*

Introduction

Dynamic social, economic, political and ecological changes and processes have caused the unsustainable growth and development of urban areas. Rural tourism has emerged as a response to a high level of urbanisation, mass tourism and unsustainable growth and it is becoming increasingly attractive to modern tourist.

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Due to its remarkable tourist and geographic location, natural and anthropogenic potentials, Vojvodina is an excellent resource for the development of various types of tourism. Considering the authentic architecture of Vojvodina, its numerous farmsteads and ethno houses, recognisable cuisine, manifestations and other predispositions, Vojvodina could become an important destination for rural tourism.

Innovation of organisation is the basis for success as it ensures for the organisations to be efficient, improve their product quality, cut the expenses, satisfy their clients' needs, increase their sales and profits, ensure a bigger market share and distinguish themselves from the competition. Knowledge and knowledge management occur as significant catalysts in this process.

This paper deals with farmsteads in Vojvodina which have a special role in the development of rural tourism in Vojvodina. The objective of the study is to point out to the importance of knowledge management in rural tourism, in order to increase the innovation and ensure rural tourist products which can respond to tourists' needs in a better way.

The task of this study is to determine whether farms, as representative hospitality objects in the function of rural tourism, respond to changes in the environment; what their attitude on changes is, whether they introduce innovation in their business management, from where they get ideas to improve their business management, which are the basic sources of knowledge and whether acquisition of new knowledge contributes to the improvement of business management.

The methods used in the research are desk research and interviews. The interviews were conducted with the owners or managers on farmsteads in Vojvodina. There were 30 farmstead involved in the study. The study will answer to the following research questions:

- Do farmsteads have plans to innovate the business in the future?
- How do farmsteads come up with new ideas for improvement of business?
- What is the attitude on the farmstead toward the changes?
- Do farmsteads analyze the market and follow the competition?
- Do employees on the farmsteads participate in seminars, training courses and conferences that are relevant to the business?
- Do the farmstead owners recognize the importance of educational activities for business improvement?

Research questions will provide an insight into farmsteads readiness to change. The basis for the development of rural tourism is the implementation of new knowledge, where innovation and knowledge management emerge as an important factors of rural tourism development.

The paper consists of several parts. The first part explains the notion of rural tourism and gives a short review of rural tourism in Vojvodina, with special focus on farms. The second and the third part give a reference review and point out to the significance of knowledge management and innovation of the organisational management. The fourth part explains the methodology used. The fifth part gives a review of the most important research results. The last part discusses the acquired results and gives a conclusion.

Rural tourism in Vojvodina

Tourism is one of the fastest-growing global activities which records growth of 25% in the last ten years, while the international tourist arrivals have increased over 4% in 2011 (UNWTO, 2012). In the following period, it is predicted that tourism will develop in all regions of the world, with the most intense relative growth in the developing countries. Tourism is a very complex and heterogeneous phenomenon which combines multiple activities such as hospitality, transport and other numerous indirect activities. The role of tourism is significant in the transition period. It is important to emphasise that tourism affects numerous economic sectors to a great extent, offers high 'value added' to the balance of payment in a country but also is an important generator of employment, especially for the employment development in rural areas.

Rural tourism is a type of tourism which involves the complexity of all activities and aspects of the whole tourist product (recreation in a rural area, enjoying leisure time and peace of the rural area, enjoying nature and diverse landscapes, national parks, nature parks, cultural tourism, rural households tourism) (Jafari 2000). The notion of 'rural tourism' has been recognized by the European Union, and as such it is related to all tourist activities in rural areas. Special types of rural tourism are: rural households tourism, hunting, fishing, ecotourism, medical tourism, sports and recreational, residential, educational, adventurous, transit, camping, continental nautical tourism, culinary and ethno culinary, tourism of protected areas, cultural tourism, religious tourism and other special types (Košić, 2009).

The role of government is highly important in supporting and encouraging the development of sustainable rural tourism (Mac Nulty, 2002). For many years Europe records excellent results in this field and further growth based on domestic market but also the support of the sustainable development concept is expected (Horwath Consulting Zagreb and The Faculty of Economics, Belgrade, 2005). On the other hand, Serbia does not fully exploit its rural tourism possibilities, such as rural tourism in the villages of Šumadija, farming tourism in Vojvodina, religious tourism, wine and ethno tourism, etc. (Čomić, 2002). Also, Vojvodina is specific for its remarkable ethnic diversity, which is a significant potential for creating numerous tourist products which should focus on folklore, culinary specialties and happenings which show the diversity and the richness of the cultural and historical heritage. Rural tourism is a real asset to the revitalisation of a large part of Vojvodina and Serbia as well, and their numerous smaller and bigger rural areas, at least those who are currently forgotten. The development of tourism in this area can seriously threaten or even stop young people from moving to cities, as today it creates elementary conditions for a general, much greater comfort of rural villages (Vratuša, Anastasijević, 2002).

Farmsteads³ in Vojvodina are the monuments of culture and tradition of the people who live in this area and are incredibly significant for the rural tourism of Vojvodina. Unfortunately, farmsteads are not fully exploited as a tourist concept, although they are characterised as the trademark of Vojvodina and cultural specificity of the Pannonian region (Dragičević, 2007). Most farmsteads were built in the middle of the last century, while some farms are over 200 years old and have become ethno museums with a multitude of old tools, agricultural tools, brick stoves and antique guest rooms with large beds and down comforters (Anđelković, 2006). Although the value of farms is reflected in retaining and presenting a classic lifestyle in Vojvodina, many of them have been redecorated and adjusted to modern needs, and thus there are swimming pools, courts, ponds and other recreational facilities. Some of the most famous and the largest farmsteads own stables, small zoos and ethno museums. Thus, farms in Vojvodina are ideal for a peaceful vacation with numerous recreational activities but also for enjoying great cuisine of Vojvodina, top local wines and rakija along with the merry sounds of the tamburica.

³ Farmstead is a translation of the Serbian word *salaš*, which is loanword from the Hungarian *szállás*. It is a rural estate surrounded by outbuildings mainly used for agricultural activities. It is characteristic for the Pannonian area. Although it does not have the exact same connotation as *szallas*, there is no equivalent for this word in English, so the translation farmstead will be used in the text.

From the aspect of business management, farmsteads in Vojvodina are an innovative and entrepreneurial business venture. In order to be seen as such, farms which are used for the needs of rural tourism should retain their original look and the authenticity of the surroundings, as this is the only way they can form a differentiated tourist value compared to regular restaurants and farms. Farmsteads are supposed to be conceived in such way to enable their owners to live there and do their agricultural activities, but also to provide accommodation, food and other services to their tourists (Anđelković, 2006). In the last several years there has been recorded a raise of awareness on the significance of farmsteads for the culture and tradition of Vojvodina (Tomić, 2002).

Knowledge management

It is globally accepted that knowledge is one of the most important sources of competitive advantage in the increasingly turbulent global business environment. Although many different models can be found in different studies (Kim, 1993; Choo, 1998; Jakubik, 2011; Nonaka et al, 2000; Melkas, Harmaakorpi, 2008), the existing models poorly answer the question of how knowledge is actually created and shared among the actors of different organisational environments. Some studies (Rutten, 2004; Nonaka et al, 2000; Cappellin, 2007; Gertler, Wolfe, 2004) suggest that the practice and investigating knowledge management should focus not only on individual organisations but also larger units (cities, regions). There are numerous approaches in different studies. Patriotta (2003) described the evolution of different paradigms on knowledge management, naming approaches in the following way: the approach based on resources, the cognitive approach, the approach based on knowledge, situational approach and the technological and scientific approach.

He considered epistemological assumptions on which the existing theories of the organisational knowledge are based, emphasising that the nature of knowledge has been much discussed, and that knowledge has proved to be a multiple phenomenon. During the last decade, there were several attempts to integrate different approaches of knowledge management into a common framework (Jashapara, 2005; Patriotta, 2003; Koenig, 2008). These studies recognised the perspectives of human resources and strategic perspectives of management, as well as the perspective aspects of the informational systems (Jashapara, 2005).

In papers which deals with knowledge management, knowledge is becoming to be viewed as situational and contextual (Koenig, 2008). Apart from that, (Orlikowski, 2002) claims that knowledge is related to objects (things, elements and facts), and that cognition is related to action (practice). She emphasised that cognition is the ability to change and that it occurs in active social interaction. Apart from that, Orlikowski (2002) claims that sharing knowledge occurs only when it is possible to learn the practice from others. Thus, cognition and abilities can be examined only by examining practice i.e. by learning how something is being done in practice. Knowledge base of a company cannot consist of multiple sources. Kerssens-Van Drongelen (1996) classified these sources into four categories:

- *brainware*: knowlegde which is inside a person's mind, such as intuition, experience, a specialised *knowhow*;
- *hardware*: tangible things such as material prototypes, products, research and hardware development, the production process;
- *groupware*: undocumented knowledge shared among people, such as heuristic, procedures, stories, myths;
- *documentware*: knowledge documented on paper or in data base/information systems, such as intranet, parts of data base, patents, manuals, laboratory reports, etc. (Davis et al., 2006).

Swan, Scarbrough and Preston (1999) define knowledge management as 'any process or practice of creating, earning, sharing and using knowledge, in order to improve learning and performance in a company.' Johannessen, Olsen and Olaisen (1999) have given a more complete definition, taking into account different types of knowledge: systemic, explicit, tacit, as well as hidden knowledge. Systemic knowledge is acquired by examining models such as those from computer simulations exercise. Explicit knowledge is relatively easy to acquire by listening and reading. The knowledge relation is being learned in interaction and is relatively difficult to communicate. The most difficult types are tacit and hidden knowledge, as they are difficult to comprehend and communicate. Hidden knowledge is the way of organising ideas and mental models and it is usually acquired through socialising.

However, the most valuable type of knowledge is tacit knowledge. Johannessen, Olsen and Olaisen (1999) describe it as a "*know how*" knowledge, which is acquired by using, working and experimenting. Tacit knowledge is usually highly subjective and it is inside a person's mind, therefore it is hard to communicate, comprehend and quantify.

This is why companies struggle to discover how to motivate their employees to share tacit knowledge, which is recognised as a significant strategic tool. Many companies attempt to achieve this by training their employees (internships) or developing their employees' competence.

Education of employees is essential for faster accepting and adapting to changes in the business environment, as well as for the improvement of the business and achieving a competitive advantage.

The importance of innovation for the business

The company's ability to innovate and use the advantages of innovation is a deciding factor of its survival in today's turbulent and unstable environment (Doyle, 1998; Quinn, 2000).

Innovation is defined as creation and successful application of a new product, process (Cumming, 1998), new idea (McAdam et al., 1998; Urabe, et al., 1988), new knowledge form (Chaharbaghi, Newman, 1996); new way of delivering quality or value for the client (Knox, 2002) or their combination. According to Freeman and Perez (1994) innovation is possible to classify to: incremental innovation, radical innovation, changes in the technological system and changes in the technological and economic paradigm.

Incremental innovations include a series of small improvements or changes in the way some things are done in a longer time period. They affect the improvement of product and service quality. Radical innovations are fundamental and revolutionary changes which demand clear departure from the existing practice, processes and technology (O'Reilly, Tushman, 2004). Most commonly they are the result of research activities in companies, universities and institutes. This type of innovation brings big changes, marks a new usage, property, design or components of the product compared to the existing ones (Kontić, 2008).

However, due to its low density and relatively small number of human and financial resources, rural area has weak connections with research and development centers, so it may encounter difficulties when it is necessary to make radical innovations. Innovations in rural areas may take over and adjust methods which have been created in other areas or finding new solutions for extremely persistent problems (Rollinger, 2012).

The innovation process is the process of learning, where companies create new knowledge, competence and abilities. Innovation value chain is the process of transforming innovation into new products, services, processes, etc. and then to exploit them in order to create new value.

Innovation ability of a company depends on the ability to create new knowledge and the interaction between the individual and groups in a company (Kontić, 2008). Ngo and O'Cass (2009) see innovative ability as an integrative process of applying collective knowledge, skills and resources in order to provide technological (product/service and production innovations) and non-technological innovations (management, marketing, market).

In tourism and hospitality papers often focus on certain aspects of product quality, such as gastronomy, animation, wellness facilities (Jacob et al. 2003; Pikkemaat, 2008). Process innovations are analysed in papers which focus on the effect of technology in order to achieve different benefits such as higher productivity, higher profit etc. (Siguaw et al., 2000; Sundbo et al., 2007). Innovations related to employees involve finding new ways to organise, direct and keep the staff, increase the satisfaction on the workplace and nurture knowledge and competence. Walsh et al. (2013) examine the application of instruments for managing human resources in hotel management. Hu et al. (2009), point out to the significance of team work and sharing knowledge for innovations.

Innovation is the basis of company's success in all areas, tourism as well, as it helps companies be more efficient, improve their product quality, cut the expenses, satisfy their clients' needs, increase sales and profits, ensure larger market share and distinguish themselves from the competition (Jones, 1996). Knowledge and knowledge management are significant part of this process.

Methodology

This study used a questionnaire created by the author of the paper. The questionnaire consists of a six-item list, divided into two groups. The first group of items explores the presence of innovation management dimensions (four questions), while the second group of items is focused on examining the knowledge management dimension (two questions). Table 1 shows the questionnaire used in the study.

Table 1. *The questionnaire used in the study*

Questions	Answers
1. Do you have plans to innovate the business in the future?	There are no plans
	We recognize the need for a plan, but we have not created an innovative plan yet and we are currently in a poor financial situation
	We have plans and we are constantly implementing and improving them
2. How do you come up with new ideas to improve your business?	From the employees
	From the guests
	From the competition
	All mentioned above
3. What is the attitude toward the changes on the slash?	Changes are hard to accept
	We are aware that something needs to change, but we are not sure what and how •
	We are actively working on adapting changes. Moreover, we are involved in a constant process of change, because without it there is no progress
4. Do you analyze the market and follow the competition?	We do not analyze the market and its opportunities
	We rely on clients feedback
	We analyze the market opportunities, monitor the competition and act accordingly
5. Do employees on the farmsteads participate in seminars, training courses and conferences that are relevant to the business?	Never
	Less than once a year
	Once a year
	More than once a year
6. Do you recognize the importance of educational activities for business improvement?	Yes
	No

The authors surveyed 30 out of 39 respondents who are the owners or the managers of farmsteads in the municipalities of Vojvodina, using the random sampling method by direct surveying. Direct surveying by telephone as well as face to face interviewing were used (five of the most famous farms were visited) in order to ensure the quality of the questionnaire.

There are 45 municipalities in the Autonomous Province of Vojvodina. According to official records, there are 39 farmsteads in 15 municipalities. Today there are 39 farmsteads in active business, which are located in 15 municipalities out of a total of 45 municipalities in Vojvodina: (*Salaš Gojić* –

Salaš uzdaha, Salaš Gnjezdo), Bačka Topola (*Capriolo, Salaš udvardi*), Bela Crkva (*Zeleni dvor*), Inđija (*Salaš od srca, Salaš Stojšić, Zekin salaš*), Kanjiža (*Kucora salaš*), Kula (*Vinska kuća Ačanski*), Mali Idoš (*Salaš Katai*), Novi Bečej (*Salaš Slano Kopovo*), Novi Sad (*Brkin salaš, Cvejin salaš, Kizin salaš, Mitin salaš, Mlađin salaš, Naš salaš, Pejićev salaš, Salaš 137, Salaš Prodanov, Salaš Volić*), Odžaci (*Katićev salaš*), Sombor (*Art salaš Višinka, Dida Hornjakov salaš, Salaš Bošnjak*), Srbobran (*Beljanski raj, Salaš Đuze Svorcana, Salaš Toše Zeremskog*), Subotica (*Jelen salaš, Majkin salaš and Cvetni salaš, Rokin salaš, Salaš Đorđević, Salaš-majur roža, Vinski salaš Čuvarđić*), Žabalj (*Babin salaš, Monikin salaš, Vila Diva*). The most famous farms are *Salaš 137, Majkin salaš, Cvetni salaš, Rokin salaš* and *Perkov salaš* (Tourist organization of Vojvodina, 2013).

Results

The first question was aimed to determine whether farms have plans for the business improvement. The results show that 46.7% of respondents have some business innovation plans for the future. A smaller percentage of respondents recognise the need for the innovation plan but do not have one yet or they currently do not have finances to make one (27.7%). It should be mentioned that a negligible percentage of respondents have no innovation plans at this moment (26.7%).

The responses related to the source of new ideas for the improvement of business point out to the fact that most ideas are collected from various sources: guests, competition and employees (40.0%). A significant percentage states that most ideas are the result of immediate communication with their guests (33.3%) or that the employees came up with the ideas (23.3%). A small percentage (3.3%) stated that competition is their source of new ideas for the improvement of business.

As far as respondents' relation to changes is concerned, opinions are divided. A significant percentage (36.0%) states that changes are hard to deal with it, while a similar percentage stated (33.3%) that they actively work on implementing changes. The smallest but not negligible percentage (30.0%) admits that they are aware of the significance of following and adjusting to changes, but that their farmstead does not yet have a clear plan and the way in which it can be changed. When asked if the management of farmsteads analyze the market and follow the competition, answers were following: 16.7% of respondents stated that they rely solely on their guests' feedback. From this it can be concluded that less than half of respondents (40%)

analyse market opportunities, keep track of their competition and act in accordance with what seems to be poor results. The responses to the question whether and how frequently employees on farmsteads participate in educational activities, the results showed that a large percentage was never involved in seminars, trainings and conferences relevant to business (69.9%). A significantly smaller percentage (16.7%) stated that they attend these type of educational activities less than once a year, while the smallest percentage (6.7%) regularly attend educational activities once a year or more (6.7%).

Despite the previous response which points out that insufficient evaluation of educational activities by respondents, as well as insufficient attending of those activities, a good result is the fact that 77.7% of respondents considers the attending of educational activities to be useful for them and their company.

Discussion and conclusion

The paper focuses on exploring the dimensions of knowledge and innovation management on the farmsteads of Vojvodina. Farmsteads are especially valuable as tourist attractions for the development of rural tourism of Vojvodina, considering that apart from accommodation, they offer an authentic experience to their guests, in the environment which reflects the spirit of times gone by and the lifestyle of this region, as well as rich gastronomic offer (Jovičić et al, 2013).

In order to explore the dimensions of knowledge and innovation management on the farmsteads in Vojvodina, a survey was conducted. It is positive that almost half of the managers and owners of the farmsteads have some business innovation plans for the future, while a smaller percentage is limited by a lack of finances or are not interested in innovation. According to the responses most innovation ideas were acquired from various sources – guests, competition and/or employees, which is affirmative, as constant feedback from various sources is significant for business development. Accepting and adjusting is business aspect which needs to be worked on because respondents' attitudes are divided. Although more than one third of respondents have trouble in accepting changes, not a negligible percentage claim that they analyse the market possibilities, keep track of the competition and act in accordance with it. It can be concluded that the innovation dimension is present in management of farmsteads to a certain extent. However, improvements can be made, primarily in the business aspect which is related to managing changes. Thus it is necessary to anticipate the changes

and act proactively. Also, constant market tracking and quick assimilation and reaction to emerging opportunities and threats is significant. As far as the knowledge management dimension is concerned, it is concerning that a surprisingly large percent of respondents did not attend any seminars, trainings and conferences which are relevant to business, although most of respondents consider attending educational activities to be beneficial to them and their company.

A conclusion can be drawn that it is necessary to work on the improvement of the knowledge management dimension, as different training programs are the essential component of business. Government and private companies which train human resources should initiate such development efforts, as well as the owners and the managers of the farmsteads. The education of the employees, their involvement in various trainings, workshops, seminars, conferences and gatherings may result in the increase of the knowledge quantum. In the following period these efforts may result in the improvement of the quality of offer on the farmsteads which can contribute the promotion of increasing the quality of tourist product of rural tourism of Vojvodina.

Radical innovations in the farmstead tourism cannot be expected, however smaller improvements by the employees which are involved in the process of giving services can significantly contribute to the overall guests' satisfaction. Innovations can relate to standards related to accommodating guests, hygiene, the amount and the quality of food, treatment of guests, etc. Also farmsteads should strive for the enrichment of their offer through innovative programs which would extend and complement tourists' stay, such as active involvement of guests in traditional work on farms, short, informative and entertaining trainings on old crafts, making and selling souvenirs, involving guests in making local gastronomic specialties, active spending time in nature which could be conceived as familiarising tourists with flora and fauna of the area, going hunting and fishing, sports and recreation tourism, etc.

The prerequisite for successful planning and managing the development of rural tourism is reflected in active involvement of the rural community as well as partnership between numerous participants of rural tourism. Also, directing the visitors' behaviour is one of the factors for the successful development of rural tourism in Vojvodina. The basis for the development of rural tourism is the implementation of new knowledge which will help in developing new tourist offer. With various seminars and trainings, formal and informal educational organisations, government and non-government

and other organisations should be involved in the process of the development of rural tourism, in order for the rural community to acquire new knowledge and skills. Forming rural centers should be the leading structures of sustainable rural development, and the activities of those centers would be (Stamenković, 1999): forming a development work group; the analysis and critical evaluation of the current state; examining different attitudes and opinions by surveying; suggesting possible solutions; organising meetings in rural centers; cooperating with other participants in the development on all levels (local, regional and international) and ensuring that there is constant presence in public (creating a web page, cooperation with the media and the local community).

In order to confirm the conclusions drawn from this paper, the research should be viewed from the international point of view, which means that the development of rural tourism in Serbia should be compared to the development of rural tourism in the European countries. It is also necessary to create a development program of rural tourism in the Republic of Serbia, including the Autonomous Province of Vojvodina.

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ECONOMIC ANALYSIS OF WHITE WINE PRODUCTION COST¹

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Abstract

In 2011 in the observed winery 9,559 liters of Chardonnay wine and 22,184 liters of Sauvignon Blanc wine were produced. The cost price of one liter of Chardonnay wine is 285.56 RSD, which is 62.19 RSD higher than the cost price of one liter of Sauvignon Blanc wine which is 223.37 RSD. In the total cost of Chardonnay wine the largest share is the cost of raw material - grapes 37.53%, and concerning Sauvignon Blanc wine the largest share is the cost of packaging (32.18%), while the cost of raw material - grapes is significantly lower (19.49%). In 2012 the difference in the production costs of the analyzed types is significantly lower, the cause of this is the price of grapes which was the same for both types in 2012 and it was 45 RSD. The cost price of one liter of Chardonnay wine is 309.64 RSD, whereas of Sauvignon Blanc wine is 296.85 RSD. In the total costs the largest share is the cost of raw material – grapes, 32% for Chardonnay wine and 28% for Sauvignon Blanc wine. The other costs are the same for both types.

Key words: *economic analysis, costs, wine, Chardonnay, Sauvignon Blanc*

Introduction

Wine is considered to be a product made by complete or partial fermentation of pomace or must of fresh grapes from noble varieties of vine (*Vitis vinifera*) (Ljubisavljević, 1990). The nature was careful to create in grapes the best raw material for wine production. They consist of all the necessary elements such as water, sugar and acids. Apart from

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sugar, grape juice contains acids essential for the wine taste. The skin and seeds contain tannins, the compounds of astringent taste which are natural preservatives enabling the wine aging and maturing and preventing it from spoiling. Yeast cells are located on the seed surface, but that yeast is usually not sufficient for wine making – yeast is added during production. The skin, apart from pigment, contains millions of microorganisms (yeast) which cause fermentation, transforming grape juice into wine.

Wine is an alcoholic beverage, but it is not a plain mixture of alcohol and water as many other beverages are. Nowadays it is known with certainty that wine comprises 800 different chemical compounds, thus it is frequently called liquid food. Numerous factors influence the wine composition and characteristics, therefore the criteria for wine categorization are very different (Milić i Radojević, 2003).

The origins of wine are unknown, it is believed that the primitive man, having the need to preserve food, kept wild grapes, putting them into rock cavities to ferment and turn into wine. The oldest written document mentioning wine dates from 4000 BC. It is a beverage which has symbolized joy and happiness from the ancient times. The moment a man discovered wine as a precious beverage, the moment he tasted its charm, he sought to produce it.

The word wine originates from the word vena – loved. Its positive effects to the appetite and digestion as well as its nutritious and hygienic value have been determined if consumed moderately. According to the examination by the International Health Organization, a hypothesis has been formulated saying that wine contains certain ingredients having the effect of protection against vascular diseases (myocardial infarction). It is scientifically proven that the positive physiological effect comes from compounds from the group of polyphenols which were later named proanthocyanidins. This is supported by a fact that at French market there is a red wine enriched with these substances with the trade name “Le vin coeur“, which could be translated as the wine for heart.

Apart from these qualities, wine was the inspiration for the creations of many artists, especially poets and composers, and it has become an integral part of religious ceremonies and traditions. Wine relaxes and incites truthfulness, because with wine people lose masks and self-image and with this divine drop, they become what they really are, hence the saying "in vino veritas", in wine is the truth.

However, to make the story on wine and its benefits complete, it should be noted that the positive effects of wine are only achieved by moderate consumption. Excessive amounts of the "heavenly drink" turn into its opposite, so instead of curing, it sickens, instead of connecting, it separates, and artistic creativity turns into apathy. The wine knowledge is an open book read for years and created for generations. Making good wine is the result of successful cooperation of science, skillfulness, dexterity and the great love of wine.

The viticulture and enology of Serbia is one of the oldest and the most important in this part of Europe. The grapevine was and is the pivot of many Serbian generations, and especially Karlovci wine sparkled throughout Europe, always noble and refined among the best. For several centuries Sremski Karlovci was considered Serbian wine capital. The wine from Fruška Gora was exported to the Czech Republic and Poland back in the 15th century.

The wine cellars in Sremski Karlovci and Irig are still a memorable experience for visitors. They were built as mines with wooden vaults. Wooden barrels with wooden or metal hoops were exclusively used for fermentation and storage of wine. Even today, there are a number of wine cellars with wooden containers, even though there is more frequent usage of the metal ones. The people from Karlovci, famous for their special wines Ausbruch and Bermet, revived their production in the nineties of 20th century. The production technology was kept and passed on as a secret in Karlovci families (www.srbija.travel).

The necessary data for this paper was taken from the Investment Programme for Constructing Facilities for Grapes Processing and Wine Production in the Srem region. The comparative analytical method was used for processing the available data. The comparison of production and economic results of the analysed white wines in 2011 and 2012 was done according to the table representations.

In addition, published data was used, i.e. the Internet websites of the FAO organisation and the website of the Statistical Office of the Republic of Serbia (www.fao.org and www.stat.gov.rs) for the observed years. Numerous congress and conference materials related to the mentioned issue were also used as a data source.

The Research Results

World wine production capacities

The average world wine production from 2009 to 2011 amounted to 28.4 million tons (table 1). Observed regionally, the largest wine production takes place in Europe, providing more than two thirds of the world production. Europe, with production of 18.6 million tons accounts for 65.65% of total world wine production. The other regions are well behind Europe and altogether account for 34.35% of the world structure. The American continent has a production of 5.4 million tons and accounts for 19.08%. Asia with the production of 1.9 million tons accounts for 6.77% in the total world wine production, whereas Oceania and Africa produced 1.3 and 1.1 million tons in the observed period, which accounts for 4.66% and 3.83% of the total world production.

Table 1. World wine production in contingents in the period from 2009 to 2011

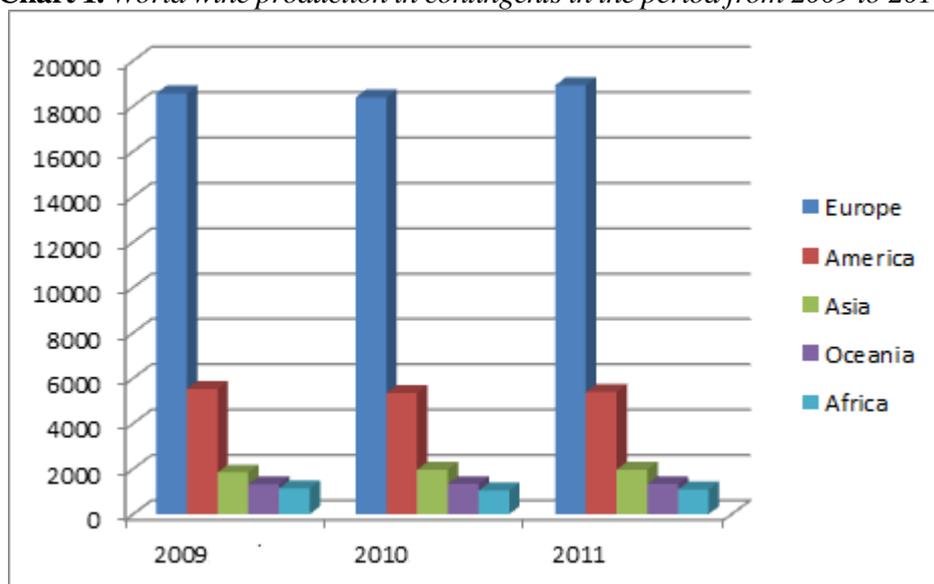
Area	Production (000 t)			Average 2009- 2011	Percentage (%)
	Year 2009	Year 2009	Year 2009		
World	28,368	28,059	28,674	28,367	100.00
Europe	18,562	18,391	18,917	18,623	65.65
America *	5,514	5,342	5,382	5,412	19.08
Asia	1,835	1,960	1,964	1,920	6.77
Oceania	1,320	1,323	1,323	1,322	4.66
Africa	1,135	1,041	1,086	1,087	3.83

Source: www.fao.org

* North America, South America and Central America

Vlahović i Samardžija (2012) state that world wine production amounts to 26.2 million tons, which expressed per capita is almost 5 liters (2010). Observed regionally, wine is most produced in Europe, which accounts for over two thirds of world production. Production expanded from the Mediterranean to many countries with moderate climate.

Chart 1. World wine production in contingents in the period from 2009 to 2011



Source: *Autors*

Leading European wine producers are France, Italy and Spain. France has more than 950,000 hectares of vineyards and in the period from 2009 to 2011 it had average production of 6.2 million tons, which makes it world and Europe's biggest wine producer (table 2). The history of wine production is more than two thousand years long, and many of the world famous types (Cabernet Sauvignon, Chardonnay, Pinot Noir, Sauvignon Blanc, Syrah...) originate precisely from France. What separated France from the rest of the world is the special relation towards the art of producing, maturing and enriching of wine. The most famous wine regions are Bordeaux, Burgundy and Champagne, which are characterized by various types of premium red, white, sweet and dry wines and Champagne also by the sparkling wine of the same name (Vlahovic, 2012).

Italy had the average wine production of 4.6 million tons. Italian wines have distinct taste, because they are made by indigenous grape varieties. In Italy almost every region produces wine and the most significant regions in Italy are Piedmont and Tuscany.

Spain has the largest area of vineyards in the world, as well as a long history of wine production and it is the third wine producer in Europe. There are almost 12 million hectares of vineyards, which makes it

the world largest vineyard area and in the observed period it had the average wine production of 3.4 million tons. The most important wine regions in Spain are Rioja, Navarra, Ribera del Duero, La Mancha, Penedes, Toro and Valencia.

Germany had the average wine production of 0.8 million tons, whereas in the Russian Federation and Portugal the average wine production was 0.6 million tons. In addition, leading European wine producers in the period from 2009 to 2011 are Greece and Austria with the average wine production of 0.3 million tons, Hungary and Romania with the average wine production of 0.2 million tons.

Table 2. *Europe wine production in countries in the period from 2009 to 2011*

Area	Production (000 t)			Average 2009-2011
	Year 2009	Year 2010	Year 2011	
France	6,113	5,846	6,590	6,183
Italy	4,624	4,580	4,673	4,626
Spain	3,251	3,610	3,340	3,400
Germany	922	690	961	858
The Russian Federation	571	695	695	654
Portugal	501	760	696	652
Greece	496	329	148	324
Austria	337	303	303	314
Hungary	334	175	176	228
Romania	235	173	281	229

Source: www.fao.org

Wine production capacities in the Republic of Serbia

Due to its geographical location, climate conditions and soil factors, the conditions for grapevine growing in our country provide opportunities for production of various wine types, from the north to the southern vineyards with a series of transitions between these extremes. Many regions have gained very rich tradition in producing wine and are well-known by that, not only locally, but in the foreign markets as well (Vlahović 2010).

Although the natural conditions for the development of viticulture are quite favorable, there are still large and long-lasting problems with a quite certain tendency of further persistence, namely:

- high production costs and vineyard land fragmentation,
- poor market conditions,
- failure of large wineries that would buy grapes from small producers,
- bad varieties intended for the production of table wine and a long production of low-quality wine,
- lack of a clear legal framework,
- enormous import of cheap wine from FYR Macedonia,
- lack of clear classification of wine quality as well as clear labeling of such wine,
- lack of sufficiently modern processing facilities,
- bad image of Serbian wine and lack of media promotion.

The average wine production for the period from 2002 to 2011 in the Republic of Serbia amounted to 166,033 tons (table 3). Wine production, despite varying during the analyzed years, shows the tendency to increase at an average annual change rate of 5.65 %. Percentage of characteristics variation to the mean in the Republic of Serbia for the period from 2002 to 2011 was 26.49 %.

Table 3. *Wine production in the Republic of Serbia (2002-2011)*

Indices	Production in the Republic of Serbia in thousands tons
Average (2002-2011)	166.03
Minimum	93.80
Maximum	224.43
Change rate (%)	5.65
Variation coefficient (%)	26.49

Source: *the Statistical Office of the Republic of Serbia*

In the structure of total European wine production the Republic of Serbia takes 12th place. The largest share in the wine production take table wines with over 65%, quality wines are present with around 20%, while premium wines take less than 15% of total production. Regarding the ratio between red and white wines, that percentage is around 64% to 36% in favor of red wines (www.poljoprivreda.info).

Production costs

Production costs represent the monetary value of resources and labor during production. In the market competition conditions, the producer's aim is to offer, not only much larger product quantity, but to make its cost slightly lower. Producers strive to achieve favorable financial results, which necessitates reliable prediction, monitoring, and comprehensive analysis of the production costs. The amount of total costs depends on the investments in a particular production, as well as on the amount of overhead costs, and therefore reflects their movement.

Production costs include a great number of components which are involved in their structure in different ratios. The amount of the total costs of a production depends, first of all, on the amount of those elements whose presence in the total costs is significant.

According to the collected data on spending during production and produced wine quantities, the total costs, production value and the realized production profit in the production of the two white wine types have been calculated. The analysis of the costs structure shows the dominance of material costs, where the cost of raw material – grapes has the largest percentage. In addition, the packaging has a great part in the structure of material costs.

During the white wine production in 2011, 9,559 liters of Chardonnay wine and 22,184 liters of Sauvignon Blanc were produced. The cost price of one liter of Chardonnay wine was 285.56 RSD, which was 62.19 RSD higher than the cost price of one liter of Sauvignon Blanc wine, which cost 223.37 RSD (table 4). That difference arose because in 2011 the grapes of the Chardonnay variety were around 50% more expensive than the grapes of the Sauvignon Blanc variety.

Table 4. *Total white wine production costs in 2011 (RSD)*

	Chardonnay	Share (%)	Sauvignon Blanc	Share (%)
Amount (liters)	9,559		22,184	
The cost of raw material - grapes	1,024,460.80	37.53	965,712.51	19.49
Wine production material – enological material	27,244.15	1.00	95,412.90	1.93
The other material	82,127.66	3.01	190,602.32	3.85
Packaging costs	687,242.12	25.18	1,594,880.59	32.18
Gross wages	98,911.34	3.62	229,553.98	4.63
Depreciation	328,065.63	12.02	761,376.53	15.36
Insurance	19,764.59	0.72	45,869.77	0.93
Rent costs	17,507.30	0.64	40,631.03	0.82
Service costs	283,248.44	10.38	657,364.55	13.27
The other common costs of processing	161,097.19	5.90	373,875.25	7.54
Total costs	2,729,669.22	100.00	4,955,279.43	100.00
Cost price per liter	285.56		223.37	

Source: *Wine house, Krcecin*

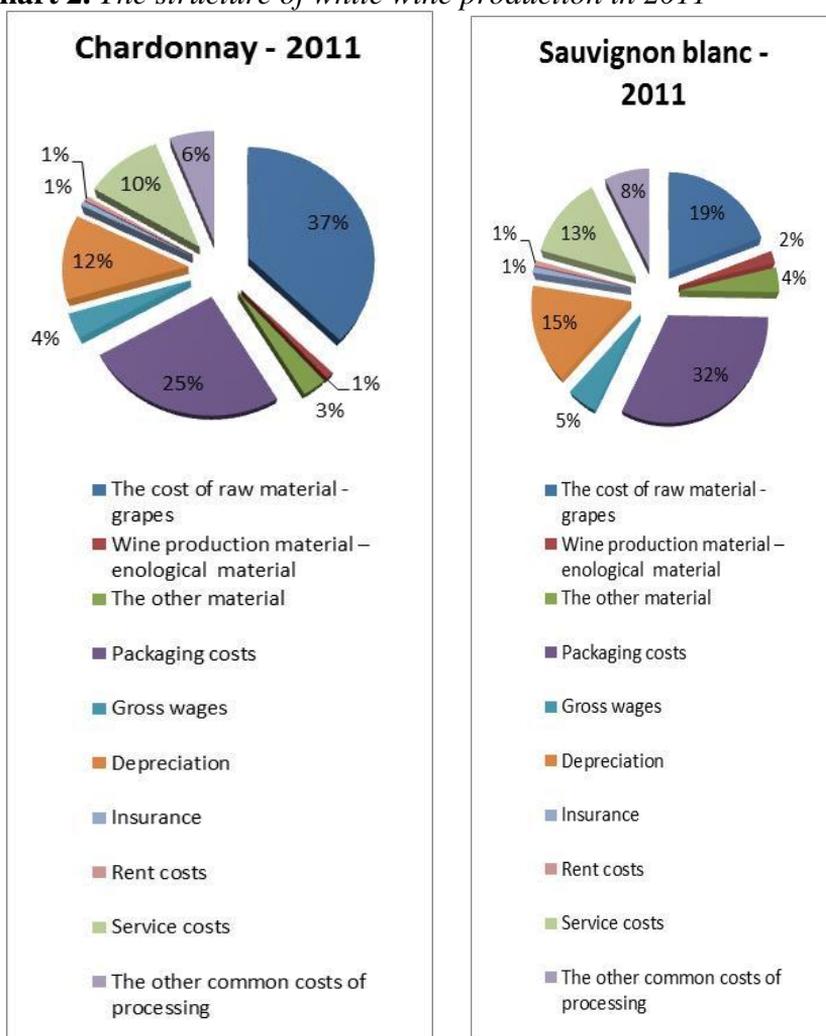
Table 5. *White wine packaging costs in 2011*

	Unit	Unit price	Chardonnay		Sauvignon Blanc	
			Quantity	Total	Quantity	Total
Bottle	pc	36.67	9,559	350,528.53	22,184	813,487.28
Cap	pc	19.3	9,559	184,488.70	22,184	428,151.2
Label	pc	7.72	9,559	73,795.48	22,184	171,260.48
Stamp	pc	0.965	9,559	9,224.44	22,184	21,407.56
Aluminum cap	pc	2.895	9,559	27,673.31	22,184	64,222.68
Box	pc	52.11	797	41,531.67	1,849	96,351.39
Total				687,242.12		1,594,880.59

Source: *Wine house, Krcecin*

Comparing the share of individual cost elements in the total costs, concerning Chardonnay wine the largest share make up the cost of raw material - grapes (37.53%) and the packaging cost (25.18%), whereas concerning Sauvignon Blanc wine the largest share makes up the packaging cost (32.18%), and the raw material cost is significantly lower and makes up 19.49% of the total cost. Significant share with Chardonnay wine involves depreciation (12.02%) and service costs (10.38%), while with Sauvignon Blanc wine the depreciation costs make up 15.36% and service costs 13.27%. The least share of costs involves insurance costs and the cost of rent which amount to just 1% (Chart 2).

Chart 2. *The structure of white wine production in 2011*



Source: *Autors*

In the analysis of the white wine production costs in 2012 the difference of production costs between Chardonnay and Sauvignon Blanc wines is significantly less than in 2011. The reason for that was the price of grapes which was the same for both varieties in 2012 and it was 45 RSD. The cost price of Chardonnay wine was 309.64 RSD, and Sauvignon Blanc wine cost 296.85 RSD (table 6). The yield for Chardonnay was higher than for Sauvignon Blanc, therefore the slight price difference of 12.79 RSD.

Table 6. *Total white wine production costs in 2012 (RSD)*

	Chardonnay	Share (%)	Sauvignon Blanc	Share (%)
Amount (liters)	10,000		10,000	
The cost of raw material - grapes	982,350.00	31.73	855,000.00	28.80
Wine production material – enological material	160,110.37	5.17	159,536.21	5.37
The other material	69,930.00	2.26	69,930.00	2.36
Packaging costs	745,036.00	24.05	745,036.00	25.10
Gross wages	202,995.00	6.56	202,995.00	6.84
Depreciation	442,844.00	14.30	442,844.00	14.92
Insurance	24,485.00	0.79	24,485.00	0.82
Rent costs	21,906.00	0.71	21,906.00	0.74
Service costs	217,951.00	7.04	217,951.00	7.34
The other common costs of processing	228,815.00	7.39	228,815.00	7.71
Total costs	3,096,422.37	100.00	2,968,498.21	100.00
Cost price per liter	309.64		296.85	

Source: *Wine house, Krceđin*

Table 7. *White wine packaging costs in 2012*

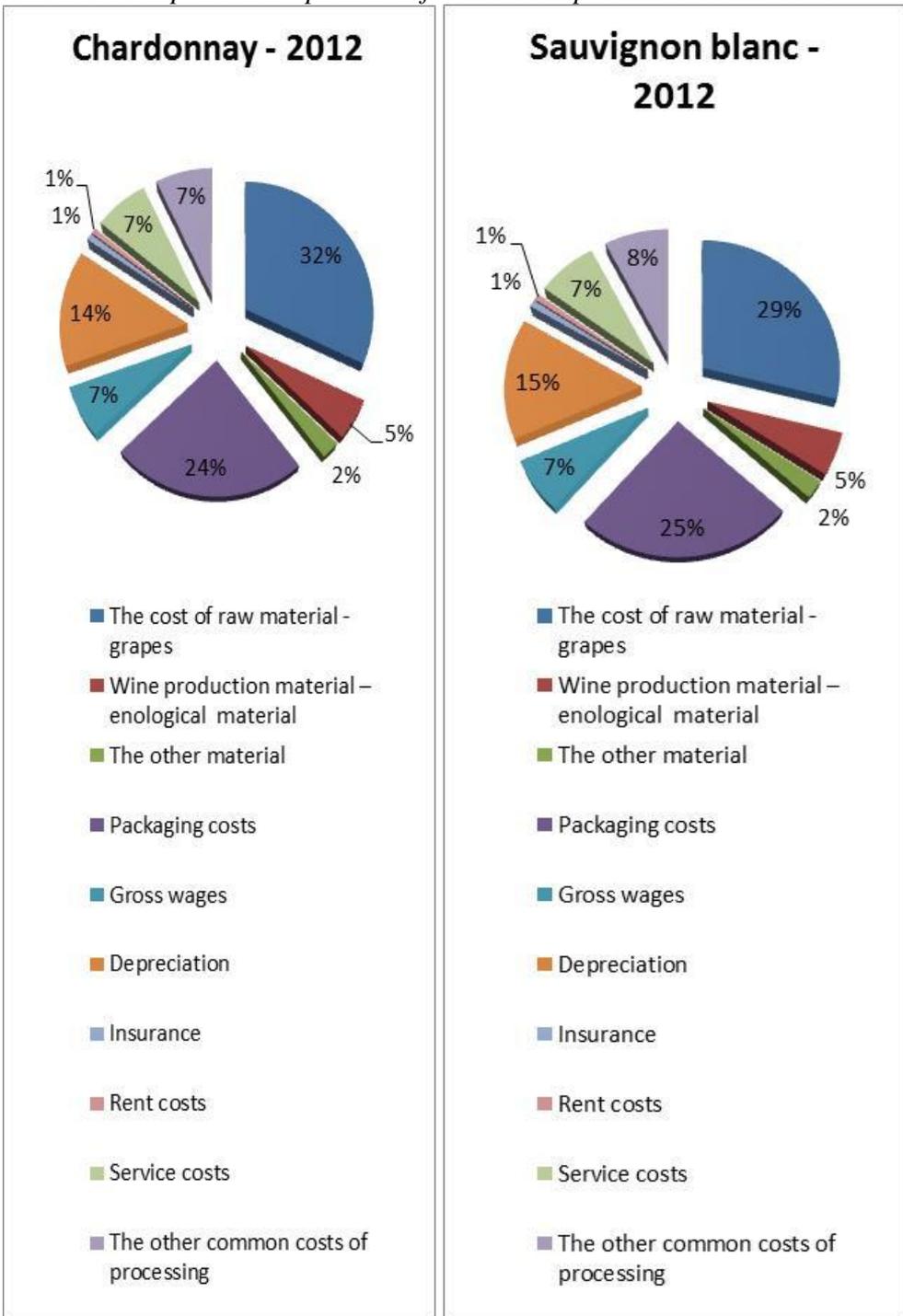
	Unit	Unit price	Chardonnay		Sauvignon Blanc	
			Quantity	Total	Quantity	Total
Bottle	pc	38.00	10,000	380,000.00	10,000	380,000.00
Cap	pc	20.00	10,000	200,000.00	10,000	200,000.00
Label	pc	8.00	10,000	80,000.00	10,000	80,000.00
Stamp	pc	1.00	10,000	10,000.00	10,000	10,000.00
Aluminum cap	pc	3.00	10,000	30,000.00	10,000	30,000.00
Box	pc	54.00	834	45,036.00	834	45,036.00
Total				745,036.00		745,036.00

Source: *Wine house, Krcecin*

The largest share in the total production costs is the cost of raw material – grapes, regarding Chardonnay 31.73%, and Sauvignon Blanc wine 28.80%. Packaging costs range from 24 to 25% and depreciation costs from 14 to 15%.

All other costs are almost identical for both wine types. The smallest share involves insurance costs 1% and rental costs 1% for both wine types (Chart 3).

Chart 3. Comparative depictions of white wine production costs in 2012



Source: *Autors*

According to the produced quantity and the value of the processed grapes, as well as the quantity of the wine got from the grapes, the yield of the white wine production is around 50%.

Depending on the available techniques and applied technologies, wine as the primary grapes product shows a high correlation with the quantity and quality of processed grapes. Namely, during pomace straining the great practical significance is in the acquired must yield, since the wine yield depends on it (Radovanović, 1986). By yield it is considered the must quantity which is acquired during processing of 100 kg of grapes. In fact, the yield is the level of usage of the total mass of the raw material, i.e. the quantity of must in liters obtained from 100kg of grapes. According to Milosavljević and Jović (1999) it should be taken into calculation that for production of 100 liters of wine it is necessary to use 200 kg of grapes.

Conclusion

The average world wine production in the period from 2009 to 2011 amounted to 28.4 million tons. Observed regionally, the greatest production is done in Europe, which provides two third of the world production. Europe, with the production of 18.6 million tons, accounts for 65.65% of the world wine production. The other regions are well behind Europe and altogether account for 34.35% production in the world structure. The leading European wine producers are France, Italy and Spain. In the observed period, France has the average production of 6.2 million tons, Italy 4.6 million tons, and Spain 3.4 million tons.

The average wine production for the period from 2002 to 2011 in the Republic of Serbia amounted to 166,033 tons. Wine production, despite varying during the analyzed years, shows the tendency to increase at an average annual change rate of 5.65 %. Percentage of characteristics variation to the mean in the Republic of Serbia for the period from 2002 to 2011 was 26.49 %.

The analysis of the costs structure shows the dominance of material costs, where the cost of raw material – grapes has the largest percentage. In addition, the packaging has a great part in the structure of material costs. In 2011 in the observed winery 9,559 liters of Chardonnay wine and 22,184 liters of Sauvignon Blanc wine were produced. The cost price of one liter of Chardonnay wine was 285.56 RSD, which was 62.19 RSD

higher than the cost price of one liter of Sauvignon Blanc wine which cost 223.37 RSD. In the total cost of Chardonnay wine the largest share is the cost of raw material - grapes 37.53%, and concerning Sauvignon Blanc wine the largest share is the cost of packaging (32.18%), while the cost of raw material – grapes is significantly lower (19.49%). That difference arose because in 2011 the grapes of the Chardonnay variety were around 50% more expensive than the grapes of the Sauvignon Blanc variety. Comparing the share of individual cost elements in the total costs, concerning Chardonnay wine the largest share involves the cost of raw material - grapes (37.53%) and the packaging cost (25.18%), whereas concerning Sauvignon Blanc wine the largest share makes up the packaging cost (32.18%), and the raw material cost is significantly lower and takes 19.49% of the total cost.

In the analysis of the white wine production costs in 2012 the difference of production costs of Chardonnay and Sauvignon Blanc wines was significantly less than in 2011. The reason for that was the price of grapes which was the same for both varieties in 2012 and it was 45 RSD. The cost price of Chardonnay wine was 309.64 RSD, and Sauvignon Blanc wine cost 296.85 RSD. The yield for Chardonnay was higher than for Sauvignon Blanc, therefore the slight price difference of 12.80 RSD. The largest share in the total production costs was the cost of raw material - grapes with Chardonnay 32%, and regarding Sauvignon Blanc wine 28%. All other costs were identical for both wine types.

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INTANGIBLE RESOURCES PROMOTION AND MANAGEMENT AS A MODERN CONCEPT FOR REGIONAL COMPETITIVENESS IMPROVEMENT

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Abstract

Competitiveness has become a natural law of the modern economy and it has been increasingly observed at different levels (national, regional, local) and from different perspectives. The regions are facing increasing competitive pressures, which encourages thinking about how to respond to the challenges of global competition. Regional competitiveness can be defined as a competitive advantage of a region over other regions. The strategic resources of regions are certain amounts of available factors that are owned or controlled. As a basis for achieving competitive advantage and creating added value, intangible resources, whose promotion and management are analyzed in this paper are authenticity, quality, technological resources, community relations and corporate culture, and we analyze them in terms of marketing and operational knowledge. In this way, the paper analyzes the possibility of regions branding, promotion of regional products, creation of regional clusters and a changed approach in the management of tourism development.

Keywords: *Regional competitiveness, intangible resources, marketing, branding*

Introduction

The free operation of market creates and deepens inequalities in regional development within the boundaries of a country and internationally. This kind of operation favors and accelerates the development of developed regions, leading to an inferior position the regions which are economically underdeveloped. The need for regionalization is motivated

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primarily by developmental needs. The politics of regional development of the countries with a market economy should have, as its starting point, the regionalization for which the first issue is the definition of the region and the regional organization of the country, including local government. The main strategic orientation of regional policy pursued by the state should be sustainable development of the regions. It involves a broad approach to their development problems and at its the center is the optimization of the use of development resources of a region, its economic links with neighboring regions and the economy of the country as a whole, taking into account ecological principles and developmental requirements, an effective communication with the state and its institutions the etc.

Regional management and regional marketing are an integral part of regional development, and their main tasks should be putting a region “on the map”, spreading information about the region, linking regions, lobbying and support, capacity building, economic promotion in terms of encouraging investments, advertising the use of domestic product. If we are talking strictly about marketing aspects of increasing regional competitiveness, it should be pointed out the importance of creating the region and its brand and marketing of regional products. Their recognition and the quality of services and products are certainly the most important intangible resources of the region in function of achieving regional competitiveness.

The concept of regional competitiveness

Regional development policy should not encourage those activities that include maintaining the existing economic structure of the region no matter how much it makes them economically and developmental non-competitive, all for the sake of preserving social peace and social security of its people. The focus of regional development in terms of free market economy should be to strengthen the competitiveness of the region. This means that measures of that policy at local, regional and national level should make the region developmentally prosperous. With those actions it is necessary to activate the developmental potentials of the region, to take advantage of local sources of investment, incorporate the economy of the region in the national economy as a whole, and so on. It is particularly important that these measures make the region attractive for capital inflows from other parts of the country (especially the economically developed), and foreign investments.

In this regard, in addition to state incentives, the measures at local and regional level are particularly important. They need to allow potential investors to obtain economically acceptable and easily achievable locations for their business, stimulating use of local infrastructure, establishment of good relations with local government, and establishment of fair and friendly relations between the local population and the incoming investors. An especially significant role of the overall regional administration is promoting and implementing the strategy of regional economic development of the state and the regions. Their involvement should be oriented towards the effective implementation of development directions and goals so that they jointly contribute to raising the overall competitiveness of the economy (general labor productivity and the efficient use of assets), while encouraging local and regional initiatives and environmental protection.

Competitiveness has become a natural law of the modern economy (Kitson et al. 2004: 991). It has been increasingly observed at different levels (national, regional, local) and from different perspectives. Cities and regions are facing increasing competitive pressures, which encourages researchers to think about how to respond to the challenges of global competition. The roots of competitive analysis can be seen in the time of the first cities - states, when competition occurs between them, but the competition as a conceptual framework for economic analysis occurs in the eighties of the 20th century. Competitiveness is, in fact, a modern term which with the increase of competitiveness in the modern, more open and integrated, global economy becomes the subject of many researches. European Commission (1999: 75) defines competitiveness as the ability to produce goods and services that will meet the challenges of international markets, while maintaining a high and sustainable level of income, or, more generally, the ability (in this case of regions) to create, along with the pressures of foreign competition, relatively high income and employment levels. In the context of future goals, the EU presents competitiveness as one of the goals of the Lisbon strategy. Competitiveness of the economy at the national level is only a reflection of the capacities, i.e. potentials and constraints at regional and local level, and therefore, the question of regional competitiveness which is less analyzed and more difficult to define. In this sense, cities and regions became the center of observation, sources of competitive advantage and economic power.

Regional competitiveness is the subject of debates on the definition of the term, on its determinants and measurement. The question is whether it means, in fact, the aggregation of competitiveness of a group of companies, whether it is a derivative of macroeconomic competitiveness or it must be determined respecting micro-aspects and macro-aspects which define it. Some authors also raise the issue of whether regions can truly be competitive (Boschma, 2004). The simplest way that regional competitiveness can be defined is as a competitive advantage over other regions that can be seen through the share (on national and international level) in the export market (Kitson et al. 2004: 992). Porter also in his works (1998, 2001) emphasized the importance of export-oriented clusters as a basis to achieve a high standard of living at the regional level. The comparative advantages of regional export sectors, as the key sectors of the overall growth and prosperity of the region, were also highlighted by Kamanje (2002).

The competitive advantage of regions is linked to the possession of superior technology, infrastructure and institutional assets. Also, important determinants of the competitiveness of regions are human resources, i.e. the level of education, which is emphasized in many definitions of regional competitiveness (Gardiner, 2003). Regional competitiveness and employment is one of the goals of EU regional policy in the programming period 2007 - 2013, which aims to, among other determinants, improve regional competitiveness and attractiveness of European regions by investing in knowledge, research, cooperation between scientific and educational institutions and entrepreneurship, with innovation, infrastructure development, etc., as described in the document of the European Commission (2005).

Intangible resources as a factor of competitiveness

According to the definitions of some authors (Amit and Schoemaker, 1993), strategic resources represent a certain amount of available factors that the company controls or owns. They, with use of a wide range of other property and various activities of companies, are converted to the final products and services. Organizational skills are related to the features and capabilities that the company has in order to recruit resources, using organizational processes. Types of resources can be viewed through different divisions. There is a known classification of “tangible” and “intangible” resources (Grant, 1998). Some authors distinguish physical capital, human capital, and organizational capital

resources. Others mention financial, physical, managerial, human, organizational and technological resources. Finally, there is a division into classes: resources based on knowledge and resources based on property. Many resources are very specific and not easily maneuverable and cannot be imitated. Therefore, companies and organizations differ in their resources. It is this diversity which can be a potential source of competitive advantage that provides above-average income. Regarding resources that are responsible for competitive advantage there is a lack of transparency, and some features of the resources increase it: secrecy, complexity and specificity.

Intangible resources, such as marketing or operational knowledge (know-how), are often poorly mobile, difficult to imitate, and without adequate replacement. In addition to resources, there are other key internal qualities, such as organizational skills or capabilities. Skills are related to the capacity of the execution of a task or activity that involves complex cooperation and coordination between human and other resources. Organizational capacities significantly influence the strategy and competitive advantage. According to the functional classification of organizational qualities, the following areas are distinguished: administration, information management, research and development, production, design, marketing, sales and distribution.

Resources are closely linked to the performance, but the key element of success is the ability to balancing and starting resources and opportunities. Resource management is carried out by concentrating resources, creating resources, linking and complementing, preventing decay and reviving resources. Organizational skills always go together with the resources (both physical and intangible), and only together that parameters create value. Among the resources we emphasize those that are intangible, and in our study are particularly important because they have a strong influence over the strength and competitiveness.

As a basis for achieving competitive advantage and creating added values “intangible resources” are more and more important in the modern economy. This category includes:

- Technological resources,
- Intellectual property,
- Capacity for innovation,
- Constant level of quality,
- Name recognition (brand),

- Corporate culture,
- Database and
- Relationships and links with business partners, and the broader community.

The definition of intangible resources might be that it is a recognized non-cash property with no physical characteristics which is owned with the purpose of use in the production and procurement of goods and services, for the purpose of renting to others or managerial motives. Information on the value of fixed assets is not sufficient to assess the strategic value of the property. If the valuation of intangible resources is excluded from the so-called balance sheet, then there are often huge differences between the “book value” of the company and its market value. Often, the term intangible resource includes intellectual capital resources. The elements of intellectual capital are human capital (know-how, education, and professional qualifications), customer capital (contracts, brand loyalty), intellectual property, infrastructure capital (corporate culture, process management, and information system). The interaction between the organizations by learning enables the flow of knowledge which enhances intellectual capital and intangible resources.

Intangible resources have relatively unlimited capacity and their value can be exploited by internal use, lease or sale (e.g. sale of the brand). They have a relatively high resistance to attempts of imitation by competitors. Therefore, they represent organizational knowledge that can be used to create a differential advantage. Regarding the establishment of a competitive advantage, which is related to the return of profits, the first significant requirement is the limitation of resources or opportunities. If anything, as the quality, is widespread and accessible, then it is not a source of strength and potential above-average profit. Also, a resource or possibility must be significant enough to bring success. If the resources and opportunities are transferable, then it is sometimes possible to buy them, and thus achieve the prerequisite for the creation or imitation of a successful strategy. Another way to achieve ownership of rare and important resources is the use of business alliances.

Marketing for improving competitiveness

The theory of competitive advantage, which was set up by Porter, clearly shows that the previous theories were based on unrealistic assumptions, starting with the lack of the scale economy, technology compatibility,

undifferentiated products, fixed national factors, and the immobility of labor and capital. In terms of globalization, the disposition of production factors can be erroneously linked to a particular country, as they are globally available to companies that are trying to use them in the best way. Lowering the costs of communication and transportation has further initiated the globalization of world trade. In such circumstances, the role of the state in international trade flows is reduced, and the holders of global business in the full sense of the word become internationally oriented companies. The state needs to create a business environment in which the factors of production will be invested in the activities that have the highest productivity. Considering that it is not the states that compete at the global market but the companies, competitive advantage comes from innovations and restrictions implementations that companies are qualified to do, as opposed to striving to maximize sales and profits at the given limiting factors.

Marketing competitiveness is, therefore, in modern conditions associated with global strategy. Global strategy essentially involves a series of competitive benefits arising from the location, scale economies and distribution of global brands, basing on global presence, defense of domestic dominance and overcoming the fragmentation of local markets (Kotabe, Helsen, 2011: 254). Understanding of global strategy is facilitated by the conceptualization of global industry, competitive industry structure, competitive advantage, hyper competition and dependence. Global industry includes those in which the competitive position of the company in one country affects its position in other countries and vice versa. The competitive industrial structure points out the key structural factors that determine the power of competitive forces within a particular industry, and the resulting realized profitability. Hyper-competition refers to the aggressive competition that is stronger than oligopolistic or monopolistic competition, but that is neither a perfect competition in which the company has no influence on the market as a whole. Dependence of modern companies is related mainly to the production technologies taking into account that the companies tend to make various products, sometimes with almost the same components using similar technology.

In terms of marketing, globalization is manifested as a mechanism with unlimited possibilities for growth and development, as well as for the efficiency and competitiveness (Lee, Carter, 2005). Marketing competition requires constant innovation in production and making profit,

where it is necessary to harmonize sometimes conflicting interests of individual stakeholders. It means that the exercise of marketing competitiveness involves creating conditions for rapid and sustained productivity growth. In the global marketing concept marketing competitiveness is seen as a new concept of competitiveness due to the decline in importance of the classical approach to comparative advantages, their obvious limitations in analyzing the causes and course of modern global trade. The point is that it takes more to build own competitive advantage, rather than using the positive effects of acquired or comparative advantages.

Marketing competitiveness of regions, therefore, indicates the ability of regions to develop their own competitive position in the local, national, and even the broader market space, but based on accepted criteria (Jovic, 2003). The general criteria on which is based the modern marketing competitiveness are: quality, flexibility, continuity of efforts to raise productivity and business networking. Prior to the strong affirmation of globalization, competitiveness in the global market was carried out from the reduction of variable costs, primarily the cost of labor and raw materials.

The regions which want to exploit marketing competitiveness in the global market should develop their own imagination and agility, because in this way they facilitate the direction of competitive performance and strengthen their own position in competing. Overtaking competitors in the market demands also a continuous raise of the values of supply and of the marketing program as a whole. Innovatively recognizable entities are qualified to recognize and take advantage of market opportunities, to raise the quality and improve productivity. In recent theories of marketing there are opinions according to which marketing competitiveness is affected by corporate social responsibility (Hollensen, 2011). According to this view, the market subjects create social responsibility programs, so as to incorporate such activities in the value chain, which is further reflected as a contribution or support to the overall competitive effort. Initiatives in the form of social responsibility help to provide the necessary production inputs, reduce operational costs, facilitate global logistics, but also to improve the position of marketing function in the value chain. Viewed from this angle, the activities of social responsibility take on a strategic importance.

Competitiveness is in marketing primarily linked with the holders of marketing activities, therefore companies, but, in terms of macroeconomic competitiveness it can also refer to the regions and countries in a situation where there is the possibility to create new value by increasing wealth by managing key resources in a given time period, connecting them with their own economic and social model (Jovic, 2003). Therefore, the strategic choices that are made at various levels should be aligned with the global criteria of certain industries. Achieving regional competitiveness provides a positive trade balance, unemployment reduction, more effective fight against poverty, raise of living standards, better consumer protection, improvement of infrastructure, increasing public sector efficiency and so on.

In any case, competitiveness becomes a result of a well-defined and well-developed strategy and less a result of good natural predispositions. Because of this it is said that competitiveness is a kind of combination of competitive resources and processes, where the resources are inherited or created (natural resources or infrastructure), and the processes translate the resources into economic effects. However, the professional and scientific marketing public does not have a generally accepted definition of the term and the phenomenon of competitiveness. The complexity and dynamism of competitiveness makes it difficult to be universally acceptably defined, and, on the other hand, provides a variety of approaches of studying.

Activities for the promotion and management of intangible resources at the regional level

Region branding - As stated in the previous section, in the process of globalization the focus has shifted from the local to the global level, from the branding of products and services on the branding of cities and regions. In the current process of connecting the world and the creation of a large global village, it is a challenge to brand the region, introduce to the world its unique characteristics, and promote the true values, while making the region develop in the right direction. In order to achieve these goals it is necessary to form all the marketing activities so as to improve the function of socio-economic interests of the city, the destination or the region. The main objectives of promoting a region should be:

- Development of Tourism,
- Development of the economy,

- Boosting investments,
- Improving the image of the region.

Popularity of regions branding is directly driven by the process of globalization with the goal of their unique differentiation and positioning. Clearly defining the image of a place, better positioning and popularizing within the international market framework, all of that helps to know better different destinations and bring closer different cultures and people.

In the future, the phenomenon of branded regions will be more prominent. In a sense, it seems that the identification with the brand, in our individualistic, materialistic, purchasing, egocentric era, became in a sense a sort of replacement or supplement to religious beliefs, that brands represent a person's identity in a confusing, competitive world in which there is the possibility of losing rational choice (Olins, 2003). People define themselves through brands, express themselves, their emotions, and complement their personalities, position in the globalized social environment. Brands and branding have a certain prospective in the future, but it is up to us which way we will direct it and how we will shape it. Reviewing the current situation in the world market, where there are many examples of manipulation by brand, we come to the conclusion that it is needed to use brands and branding in favor of socio-economic development of countries and regions. The brand has a perspective if strong emotional ideas, coherence and consistency basically support the development of loyalty to itself. Depending on these settings, brands can be divided into desirable and undesirable. They can become socially responsible and promote positive values, achievements and obtain a certain attitude (positive or negative) towards the local community.

In the field of globalization and strengthening of the market competition, states and regions pay strong attention to branding in order to transfer the image to the world public of a desirable tourist or investment destination. Region branding is the modern way of their development, which may contribute to their promotion and positioning in the country and the world. Having in mind the actuality of countries, regions and cities branding in the world, significant benefits would be achieved from the definition and implementation of effective brand strategy of the regions in our country.

The goal of region branding is to develop a notion of a location as unique, attractive and credible. In this way, the main objectives of a region should

be: economic development, tourism development, increase of investment and improving the image of the region. The result of the project of branding a region is an emphasis on a clear competitive advantage of the region, which would ultimately contribute to greater inflow of foreign direct investment in the region, increased exports, increased tourist numbers and/or larger number of organized cultural and sporting events. Accordingly, the branding of a region would help in the overall socio-economic development of the region by strengthening the economy, promotion of cultural heritage, job creation and poverty reduction.

Region branding is a complex process in which, in order to achieve maximum results, it is needed the involvement of all stakeholders (residents, local authorities, industry representatives) to create and broadcast a single message to the public. For this reason, the branding of regions is primarily seen as the responsibility of local government to take the initiative and utilize all the resources in close cooperation with representatives of industry and experts in relevant fields.

Promotion of regional products - Improving the production of products with protected geographic origin should contribute to the sustainable improvement of the industrial sector through investments in increase of competitiveness, as well as improve food safety standards, environmental standards and other standards in accordance with the legal framework of the EU, as well as the sustainable development of the local economy. Products with geographical indications achieve a better position in the domestic and international markets, higher prices and become recognizable for direct connection to a certain geographical area, which gives them an extra special value. With the registration of geographical indications a product acquires legal protection against counterfeiting. The needs of the consumers of the products with protected geographic origin, whose consumption we want to improve, and their desires are the main motive in the performance of all marketing activities, including what to do, the choice of what to produce, how to process, how to inform consumers and where and at what price to sell the final product, with continuous collection of information to what extent they are satisfied with existing products.

Establishing clusters at the regional level - New competitiveness today is the intersection of appropriate strategies and high productivity, and it is these elements of modern competitiveness that can be effectively achieved through clustering the economy. In fact, both theoretically and

practically speaking it is confirmed that clusters contribute to the growth of competitiveness of enterprises, and thus the region and the national economy, through increased productivity of companies based in the cluster, as well as through creating innovative business and marketing strategies (Porter, 1998). Heads of the cluster have a whole range of available instruments, since a part of their internal investments is equally effective and not much different from those adopted as part of a more general investment strategy. They include the provision of financial assistance, packages of training programs, building appropriate institutions and infrastructure as well as providing advice. Of course, investors are not the only ones who benefit from the advice and support, other companies in the cluster can also benefit. Industrial recruitment is one of the most convincing explanations for the cluster strategy.

With the construction of adequate infrastructure and operating conditions regions can in a very efficient way attract investment and enable the creation of various businesses necessary for the development of a region. Attracting investment and creating a favorable business environment increase the chances of success of the economy of the region to compete on the market, and on the other hand, create a positive image of the region. This set of activities may be aimed at take advantage of recruiting for clustering. Despite the fact that most of the clusters developed as an accident of the historical or local conditions, it is not uncommon for regions to tend to form clusters outside the whole, especially in the most powerful high-tech sectors, through the creation of appropriate conditions for the establishment of new companies and their resettlement from other regions.

One activity that stands out as significantly important for attracting investment to the cluster is to create a positive image of the area through marketing and promotion. Regions that have become known for certain clusters are more likely to attract investors in the cluster than those who were not known. Creating an image of the area can therefore be a crucial part of any cluster development strategy. Regions around the world have used clusters to promote themselves as a desirable place to visit and do business. Possible directions for improvement which should be supported by the regional authorities are:

- Providing joint participation in trade fairs,
- Cluster trade missions,
- Joint international sales offices,

- Cluster alliances for export,
- Business networks for export.

A cluster can also be a means of products branding to distinguish them from the competition. Branding is especially important in an economy where the buyers and consumers are overwhelmed by choice and often use a distinctive name. Regions can support branding through their marketing forces and government publications. Branding is more common in clusters that include local ownership companies that sell to consumer markets, but also can serve to large companies, especially if they are associated with research centers and universities of world renown. Another way to establish a brand is to selectively choose cluster congresses and trade fairs which will be hosted by the region.

Increasing the competitiveness on the tourism market – In order to increase the competitiveness of the region as a destination in the domestic and international tourism market, in the short and long term, it is necessary to remove the existing deficiencies. Identified competitive disadvantages can be eliminated by applying the key competitiveness programs and their application should remove competitive disadvantages and significantly improve its competitive position in the domestic and international tourism market. The competitiveness programs can be seen in terms of separate program parts:

- Development and improvement of accommodation facilities,
- Development of tourism infrastructure,
- Training of personnel,
- Development of entrepreneurship,
- Planning, development and protection of the area,
- Tourism signalization,
- Improvement of public services and public infrastructure,
- Establishment of quality systems.

The current level of management and tourism development has a basic flaw in the absence of clearly defined management structure, as an organizationally professional approach to the determination that tourism is one of the directions of the future development of a region. The issue of management on the level of a tourist destination is particularly significant because it is one of the main driving forces of development of the value chain that would allow tourists an unforgettable travel experience. That means that someone is engaged in the development of competitiveness of certain area in a professional, effective and efficient manner, that is, it

means that there is an institution that will assume the operational responsibility for the implementation of this strategy. In this context, it is necessary to consider possible models for organizing the management of the region as a tourist destination.

Existing institutions which at the local/regional level conduct almost exclusively the promotion activities, and modest ones despite the annual marketing plans, are unable to make any significant progress in the area of destination marketing, and especially in the field of destination management. The key reasons behind this limited power (or powerlessness) are immanent to the whole system of local destination marketing of Serbia, and concern the inadequate structure of human resources, lack of knowledge in the field of marketing and management, more than a modest financial resources, peripheral location and inadequate treatment by the local authorities, ignorance of budgeting techniques and others.

Now the question arises as to how, on the basis of the insight in the current situation at the local/regional level, and based on the perception of experiences in the European and international practice, to organize the management of the region as a tourist destination. The first option is the status quo, which means not to touch anything. In this case, a particular region will be developed by inertia of tourism development, without much impact on the fact on which micro location and in which direction this growth will take place. Another option is to develop the present tourism organizations in the local area into a kind of destination management organizations (DMOs), with the strong and growing influence of the private sector. It is a long and difficult process of transformation, but its ultimate effects would indeed be strongly expressed through public-private partnerships. This would, in addition, show that the less developed areas in Serbia are ready to apply new concepts of local development. No matter what level of organization it is about, it must be clear that a DMO must have:

- A full financial, administrative and political support of local governments,
- The impact of the decisions and resolutions of the competent authorities,
- The authority to initiate change and gain support,
- Full support of the private sector,
- Competent and professional staff (which mostly needs to be trained).

The base of destination marketing plan are marketing activities which are applied in a given period, making tourism products more commercialized, increasing the total tourist traffic and achieving long-term growth of the market share. Marketing plan should define the basic marketing activities which need to be undertaken in the future in order to increase tourist traffic in the destination and meet defined vision and goals of touristic development. Marketing plan should be the basis on which marketing strategies will be upgraded in accordance with the future development of tourism in the destination and the trends in the international and domestic tourist market. The focus of the marketing strategy are marketing communications and delivering new value which will be created by the development of tourism products in the region by the implementation of investment projects, competitiveness programs and tourism development plans.

Branding from the tourist point of view as well is one of the key elements of the tourism development strategy and marketing plan. Building a brand is a method of creating a unique region identity with name, design, logo, symbol or combination thereof, on the basis of differentiation over other competing regions. Destination brand, in a broad sense, is the sum of unique experiences provided by a mix of rational, emotional, social and cultural values and benefits that exist in a given region. Branded destinations are viewed by tourist in a different way than competing destinations and they get a sense of added security when making decisions about travel. In the process of building a destination brand two main effects must be achieved: first, the brand should give visitors some promise in terms of service quality and wealth of experience, and second, it should contribute to the strengthening of memories of experiences lived by consuming the tourism products.

Branding the region in this case is the process of creating identity of the region as a tourist destination in order to build an image that will make it distinctive and different compared to other destinations in the domestic and international tourism market. Branding is a marketing process that requires effort over a long period of time. Branding involves defining the following elements:

- Definition of primary attributes of the destination/region on which the brand will be based,
- Determining the rational advantages that visitors can have, and which are based on primary characteristics/attributes of the destination/region,

- Emotional benefits that visitors can experience,
- Brand personality that communicates differentiating characteristics of the region as a tourist destination,
- The value of the brand, which has a certain meaning for visitors, and
- Definition of the essence of the brand, which reflects the essential characteristics of the region as a tourist destination.

Conclusion

The main strategic orientation of regional policy pursued by the state should be sustainable development of the regions. It involves a broad approach to their development problems and at its the center is the optimization of the use of development resources of a region, its economic links with neighboring regions and the economy of the country as a whole, taking into account ecological principles and developmental requirements, an effective communication with the state and its institutions the etc. If we are talking strictly about marketing aspects of increasing regional competitiveness, it should be pointed out the importance of creating the region and its brand and marketing of regional products. Their recognition and the quality of services and products are certainly the most important intangible resources of the region in function of achieving regional competitiveness. As a basis for achieving competitive advantage and creating added values, intangible resources are more and more important in the modern economy. Competitiveness is in marketing primarily linked with the holders of marketing activities, therefore companies, but, in terms of macroeconomic competitiveness it can also refer to the regions and countries in a situation where there is the possibility to create new value by increasing wealth by managing key resources in a given time period, connecting them with their own economic and social model.

The goal of region branding is to develop a notion of a location as unique, attractive and credible. In this way, the main objectives of a region should be: economic development, tourism development, increase of investment and improving the image of the region. In addition, improving the production of products with protected geographic origin should contribute to the sustainable improvement of the industrial sector through investments in increase of competitiveness, as well as improve food safety standards, environmental standards and other standards in accordance with the legal framework of the EU, as well as the sustainable

development of the local economy. With the construction of adequate infrastructure and operating conditions regions can in a very efficient way attract investment and enable the creation of various businesses necessary for the development of a region. Attracting investment and creating a favorable business environment increase the chances of success of the economy of the region to compete on the market, and on the other hand, create a positive image of the region. This set of activities may be aimed at take advantage of recruiting for clustering. Despite the fact that most of the clusters developed as an accident of the historical or local conditions, it is not uncommon for regions to tend to form clusters outside the whole, especially in the most powerful high-tech sectors, through the creation of appropriate conditions for the establishment of new companies and their resettlement from other regions. Finally, concerning tourism, branding the region in this case is the process of creating identity of the region as a tourist destination in order to build an image that will make it distinctive and different compared to other destinations in the domestic and international tourism market.

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ACQUIRING REGIONAL COMPETITIVENESS WITH EXPORT OPPORTUNITIES OF SERBIAN AGRO-FOOD CLUSTERS

Gajo M. Vanka¹, Wim J. M. Heijman²

Abstract

This article collected and displayed information on export opportunities of agricultural and food products and analysed performance of some clusters and associations within industry/branches which operate in Serbian region. Producers were analysed in detail within agricultural and food production clusters, their problems and opportunities they encounter in domestic and foreign markets. Business analysis was carried out on two clusters, association and on their survival in domestic market. SWOT analysis managed to make good&viable cross section of agricultural production and food industry through its branches within which these clusters work. These branches are baking, wine, organic food production & dairy industry. Ethno tourism and the way it connects all of these food items of food industry is also analysed within this paper. In this way a complete picture of the clusters in the agriculture and food industry was gained.

Key words: *agribusiness, agro-food sector, clusters, competitiveness, macro & micro levels, Serbia, SWOT analysis*

Introduction

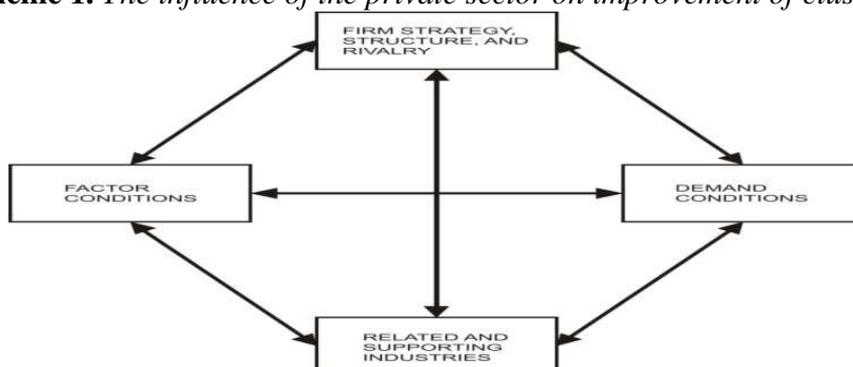
In geographical terms, the cluster might involve or include a city, but also the entire country, and even the entire network of neighboring countries (Porter, 1998). So far many obstacles have been encountered in the development of clusters in Serbia, which is primarily explained by an

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insufficient connection between the cluster members, lack of connectivity of clusters in the country and abroad, as well as weak development and management engagement of clusters in the creation of development strategies. In order to overcome incurred obstacles and achieve results in business of clusters, it is necessary that both the state and the private sector involve more and more seriously in an effort to improve clustering in the country. The state has three roles in the economy with which it can and should achieve macroeconomic and political stability by establishing steady state institutions, the legal and economic framework and sound macroeconomic policies. In addition, the state should establish a general micro economic stability and efficient investment in their own country and foreign investments and actions across all four determinants of the national diamond or a rhomb. Finally, the government should establish a general micro economic policy and incentives on the line to direct the competition which encourages the growth of productivity (Porter, 1998). At the cluster level, government policy is leading to all parts of his diamond or rhomb model as it can be seen in Scheme 1:

Scheme 1. *The influence of the private sector on improvement of clusters*



Source: *created on the base of Furman et al. (2002) & Porter (1990)*

The current state of Serbia in foreign trade exchange between the agricultural and food industries: Since the end of year 2000 and the approval of the preferential trade concessions by the EU, all the agricultural and food products originating from Serbia are exempt from customs duties during placement or the export to EU market. This fact allows duty free access for Serbian products towards an exceptionally large, rich by abundant and demanding market, which is largely used. In early 2009, with the unilateral implementation of the trade agreement has established a symmetrical relationship in foreign trade exchange with the EU. By creating a strategy of development and export oriented

agriculture, the EU market absorbs approximately half of the total agricultural exports from Serbia. The most important and significant business partners of Agriculture and Food Industry of Serbia in addition to the EU countries and the CEFTA are signatories of the multilateral FTAs. Serbia at the end of the year 2006, and seven other countries signed the first multilateral agreement in South-Eastern Europe, named Central European Free Trade Agreement – CEFTA 2006th. CEFTA 2006th signatory countries are Albania, BiH, Croatia, Macedonia, Montenegro, Moldova and besides that Bulgaria and Romania have also been signatories, but in 2007 they joined the EU and became the EU members. Serbia sells about 30 % of total exports to market of CEFTA member countries, and with all countries, except with Croatia and Moldova, has a trade surplus in the exchange. Serbia from 1 January 2010 chairs this association. With the survey among executives, businesspersons and generally businesspeople, it was found that the biggest problem is mutual non recognition of quality certificates. Nonetheless, the diagonal accumulation of origin of goods which also enables a reduction of customs duties or tariff is insufficiently used among business people in CEFTA region. In the meantime, Serbia has signed an agreement on market liberalization with Belarus and Turkey. Nonetheless, the increase in the balance of foreign trade exchange with Russia is also on the rise, and the fall in 2009 is justified by the effects of the financial crisis. Upward trend in exports of agricultural and food products is interrupted by the financial crisis. Although in most countries the crisis has left traces in early 2008, agricultural production in the same year in Serbia increased by 9 %, and its products are mostly exported to CEFTA countries, which have quite cushioned or alleviated the first effects of the world crisis on the country (Statistics of National Accounts, 2012). Nowadays the economy is gradually returning to the level of exports from the previous years, but that process is developing very slowly. The reduction of FDIs over the past two years is also going in favor of a slow recovery, which has negative effects on the stability of the exchange rate and its large oscillations during the year. Due to the current and insufficiently successful monetary and fiscal policy, the state should lead these policies by more austere than ever or so far, the so called prophylactic measures. Krugman&Obsfeld (2009) argue that these measures are related to greater transparency, strengthening the banking system and credit facilities and increase equity capital influx relative to the inflow of debts. On the other side, Serbia needs to consider the opportunities to increase food products exports by strengthening the production, organizational and market strategies. In this way will perceive

which products to produce and in which way, how to organize a domestic producers and which foreign markets or markets abroad should be examined in order to place them larger amounts of agricultural and food products. According to the World Bank (2013), prices of many agricultural and food products in Serbia show high volatility, rising higher than EU prices in periods of shortage and dropping lower than EU prices in times of surplus. This volatility indicates a lack of competition and efficiency in the marketing chains, and makes it difficult to achieve a continuity of exports, with obvious negative effects on consumers (World Bank, 2013).

Export performance of Serbian agriculture through the food industry:

Serbia leads the strategy of an export oriented economy. Serbia, in spite of the excellent geographic position and climatic conditions for agricultural development has always had a lack of adequate agricultural policy. Created in the period of planned economy, lost also those few clear visions during the sanctions, and as such, fetched as a tragic inheritance in the transition period, agricultural policies need to be shaped according by structural changes in the economy and toward market demands. During the transition period, opening its market to the world, Serbia encountered an unfamiliar terrain. When in Serbia began a period of transition, it was not immediately possible to see how much is the loss of equity capital, expertise – in regard to competence, skills and professionalism, and the technology compared to other economies. Moreover, when they tried with the planning of attracting foreign investors in order to obtain FDI, it was realized that Serbia's ranking in the global or world economy is very low and as such, the Serbian economy is insufficiently attractive for investment. Since then a lot has happened, but still insufficiently in terms of competitiveness, antitrust policy, technological development, investments into R & D of all other factors necessary for the rapid or quicker development of the national economy. The similar situation is in agriculture. Opening of the domestic market towards the world has so far not been used sufficiently exploited. In this lack, the roots can be found that still were in the former Yugoslavia, when Serbia over 50 % of agricultural and food products, as well as from the majority of other economic sectors, exported to the markets of the former Yugoslav republics. Insufficient knowledge about the requirements that existed in the markets of EU countries, former republics of the Soviet Union - USSR or Asia, caused the placement of small quantities of agricultural and food products & stuffs from possible to the aforementioned markets. What characterizes the Serbian agriculture

is a great diversity of agricultural holdings and their great compartmentalization (average size of less than three acres of land and seven parcels), insufficient equipment of agricultural machinery which is however technologically overcome or outdated and obsolete - average age is 20 years old, low use of mineral fertilizers and extremely low productivity in all fields of production – by showing the average yields and especially average agricultural harvest yields below the level of the EU average. The Serbian market does not practice yet more rational use of significant ecological, production and human resources in agriculture. This primarily relates to the increase in overall generation & production efficiency, faster growth and sustainable development. In some developed countries, organic agriculture has a significant portion of the total agricultural production, so that organic farming in Denmark makes 13 % of the total, in Austria is 10 % and 8 % in Switzerland. The largest market for organic products is in Germany with an annual growth rate of 10 %, followed by France with an annual growth rate or an increase of 5 %. It is estimated that in the United States, France and Japan, the annual growth of this production is about 20 %. The most successful country in place regarding terms of exports of products from organic agriculture in Europe is the Hungary, which exports about 80 % of its products. Hungary stimulates & encourages producers of organic food, which also needs to be done by others, especially the less developed economies. According to the World Bank (2013), the pursuit of EU accession will affect agriculture more than any other sector, but it is also the sector that will benefit the most. The preaccession period requires great adjustments and investments at all levels of the agriculture and food industries. The Serbian agricultural policy has created uncertainty over the last decade, and has been redesigned into a two year cycle since 2000, leading to an unstable political environment. This policy uncertainty has had negative effects on investments in the sector, as well as on its restructuring.

Methodology

This article analyses the operation of several clusters and associations in the food industry of the Serbian transition economy. Due to difficulties in collecting of data by which could be seen ways of working, opportunities and obstacles encountered by domestic producers rejoicing in clusters and associations in the food industry, two clusters and one association of Serbia were analyzed. These are cluster Pekos & Sombors' Farmsteads and the Association of Winegrowers and Winemakers of Serbia. The organization, operations, plans, opportunities, objectives and obstacles of

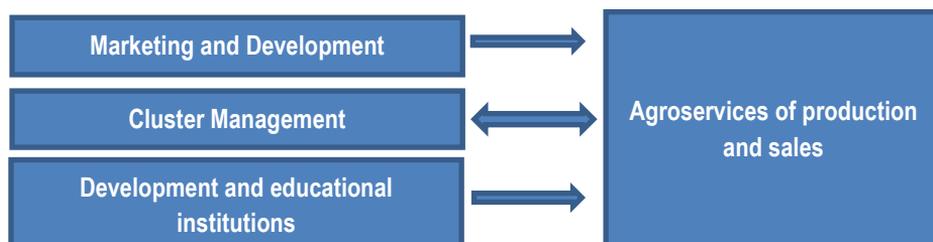
all three participants in this analysis were examined by using organizational maps, SWOT analysis and their future plans. In the SWOT analysis of the cluster, in detail are explained all of the possibilities that members of clusters can have through the strengths and opportunities as well as of the weaknesses and threats that may also negatively affect the further growth and development of the cluster and its members. With their analysis, it managed to make a good cross section of the food industry through its branches within which these clusters operate. These branches are baking, wine, organic food production and dairy industry. Ethno tourism and the way he connects all of these food products of food industries is described in this paper as well. In this manner the complete picture of the clusters in the agriculture and food industry was obtained, which as an important branch of agriculture has an important role in the current and future development of the Serbian transition economy.

Results

Case Analysis of business performance and potential of agricultural and food business clusters: “Pekos” bakery cluster founded at the end of 2007 as a network of companies for the production of bakery products and educational institutions in charge to support labor (raw materials, transportation, marketing, and training) and cluster development. The cluster consists of 19 members (14 companies and 5 R & D organizations), mainly located in Novi Sad, Vojvodina. The cluster is local and cluster members are primarily small bakery producers, agency for introducing quality system, associations of bakeries and millers, R & D institute and non governmental organization. The cluster's objective is to provide support to its members in the process of strengthening or enhancing their competitiveness and generating or achieving profitable positioning on both domestic and foreign markets. Moreover, it aims to develop new health secure products and improved production process in order to improve export and market recognition. Cluster Pekos belongs to a group of the zero stage clusters in Serbia – clusters that with its recent developments do not have sufficient possibilities for increasing exports. For that reason, this cluster is also less preferred by the state for allocations of the funds earmarked for the planned projects. At the beginning of its operation, this cluster has received funding for the conceptual project in association of manufacturing companies and educational institutions from the South Backa District in cluster Pekos to the amount of half of the necessary financial resources, which helped creation of this cluster. This project consisted of three subprojects:

- ✓ The project for the exercise of legal form of cluster Pekos
- ✓ The formation of all bodies of clusters and establishment of control at work of clusters
- ✓ Seminar about concepts and experiences of clusters

Scheme 2. *Organizational map of clusters Pekos*



Source: *authors' data processing*

In one of the few strengths of this cluster is considered as a determination to form a cluster. All three subprojects have been successfully completed, but the main problem is undeveloped management which is still unsolved and creates a problem in the development of the cluster. By the opinion of its members, this problem must be solved as soon as possible, because cluster Pekos has difficulties in the planning and holding events where exposing its members, which are poorly interrelated and many still do not realize the benefits of a multifaceted group collective exposure of their products. In the cluster, next to producers and sellers of bakery products are also involved three research and educational institutions, which have so far provided support with the production, control and improvement of the quality of bakery products. These are the Institute of Food Technology, Agency for the system quality (QS) introduction "Quo Vadis" and the Institute of Occupational Health in Novi Sad. Based on the organizational map of clusters Pekos, it can be concluded that there exist another two important organizations for the development of this cluster. These are nongovernmental nonprofit organization "Development Project Group Rumenka" from Rumenka which organizes projects and is working on raising funds for their execution. Inter-municipal association of artisans from Novi Sad has had the role of leader, management and the legal adviser on the project of clusters. In the agroservices of production and sales, the roles in the organization and sponsorship of events have both the Bakers' Union of Vojvodina and Zitovojvodina. This role could be higher if these two members had better think about common interests that may have with the others, although smaller but not less important

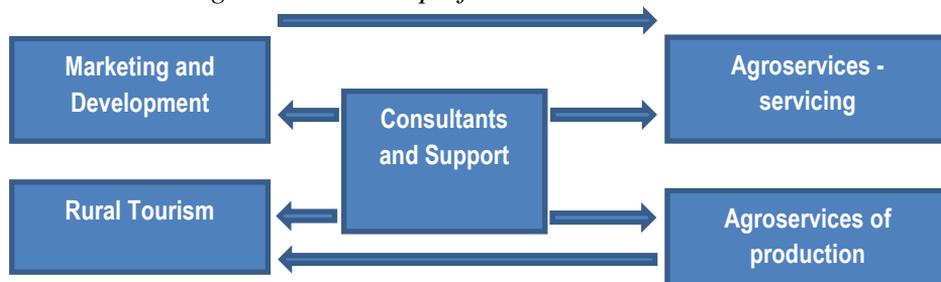
members within the cluster. Ltd. for the production and supply of intermediate goods for the food industry PIP represents one of the most developed members. PIP has achieved a high quality of its products and services. This specific producer is specialized in the production of mixture for baked products which are mainly sold in domestic market. PIP possesses a standardized quality management system ISO 9001:2000 certified for the entire area of operations and HACCP quality system for production area of wheat tortillas. Other members of the agroservices of production and sales possess several sales outlets, while some also have their own production. However, their way of obtaining HACCP certification is not over yet. In order to be more acquainted with the problems and opportunities that members of the cluster have or may have, a SWOT analysis of cluster Pekos has been applied:

Table 1. *The SWOT analyses of Cluster Pekos*

Strengths	Weaknesses
<ul style="list-style-type: none"> ✓ Determination for building a cluster ✓ Created database on producers of bakery products and flour mills in Novi Sad 	<ul style="list-style-type: none"> ✓ Insufficient connectivity between the cluster members ✓ Weak level of development of individual members ✓ There is no working group in the cluster which would deal with providing services to other members of the cluster. ✓ Insufficient availability of skilled personnel potential – human resources ✓ Insufficient affirmation of the cluster to work on increasing the interest of young people in the bakery industry ✓ All members do not possess the HACCP system ✓ Lack of website of cluster
Opportunities	Threats
<ul style="list-style-type: none"> ✓ The possibility of easier obtaining financial resources from the international organizations ✓ Lowering of prices of raw materials through joint and planned purchase ✓ Increased activity of marketing and management of cluster 	<ul style="list-style-type: none"> ✓ Law on HACCP has not been precisely limited ✓ Price at the expense of quality – quality suffers because of price ✓ Insufficient cooperation with other associations of bakery industry in the country and the region

Source: *authors' data collected processing*

Scheme 3. An organizational map of cluster Sombors' Farmsteads



Source: authors' data processing

Cluster Sombors' Farmsteads – was established in 2008 with the objective of tourist offer affirmation & promotion of Sombors' Farmsteads, as well as to increase the quality and quantity of organic food production in the area of western and of the Southern Backa District. The initiative for establishing an association with the features of today's clusters was identified as early as 1996 in the general Master Plan of Serbia whose one part is referred to the Sombors' Farmsteads as a spatial entity which should be protected. Under existing survey, which surveyed 300 agricultural producers and farmers from this region, it is clearly noted that there is an interest in rural tourism development and production of organic food. The beginning of the work of this cluster has been facilitated through professional & technical assistance of the TAM programs and services for reconstruction and business advisory by the EBRD in the first 12 months. Role in the creation phase, as for this one as well as other clusters has also played the Republic of Serbia, which has established an education team through the Provincial Secretariat for Economy, which has with the history of cooperation with GIZ allowed easier orientation of clusters and drawing up its organizational structure and recognition of opportunities and objectives for future development. Yet at the very beginning, next to existing organic food producers and farmers in the area of Sombor, in the cluster were also involved institutions such as "Agroinstitute" from Sombor and the Agency for Development of Small and Medium Sized Enterprises "Alma Mons" from Novi Sad. These two institutions with their previous work and expertise & competencies in the business very quickly have created a sense of security in both existing and potential members of the cluster Sombors' Farmsteads. Further cooperation & partnership between existing cluster members drew the attention of the Tourist Organization of Sombor, which by that time was already working on the promotion of urban tourism.

However, at that time trade fairs on the state level were at a much lower level than they are today, so the majority of events were organized by districts in the province of Vojvodina. Exchanging information of the cluster members and the Tourist Organization of Sombor has allowed recognition of their common objectives, and in collaboration with the Ministry of Economy and Regional Development came to promote their products and services at trade shows fairs which are today of an international character. Nowadays the work of the cluster takes place in the working groups set up for individual projects. Basic working groups are the working group for Rural Tourism, the working group for agroservices and the working group or task force for the organic production. The executive body of the cluster is the cluster Sombors' Farmsteads Ltd., which operates or acts based on the conclusions of the working groups and projects approved. The greatest & most important role in the development of the cluster Sombors' Farmsteads have associations and members, which have with their long time work and quality of products and services managed to survive in a difficult time period when country of Serbia was under sanctions, and its economy was also closed towards others, but also to grow & further develop, and win the awards at domestic and international events when the Serbian economy opens to the world market. Thanks to them, the cluster Sombors' Farmsteads can count on the quality of organic products, dairy products and tourist services. On the image of Scheme 3 can be seen who are nowadays members of the cluster as well as a schematic representation of their mutual relationship or interconnection. So far, so well organized work primarily in these three associations provide a slight growth or an increase in the number of workers, as can be seen in the Table 2 below:

Table 2. *Number of employees within cluster members of Sombors' Farmsteads*

Year	2009	2010	2011
Companies			
SMEs	160	210	230
Large Companies			
Companies & Entrepreneurs	50	50	50
Support Institutions			
Research & Development Institutions	20	20	20
Educational & Academic Institutions			
Other Support Institutions			
	20	20	20
In Total	250	300	320

Source: *authors' processing data on clusters*

Although most of the members are working with great success on the market as an independent/standalone households and firms, their mutual cooperation as well as in most of the clusters in Serbia is not at a satisfactory level. Collaboration in most cases starts and ends at events such as fairs in which meet current and prospective consumers with its offer. In order to better understand why is such a state within a cluster, and what can be also done in order to each of its members get the most from their presence and work within a cluster, were done comprehensive SWOT analysis.

In the SWOT analysis of cluster Sombors' Farmsteads which is shown in the picture will be more thoroughly explained all the opportunities that members can have through cluster strengths and opportunities as well as weaknesses and threats that may negatively or adversely affect further growth and development of the cluster and its members. In the strengths of the cluster certainly are included the determination for building a cluster, qualifications in the field of rural tourism – through the Master Plan of the Upper Danube region, and Serbia's commitment according to the principles of organic production & farming, which in the beginning was represented the basis or foundation of the cluster formation and in their future work, the part of a strategy based on which will cluster development move.

Because of many years of long standing work, in a certain number of cluster members even before its creation, the need for qualified personnel is downplayed by training the existing employees and hiring new employees which are already referred for certain positions. With the emergence of clusters, aid in the specialization of workers was obtained from the available foreign consulting staff, such as members of the TAM Program, out from the EBRD team, by GIZ and the team for education of the Provincial Economy Secretariat. All this has led to it, that nowadays a cluster has a high availability of skilled personnel potential, both in its coordinate team, as well as in the labor force of the members themselves in the cluster. This cluster has also made collaboration in the field of research, development and exchanging cooperation with cluster Bio Q from Osijek.

Except for participation in international trade fairs, with a cluster Bio Q was planned joint participation in the IPA crossborder cooperation between Serbia and Croatia, the project titled "Tradition for the Future".

Table 3. *The SWOT analyses of cluster Sombors' Farmsteads*

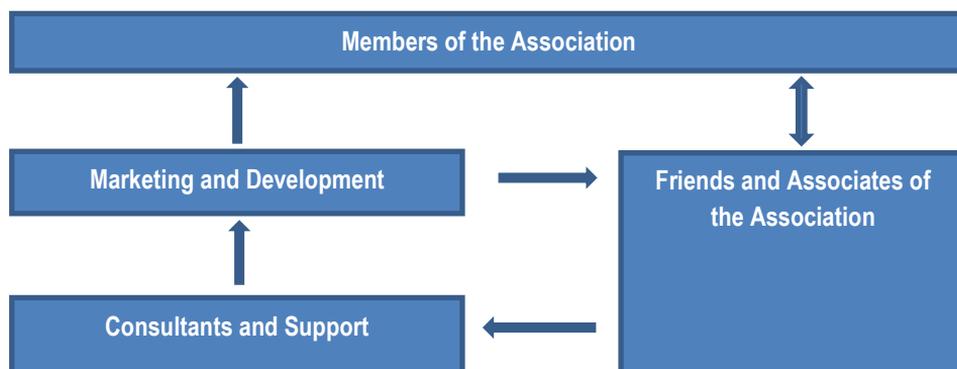
Strengths	Weaknesses
<ul style="list-style-type: none"> ✓ Commitment & Determination in building a cluster ✓ Qualified in the field of rural tourism & its development and the organic food production ✓ Availability of skilled personnel & staff potential ✓ Diversity of participants specialization ✓ The availability of foreign consulting staff ✓ Existence of collaboration with foreign buyers 	<ul style="list-style-type: none"> ✓ Insufficient interconnection – lack of mutual links ✓ Lack of an information infrastructure between the members ✓ Weak individual level of development of individual participants or stakeholders
Opportunities	Threats
<ul style="list-style-type: none"> ✓ Serbia's commitment for the development of rural tourism ✓ Serbia's commitment for the development according to the principles of organic production & farming ✓ Adoption of advanced technologies for organic production. ✓ Growth in demand for agricultural products of organic genuine 	<ul style="list-style-type: none"> ✓ An unfavorable & disadvantageous legislation and law regulative in the field of rural tourism & its development ✓ Legal and economic uncertainty in this field ✓ Insufficient access to funds or resources for investments

Source: *authors' processing data on clusters*

Case Analysis of business performance and potential of wine business

clusters: An association of Winegrowers and winemakers of Serbia was formed in 2008 as a result of several long years of work in its formation. The formation of the Association is supported by the Ministry of Agriculture, and also the GIZ has been providing services in the field of business advisory, easier orientation of clusters, drawing up their organizational structure and recognition of opportunities and objectives for future in further development. Ministries of Agriculture, Forestry and Water Management was also giving funds for establishing & raising vineyards to some winemakers prior to the formation of the Association.

Scheme 4. *Organizational Map of Serbian Association of Winegrowers & Winemakers*



Source: *authors' data processing*

In Scheme 4 is a scheme of the Association of Winegrowers and Winemakers of Serbia. More seriously was started with the formation of the association towards winemaker's subsidy by the state but due to lack of information from the accompanying support services' officers, it is often plagued by mistakes, which were mainly administrative in nature. These errors have caused more winemaker's negatively resolved requires for the incentive funds for establishing & raising vineyards which caused protests of the damaged. By adoption of the new law on wine, better informed accompanying support services' officers and clarification of conditions and required documentation for applications in order to obtain incentive funds, Winegrowers are allowed to be timely and accurately informed about the conditions of applying for subsidized resources. High quality lectures on production of wine and the possibilities for development of oenology in Serbia are held with the assistance of agricultural experts from the Faculty of Agriculture at Serbian state Universities of Belgrade and Novi Sad. To the needs of organizing and participating in national and international trade shows and events, wine makers are referred & addressed to the Serbian Chamber of Commerce and the Tourist Organization of Belgrade. The most important and greatest role in the production of wine and their presentation to consumers have a producer themselves. Producers are the ones on which is to decide which type of varieties is good for breeding, which kind of wine to produce in order to enhance its quality and how to continue to sell it further. An association now has 51th member and around the fifteen honorary members of the Association. Some of the members are also

involved & engaged in the production of other alcoholic beverages, such as various types of brandy, wine distillate, whereas the larger producers, such as Ruby known as the Rubin and Navip deal with the production of fruit juices and syrups. Members of the association have great support from several forums, journals and festivals with which they can more easily plan the organization of events on which their products are exhibited within the country and abroad. Since the formation of the Association, it is necessary to do a lot of work on the marketing and media monitoring of all presentations and the appearances or guest performances by the wineries themselves which have invested heavily in refurbishing their respective websites which represent an excellent source of information. Members of this cluster are producers who have been known also in the former Yugoslavia, but also newer producers whose qualities meet standards of the domestic and foreign market. Navip Belgrade, once the largest exporter of wine in the former Yugoslavia, has been privatized, a large company which in addition to the production of wine deals with the liquor and the production of fruit juices and syrups. Under vineyards is located more than 2,000 acres of land from whose organically produced grapes Navip produces more than 180,000 liters of biowine. Vineyards of Vrsac Joint Stock Company (JSC) from city Vrsac, their wine produced from the vineyards of the famous for centuries Vrsac vineyards, which extends to about 1,700 acres, occupying one of the first places in size in Serbia. Today, this one producer exports around 10 % of its own production, partly to EU countries, mostly in the region as well as to the Russian market. Rubin Joint Stock Company from Krusevac, once the largest producer of Brandy alcoholic drinks known as Vinjak in southeast Europe, after privatization in 2005 has managed to continue to produce high quality alcoholic drinks, including wine. Nowadays, Rubin has or disposes with 700 acres of vineyards and successfully serves different market segments both in Serbia and the EU, Russia, Australia, Canada and the United States. By the quality of wines in the country and abroad, allocated are a few or several small but high quality wine producers. Amongst them are also Wine cellar Alexandrovich from Vinca who for years, primarily due to their main product known as Wine Triumph, won the first places in both Serbia and the region and in the EU. Tamnjanika wine from winemakers of wine house Spasic from Trzca with their quality is expanding its own consumer market. Wine Bermet is a ticket to the winery from Kish at Sremski Karlovac in domestic, regional and EU markets. In addition, the winery Kovacevic from Irig succeeds first in Serbia to produce sparkling wines via traditional method from France and its total production increases by 30 % annually. As can be

noticed from the above mentioned, the diversity of its members is great. Among them are also a large major producers such as Navip, Rubin, wine producer „Vino Zupa“, which in recent years have privatized and aspire to become at least as giants they were in the former Yugoslavia, as well as a small private producers which produce only a few (small number) types of wine. There are also producers who have only recently started to produce wine, while there are a large number of smaller winemakers who continued the tradition of their forefathers who during the nineties due to the difficult state was interrupted. These and the other differences affecting the insufficient mutual links between the members of the Association, which, together with other obstacles, weaknesses, strengths and opportunities will be discussed & described in the SWOT analysis shown below in the Table 4:

Table 4. *The SWOT analyses of Serbian association of Winegrowers&Winemakers*

Strengths	Weaknesses
Excellent climate for viticulture – wine growing An incentive of the State through subventions Availability of skilled personnel potential – human resources A wide range of wine varieties – sorts of wine The quality and diversity – variety of wines Specialization of producers by type of wine	A large number of vineyards are still of an unacceptable quality Many areas which were under the vineyards are cleared Land is expensive, parceled and divided Insufficient mutual links between members – lack of interconnectivity A weak individual development level of members
Opportunities	Threats
The great potential of Serbia for the development of viticulture – wine growing The export quota of wine which has been granted by the EU even half is not used The EU Commission Regulation has banned new vineyards in the EU countries The increase in plantings Production by small wine producers producing quality wine Reinforced & enhanced marketing of Serbian wines The development of wine tourism	The law is not enforced strictly enough No regulated property and legal relations – unregulated issues Large imports of grapes and wine Low cost competition High costs of planting and processing Problem of debt collection

Source: *authors' data collected processing*

Conclusions and recommendations

This particular original scientific article collected and presented information on the export opportunities for agricultural and food products or foodstuffs and the performance & operation of some clusters and associations within this industry or their branches, which operate on the territory of the Republic of Serbia. Serbia exports about half of its agricultural and food products to the countries of the EU, and about one third of those in the CEFTA countries. Although this is an encouraging fact, this branch of the Serbian economy can and ought to give even better results. In order to increase the export of agricultural and food products, it is necessary to produce high quality products which are the most in demand on the foreign markets, such as organic food, dairy and bakery products, and domestic drinks & beverages, all of which in this paper accent was put on wines. To make it easier to qualify in foreign markets, it is necessary for the Serbian producers to collaborate in clusters and associations. Such a way of working will allow them the increase of information and greater awareness, sharing the costs of procurement, production, marketing, product placement and selling products through the collaboration with the other members. The private sector within the cluster should foster the development of information, technology and transport infrastructure, to collaborate with the government bodies and in that way solves the obstacles and problems and to create a stable trade & professional associations who will attract a greater number of participants and thus strengthen its position on the market. On the other hand, the state needs to create and maintain a stable micro and macro economic conditions in the Serbian economy. By attracting foreign direct investments in the vicinity of cluster centers, by removing barriers to entry for the local competition, by establishing standards that are conducive to innovations and by acting in the cluster as a buyer of goods - products and services, the government will encourage the greater interest of producers to engage in clusters and make or harvest the profits. In order to help research and education, it is necessary to activate the educational and scientific technological public state and private institutions or agencies in the examination and the development of clusters. By linking participants of different clusters, cooperation between related and auxiliary branches or sectors of the food industry will be intensified. Due to the increase of globalization in the world market, domestic producers should take advantage of the lack of major market players to meet the needs of all segments of the market. These narrow market segments known as well as market niches, should be analyzed in

detail and then create and implement strategies for doing business with them. For the successful implementation of strategies to a niche market, it is necessary to use a marketing niche. Niche marketers are well acquainted with a certain market of niches and the customers or its users are ready to pay for their services at a premium price (Kotler&Keller, 2012). According to the AT Kearney's research, it has been proved that the managers of companies that reach beyond the average business results, for achieving a successful organic growth listed the factors, such as the relationship with customers, a vision of growth and the availability of resources and capabilities. In the market, it can perform with the strategy of cost leadership - competitive advantage via lower cost, differentiation strategy and the focus strategy - cost focus & differentiation focus. The cost leadership strategy is used to achieve the lowest expenses per product - output unit compared to the competition and is provided through the economies of scale. Economies of scale allows the lowering of costs per unit by increasing the amount of scale with greater capacity utilization and performance of the curve of experience & learning (Krugman&Obstfeld, 2009). According to Krugman et al. (2012), the curve of experience explains that the more the company produces, is the more intensive their learning process and it becomes more efficient & effective and reduces costs. In order to be in the cost advantage compared to smaller rivals, the firm can achieve economies of scope by increasing the scope and breadth or width of the product portfolio and by the simultaneous division of fixed costs on them. Knowledge of the domestic and regional markets is another advantage that the domestic food producers achieve high profits, and perhaps become the leaders on the regional commodities and the multiregional commodity relations – the niches. The further development and strengthening of Serbian economy will allow stable business operations on the international commodity relations – the so called niches. In practice the things develop more slowly than it is the desire of members of clusters and associations. Mutual cooperation between members is not at a satisfactory level. The existence of a low & weak individual development level of members, expensive, parceled and divided land, and the law which is not enforced strictly enough are just some of the reasons for the creation of mistrust among the cluster members as well as for the public state authorities or government bodies. So far, the previous efforts of the state in subsidizing the development of viticulture and rural tourism is a good start of the state activation in the development of clusters and associations. In order to independently develop and connect producers with the other members of their clusters and clusters from the region, it is

necessary to have the option of using the favorable funds for the investments which the state can activate by signing trade agreements with other states or countries. This will create projects in which their interests will find both domestic and foreign producers, and as such, it will be interesting for investments of both domestic and foreign investors. By an increased investment into the development and production, producers will be better able to take advantage of the climate for the development of agro-food products in which Serbia is located and thus bring the closer Serbian economy to other developed economies.

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VERTICAL PRICE TRANSMISSION ALONG THE FOOD SUPPLY CHAIN: SERBIAN PORK MARKET¹

Ivan Djurić,² Danijela Petković³

Abstract

In this paper we analyze the price transmission between Serbian pig producers and processors (slaughterhouses) during the recent global commodity price peak in 2010-2011. For the vertical price transmission analysis we choose highly flexible Markov-switching vector error-correction model which allows us to identify the nonlinear price adjustments. Our preliminary results indicate that the price changes in the live pig prices are completely transmitted to the carcasses prices. Furthermore, we found that the processors are increasing their margin disproportionately, especially during the episodes of the extremely high live pig prices, wrongfully justified by the increase in input costs.

Key words: pork market, vertical price transmission, Serbia.

Introduction

The significant price increase of global commodity prices in the last decade, together with the global financial crisis, had significant consequences for Serbian agriculture, especially for the meat sector. Pig producers were particularly challenged by the price surge of the main row materials. The price of wheat and corn⁴ recorded historically high levels during the global commodity price peaks in 2007-2008 and 2010-2011 (see Djuric et al., 2012). On the other hand, despite the difficulties of meat processors to obtain sufficient financial and input assets, they were

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⁴ Together present about 80 % of the feed components.

able to keep a high margin due to the relatively closed Serbian pig market.

In this paper, we aim at investigating the price transmission between pig producer prices (live pig prices) and processors (slaughterhouses) in Serbia during the recent period of the global commodity price peak (i.e. 2010-2011). Our research questions are: What are the main factors influencing the price development of pig prices and carcasses (pork meat) during the observed period? How fast and to which extent are the prices of live pigs transmitted to the price of carcasses?

Our first hypothesis is that the meat processing industry adjusts the meat prices almost instantaneously, and disproportionately, to the increase in prices of raw materials (live pig prices). The second hypothesis is that the processing industry uses the situation of the significant price increase in raw materials to increase the trade margin, and thus profits.

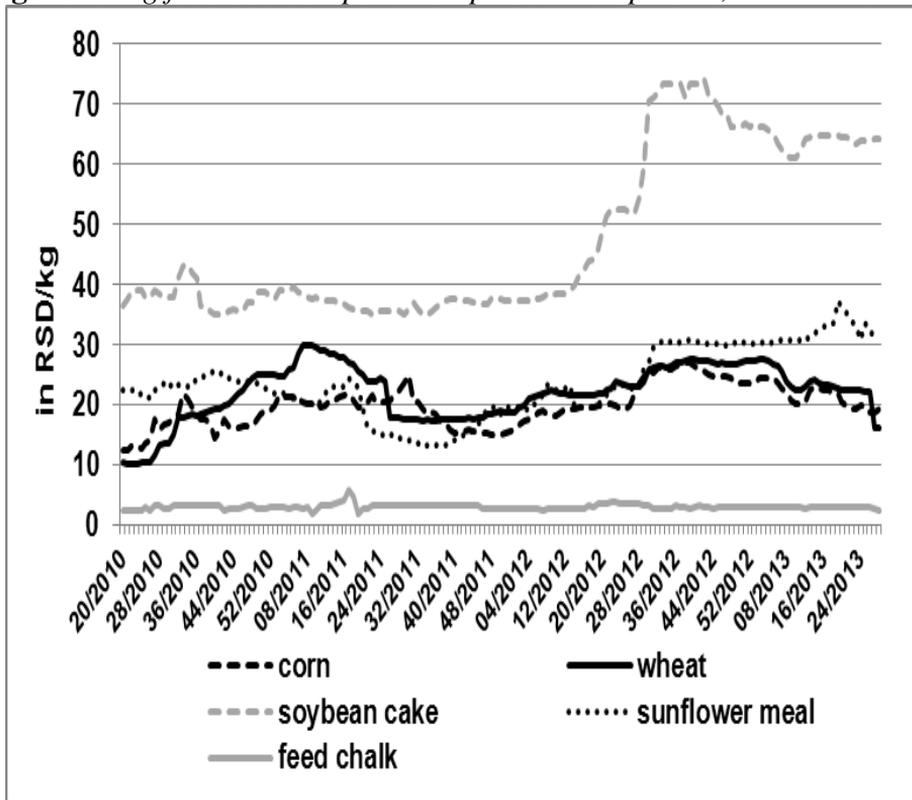
For the vertical price transmission analysis, we use a highly flexible Markov-switching vector error-correction model. The main advantage of this model is that it allows us to identify different price transmission regimes between the prices at the different level of the supply chain where the state variable, which governs the regime change, is not directly observed. This characteristic of the model is very suitable when uncertainty is present on the market and it thus becomes very difficult to identify the reactions of the market participants towards the price development at the different levels of the supply chain.

This paper is structured as follows: Section 2 describes the factors that have a major impact on the price development along the pork market supply chain. Section 3 provides the estimation approach and data description. Section 4 presents the empirical results with the discussion. Finally, the conclusions are presented in section 5.

Factors influencing the price development along the supply chain

The pig producers in Serbia were confronted with high input costs in the last decade (especially during the observed period 2010-2013). The price of the main feed components, such as corn, wheat, soybean cake, sunflower meal, and feed chalk doubled, and some almost tripled, in the last three years (Figure 1).

Figure 1. *Pig feed cost components - price developments, 2010-2013*



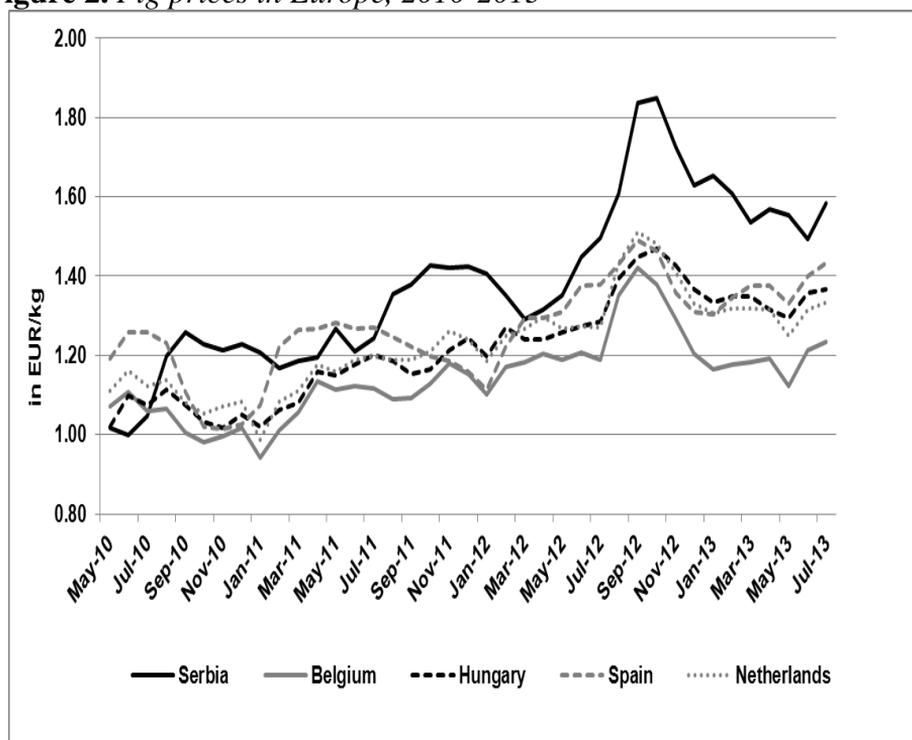
Source: *Serbian Grain Fund and GEA Info Center, own illustration.*

The high input costs certainly influenced the domestic prices for live pigs. During the observed period, from May 2010 until July 2013, the Serbian pig prices were on average 14 % higher compared to the average pig price in the selected EU countries (Figure 2).

Uncompetitive prices on the regional and the EU markets, high fluctuations of the exchange rate, and no possibility for meat export⁵ reduce the market for pig producers only to the domestic market. Beside these factors, the domestic market uncertainty and reduced meat consumption mainly influenced the reduction in number of pigs produced (Zivkov et al., 2010).

⁵ Pork meat export from Serbia to the EU is banned due to the non-accepted vaccination against swine fever.

Figure 2. *Pig prices in Europe, 2010-2013*

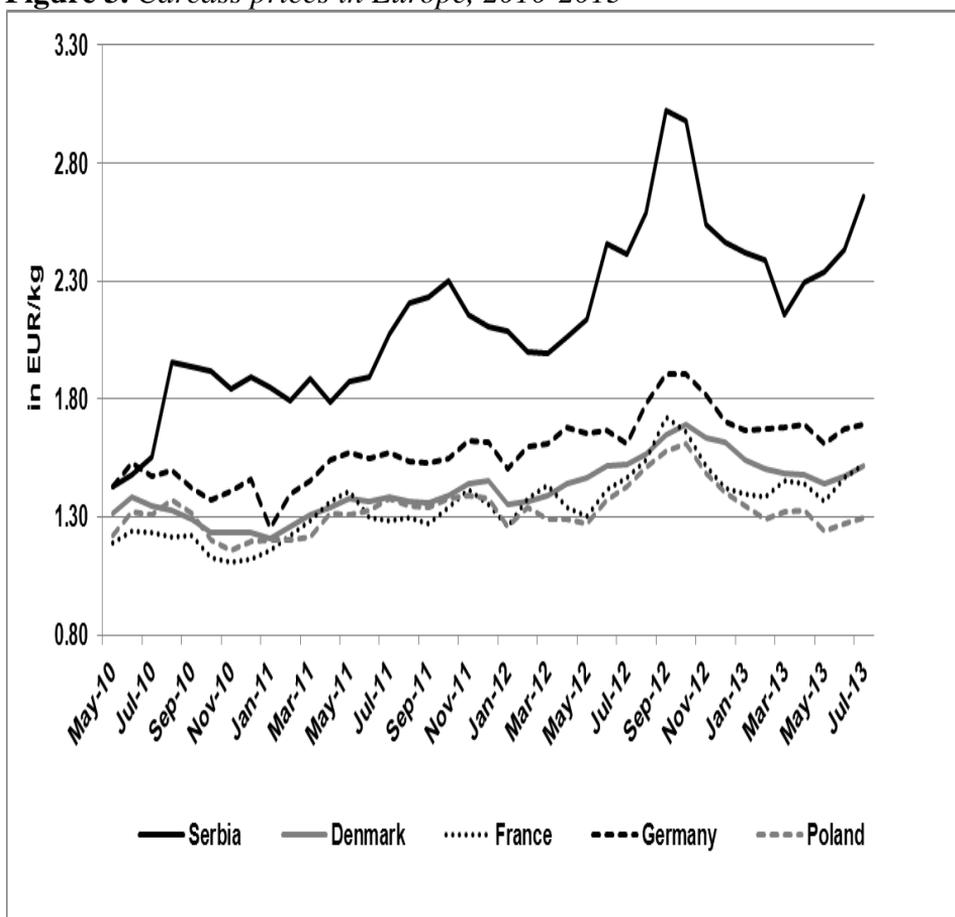


Source: *STIPS (2013), own illustration.*

Concerning the pork meat processing sector, it faces many challenges: The privatization of the large state owned slaughterhouses is still ongoing; private owners are facing a shortage of capital for further investments, and there is a general presence of unstable raw material basis since more than 30 % of the total number of pigs are slaughtered within households (Gill *et al.*, 2010).

As it was the case with the prices of live pigs, carcass prices in Serbia are not competitive on the European market. During the observed period, the carcass prices were 50 % higher than the prices in the selected EU countries (Figure 3). The import of pork meat from the EU (both live pigs and carcasses) would certainly decrease the domestic meat prices. Nevertheless, domestic producers and processors are protected by the ad valorem import tariff of 56 % on average (range between 38.3 % and 73.3 %). Thus, the relatively closed market creates suitable conditions for the processing and the retail sectors to exercise the market power and thus do not adjust their prices according to the price fluctuations within the supply chain.

Figure 3. Carcass prices in Europe, 2010-2013

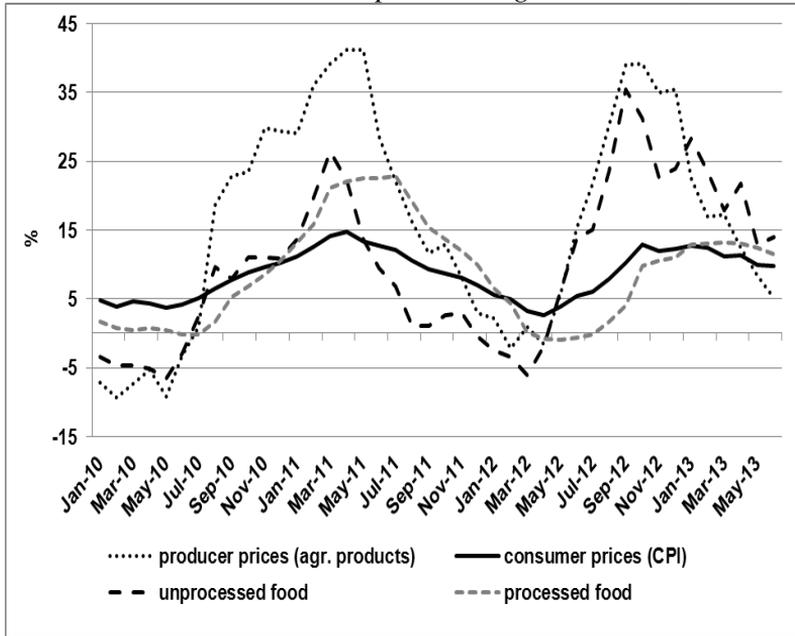


Source: GEA Info Center, own illustration.

Concerning the consumers, pork meat has a great importance from the nutritional aspect in Serbia. According to the CEECAP report (2007), pig meat accounts for about 60 % of total meat consumption. Figure 4 shows the end consumer price development in Serbia during the observed period.

During the three years, the Consumer Price Index increased by 15 % only in 2010, which was mainly driven by the significant increase of agricultural and food prices. The same situation was observed in 2012. Thus, consumers were confronted with a high expenditure for food products (especially meat) during the observed period.

Figure 4. *Producer and consumer price changes in Serbia, 2010-2013*



Source: *National Bank of Serbia, own illustration*

Estimation approach and data

Price transmission analysis

Before conducting the price transmission analysis, we started with the identification of the time series properties. First we conducted unit root tests in order to identify the order of integration of the data. We conducted the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979), and Kwiatkowski et al. (1992) KPSS test. After identifying the order of integration, the second step is to test if the time series are co-integrated (i.e. if there is a long-run equilibrium). For testing the co-integration, we used the Johansen co-integration test (Johansen, 1988). If the result of the co-integration test indicates the existence of a long-run relationship between the time series, the pre-conditions for using the Vector error-correction model (VECM) are fulfilled:

$$\Delta p_t = \alpha \beta' p_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta p_{t-1} + \varepsilon_t \quad (1)$$

Where p_t represents a vector of prices of products at the different level of the supply chain, and Δ donates the first difference operator

$(\Delta p_t = p_t - p_{t-1})$. The matrix β contains the coefficients of linear combinations of the prices p_t interpreted as stationary long-run relationships between the prices. Thus, β denotes the cointegration vector. Term $\beta'p_{t-1}$ is equal to ect_{t-1} , which quantifies the equilibrium errors of each co-integration relationship for each point in time, and α denotes the matrix containing the rates at which the price differences Δp_t react on the deviations from the long run equilibrium, which are quantified by $\beta'p_{t-1}$. Thus, α represents the speed of adjustment. The matrices Γ_i contain the short-run reactions of the price differences to past differences, and ε_t denotes an error term.

The underlying assumption of the VECM is that all of the model parameters are constant, which means that this model is characterized by a unique long-run equilibrium. Since it is very unlikely to obtain a parameter consistency during the whole observed period, we applied one of the recent extensions in the price transmission modeling approach which allows for the nonlinearity⁶ of the relations among price series. Thus, in this paper we use the regime-dependent model framework for investigating the vertical price transmission between the producers of pigs and meat processors (slaughterhouses) in Serbia. We selected highly flexible unrestricted Markov-switching vector error-correction model:

$$\Delta p_t = v(S_t) + \alpha(S_t)(\beta(S_t)'p_{t-1}) + \sum_{i=1}^k \Gamma_i(S_t)\Delta p_{t-i} + u_t \quad (2)$$

where Δ is the first difference operator; p_t represents the vector of respective prices; v is the intercept term; α is the loading matrix (speed of adjustment); β is the cointegration matrix; matrices Γ_i contain the short-run autoregressive price reactions and heteroscedasticity; u_t represents a vector of residuals; S_t is the state variable which indicates which of the M possible regimes governs the model at time t ($S_t = 1, \dots, M$). Thus, the term (S_t) indicates the dependence of the model parameters on the state variable S_t .

The main assumption of the model is that the state variable follows a Markov-chain. This implies that the probability of switching from one regime to another is only conditioned by the regime of the previous period:

⁶ The term “nonlinearity” refers to the non-stable parameters of the price transmission model.

$$Pr(S_t|S_{t-1}, \Delta p_{t-1}, \beta^1 p_{t-1}) = Pr(S_t|S_{t-1}, \Pi) \quad (3)$$

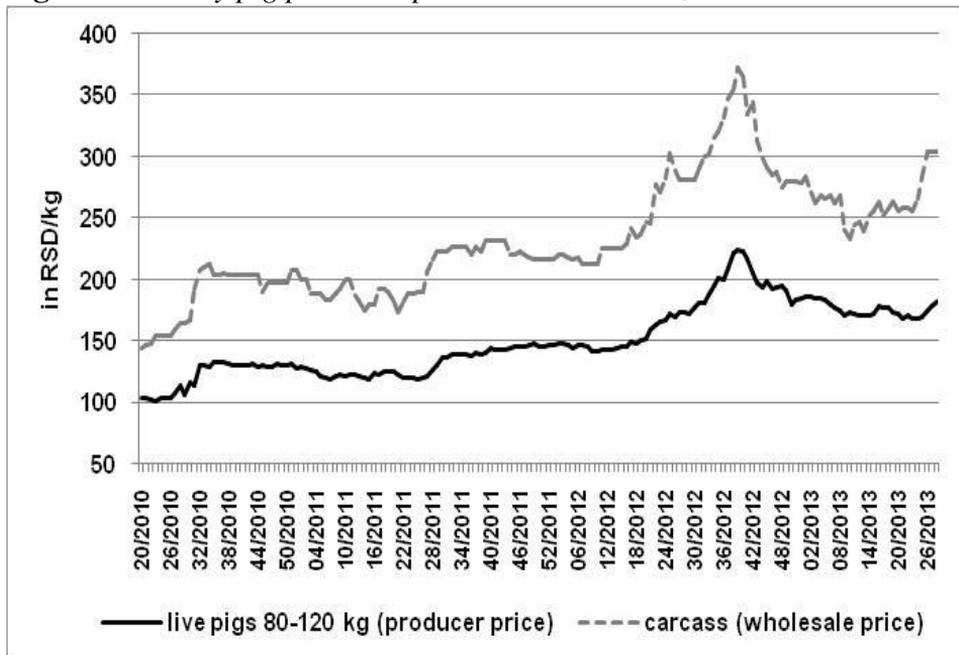
where square matrix Π contains the probabilities (π_{ij}) for the transition from one regime to another.

The estimation of the MSVECM is based on the maximizing the likelihood function with the Expectation-Maximization algorithm (Dempster et al., 1977; Hamilton, 1990; Kim, 1994; Krolzig, 1997).

Data

The data used for the analysis are weekly producer prices of fattening pigs (between 80 and 120 kg), and weekly wholesale prices (EXW⁷slaughterhouse) of pig carcasses. All prices are in Serbian national currency (RSD) covering the period from May 2010 until July 2013 (165 observations). The data used for the analysis is presented in Figure 5.

Figure 5. *Weekly pig producer prices and carcasses, 2010/13*



Source: STIPS (2013) and GEA Info Center, own illustration.

⁷EXW – Ex Works (named place of delivery) – The seller makes the goods available at its premises (INCOTERMS, 2010).

Empirical results

In order to estimate the price transmission parameters between live pig prices and carcasses, we have to identify the properties of the price series. First, we conducted the ADF and the KPSS tests, identifying the order of integration for each time series. The proper lag length for the ADF test is selected according to the Akaike Info Criterion (AIC) and the Schwarz Criterion (SC). The lag length for the KPSS test is selected according to the calculation of Kwiatkowski et al. (1992). According to our results, both tests indicate the presence of a unit root in both price series (Table 1). By using the first differences, both tests indicate a strong evidence of stationarity. Thus, we can conclude that both series are integrated in order 1.

Table 1. *Unit root tests*

series	ADF			KPSS		
	test statistic	specification	5 % critical value	test statistic	specification	5 % critical value
In liveP120	-1.6953	2 lags, const.	-2.86	2.4049	5 lags	0.463
IncarcPw	-1.8656	1 lag, const.	-2.86	2.1923	5 lags	
Δ In liveP120	-6.7647	1 lag, const.	-2.86	0.0983	5 lags	0.463
Δ In carcPw	-11.361	0 lag, const.	-2.86	0.0858	5 lags	

Note: 5 % critical value in KPSS test is the same for levels and first differences.

Source: own calculation.

After identifying the order of the integration, we proceed with the co-integration test. The results of the Johansen's co-integration test, presented in Table 2, indicate that the price series are co-integrated. Thus we can say that there is a long-run equilibrium between wholesale and producer prices along the pork supply chain. This is the main precondition for utilizing the VECM.

The results of the VECM estimation are given in Table 3. For checking the stability of the model we used the Chow test (Chow, 1960) where the bootstrap procedure was used for calculating the empirical values for different breakpoints. The results from the Chow test show that there might be several structural breaks in the model (Figure 6).

Since the main characteristic of the VECM model is that all of the parameters are constant, the obtained results indicate that the linear VECM is not an appropriate model for our data. Thus, we decided to use a regime-dependent model framework.

Table 2. *Co-integration test*

number of co-integrating vectors		specification	rank test	p-value	5 % critical value
H_0	H^0				
0	1	3 lags, const.	24.62	0.0103	20.16
1	2		5.26	0.2650	9.14

Note: Number of lag length is selected according to the AIC.

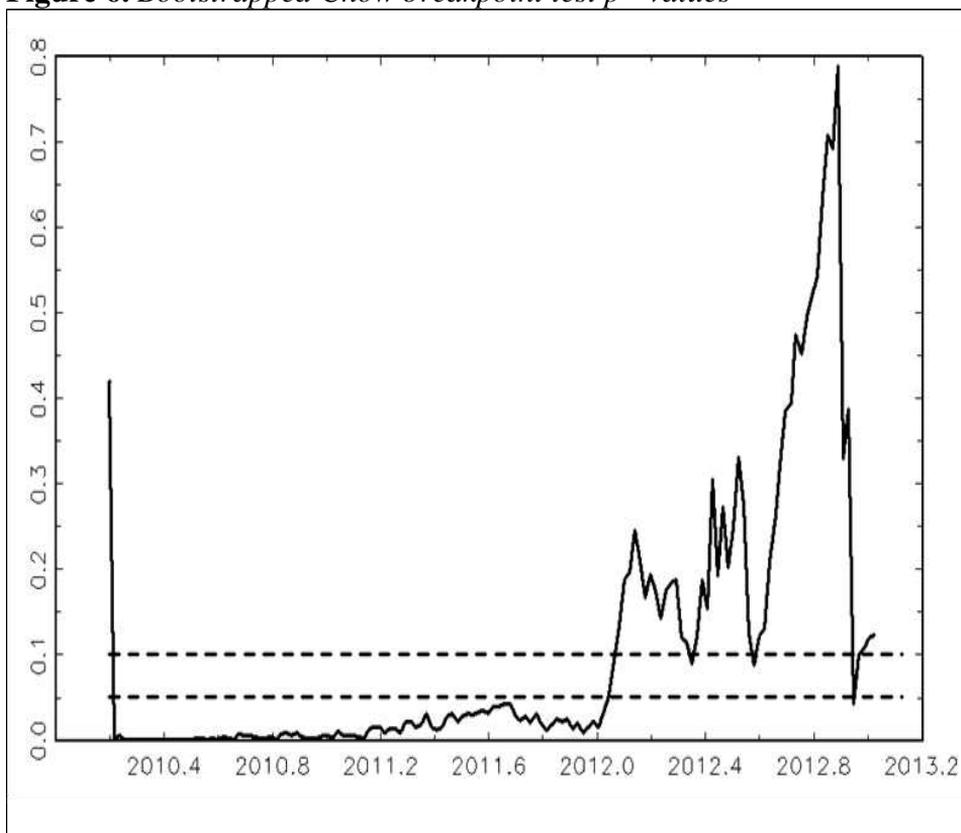
Source: own calculation.

Table 3. *Estimated coefficients of the long-run equilibrium regression (VECM)*

coefficient	estimated value	t-value	p-value	standard deviation
intercept				
β_0	0.036	2.281	0.023	0.016
loading coefficients				
α_{carcPw}	-0.120	-2.127	0.033	0.056
$\alpha_{liveP120}$	0.137	3.853	0.000	0.035
estimated co-integration relation				
β_1	-1.031	-23.207	0.000	0.044
lagged endogenous terms				
$\Delta \ln carcPw_{t-1}$	0.105	1.232	0.218	0.086
$\Delta \ln liveP120_{t-1}$	-0.121	-1.674	0.094	0.072

Source: own calculation.

Figure 6. *Bootstrapped Chow breakpoint test p - values*



Note: Calculation is based on 1000 bootstrapped replications. Values below the lower dotted line indicate the rejection of the parameter constancy hypothesis at the 5 % level of significance.

Source: own calculation.

As we mentioned before, for analyzing the price transmission within a non-linear model approach, we used the Markov-switching vector error-correction model. We estimated the model for different specifications with regard to the number of regimes and lagged short-run price transmission parameters. According to the Schwarz Criterion (SC), we selected the model with two regimes and 5 autoregressive parameters (MS(2)-VECM(5)). The model diagnostics indicate that there is no autocorrelation, and that homoscedasticity and normality of the residuals are present. The model is of a MSIAH type which means that we allow for the intercept (I), the short-run price transmission, the autoregressive parameters (A), and the variances/heterogeneity (H) to switch between the regimes.

Our preliminary results indicate that the price transmission between pig producers and processors is characterized by two regimes (Table 4). The first regime is prevailing during the observed period and accounts for 128 observations.

Thus, we named this regime “normal”. The average duration of this regime is about 4 months. In certain periods, the “normal” regime is substituted with the second regime (“acceleration” regime) which accounts for 31 observations with an average duration of 1 month.

Table 4. *Regime properties: MS(2)-VECM(5)*

regime	no. of observations	probability	duration
“normal”	127.9	0.81	16.66
“acceleration”	31.1	0.19	3.96

Source: *own calculation.*

Table 5 presents the selected parameter estimates of the model. Our preliminary results show that the price transmission between live pig prices and carcass prices improved during the period of the “acceleration” regime (the difference from the perfect price transmission, $\beta_1 = 1$, is smaller). The size of the error-correction term increased slightly, indicating that the carcass prices were a bit above the equilibrium during the “acceleration” regime.

The significantly higher speed of adjustment indicates very fast corrections of the deviations from the equilibrium, meaning that the slaughterhouses were rapidly increasing the price of carcasses. Only a small reduction of the residual standard error in the “acceleration” regimes compared to the “normal” regime indicates that the observed market was stable during the observed period.

Furthermore, figure 7 shows the regime classification of the model, where each observation corresponds to a particular week. Figure 7 illustrates that the “normal” regime is substituted with the “acceleration” regime mainly during the periods of the high increase in live pig prices.

Table 5. Selected parameter estimates for MS(2)-VECM(5)

market	indicator	“normal” regime	“acceleration” regime
long-run price transmission	constant (β_0)	1.317	0.172
	elasticity (β_1)	0.818** (0.182) ^a	1.057* (0.057) ^a
equilibrium			
deviation from equilibrium	regime specific average $\epsilon_{t,c}$	0.0206	0.0210
adjustment dynamics	speed of adjustment ^b	-0.1655**	-0.5094*
stability			
price fluctuations	residual standard error ^b	0.0255	0.0198

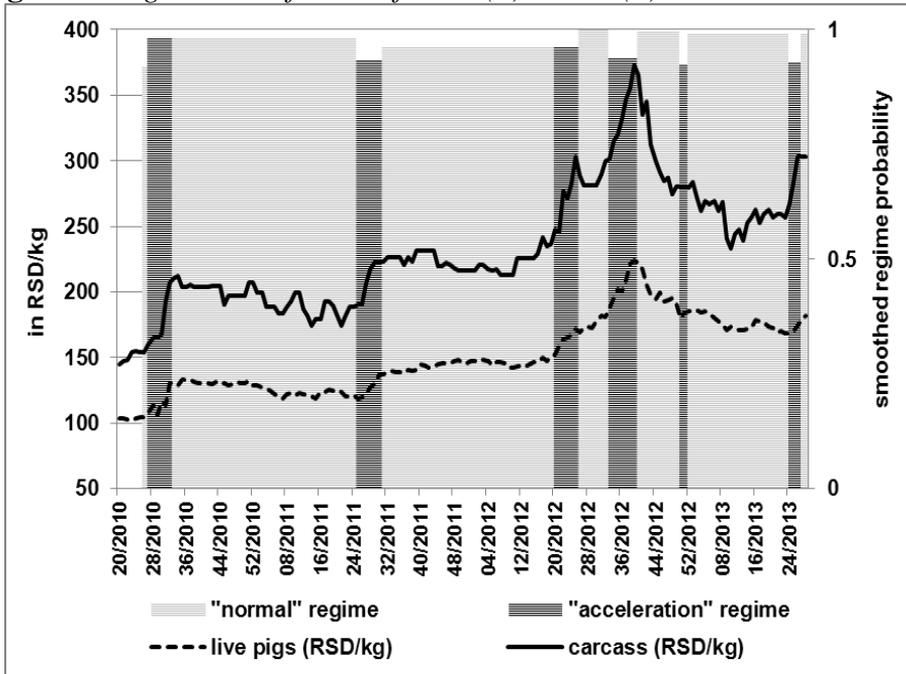
^a difference from perfect price transmission ($\beta=1$), in absolute values.

^b regarding the most probable price transmission regime prevailing in this time period.

* indicates statistical significance at 5 %. ** indicates statistical significance at 1 %.

Source: own illustration.

Figure 7. Regime classification for MS(2)-VECM(5)



Source: own illustration based on the model specification.

Conclusions

In this paper, we analyze the price transmission between live pig and carcass prices within the Serbian pork meat supply chain. The recent global commodity price peak and the persistent financial crisis had significant consequences for the meat industry in Serbia. In a particularly bad situation are the pig producers who are affected by the significant increase in feed costs, which represent about 70 % of the production costs. Furthermore, their production is not competitive on the regional markets and thus is mainly concentrated on the domestic market. On the other side, slaughterhouses also face difficulties, mainly in the sense of obtaining sufficient financial assets and inputs (pigs) for continuous production. Nevertheless, the relatively closed market, characterized by high import tariffs for live pig imports, permits processors to increase their margin much more than the increase in input prices justifies.

The preliminary results of our price transmission analysis indicate that the price changes in live pig prices are completely transmitted to the carcass prices during the observed period. Adjustments towards the equilibrium take about a month and a half in the “normal” regime. During the “acceleration” regime, the adjustments are much faster, only two weeks are needed. Furthermore, our results indicate that the carcass prices were above the equilibrium in the “acceleration” regime which indicates a higher increase of carcass prices compared to the live pig prices. Thus, we can conclude that in the periods of a high increase in live pig prices, the processors increase the price of carcasses to a much higher extent, arguing with high input costs.

Further research of the cost structure of fattening pigs and carcass production costs is needed in order to identify what the deriving factors of the price increase are. A further investigation of the carcasses-live pig margin will provide more detailed insights about the justification of processors for increasing the price of carcasses much more than the live pig price.

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MAINTENANCE OF THE TREASURY'S ACCOUNTING CONSOLIDATED ACCOUNT SOLVENCY

Ivan Milojević¹, Saša Trandafilović²

Abstract

Establishment of a rational management of assets made available to the users of public resources represents the basic task of the financial function of every accounting information system. Spending units realize their financial-accounting function through an unique consolidated treasury account, by which the starting point for setting up a financial discipline is made. In this respect the need for maintaining permanent solvency of the account appears, in order to timely execute the liabilities created on the account of the spending units. In this paper we will deal with a model of tracking and establishing an adequate system for maintaining the solvency of the spending units, as well as the methodology for grading investment projects in the public sector.

Key words: *accounting, investments, solvency, consolidation, account, public sector.*

Introduction

Efficient management of spending the state's money depends on the level of development of the financial system, and primarily on the monetary and a fiscal macroeconomic sub-system ratio. In our conditions, it would reflect on the ratio of banking arrangements and opportunity of the spending unit's solvent assets.

If the conditions of bank borrowing (debiting) are unfavourable, then the lack of the spending unit's solvent assets is more harmful for the treasury consolidated account.

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On the other hand, if the system for managing budgetary solvency is insufficiently efficient, the money will be unengaged on certain accounts longer, while spending units will have to further borrow, in order to provide continuous solvency.

Research goals of this paper are primarily related to models of spending unit's asset management, in form of monitoring budget liquidity and models of investment decision-making for the needs of spending units.

In order to surpass this it is necessary to introduce the system for managing budget solvency primarily in the area of management and control of money, by which costs of debts servicing would decrease. In this text recommendations for financial authorities regarding tracking and managing budget solvency will be given.

Managing the cash balance

Financial management within public finances includes different activities: formulation of a fiscal policy, budget preparation, budget execution; management of financial operations; accounting rules and control; keeping records and comparative data; financial audit and evaluation of financial effect and results of public finance policy and financing programs. Within this wide frame of financial management, a treasury function aims to achieve honoring of set goals, which were stated. In order to realize the stated goals, it is necessary to achieve certain series of activities, which can be represented in the following way:³

- managing financial resources,
- keeping financial accounts,
- accounting and reporting,
- financial planning of cash flows,
- managing the public debt and warranties,
- managing foreign-transfers and partnership funds from international assistance, as well as
- managing financial assets.

³ Allen R., Tommasi D., (2004)*Managing public expenditures*, Book of reference for the transition countries, pp. 247.

In order to execute all of these activities, the organizational structure and distribution of responsibilities differ from country to country. In our country, the Treasury, with the latest changes of the Budget System Law, has turned to a prevailing model of cash management, which is used in the European Union.

The model in question is of active management of cash balance (AMBC), which has the goal that the consolidated treasury account has the targeted zero value at the end of a day. In case that the treasury disposes with assets surplus, these assets can be invested, while in the case of the assets deficit, the Treasury must borrow the necessary amount.

Such cash management model functions if the financial markets are sufficiently developed, with regular and *ad hoc* programs for treasury notes, *ad hoc* programs for repurchase and a direct bilateral business. One of more important elements for this system work is efficient coordination between the cash management policy and a monetary policy, because the cash surplus is invested on the domestic market.

The stated model of cash management is applied the most in developed countries, such as Netherlands, Spain, France, Germany along with some variations linked to a desired level of balance value at the end of a day. In Spain, the treasury tends to achieve assets surplus, in order to avoid debiting, but every month the expected balances are put up for auction (contracts on repurchase with collateral in the form of government bonds), while the Treasury in the Netherlands uses a deficit assets balance.

A scope of the target balance varies from country to country within the euro zone, but what is mutual for each of them is that the scope be as smaller as possible, i.e. to reduce a difference to a minimum. France has the most expressed model for reduction of instability, which bases on a fact that the target balance value is equal to zero.

Small difference exists in Belgium, Austria, Luxemburg, Netherlands and Germany. The agreements which have been made in relation Central Bank – Ministry of Finances have defined the interest amount which is paid for the balances which are under the target value, which is compensated by the marginal rate of the European Central Bank.

Tracking the treasury's solvency

The financial segment of the budget system reflects through a set of accounts and sub-accounts of the treasury consolidated account. The approved budget appropriations are executed by budget business through a set of goals and tasks of the spending units.⁴

Spending units make projections of financial needs. The planned needs are submitted to the Treasury, as on the republic, so on the local level. In most cases, there are significant differences between planned amounts and the amounts which the spending units had really spent.

Such way of spending assets from the treasury consolidated account represents the solvency opportunity cost, because less spent assets could have been directed to other appropriations or more spend assets disturb general solvency and make a need of additional debiting, i.e. payment of interests for non-fulfillment of liabilities in maturity period.

This incompatibility between planning and spending of assets is necessary to be reduced to a minimum. The procedure for this incompatibility decrease needs to be carried out by the Treasury, in order to stimulate the spending units which plan the assets more precise. This procedure can be carried out by using different methodologies, but each of them must satisfy certain criteria: to be easy to use, available for control by the spending units and are economical.

The simplest way of grading is to calculate on daily basis an absolute (1) or a relative (2) deviation

$$AD = X_p - X_s \quad (1)$$

AD= absolute deviation

X_p - planned resources

X_s - spent resources

⁴ Milojević I., Mihajlović M., Cvijanović M., (2012) Impact of organizational failure of relevance consolidated budget, Economics of Agriculture, Vol. LIX, N°1 (1-176), pp. 63-71

$$RD = \frac{(X_p - X_s) * 360}{y_i} * 100 \quad (2)$$

RD- relative deviation

X_p - planned assets

X_s - spent assets

y_i - planned assets on annual basis

By using one of these two methods for tracking deviation is achieved by continual tracking of compatibility between budget planning and realization. We have to accentuate that, by measuring in absolute deviations, small users are favoured, while, by applying relative deviations, big users are favoured.

In order to surpass the difference between these two methodological procedures, different weighting are applied, which leads to a mixed indicator which provides best results, depending on size of local authority treasury, a number of spending units, a level of development of the local authorities etc., because it is well known that there cannot apply a unique methodology for all treasuries of the local authorities.

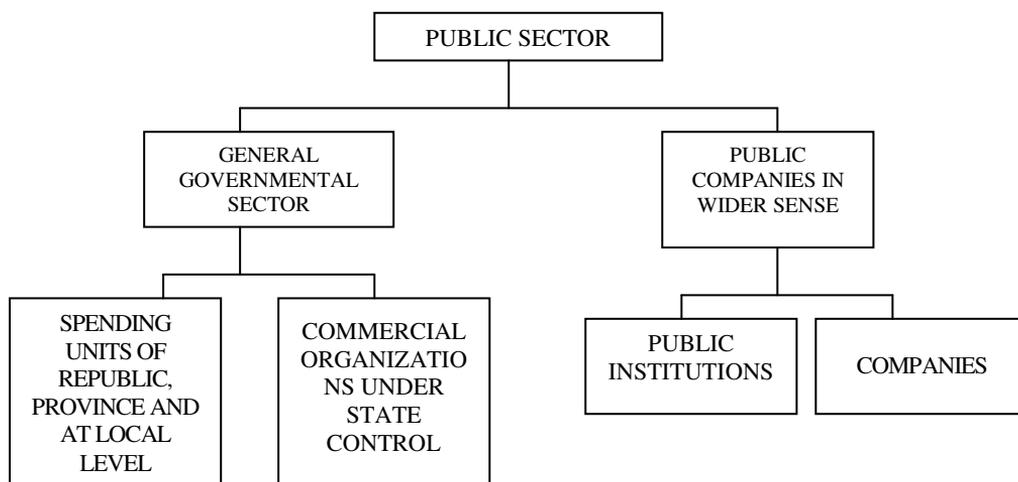
Need for evaluation of investment projects in public sector

Within the general public sector are two groups of users: spending units and institutions in form of budget institutions which do business on the principle of profit gain. It is necessary to mention that the assets which are in use within the general public sector, besides the use for execution of their authorities, can be used for income realization of the so called, commercial purposes.

The above mentioned comes out from injunctions of the Public Property Law, by which has been defined that users of public property are:

1. general government sector (state bodies and organizations of the Republic of Serbia, bodies and organizations of an autonomous province and a local authority units),
2. public companies in wider sense (public properties, companies whose founder is the Republic of Serbia, autonomous provinces and local authority units).

Picture 1. *Public sector structure*⁵



The users of public property are government bodies and organizations of the Republic of Serbia, bodies and organizations of the autonomous province and local authorities units and public companies, companies founded by the Republic of Serbia, autonomous province and local authority unit⁶.

Within the general state sector as a commercial organization the institutions which do business by the principle of income gain and distribution appear. This kind of organization is within a direct, i.e. indirect spending unit, whose organization is determined by an enactment of foundation, a common enactment on organization and work and a common enactment on internal work organization and systematization. These institutions do business in the field of production and services for need of the direct spending units, but also can provide services to other users.

The state's motive to stay present as a producer or service provider in specific branches is associated to the wider public interest. In that sense, one of the most important reasons for engaging the state is solving problems of the so called, natural monopoly, whose existence is made inefficient by the presence of more companies in the branches which initially require very high investments. In this regard, it is necessary to emphasize that the state deals with some commercial activities in a

⁵ Made by the author

⁶ Paragraph 19 of the Public Property Law (Official Gazette of RS, no. 72/2011)

similar way as the private sector (where winning motives are present), but they must not be the only thing that is important.⁷

Budget assets are provided within budget appropriations. Most of the countries worldwide use an upward approach to budgeting, within which the budget is implemented by setting aside the resources anticipated by the Budget and Spending Units Law. On the contrary, descending budgeting is implemented by determining overall expenses limitation in accordance with basic social-economic and developmental priorities defined in program documents. This form of budgeting implies several steps which can be grouped in two phases: determination of total costs limitation and determination of upper limits in specific sectors. For example, in Denmark special limitations are determined for current and capital expenses, in order to prevent transfer of assets from capital investments to current consumption.

Current expenses have to obey the golden rule and capital investments rule of sustainable investment⁸, which aims to maintain the debt „on a cautious level“ by determining the investment rates. The only purpose of the rule is to decrease the total demand in order to decrease inflations and unemployment, which achieves by increase of investments size. For example, a level of debt which is considered „cautious“, is up to 40% of GDP.

Capital projects are the construction projects and the projects of capital building and infrastructure maintenance, important for the Republic of Serbia, i.e. a local authority, including the service of project planning as the project's integral part, providing a building site, as well as the projects which imply investments in equipment, machines and other non-financial property, and are of public interest.⁹ Generally observed, capital projects can be divided in four groups: tactical, strategic, urgent and reconciliation projects.¹⁰

⁷ Malinić D. (2013) Financial weakness of public companies, 44. Symposium, Zlatibor 23-25 May, pp. 132-133

⁸ Young, Stuart: The British Budget Process: A Case Study. Harvard Briefing Paper 32/2006. www.law.harvard.edu/faculty/hjackson/BritishBudget_32.pdf (28.09.2013.)

⁹ Paragraph 2 Budget System Law (Official Gazette of RS, No. 54/09, ..., 62/2013)

¹⁰ Zaman S, Drčelić B, (2011) Directions for prioritization of public investment projects, Support to the national investment planning and conducting, Belgrade, pp. 96.

The grade of capital projects is implemented in two basic parts: the first one, where the priorities are determined and the other one, in which determine financial effects of the capital projects are determined. Within this text we will show the need for use of methods which refer to the second part of the capital projects grading in the public sector.

Spending units, by the newest changes of the Budget System Law, are obliged to make an evaluation of capital projects and can be used for numerous methods. Depending on a concrete situation it is possible to use only one or combination of several. In order to avoid mistakes and reduce the effect of methods' bad features it is best to combine the methods.

The starting point for the grading capital projects in the public sector is the price of financial resources, which are used for investment needs. Base for price determination is interest as the price of someone else's capital use. The amount of interest is the function of three variables: primary borrowed amount (principal), interest for borrowed time period, as well as a number of time periods (number of years) for which principal is borrowed.

A formula for calculation of such simply defined interest can be written as:

$$S = P_0 * k * g \quad (3)$$

where:

S – simply defined interest in currency units,

P₀ – principal or initially borrowed amount in time period 0,

k – interest for time period,

g – number of time periods, i.e. number of years¹¹

This is the formula for calculation of simple interest. This is the interest which is paid only to the primary amount.

Or, for any simple interest, the future value at the end of the g period could be written as:

11 Van Horne J., Wachowich M. J. (1995) Fundamentals of financial management, Prentice Hall Inc, New Jersey.

$$FV_g = P_o + S = P_o + P_o * k * g \quad (4)$$

In case of unknown principal, the previous expression can be written as:

$$P_o = \frac{FV_g}{1 + k * g} \quad (5)$$

Time value of money cannot be expressed through simple interest. It is necessary to calculate compound interest.

In this case, the interest is calculated both on interest and principal (compound interest or complex bearing interest). It means that the interest paid periodically is added to the principal. This can be shown with the following formula:

$$FV_g = P_o * (1 + k)^g, \quad (6)$$

or

$$FV_g = P_o * (FVKFk, g)$$

where FVKFk,g – is future value of interest factor, with interest rate k%, and time period of g years, and can be expressed as (1+k) g.

Financial table facilitates tracking the bearing interest procedure, since it gives already calculated values of interest factor for interest rate k, and time period of g years. It can be said that the bearing interest is the procedure of defining the future value by which we dispose in this moment.

An answer to a question how much money, for which expects to be ensured in some time period of g years, and with the interest rate of k%, can be got now is the discount technique.

Discounting reduces the future value to the present one. The discount process is realized by a discount rate. By the discount rate future money flows are reduced to the present value. This rate is also a measure of the solvency maintenance opportunity cost regarding the spending units. Opportunity cost is a value which could be achieved if resources were invested in some other investments.

Determination of the current value is basically a reverse process from the compound bearing interest. The equation for calculation of the present value can be written as:

$$PV_0 = P_0 = \frac{FV_g}{(1+k)^g}, \quad (7)$$

or

$$PV_0 = P_0 = FV_g = \frac{1}{(1+k)^g}$$

It can be noticed that the expression $\frac{1}{(1+k)^g}$ is a reciprocal value of interest factor for the future interest value of $k\%$ and for the period of g years, or $PV_k F_k, g$. That reciprocal value has its name – a discount interest factor for $k\%$ for the time period of g years, i.e. $PV_0 = FV_g * (PVIF_{k,g})$.

Management of spending units' assets solvency

By making changes and amendments to the Budget System Law („Official Gazette of RS“, no. 54/2009, 73/2010, 101/2010, 101/2011 and 93/2012) it was primarily tried to influence the risk decrease from the spending units insolvency, i.e. making long-term negative consequences for delegated functions execution.

Spending units have to implement, in adequate way, the mentioned law clauses within their institutional domain, by which will predominantly affect to the risk decrease from insolvency and make the institutional system of equity capital management.

The significance of introducing solvency tracking system was tried to be initiated by quarterly and monthly quota, which are obliged to be planned by spending units. In this way accent was insufficiently put to a cash-flow analysis, which has been used in the finances system for almost half a century.

Practically observed, the inflow of assets, on any ground, has been causally connected to purposes approved by the budget for realization, but with a level of realization dependable from how fast the assets inflow into the budget. From the above mentioned clearly comes out a fact that managing solvency should not be put aside.

At all levels, and especially lower ones, it is necessary to constantly track and to improve the sustainable financing system, which represent the higher level of assets utilization within the budget year, but not higher than permitted. This refers predominantly to a level of satisfaction of

needs for inputs, in order to enable undisturbed functioning of the spending units.

Spending units, which depend on their own incomes are especially affected by insolvency, as well as the local authority with carried over authorities.

Establishment of the spending unit's solvency management system consists of several elements which need to be defined, and after that implemented in the existing financing system. The solvency management system base represents procedures for identifying, measuring and tracking of the solvency.¹²

In order to be conducted in practice, it is necessary to define the organizational structure of spending units and to identify the existing information systems. Depending on the character of spending units, two elements are differentiated:

- For some users the structure is monolithic (unique, there are no indirect users within the direct), for some this structure is differentiated (divisional, stencil or mixed) which implies more indirect users and institutions which use budget assets within the specific budgetary sub-system.
- Some spending units have a unique information system to which sub-systems of users are added depending on the organizational structure, while regarding others special individual information systems are set, etc.

Managing solvency implies that independence in managing finances in the best possible way use for achieving more complete and more qualitative execution of entrusted functions and set tasks in activities which the spending units deal with.

After defining these elements approaches to establishment of principles for managing solvency, by providing timely and adequate process in cases of increased insolvency risk and of course establishment of appropriate internal control system.

¹² Milojević I., Ignjatijević S., Đorđević D., (2013) *Spatial expression of business risks*, Economics theory and practice, Vol. VI, N°1 (1-87), page 12

On establishing the appropriate system of internal control accent was put by a series of legal and sub-legal norms, but the finance management was not exactly of utmost importance.

The treasury, as the financial institution, has a need for permanent solvency as well as other institutions, but a need for treasury solvency does not end in its own frame, but it institutionally sustain within the consolidation, i.e. within a whole series of users of assets. This will be especially emphasized during the implementation of the International Accounting Standards for public sector, where accounting base will have a priority in accounting reporting.

Methodology for managing the spending units' solvency

As a supplement to the research we will suggest the methodology for solvency management of spending units.

The managing method of spending unit's solvency, which represents a risk of making negative effects due to inability to settle mature liabilities, it is necessary for the users to regulate in form of the Rule Book in which it would comprise the following elements, necessary to determine and implement into the continuous process of tracking and managing solvency;¹³

1. to determine the principles for solvency management,
2. to organize solvency management,
3. to determine the procedures for identifying, measuring, mitigation and tracking of solvency,
4. to establish the information system which supports solvency management,
5. to provide timely and adequate process in cases of increased solvency risk,
6. to set up appropriate system of internal controls for solvency management.

¹³ Milojević I., Vukoje A., Mihajlović M., (2013) *Accounting consolidation of the balance by the acquisition method*, Economics of Agriculture, Vol. LX, N°2 (217-436), page 239

Spending units track solvency on monthly basis, by set procedures, according to income and expenses projections, within the plans for the budget realization.

Determination of the solvency management principle comprises the principles which particularly refer to:

1. developing of organizational and normative ground for the solvency management,
2. managing solvency by types of financing,
3. providing stability of funding sources for liabilities,
4. managing approach to market sources of solvent assets,
5. making a plan in case of some unexpected events,
6. public announcement of information regarding the solvency improvement.

Organization of solvency risk management comprises making organizational structure of spending units in a way which enables realization of the principles for solvency management.

Determination of procedures for identifying, measuring and tracking solvency includes:

1. methods of information exchange, significant for solvency management between organizational units, in whose domain solvency management is;
2. basic exposure indicators to solvency risk, a way of their tracking and value limits of those indicators, as well as a procedure in case the limit exceeding;
3. ways for making a business plan in case of some unexpected events and for its periodical updating;
4. methodology for making reports on solvency indicators.

For determination of coordination between monetary incomes and expenses, spending unit is obliged to determine maturities scale, for already determined time period.¹⁴

¹⁴ Milojević I., Vukoje A., Mihajlović M., (2013) *Accounting consolidation of the balance by the acquisition method*, Economics of Agriculture, Vol. LX, N°2 (217-436), page 240

Registering monetary incomes and expenses in the maturity scales is made by applying the following criteria:

1. monetary incomes register by the maturity period or a real collection period,
2. monetary expenses register by the maturity date or the earliest date for collection of potential liabilities.

Inconsistency of monetary flows by the maturity period expresses individually for every maturity scale and in cumulative amount.

The solvency level is expressed with k , and the stated indicator should be higher or equal to 1.

The solvency indicator represents a ratio between the solvent assets sum and the maturity liabilities sum.

Establishment of the information system, which supports solvency management, comprises the establishment of such information system which will, among other things, provide data for timely and continually management of the solvency:

1. tracking solvency by set periods,
2. tracking solvency for types and sources of financing,
3. tracking business inconsistency with set limits for solvency management,
4. determination of solvency indicators,
5. trends analysis and stability evaluation of liabilities settlement,
6. identification of key internal and external factors, whose changes affect solvency,
7. quantitatively expression of internal and external factors change,
8. making reports and information for needs of bodies and persons included in the process of solvency management.

Spending unit is obliged to make a plan for solvency management in crisis situations, when is necessary to provide conditions for a rapid transformation of other types of assets in cash.¹⁵

¹⁵ Milojević I., Ignjatijević S., Đorđević D., (2013) *Spatial expression of business risks*, Economics theory and practice, Vol. VI, N°1 (1-87), page 14

The plan should contain:

1. defining situations in which the plan is applied;
2. clear division of tasks, authorizations and responsibilities for the plan realization;
3. procedure for early detection of possible problems regarding solvency, which include a list of solvency indicators and other indicators;
4. names of persons responsible for identification of problems, as well as persons who must be informed of it;
5. planned forms of communication with major creditors and debtors and public;
6. obligation to prepare special reports with data, indicators and other information significant for taking measures in case of the solvency crisis;
7. approach method to available or potential sources of solvency, as well as procedures for ensuring approach to additional financing sources;
8. method of authority informing on the solvency crisis causes, as well as on planned activities for their elimination.

After evaluation of series of elements, which is necessary to establish and implement into the system of the spending units' financial assets use, there appears a need for setting up a system of this process control, and in this regard is necessary to establish the adequate system of internal controls for solvency management, which comprises:

1. adequate control activities, conducted by the persons responsible for solvency management,
2. regular evaluation of adequacy, reliability and efficiency of this system, executed by the internal control and financial audit.

In this way, the spending units enable insolvency risk reduction, by which they contribute to higher functionality in realization of basic effectiveness requests and efficiency during the entrusted assets use.

Conclusion

Maintaining solvency at spending units in time of general economic crisis represents a primary task. Caused by numerous factors, along with insolvency risk increase, settling liabilities in anticipated legal limit of time has the effect of cash balance constant sustaining.

In regard to this, the financial service of spending units must continually track and analyze the relation between planned and spent financial resources of the treasury consolidated account. It is especially significant for the local authority units which are not evenly developed, and they have the same need for satisfaction of some needs.

Within the previously mentioned the question is how to plan and reserve the assets for a specific purpose, which should be determined for the investment capital projects, and not to disturb the treasury consolidated account's solvency. For these needs exactly perceive the solvency opportunity costs, i.e. money price on the market. Of course, going further into analysis comes to the investment methods application for evaluation of investments in projects, which was not analyzed in this text because they indirectly affect the budget solvency maintaining.

At the end is necessary to emphasize that, by using the method for evaluation of cash balance, comprise to decrease solvency opportunity costs, which is very important for spending units from the financing price point of view.

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ECONOMIC INSTRUMENTS FOR ENVIRONMENTAL POLICY IN SERBIA

Jelena Matijašević¹, Anastazija Tanja Đelić²

Abstract

Economic instruments are one of the groups of instruments in the field of environmental protection, whose goal is achieving specific environmental improvements. The main purpose of the application of economic instruments is to ensure adequate environmental-pricing of natural resources, in order to ensure their effective use and proper allocation. This study presents the characteristics of economic instruments, the key criteria of their classification, the situation in developed market economies, as well as all other relevant information on this subject. Special attention was paid to the situation in Serbia in terms of legislation, investment environment, using different sources of finance and economic instruments.

Keywords: *Economic instruments, Economy, Ecology, Environment Protection Policy, Republic of Serbia.*

Introduction

Environmental degradation in recent years takes on an expansive proportions. Environmental degradation implies numerous consequences. Particularly significant health and economic. Also, the growth of industrial activity in most countries, including Serbia, has increased pressure on the environment due to outdated, polluting technologies extensively. The energy sector is the biggest emitter, because it uses a polluting fuel that is burned in outdated equipment, without the use of technology to reduce pollution. Air and water pollution for many years

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greatly exceeds the established standards. The intensification of agricultural production in Serbia is causing contamination of land. People also made a significant impact on the environment, especially through home and transport activities. The result is reflected in the decline in the quality of water resources in most parts country, which is partly due to the poor state of infrastructure in the field of environmental protection in relation to waste management, water supplying, and waste waters, and more than 10 years of limited expenditure on maintenance and repair of the public and the private sector.

On the other hand, there are different solutions of potential problems in this area. "The man has finally realized that the question of the survival strategy, demands a different attitude towards the environment. One of the basic concepts of economics of natural resources and the environment is the concept of sustainability and sustainable development."³ Economic aspect of sustainable development, assumes such behavior in the use of resources (human, natural and manufactured) that will maintain the dynamic balance of relations: Nature-Man-Society-Technology-Economy. Therefore, sustainable development is a goal of many projects that are planned, initiated or implemented in recent years.

The theme of this this paper is economic instruments of environmental policy, that is, their characteristics, the key criteria, the situation in Serbia, with reference to the economic instruments of environmental policy in developed market economies. The reasons for choosing this approach to the topic defines a relationship of financial and environmental aspects. in focus relations between Finance and Environment are economic instruments (taxes, fees, subsidies, tariffs and penalties). Specific issues that were addressed in this study is the relation of economics and ecology, as well as basic aspects of sustainable development.

³ Dragan Mihajlovic, Dragica Stojanovic, Biljana Ilic: "Economic management in terms of sustainable socio-economic development", VIII Meeting of businessmen and scientists, " Operations management in terms of sustainable economic growth and development in Serbia 2011 - 2020, p.448, http://www.spin.fon.rs/doc/ret/SPIN%202011/Sekcije/09ekoloski%20menadzment-pdf/905_EKOLO%C5%A0KI%20MENAD%C5%BDMENT%20U%20FUNKCIJI%20ODR%C5%BDIVOG%20DRU%C5%A0TVENO-EKONOMSKOG%20RAZVOJA.pdf (15/02/2013)

Relationship between economic growth and environmental

The debate between economists and ecologists takes about twenty years and shows that most of the economists have antiecolological attitude. Economists often ignore the social and ecological interdependence of treating all goods equally, not thinking about the various ways in which these assets relate to the rest of the world - whether it is produced by humans, or its formed naturally, whether they are renewable or nonrenewable. In addition, economists have also ignored the environmental costs that do not fit into their theoretical models. Gain or profit is increasingly realized at the expense of balance in nature, which has a negative impact on the environment of man. The economy is the most dependent on energy and the production of goods it is oriented to the capital, not to work. By reducing the natural resource, capital that remains is a very scarce resource. The economy is so focused on the capital, energy and natural resources.⁴

On this issue among experts representing different perspectives. And economics and ecology have their specifics in various ways support the justifiability of activities that are performed in each area separately. At the outset, however, the most important thing is to understand the aspirations that are a priority for both the economic sphere and in the sphere of ecology.

The main goal and / or economy task in relation to the environment is finding of such procedures and methods which will through the production process, ensure the most efficient possible way, "processing" natural resources into goods and services to satisfy some of the many human needs. In contrast, the basic "interest" ecology, also with the aim of satisfying certain (s) of human (s) needs, to the environment, with all its resources, preserve cherishes.⁵

⁴ The economic aspects of organic agriculture, p. 3-4
<http://www.ef.uns.ac.rs/Download/menadzment-organske-proizvodnje-hrane/2012-05-29-privredni-aspekti-organske-poljoprivrede.pdf> (10/02/2013)

⁵ Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), *Economy Ecology - Ecology Economy*, Ministry of Environmental Protection of the Republic of Serbia, p. 5,
<http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20OMIJA.pdf>
(13/02/2013)

Such a character of the relationship between economy and ecology to the environment is expressed in virtually all of the four basic properties (use value or utility) that natural environment has for humans: 1. appears as a provider of renewable and non-renewable raw materials that are used as inputs in the production process (included in the category of the production factor "land"), 2. possession of such public resources *poseduje takve javne resurse* which in its natural (in no way the altered by humans) condition enables fulfilling of a whole range of individual, his existential and derived needs - air to breathe, water to drink, to enjoy the natural scenery and recreation, etc., 3. represents a "natural kolektor" all kinds of debris that man produces its production and biological activity (including noise and the warming of the atmosphere), and 4. gives land as a place and space for all human, and thus also economic activity.⁶

Such a character of the relationship between economy and ecology to the environment is expressed in virtually all of the four basic properties (use value or utility) that natural environment has for humans:

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3. represents a "natural kolektor" all kinds of debris that man produces its production and biological activity (including noise and the warming of the atmosphere), and
4. gives land as a place and space for all human, and thus also economic activity.⁷

Considering the above, the confrontation of economy and ecology is nothing than, searching, retrieval and use of such a resource allocation

⁶ Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), *Economy Ecology - Ecology Economy*, Ministry of Environmental Protection of the Republic of Serbia, p. 5, <http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20OMIJA.pdf> (13/02/2013)

⁷ Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), *Economy Ecology - Ecology Economy*, Ministry of Environmental Protection of the Republic of Serbia, p. 5, <http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20OMIJA.pdf> (13/02/2013)

mechanism which, along with maximizing economic efficiency will ensure maximum preservation of the ecological balance.

Economic Instruments in Environmental Protection

Instruments of global environmental policy are based on the principles of international environmental policy, which are the basis for the activities of certain subjects of politics and law, as well as the basis for determining the general framework of the interpretation of certain specific situations. These principles can be three-fold:

- Principles used for the design of global environmental policy and sustainable development;
- Principles relating to cross-border disputes in relation to the environment;
- Management principles of international institutions in the field of environment.

The most principled stances of this corpus are:

- The principle of state sovereignty;
- Obligation of not causing damage in environment;
- The principle of state responsibility for the situation in the field of environment;
- The principle of prevention;
- The principle polluter of properties;
- The principle of cooperation;
- The principle of common but differentiated responsibilities.

Mechanisms and funds of implementation of the above principles are: regulatory measures (standards and regulations), prohibitions and restrictions, assessment of the environmental impact, licenses and permits, economic instruments, public participation in decision-making mechanisms for implementing the prescribed norms, education, development and improvement awareness of the environment, transfer of appropriate technology, and other.

Economic instruments are one of the groups of instruments in the field of environmental protection, which aims to achieve certain environmental improvements.

According to some authors, "in all developed societies, for the success of environmental policy are essential to well-placed, well-designed and well-calibrated economic instruments"⁸. When deciding on investments in environmental protection must be counted with the existence of more possibilities and more variants. This requires evaluation of each variant according to the principle: cost - benefit, so that the results represent a reliable basis for the determination of the best variant.⁹

The primary purpose of the application of economic instruments is to provide adequately determine the cost of environmental-natural resources, in order to ensure their effective use and proper allocation. If you get a realistic ecological resources, adequate price, like any other goods, it can be expected that they will then be treating them like any other factor of production, which means the efficient allocation of scarce resources. Properly set the price level of environmental resources is reflected in the fact that in the case of the marginal cost of pollution reduction is equal to its marginal cost of environmental damage. However, in the field of environmental protection, in principle, the market does not acts in a classical form, then recourse to the application of so-called "second best solution" (second-best solution approach). It practically equate the marginal costs of protecting the environment by specifying the price per unit of pollution generated. In this way, the effect is achieved by an efficient situation, since a certain degree of pollution reduction achieved with the lowest costs.

Cost efficiency is the basic characteristic of economic instruments.¹⁰ Tabular views of basic characteristics of economic instruments of environmental policy and environmental instruments in developed market economies are given in the tables that follow.

⁸ Radmilo Pesic: „*Economic instruments in order to improve implementation of and compliance activities in the field of environment - current status, prospects and recommendations*," p. 5, http://www.eukonvent.org/downloads2/101008-radmilo_pesic.pdf (15/02/2013)

⁹ Ljubica Gajic, Ivana Medved i Livia Rac: ” *Costing and Ecology - new approaches to business improvement*," the school of business, No. 4/2010, UDC 502.17:657.47, p. 78, <http://www.vps.ns.ac.rs/SB/2010/4.9.pdf> (15/02/2013)

¹⁰Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), *Economy Ecology - Ecology Economy*, op. cit., p. 8

Table 1. *The basic features of economic instruments of environmental policy*

ECONOMIC AND ENVIRONMENTAL INSTRUMENTS - GENERAL CHARACTERISTICS	
Expenses saving	can realize significant cost savings, as they allow selection of the most appropriate method polluter to fit the required standards
Initiative effects	give specific initiative to reduce the effects of pollution below the allowable limit, and through the introduction of new "clean" technologies, products and processes
Flexibility	increase flexibility in the protection, because it is always easier to modify and adjust the height of taxes, but the whole legal framework,
Resource Conservation	act in terms of promoting conservation of environmental resources and their transfer to the next generation
Financial resources	supply a significant source of finance that can be used for environmental purposes or as part of the fiscal policy

Source: *Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), Economy Ecology - Ecology Economy, Ministry of Environmental Protection of the Republic of Serbia, p. 10, <http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20MIJA.pdf> (13/02/2013)*

Table 2. *Economic instruments for of environmental protection policy in the developed market economies*

ECONOMIC - ENVIRONMENTAL INSTRUMENTS IN DEVELOPED MARKET ECONOMIES	
Taxes on emissions	proved to be most effective at stationary sources of pollution, and there are significant differences in their marginal cost reduction between certain pollutants
Taxes on products	most often applied to those items that are produced and used in large quantities and in different ways of use (in extreme cases, extremely dangerous and harmful product can be insted of taxes on product, banded the production or using)
The system deposits	used in those products that can be successfully recycled, reused or who are looking to destroy the proper disposal after use
Trade law	pollution policies can be restricted to certain areas or subjects (initially determine the level of contamination can be made by direct allocation (assignment) or exogenous variables from a particular environmental program, or different types of auctions, way much of the endowment predisposes acceptability of the program, and it is directly related to the costs of implementation.

Source: *Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), Economy Ecology - Ecology Economy, Ministry of Environmental Protection of the Republic of Serbia, p. 12, <http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20MIJA.pdf> (13/02/2013)*

According to the normative economic theory, the essential character of economic instruments are highlighted as follows:

- 1) efficiency, which can be economic or cost;
- 2) reliability, ie. to which extent we can rely on a certain instrument, that it will achieve a certain goal;
- 3) level of awareness by the public subject must possess in order to properly implement the instrument, which affects the cost of obtaining information;
- 4) long-term consequences, in the sense that the effect of the instrument over time weaken, strengthen, or remain unchanged;
- 5) applicability, which is the degree of control necessary to make the instrument more efficient, ie. What are the costs of a particular application of the instrument;
- 6) dynamic efficiency, in terms of what the impact on the competitiveness of the application of an instrument over time, whether its application creates incentives to increase production quality and reduce pollution
- 7) flexibility, ie. whether the application of the instrument can quickly adapt to changing conditions,
- 8) neprotivurecnost and compatibility, ie. economic instrument that does not suppress the desirable effects of other instruments, but to be kompatiblini with the objectives of environmental policy as well with economic policy in general;
- 9) fairness and the effect that has on the application of the instrument on distribution.¹¹

In a democratic constitutional state of economic policy and environmental policy in the first place must respect the limits prescribed by the Constitution and existing laws. In addition, given the economic organization, procedures and economic policy environment must respect the rules of behavior and limits within which will not be disturbed by the basic principles of operation and the ability of the market mechanism in

¹¹ Radmilo Pesic: „*Economic instruments in order to improve implementation of and compliance activities in the field of environment - current status, prospects and recommendations*“, op. cit., page. 6

which the economic system is based. Limits the autonomy of national governments derive from commitment to the State to supranational economic and political alliances (for example. EU, CEFTA), membership in international institutions and agreements (eg, IMF, UN, WTO). Instruments to relevant policymakers and thus environmental policy, are available in the following display, and classified according to the intensity and immediacy of interference in the freedom of making decision economic entities.¹²

Table 3. *Classification of policy instruments*

Instruments of economic policy	Moral pressure	
	The institutional framework conditions	Arrangements
		Codification
	Indirect economic activities of the state	
	Macroeconomic management of fiscal policy measures such as taxes and subsidies	
	Directly regulate individual economic behavior	Completely prohibition or order
Quantitative grading		

Source: Development and environmental policy, p. 9, http://www.futura.edu.rs/servisi/materijali/Razvoj%20i%20politika%20za_tite%20ivotne%20sredine.pdf 13/02/2013

Economic instruments for environmental management is usually applied in the following areas: protection of air, water, waste disposal, transport, nature conservation and biodiversity, natural resources (land, forests, agricultural land, mineral resources), production and import of technology environment, general taxes on the environment, environmental funds (local, regional, national, international / supranational).¹³

¹²Development and environmental policy, p. 9, http://www.futura.edu.rs/servisi/materijali/Razvoj%20i%20politika%20za_tite%20ivotne%20sredine.pdf (13/02/2013)

¹³Development and environmental policy, op. cit., p. 10

The situation in Serbia

Economic instruments aimed at environmental protection in Serbia were introduced on the basis of the Law on Environmental Protection in 2004.¹⁴, a specified range of regulations and their implementation and operation. Shaping instruments for environmental protection was performed in three groups: 1.) command-control instruments, which directly regulate prohibitions and license in the production and consumption of goods and services; 2.) economic instruments of direct and indirect regulation (taxes, fines, fees, grants and other forms of economic stimulus and load) environmental management; 3.) voluntary instruments manufacturers, consumers and government to promote ecological balance, as well as integrated planning with an emphasis on sustainable development, environmental responsibility of producers during the lifetime of the product (can be combined with taxing the life cycle of a product or production technology), the arrangements and control measures and evaluation of the environment (pollution levels), information systems and the public on the environmental problems (combined with public moral pressures).¹⁵

Article 83 Law on Environmental Protection stipulates that the Republic of Serbia and the autonomous province or local self-government, within its powers provide funding and achieving the objectives of environmental protection. Funds for environmental protection may be provided through grants, loans, international assistance, foreign investment funds for environmental protection, the funds from the instruments, programs and funds of the EU, the UN and international organizations. The law regulates the types of economic instruments. Article 84 the prescribed fee for the use of natural resources. Article 85 the prescribed fee for pollution. Polluter is obliged to pay compensation for environmental pollution. The criteria for determining the fees are: 1) the type, quantity and characteristics of emissions from a given source, 2) type, quantity and characteristics of emissions generated or disposed of; 3) the content of harmful substances to the environment in the raw material, semi-finished product. Funds generated from this fee to 60% of the revenue of the Republic of Serbia, in the amount of 40% of the revenue of the local government unit. Article 85a. regulated charges for environmental pollution in areas of

¹⁴Law on Environmental Protection, " Official Gazette RS", p. 135/2004, 36/2009, 36/2009 – Other Law, 72/2009 – Other Law and 43/2011 - decision US

¹⁵ Development and environmental policy, op. cit., p. 7

special interest. The government determines what are the areas of interest and provides criteria for the identification of areas of special interest. Funds generated from this fee of 80% are revenue of the Republic of Serbia, in the amount of 20% of the revenue of the local government unit. Article 87 of the regulated charge for the protection and improvement of the environment. The local government may, within its own rights and duties, impose a fee for the protection and improvement of the environment. Articles 89-100. prescribes the following economic instruments - budget funds and international financial assistance. Funding earmarked budget funds and international financial assistance is made through the Fund for Environmental Protection, which was established to provide funds to encourage the protection and improvement of environment in the Republic of Serbia. According to the relevant provisions of the Act, include only funds of the province and the local governments. Article 101 are governed by economic incentives. For legal and natural persons who apply technology products and marketed products whose impact is better than other similar, or using renewable energy sources (solar, wind, biogas, etc.), Equipment and devices that directly serve to protect the environment, can be determined by tax, customs and other relief or exemption from payment under the terms and conditions established by a special law. Tabular presentation of economic instruments of environmental policy in Serbia follows below.

Table 4. *Economic instruments for environmental policy in Serbia*

ECONOMIC - ENVIRONMENTAL INSTRUMENTS IN SERBIA	
species	regulates
Compensation for the usage of natural resources	Separate legislation (exploitation of mineral resources, land use, water, forests, collecting and trading of wild flora and fauna, fishing, etc.)
Compensation for polluting the environment	Government (define types of pollution, the criteria for the calculation of payers fee, amount and method of calculation and payment of applicable fees)
Special funds of budget	Government by ministries
International funds of financial assistance	Government on integrated programs

Source: *Jordan Aleksic, Boza Draskovic, Maja Mitic, Natasa Velickovic (edited), Economy Ecology - Ecology Economy, Ministry of Environmental Protection, Republic of Serbia, p. 13*, <http://www.futura.edu.rs/servisi/materijali/EKOLO%C5%A0KA%20EKON%20MIJA.pdf> (13/02/2013)

According to the report on the environmental situation in the Republic of Serbia in 2011. year, there is no systematized data on the allocation of funds for specialized institutions (public and private undertakings which carry out waste management, waste water management, etc.), or sector of the economy that put strong pressure on the environment (manufacturing, mining, transportation, etc.).

For the protection of the environment, based on available data ¹⁶, it is estimated that in 2011. The energy sector has invested 5506.31 million, while the water and agricultural sectors singled 739.52 and 35.00 million. The following table shows the estimates of investment in these sectors of the economy for the period 2009-2011. year, expressed as a percentage of gross domestic product (GDP).¹⁷

Table 5. *Investments in environmental energy, water management and agriculture in the period 2009 - 2011. (in% of GDP)*

	2011th	2010th	2009th
Energetics	0,16	0,14	0,19
waterpower engineering	0.02	0.04	0.03
agriculture	0.001	0.001	0.001

Source: *Report on the state of the environment in the Republic of Serbia in 2011. year, the Ministry of Energy, Development and the Environmental Protection Agency and Environmental Protection, Belgrade, 2012, page 177.*

Based on the analysis of data for the period 2009-2011. years, from the national budget for environmental protection is constantly allocated 0.3% of GDP, while energy, water and agriculture summary invested around 0.2% of GDP (2010. approximately 5 billion, and the 2011th about 6.3 billion CSD), and the estimated donations ranged around 0.5% of GDP (2010. and 2011. amounted to 1.4 and 2.0 billion).

¹⁶ Contributions to line ministries by the Agency for Environmental Protection received order to prepare the report on the environmental situation in 2009, 2010. and 2011. year, according to: report on the environmental situation in the Republic of Serbia in 2011. year, the Ministry of Energy, Development and the Environmental Protection Agency and Environmental Protection, Belgrade, 2012, p. 176

¹⁷ Report on the environmental situation in the Republic of Serbia in 2011. year, the Ministry of Energy, Development and the Environmental Protection Agency and Environmental Protection, Belgrade, 2012, p. 176

Total revenues from compensations in 2010. year were 8.5 billion (0.3% of GDP), and the 2011th amounted to 8.9 billion (0.26% of GDP). Incentive funds are allocated from 2010, and 2011. increased compared to 2010, from 0.3 to 0.9 billion (Table 7).¹⁸

Table 6. *Sources of Financing and economic instruments for environmental protection in the Republic of Serbia 2009-2011. (% of GDP)*

			2011	2010	2009
Economic instruments	Sources of Financing	Expenditure from budget	0,30	0,30	0,30
		Energy, waterpower engineering, agriculture	0,19	0,18	0,22
		Income from fees	0,26	0,30	0,06
		International donations	0,06	0,05	0,05
		Incentive funds	0,03	0,01	/

Source: *Report on the environmental situation in the Republic of Serbia in 2011. year, Ministry of Energy, Development and the Environmental Protection Agency and Environmental Protection, Belgrade, 2012, page 177.*

¹⁸Report on the environmental situation in the Republic of Serbia in 2011. year, op. cit., page. 177

Structure financing sources environment has changed compared to 2010. year. The total financial assets, increased the share of expenditures from the budget from 36.3% to 37.0%, international donations from 6% to 7.4% and the sector of the economy (energy, water and agriculture) from 21.4% to 23, 1%, and reduced participation fees from 36.3% to 32.5%.¹⁹ Estimated total funding for the protection of the environment are reduced to a minimum compared to 2010. year, with 0.83% of GDP to 0.81% of GDP, but it was significantly higher than the 0.63% of GDP in the 2009.²⁰ On the basis of data on investments in the environment which we present in this paper we have selected some conclusions:

1. Estimated funding for environmental protection in 2011. The slightly decreased compared to 2010. year, with 0.83% of GDP to 0.81% of GDP, but much higher than the 0.63% of GDP in 2009. year;
2. There are not systematized data on investments in environmental protection of specialized institutions in waste management, waste water management and others. Or sector of the economy (manufacturing, mining, transportation, and others.);
3. In the future, priority will be to establish a sustainable system of financing environmental protection and the improvement of economic instruments.²¹

Conclusion

The purpose of economic instruments of environmental policy is multifaceted. A significant foundation of the optimal integration environmental policy at the national and international levels with other policies. In particular, it refers to the system of proper pricing of environmental resources, which should lead to easier fitting of environmental policy in the whole fiscal and pricing system. It is important to point out that the use of economic measures government can adjust/reduce the degree of intervention by the legislation, which consequently leads to repressive attitude, and its gradually replaced by a preventive approach to this type of problem.

¹⁹ Report on the environmental situation in the Republic of Serbia in 2011. year, op. cit., page. 177

²⁰ Ibid., 178

²¹ Ibid., 176

Economic instruments in OECD countries soon showed that economic measures can achieve many objectives in the field of environmental protection. As for the situation in Serbia, an effective system of economic instruments should lead to encourage the reduction of pollution, and the introduction of efficient financial mechanisms which will encourage investment in the environment and will provide reliable sources of financing of the Fund for Environmental Protection and budget funds for the Environment of local governments, whose funds are earmarked to finance environment.

Literature

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FORECAST OF FUTURE INVESTMENT TRENDS IN AGRICULTURE WITHIN THE DANUBE REGION IN REPUBLIC OF SERBIA¹

Jonel Subić², Lana Nastić³

Abstract

Since investments represent a basic material factor of socio-economic development, their volume, structure and efficiency largely affect on how will be and until what level will be solved basic issues of sustainable development of agriculture, as within the Danube region, as well as in whole Republic of Serbia. Having in mind the perspectives that come for Serbia from the process of European Union (EU) enlargement, as well as that in sustainable development of agricultural husbandries investments will play a key role, borders of this study are framed by forecast of future investment trends in agriculture within the Danube region in Serbia. For forecasting of future investment trends in agriculture of Danube region in Republic of Serbia was used scenario analysis based on two methodological approaches. First methodological approach tries to answer the question: What could happen? Second methodological approach aims to answer the question: What would have to happen if we want to achieve certain strategic objectives?

Key words: *investments, fixed assets, agriculture, Danube region, Republic of Serbia.*

Introduction

As it lost 10 transition years (last decade of the previous century - period of devastation of all development resources) and started with transformation at 2001, the Republic of Serbia is currently in the central phase of transition and

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process of intensive redirection to market economy. At a time when developmental performances rank our country behind all European countries⁴, sectoral changes, as a factor of socio-economic progress, points to the necessity of expanding of activities that will lead to better competitiveness and export, and along with that to economic growth.

Republic of Serbia, within its territory, has on disposal rich natural diversity of the regional structure, as well as resources that provide conditions for economic development and quality life standard. However, the favourable natural conditions for the development and established economic capacities have not distributed equally within the all regions of the Republic of Serbia, so conditions for entry of fresh capital and future economic development are not equal too (Jakopin et al., 2009).

Acute shortage of investments imposes the necessity that all regions in Republic of Serbia have to make more attractive for capital attraction and its efficient investment, as it is main prerequisite for economic growth. In accordance with the concept of sustainable development, technological revitalization is necessary, as like development of competitive agricultural production with full integration of the modern technological solutions towards social acceptability, pollution minimization, environmental protection and economic justification. Accordingly, sustainable development of agriculture should be a component of a strategy that predicts not only medium-term development goals, but also the possible scenarios under which they can be achieved.

Main goal of this paper is to consider the current state and possible development directions that are a prerequisite for defining the objectives and instruments of sustainable development, as well as adjustment of agriculture in the Danube region within the Republic of Serbia. In that context, for better planning of certain measures, as for expressing of forms and future support to sustainable development of agriculture, was appeared the necessity for expert assessment of the possible future trends that relate to investments in fixed assets (Subić et al., 2008).

Territory of the Danube region within the Republic of Serbia, related to the purposes of this research, is observed in broader context and involves next sub-regions:

⁴ Current economic structure of Serbia is caused by the delayed process of transition, long-term isolation and absence from the world market, long-lasting disinvestment and significant technological backwardness towards developed economies (Jakopin et al., 2009).

- Territory of Upper Danube region;
- The Metropolitan area Belgrade- Novi Sad (for this area is also used term Central Danube region);
- Territory of the Carpathians within the Republic of Serbia (for this area is also used term Lower Danube region).

According to theme and goals of this research, forecast of future investments in agriculture refers to the investment trend within the administrative areas of following local communities:

- Within the Upper Danube region: city of Sombor and municipalities Apatin, Bač and Bačka Palanka;
- Within the Central Danube region: cities Belgrade, Novi Sad, Pančevo and Smederevo, as well as municipalities Beočin, Irig, Sremski Karlovci, Inđija, Ruma, Pećinci and Stara Pazova;
- Within the Lower Danube region: municipalities Golubac, Kučevo, Majdanpek, Kladovo and Negotin.

Since 2001, the adoption of a large number of legal acts led to a significant improvement of the business environment within the Danube region in the Republic of Serbia (primarily in the Metropolitan area Belgrade - Novi Sad). In accession process, main goals of many newly established reforms that are in accordance with the European Union (EU) legislation, point out in foreground business easiness and security of investment. Among many factors that describe the Danube region in the Republic of Serbia as one of the most attractive locations for business conduction in this part of Europe, especially are expressed: market size; business costs; human resources; geographical position; investment infrastructure.

For the most of industrial and agricultural products, Danube region in the Republic of Serbia provides the large sale potential to all investors, both on world and national market, which comes from: tax-free access to market of EU, USA, Russian Federation and South East Europe countries (SEE) - CEFTA Agreement; dynamic growth of wages and purchasing power of local population, whose average monthly income is cca. 350 EUR (net).

Openness to each potential investor is particularly directed to attraction of foreign direct investment, what will significantly increase the growth rate of gross domestic product (GDP) and reduce the unemployment rate (Subić et al., 2009).

Compared to other regions within the neighbouring countries, potential for investment attraction, according to business costs, is relatively more favourable on the territory of the Danube region in the Republic of Serbia, primarily because (Subić et al., 2013):

- *Low tax rates* (profit tax of 15%; the value added tax, 8% or 20%; income tax of 10%);
- *Numerous investment incentives*, which include state subsidies for direct investments (3.000 - 10.000 EUR per employee), then exemption from payment of profit tax for 10 years period in case of large investments, as well as exemption from payment of income tax and social security contributions for workers younger than 30 and older than 45 years;
- *Cheaper utilities* (such as electricity, gas or water);
- *Quality and price of labour*, which are, after general assessment of investors, one of the key reasons for investing in the Danube region and the Republic of Serbia (human resources are expressed by high productivity, excellent technical education, significantly lower labour costs);
- *Transport infrastructure* (European transport corridor 7, that links the EU countries with the Middle East);
- *Development of cross-border and regional cooperation* (Danube region in Republic of Serbia is bordered with several members of the European Union: Croatia, Hungary, Romania, Bulgaria);
- *Closeness of European market* (goods for a short time can be transported to and from the major European markets).

Considering the principles of sustainable development, because of establishing of strategic directions for mid-term development of agriculture in the Danube region in the Republic of Serbia (until 2016), in this paper are presented the volume of totally realized investments, realized investments in agriculture and estimations of future investment trends in agriculture.

Methodology and data sources

Investments are the main material factor of economic and social development. From the size, structure and efficiency of investment largely depends how and to what level will be resolved basic issues of economic and social development of any country, region or local community, as like (Subić, 2010): economic growth; balance of economic development; employment; level of standard of living; etc.

No matters on field of research, mostly of prognosis of future mowing are based on three scenarios: *pessimistic*, *most probably* and *optimistic*. Observing the field of agriculture, FAO (Food and Agriculture Organization of the United Nations) use the methodologies which are established on one base scenario, but with two variant (*optimistic* and *pessimistic*). Concrete, it makes one scenario with intervals in plus, apropos in minus (Cvijanović et al., 2010).

So, in the way to get to possibly better prognosis of future investments in agriculture in area of Danube region in Republic of Serbia, in which focus is medium-term period since 2011-2016., the scenario analysis which is given in this paper predict two possible scenarios. In the other words, it creates a scenario with minimal, optimal and maximal values, apropos scenario of high of investments depending of external and internal factors.

Prognosis are were done based on data for period 2001-2011, apropos based on data for 11 years. Reason because of which the prognosis are establish exactly until 2016, is to establish the proper relation between periods for which data exist and period on which is applying the prognosis. The prognoses can also be done for longer period, but on that way are decreasing the quality of given trend (apropos, it calls into question the accuracy of obtained estimations) (Subić et al. 2008.).

According the previous words, for prognosis of future investments in agriculture on area of Danube region in Republic of Serbia, were been used two methodological approaches. With first approach, is tries to give the answer on question: *What could be happened?* With other approach is tries to give the answer on question: *What should be happens, accordingly to strategic goals which we want to achieve in function of sustainable agricultural and rural development?*

In order to get the fuller insight in possible future mowing of investments in agriculture of Danube region in Republic of Serbia, using the ***first methodological approach (FMA)***, have been used three types of function: *linear*, *logarithmic* and *exponential*. Mentioned function is in a wide use, in theory and in practice, and can give very useful information for solving similar problems. Their results must provide, on first place, overview of expected *maximum* and *minimum* volume of investments in fixed assets, as well as getting an average values, apropos values which most realistic can be expected. Comparing the results obtained with use of certain types of function, easily can throw away prognosis which largely differing from realistically possible in observed period of time. During the analysis of results obtained by using

different types of function, must be taken into consideration the fact that prognosis were done based on available statistical data (apropos, based on recent investments in fixed assets).

Considering that future movements will depend not only on their previous amounts, but also on the socio-economic circumstances in which the investment process takes place, imposes the necessity of applying the ***second methodological approach(SMA)*** which leads to prognosis of investment level depending on external and internal factors.

In most important internal factors, for prognosis of the future movements of investments in agriculture in area of Danube region in Republic of Serbia, are include:

- agricultural resources;
- geographical position;
- human resources;
- agricultural capacities;
- private sector;
- agricultural structure;
- traffic and other infrastructure;
- segments of transition;
- administration;
- image in world;
- structure of use the realized gross domestic product (GDP);
- existing trends and attained level of investment in agriculture in the previous period;
- technology of production;
- dynamics and achieved level of modernization;
- level of competitiveness of important agricultural products;
- changes in macroeconomic framework, movement in economy in general and trier influence on standard of inhabitant living; which will reflect on the changes in supply and demand of agricultural products on the market;
- development of tourism, as an important factor of induction of demand for domestic products;
- costumer's relation to the local produced food, etc.

Between external factors for prognosis of the future movements of investments in agriculture in area of Danube region in Republic of Serbia, are include:

- dynamics of valorization of agricultural resources unused capacities;

- inflow of foreign direct investment (FDI), on the first place greenfield investment;
- involvement of Republic of Serbia in international transport and energetic corridors;
- possibility of increasing public-private partnership;
- integration process of Republic of Serbia in European Union;
- world financial and economic crisis;
- transitional condition of economics related to the surrounding;
- movement and tendencies on food market in region, European Union and global market;
- reached level of negotiation in frame of World Trade Organization about global liberalization of food trade;
- state of market in our region and state of bilateral agreements which Republic of Serbia is signed and which are in implementation process (CEFTA);
- liberalization of trade in frame of expected access of Republic of Serbia to World Trade Organization;
- trade liberalization in frame of upcoming Stabilization and Association Agreement id Serbia to European Union, etc.

Scenario analysis becomes from fact that is not realistic to expect big annual changes in investment movement in agriculture at area of Danube area in Republic of Serbia. In extreme situations, there is possibility to achieve maximal grow rate, until in some specific cases are possible to achieve and prominent jumps.

Results with discussion

In terms of the contemporary scientific and technical progress, investments strongly stimulate process of development, the economic growth in any area of economy. Practice is show that in initiation of any business activity, no matter on size and character, process of investment have role of *impulse*, app. *lever* which enables her to concretize, to take place and to develop in the accordance with the market mechanisms. According to that, can be said that for the economy investments represents same thing what represents motor for one active system (Romănu et al., 1997).

As a moving instrument of quantitative and qualitative growth of total agricultural productivity factors and production, but also creating of better conditions for social security of people on village, investments have crucial place in realization of goals and priorities of sustainable agricultural and rural

development. Investments in agriculture represents a condition of providing growth fixed and current assets, increasing the number of working places, raising the performance of working tools, better productivity of work, diversity of production etc. (Subić, 2007).

Process of investment contains in itself and process of scientific and technical progress, i.e. every investment, by rule, inevitably makes possible process of reproduction on one quality higher level.

Accordingly to that, investment growth in agriculture in area of Danube region in Republic of Serbia represents not only condition of its technical and technological modernization, but also condition of economic stability of domestic economy as a whole (Subić et al., 2009).

In order to evaluate the more precise movement of investments height is it shown its movement though longer time period, app. during eleven years (2001-2011). Besides the total achieved investments in Danube region, also is shown the area of Republic of Serbia, in general (Table 1.)

Amount of total realized investments in area of Danube region, from the beginning of analyzed period (2001) in is constantly growth, until 2008. After that, in 2009th it comes to sudden decreasing of investments activity, and after that to their gradual re-growth.

Share of total realized investments in Danube region in total realized investment of Republic of Serbia shows tendency to growth during the period since 2001-2005, but after that coming to decreasing of share and its smaller oscillation. However, share of analyzed indicator is relatively equable and it ranges from 51.19 – 64.53%.

Based on absolute amounts of total realized investments in area of Danube region and Republic of Serbia and their movement during the analyzed period, can be shown an average annual growth rate.

Were realized positive growth rate on both analyzed level. In the area of Danube region, average annual growth rate amounts 24,54%, until in the area of republic of Serbia realized rate is something smaller (24,48%).

Table 1. *Spatial distribution of totally realized investments* within the Danube region (in 000 RSD)*

Year	U.M.	Territory	
		Republic of Serbia**	Danube region
2001.	RSD	55,188,399	28,249,419
	%	100.00	51.19
2002.	RSD	102,860,663	53,353,886
	%	100.00	51.87
2003.	RSD	115,662,223	62,375,206
	%	100.00	53.93
2004.	RSD	152,929,464	85,321,807
	%	100.00	55.79
2005.	RSD	163,549,507	104,655,023
	%	100.00	63.99
2006.	RSD	291,845,739	170,224,981
	%	100.00	58.33
2007.	RSD	398,990,391	250,599,881
	%	100.00	62.81
2008.	RSD	472,746,680	305,046,151
	%	100.00	64.53
2009.	RSD	369,438,089	235,622,920
	%	100.00	63.78
2010.	RSD	425,400,001	253,314,348
	%	100.00	59.55
2011.	RSD	493,100,031	297,287,839
	%	100.00	60.29

Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

* *Investments in fixed assets.* ** *Without data for KiM.*

Amount of realized investments in agriculture in the Danube region and Republic of Serbia represents the same tendencies of movement. Until 2008th realized investments in agriculture achieved increase, after that in period 2009-2010th is expressed declining trend, but in 2011th coming to slight increasing of investments in agriculture (Table 2).

Amount of realized investments in agriculture of Danube region in total realized investments in agriculture of republic of Serbia, in period 2001-2011th show largely oscillations. Of particular importance is period 2008-2011, when is expressed the declining period, so share decrease from 67.12% to 27.72%.

The average annual growth rate of realized investments in agriculture in area of Danube region, during the period 2001-2011, amounts 14.07% until in area of Republic of Serbia growth rate is on a same level and it amounts 14.52%.

Table 2. *Spatial distribution of realized investments* in agriculture within the Danube region (in 000 RSD)*

Year	U.M.	Territory	
		Republic of Serbia**	Danube region
2001.	RSD	3,146,845	907,429
	%	100.00	28.84
2002.	RSD	4,947,895	1671,990
	%	100.00	33.79
2003.	RSD	3,260,612	1481,522
	%	100.00	45.44
2004.	RSD	3,721,166	2169,738
	%	100.00	58.31
2005.	RSD	5,028,799	2562,207
	%	100.00	50.95
2006.	RSD	13,016,883	4639,395
	%	100.00	35.64
2007.	RSD	14,111,462	8231,812
	%	100.00	58,33
2008.	RSD	21,099,194	14162,120
	%	100.00	67.12
2009.	RSD	13,203,838	5568,260
	%	100.00	42,17
2010.	RSD	9,219,328	3167,677
	%	100.00	34,36
2011.	RSD	12,211,147	3385,463
	%	100.00	27,72

Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

* *Investments in fixed assets.* ** *Without data for KiM.*

As well is already said, in frame of Danube region in Republic of Serbia, there are three administrative unity: area of Upper Danube region, Metropolitan area Belgrade – Novi Sad (i.e. Middle Danube region) and Carpathian area (i.e. Lower Danube region); which all have different significance in forming of total realized investments and investments realized in agriculture.

Highest importance in forming of total realized investments of Danube region (Table 3), have the area of Middle Danube region (which includes big cities cores, like Belgrade and Novi Sad), which share is from 94.19% to 96.38% during the analyzed period (since 2007-2011), until the lowest significance have the area of Lower Danube region, which share is from 0.51% to 1.71%.

Based on absolute values of total realized investments in period 2007-2011, by administrative unities of Danube region, has been reached next growth rate: 35,11% for Lower Danube region, 4,55% for Middle Danube region and - 11,48% for Upper Danube region (in this case is identify negative growth rate).

Table 3. Structure of spatial distribution of totally realized investments* within the Danube region (in 000 RSD)

Territory	U.M.	Year				
		2007	2008	2009	2010	2011
Danube region	RSD	250,599,881	305,046,151	235,622,920	253,314,348	297,287,839
	%	100.00	100.00	100.00	100.00	100.00
Upper Danube region	RSD	9,262,916	16,178,900	7,329,942	8,446,205	5,686,875
	%	3.70	5.30	3.11	3.33	1.91
Central Danube region	RSD	239,815,515	287,312,769	225,899,778	240,589,911	286,530,538
	%	95.70	94.19	95.87	94.98	96.38
Lower Danube region	RSD	1,521,450	1,554,482	2,393,200	4,278,232	5,070,426
	%	0.61	0.51	1.02	1.69	1.71

Source: Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.

* Investments in fixed assets. ** Without data for KiM.

In care of forming of investments in agriculture during fifth year analyzed period is visible extremely varying of share of some areas in frame of Danube region (Table 4). Biggest contributions have Middle Danube region, as in formation of total realized investments, as well in forming of realized investments in agriculture. From the other hand, regarding both indicators, share of Lower Danube region is almost negligible.

Table 4. Structure of spatial distribution of realized investments* in agriculture within the Danube region (in 000 RSD)

Territory	U.M.	Year				
		2007	2008	2009	2010	2011
Danube region	RSD	8,231,812	14,162,120	5,568,260	3,167,677	3,385,463
	%	100.00	100.00	100.00	100.00	100.00
Upper Danube region	RSD	713,588	5,698,310	383,768	656,937	477,600
	%	8.67	40.24	6.89	20.74	14.11
Central Danube region	RSD	7,462,489	8,451,244	5,184,492	2,510,740	2,889,763
	%	90.65	59.67	93.11	79.26	85.36
Lower Danube region	RSD	55,735	12,566	0	0	18,100
	%	0.68	0.09	0.00	0.00	0.53

Source: Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.

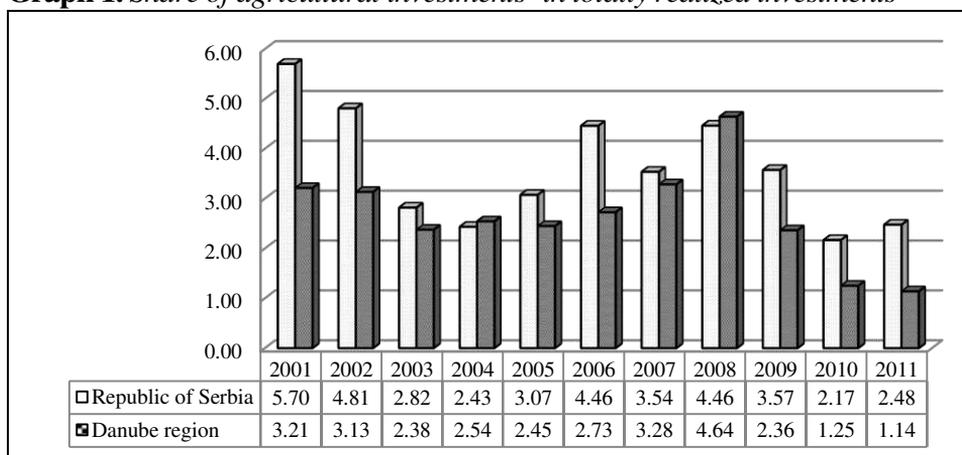
* Investments in fixed assets. ** Without data for KiM.

Annual growth rate of realized investments in agriculture, at all levels of administrative unities of Danube region, have negative values, i.e. it is come to decreasing of investment activities which in certainly influent on slower growth

of agricultural production. Contrite, annual growth rate at level of Upper Danube is -9.55%, at level of Middle Danube region amount -21.11%, until at the level of Lower Danube region it amount -24.51%.

Share of realized investments in agriculture in total realized investments at level of Danube region, as well at the level of Republic of Serbia in general is given with help of graphical review (Graph 1).

Graph 1. Share of agricultural investments* in totally realized investments



Source: Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.

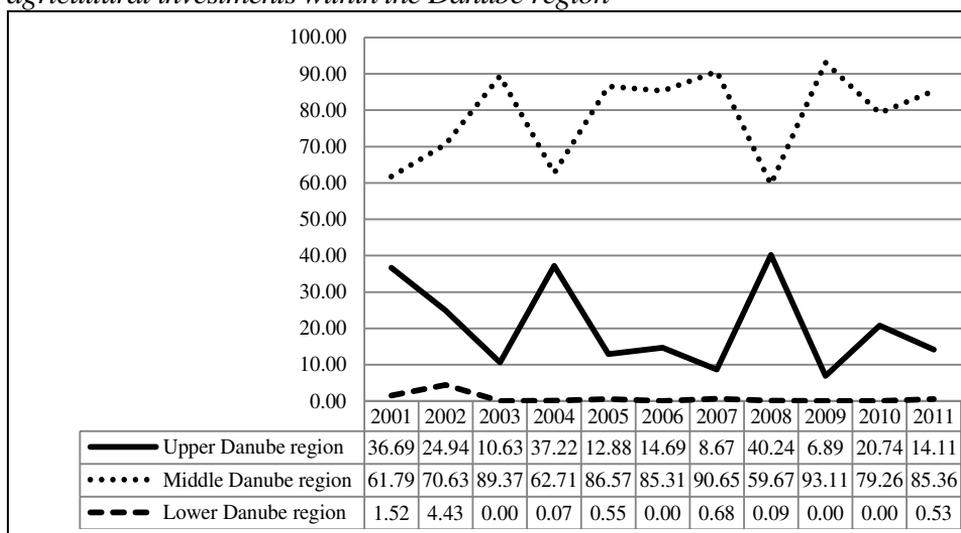
* Investments in fixed assets. ** Without data for KiM.

During the observed period (2001-2011), share of realized investments in agriculture in total realized investments at area in Danube region is decreased from 3.21% to 1.14%. During the same period, in Republic of Serbia in general, the observed indicator also marked a decrease (from 5.70% to 2.48%). Observing the annual growth rate reached results reflecting negative values, as for the Republic of Serbia in general, also and for Danube region (-9.85%).

Participation of realized investments in agriculture at the level of administrative units in total realized investments in agriculture at the level of Danube region as a whole is given using graphical representation (Graph 2). By the analysis of administrative units in the formation of total realized investments in agriculture of entire Danube region, in the long term period (from 2001 to 2011), it can be noticed that the top priority area has Middle Danube area (with achieved positive

average annual growth rate of 3.28%). Looking at the same time period, one can conclude that the other two administrative units have negative values for the aforementioned indicator (i.e. the results were as follows: -9.12% for the level of Upper Danube and -9.94% for the level of Lower Danube Region).

Graph 2. *Share of agricultural investments* of sub-regions in totally realized agricultural investments within the Danube region*



Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

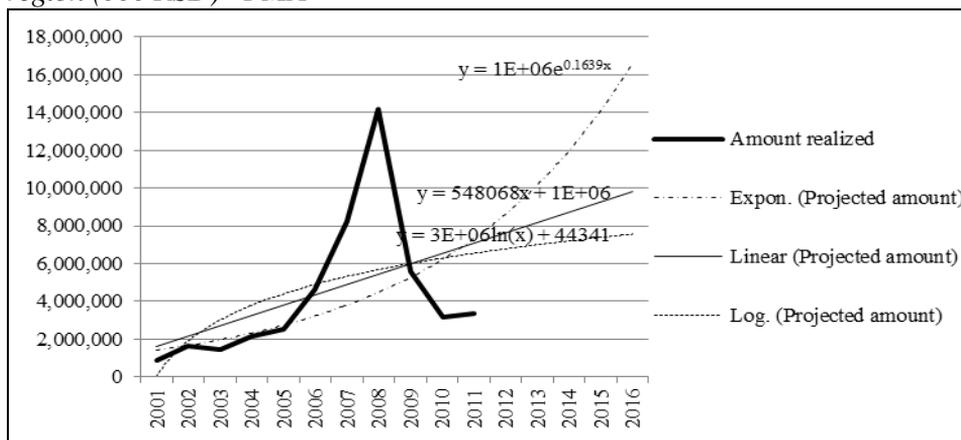
* Investments in fixed assets. ** Without data for KiM.

As the driving instrument of growth of total production factors and production, investments play a crucial role in realizing the goals and priorities of sustainable agricultural and rural development. In this context, future trends of investment in agriculture in the Danube region in Serbia were analyzed in detail, and thereby the division was made at the following investment activities (Subic et al., 2009): realized investments in agriculture at the level of Danube region; participation of realized investments in agriculture at the level of Danube region in total realized investments in agriculture at the level of the Republic of Serbia as a whole.

Taking into account *the first methodological approach*, for the prediction of future trends of investment in agriculture in the Danube region in Serbia, we applied three types of functions. In particular, exponential, linear and logarithmic functions were used, and based on used function different results were obtained.

Based on the *exponential function*, it was obtained the highest expected amount of investments in agriculture in the Danube region in Serbia (for the medium time interval until 2016.), which was 16,650,177.58 thousand RSD (where the average annual growth rate for the period 2011-2016, was 37.52%). Using a *linear function*, we got the amount of 9,839,555.82 RSD (where the average annual growth rate for the period 2001-2016 was 23.79%), while the lowest expected amount based on *logarithmic function* was 7,562,588.53 RSD (where the average annual growth rate for the period 2011-2016 was 17.44%) (Graph 3)

Graph 3. Projected amount of investments* in agriculture within the Danube region (000 RSD) - FMA

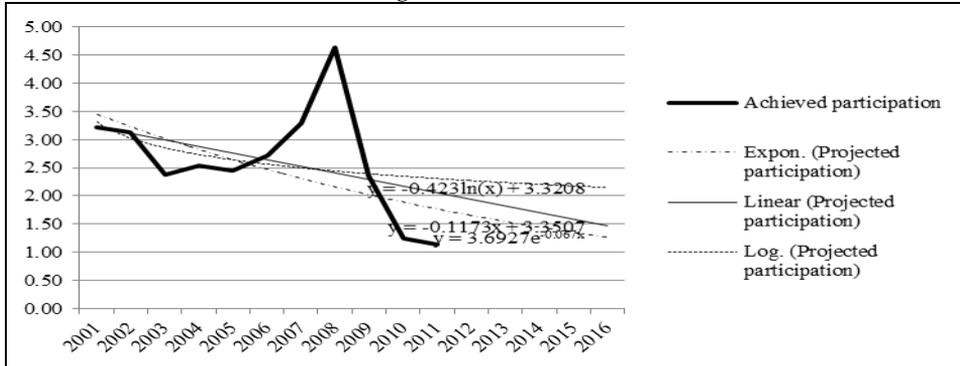


Source: Statistical office of the Republic of Serbia (2002-2012): *Municipalities and regions in Republic of Serbia 2001-2011*. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): *Investments in Republic of Serbia 2000-2009*. SORS, Belgrade.

* Investments in fixed assets.

Trend forecast for future participation of realized investments in agriculture in total realized investments in Danube region in Serbia, which was also obtained by using the above- mentioned functions, in all three cases reflected a continuing decline (Graph 4). The highest projected participation of realized investments in agriculture in total realized investments (for the medium period until 2016), was obtained based on the logarithmic function (i.e. 2.15%). On the other hand, by using linear and exponential function, significantly lower results were obtained (i.e. 1.47% and 1.26%).

Graph 4. *Projected participation of agricultural investments* in totally realized investmentswithin the Danube region- FMA*



Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

* *Investments in fixed assets.*

Based on the projected amounts obtained for the 2016, we got the average annual growth rates for the period 2011-2016, which have positive values for all three used functions (namely: 13.53% for logarithmic, 5.29% for linear and 1.26% for the exponential function).

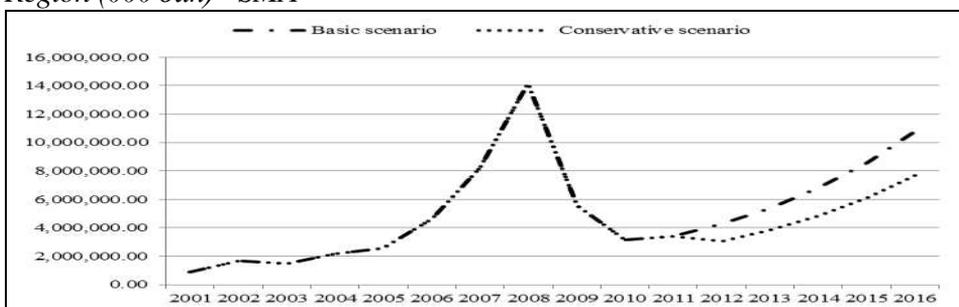
The second methodological approach, beside it takes into consideration an amount of the previous investments, also pays special attention to social-economic circumstances, which are expected in a time period in which the prognosis is done. Accordingly, in this case the future investments prognosis, in the Danube region in the Republic of Serbia, bases on economic trends' tendencies, a planned macro-economic policy, planned structural reforms and measures, anticipated activities of sustainable agricultural and rural development, taking into account the tendencies in the EU economy and the global economy, as a whole.

Taking into consideration a strong influence of the world financial and economic crisis to agriculture, as well as the entire Republic of Serbia economy, in the following mid-term period (up to 2016) is expecting moderately increase of demand on the foreign market, which will lead to a lesser amount of foreign direct investments' (FDI) inflow and slower increase of domestic economic activities. In that context, there is estimated a lesser inflow of FDI in the period 2011-2014.

Considering a fact that expectations are in favour of complete recovery of the world economy to 2015, it is possible to anticipate accelerated increase of an investment activity in the period 2014-2016. Accordingly were analyzed two scenarios of future investment trends in agriculture of the Danube region in the Republic of Serbia: *a conservative scenario* and *a basic scenario* (to which should strive).

In the all above mentioned context, the projections of expected realized investments in agriculture, in the Danube region in the Republic of Serbia (for the mid-term period 2011-2016) point out to the following amounts (Graph 5): 7,707,140.21 thousand RSD (with average annual growth rate of 17.88%), for the conservative scenario; 10,789,996.29 thousand RSD (with the average annual growth rate of 26.09%), for the basic scenario.

Graph 5. *Projected amount of investments* in agriculture within the Danube Region (000 đUH) - SMA*

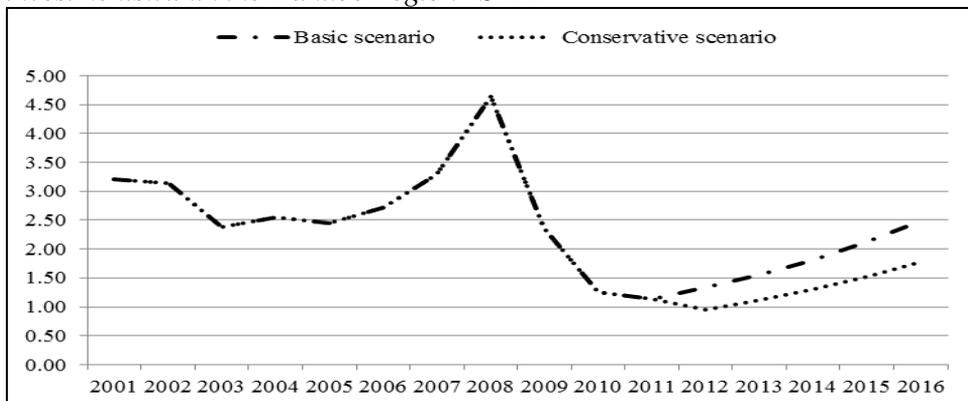


Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

* *Investments in fixed assets.*

Also, according to the second methodological approach can project the expected participation of realized investments in agriculture in the totally realized investments in the Danube region in the Republic of Serbia (for mid-term period 2011-2016). Consequently, the got results point out to the following amounts (graph 6): 1.77% (with average annual growth rate of 9.23%), for the conservative scenario; 2.48% (with average annual growth rate of 16.83%), for the basic scenario.

Graph 6. *Projected participation of agricultural investments* in totally realized investments within the Danube Region– SMA*



Source: *Statistical office of the Republic of Serbia (2002-2012): Municipalities and regions in Republic of Serbia 2001-2011. SORS, Belgrade; Statistical office of the Republic of Serbia (2002-2010): Investments in Republic of Serbia 2000-2009. SORS, Belgrade.*

* *Investments in fixed assets.*

Neither the conservative, nor the basic scenario can be realized without big systematic and structural changes, which can be done only by coordinated macro-economic and structural policies. More concrete, the realization of both scenarios prefers the essential implementation of strategic measures and activities of sustainable agricultural and rural development. Hence, a difference between the conservative and the basic scenario reflects in a level of sustainable agricultural and rural development strategic goals' realization in the Danube region in the Republic of Serbia.

Conclusion

In the following mid-term period (up to 2016), the agrarian policy measures should conceptualize in a way that they can contribute to new opportunities and needs of investments in all fields which can be of significance for economic growth and sustainable development, not only agriculture, but the entire economy in the Danube region in the Republic of Serbia.

Focusing to the projections got according to the second methodological approach, realization of the basic goals of the conservative and the basic scenario (which reflect through: prolongation of economic growth high rates trends, decrease of unemployment and increase of productivity), require significant changes, as in economic structure, as well as in pursuing the economic policy.

Aiming to increase competitiveness of agricultural sector, construction of a competitive food sector, as well as preservation and protection of natural resources and revitalization of polluted environment, the assumptions on which base the two above mentioned scenarios, are:

- *Realization of high annual inflows of FDI for export growth* (first of all by green field investments). Accordingly, there is necessary to make favourable business climate for foreign investments, which implies also overall decrease of a country's risk.
- *Realization of ambitious growth rate of goods and services export*. In that context, there must make the structural changes and increase of international competitiveness of the entire domestic economy.
- *Realization of significant change in structure of a realized gross domestic product (GDP) use*. Accordingly, there should increase the investment activity, not only in agriculture, but in the economy as a whole.

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ELASTICITY OF AGRICULTURAL LABOUR MARKET – THE CASE OF ZRENJANIN DISTRICT¹

Jovan Zubović², Veronika Boškov³

Abstract

Agriculture in Serbia is the economic branch which has best coped with the long-term recession as of 2008. However, number of persons being employed in it was stagnating, or even diminishing. In this paper the authors have set a goal to find out if it is possible to determine how, and in what extent the elasticity in labour market in district of Zrenjanin has had an impact on shifts in its labour market. By the means of using all available statistical data, and its interpretation they are giving the overview of the resources for agriculture in Zrenjanin. Moreover by using the regression we have shown how the equilibrium in labour market was shifting in all quartiles in the period 2010-2012. We have found that agricultural labour market in Zrenjanin is inelastic in short term, but in the long run it is getting elastic, as well as that demand side is more elastic and flexible to changes in the environment.

Key words: *agricultural sector, employment elasticity, labour market*

Introduction

Modern agricultural business needs to adapt to changes on the global market in order to become more competitive. According to Zubović et al. (2009) “Efforts to increase productivity include innovations on four levels which are policy, institutional, program and household... At institutional level, it is necessary to provide better fit between the supply of trained workforce and a demand that is constantly changing”. Rivera and Alex (2002) note that it is flexible approach that is needed for occupational profile of trainees in agriculture. At the same Marshall (2011) points out

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that time firms and individuals have only two basic choices in increasing competitiveness: lower costs, mainly wages; or increased value added over increased human capital. As noted in previous section, low cost of wages is already available, so it is necessary to focus on increase of human capital value. Moreover, increase of productivity based on low wages, is not sustainable in the long term.

Improved productivity and increased levels of production in agriculture is a tool to overcome the challenging effects of the economic crisis. At the same time greater liberalization dictate a need for greater capacity on the part of the agriculture workforce and rapid increase of productivity.

In this paper authors aim to determine what capacity for agricultural development of Zrenjanin district exist, by focusing on elasticity of labour market, and its capability to adapt to new market trends. The paper is divided in five sections. After introduction the research methodology will be presented. It is followed by the overview of Zrenjanin district and its capacities for rural development. Further on we present descriptive statistics on the labour market trends in the district. Discussion on the findings is the next section which is followed by conclusions and recommendations.

Methodological aspects

In our analysis we are using several basic economic models. At first we will try to discover what the market trends are in respect to equilibrium on the labour market in Zrenjanin. Further on, it is necessary to decompose those trends and to find what the elasticity of supply and demand side is. A key question in respect to elastic for any market is how the level of demand for its product will change in response to a price change. Labour markets are also under the impact of the same economic law. A 5 per cent decrease in wages should attract more job openings from farmers, but, this increase in number of jobs may or may not be followed by sufficient aggregate income growth to compensate for decreased wages. Total revenue could either rise or fall depending on how big the increase in demand on the market is in relation to the size of the price. The impact of such circumstances reflects promptly on the labour market. A wage cut will increase revenue only if demand is elastic and a wage rise can only raise total revenue if demand is inelastic. The elasticity of demand may be presented by the formula:

$$e = \frac{\Delta Q}{\Delta P} \quad 1)$$

The price elasticity of supply is the percentage change in the quantity of labour supplied divided by the percentage change in its cost. However, the question arises as to whether price and demand changes ought to be measured as a percentage of their initial value or as a percentage of their final value. To avoid confusion, and inconsistency in measuring elasticity, the average of the initial and final price or quantity demanded can be used as the basis for calculating the degree of price elasticity of demand. The formula is:

$$e = \frac{\Delta Q}{(Q_1+Q_2)/2} / \frac{\Delta P}{(P_1+P_2)/2} \quad 2)$$

where P1 and Q1 denote the old cost and quantity and where P2 and Q2 represent the new cost and quantity.

When the elasticity of demand, or supply, is greater than 1.0, that demand or supply is said to be elastic. A ratio of less than 1 indicates that demand, or supply, is inelastic. Elasticity will be zero if the quantity demanded or supplied does not change at all when price changes. The greater the elasticity, the bigger the percentage change in quantity demanded for a given percentage change in price. A summary of price elasticity patterns is given in Table 1.

Table 1. *Degrees of own-price elasticity of demand*

Value Of Elasticity	Interpretation	Type
$e = 0$	Quantity demanded does not change at all in response to price changes.	Perfectly inelastic
$0 > e > (-)1$	Quantity changes by a smaller amount than price.	Relatively inelastic
$e = (-)1$	Quantity changes by the same amount as price.	Unitary elasticity
$(-)1 > e > (-)\infty$	Quantity changes by a larger amount than price.	Relatively elastic
$e = (-)\infty$	Consumers will purchase all they can at a particular price but none at higher price.	Perfectly elastic

By using the formula for elasticity, in our research we will determine the level of elasticity of the labour market equilibriums in Zrenjanin in order to determine its impact on the level of unemployment. Moreover we will explore on the impact of demand and supply side in the agricultural labour market on estimated elasticity.

Agricultural resources

Zrenjanin belongs to Central Banat County, which is covering an area of 1,326 km² which is the second largest local government in the Republic of Serbia. It includes 4 districts, namely Zrenjanin, Zitiste, Nova Crnja and Novi Becej. Area of Zrenjanin is extremely flat area with mostly agricultural land which occupies 83.56% of its territory. Average elevation of Zrenjanin is 80 meters, with no significant variations.

Human Resources

Population trends in the period 1948-1981, indicate a tendency of slight increase in the total population. In the census of 1948 there were 100,371 inhabitants. From this period until the eighties, the population had risen to 139,300. In the city of Zrenjanin today there is 122,714 inhabitants (11.91% less than in 1981), with three consecutive last decades of drop in population size (Table 2).

Table 2. Trends in population of Zrenjanin (1971-2011)

Year	Population	Change in population %
1953	102.844	2,46
1961	115.692	12,49
1971	129.837	12,23
1981	139.300	7,29
1991	134.252	-3,62
2002	132.051	-1,64
2011	122.714	-7,07

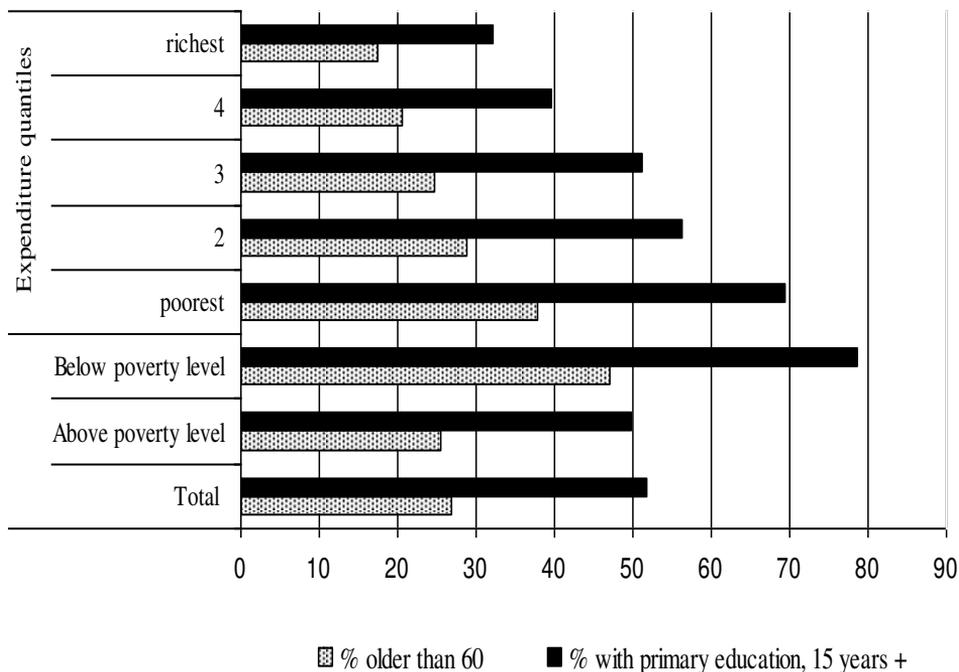
Source: Statistical office of Republic of Serbia

Trend of the demographic development in the period 1991-2002 was negative, and the natural growth rate was at the rate of -5.08 ‰. Natural shifts of the population according to the data is negative - characterized by low birth rate of 9.52 ‰ and a high rate of overall mortality of 14.61 ‰. The average life expectancy for men is 68 and for women 74.

As recorder in 2011 census of population, nearly half of Serbian population is living in rural areas. Compared to previous censuses younger population is moving from rural to urban areas. In graph 1 we can see the level of human capital amongst rural population.

It is visible that population belonging to lower level expenditure quintiles are mostly older than 60 years of age and have only primary education or less. This proves the necessity of making efforts to increase education level, especially training and lifelong learning for adult population.

Graph 1. *Human potential of rural families, by expenditure quintiles*



Source: *Serbian Statistical Office (2008, pg. 145)*

Migrations

After World War II, Zrenjanin has experienced an economic boom and became one of the most developed urban centres in the former Yugoslavia. Until the eighties, it recorded strong inflow of population from rural areas to the city, which led to significant changes in the social, educational and ethnic composition of the population.

However, after the eighties, there came a gradual decrease in the population, especially in rural areas. Derelict network of local and regional roads, water supply problems, rising unemployment, weak economic activity and many other factors have brought natural decrease in the population and the migration of rural population to urban areas.

Age and gender structure

According to the data of 2002 census, the population of the city was elderly, with only 15.12% of the population under the age of 15, and 35.07% of the population older than 50. Male population was 63,788 and female 68,263 which comprised 52% of the total population. In all age cohorts up to 39, male are dominant. In the cohort of 49-59 there is equal number, as long in all other age groups, women's participation is greater. The largest population is in the age cohort 45-49 (8.6%).

According to the official statistics in 2010, the declining trend continues, with population under 15 representing only 14.78% of total. Working age population 15-64 included a total of 86,473 people (70.5%). Only 22.9% of the population is fertile (15-49 years old). According to 2002 census, most of the active population was engaged in manufacturing and agriculture which represented 47.6% of total active population

Rural resources

The most important natural resource in Zrenjanin is agricultural land which covers an area of 110,881 hectares, occupying 83.56% of the territory of the city. In addition to arable land, the city has other resources necessary for rural development which include: desirable natural and climatic conditions for the production of a fertile soil, favourable geographical location, tradition, skilled and non-expensive labour force, developed scientific research institutions and the existence of processing capacity and substantial agricultural budget at the local level. Area of the city of Zrenjanin is very plain and the most densely river and canal hub in Europe, where within 30 kilometres of city centre there exist four rivers - Bega, Tamis, Tisa and Danube as well as canal network DTD.

Agricultural production is intensive by the land use (a little participation orchards and vineyards), and by the structure of agricultural production (high share of cereals and industrial crops). According to the RAH (2011) 47.97% of the total area was used for agriculture (Table 3) most of which is devoted for production of cereals - 67.28% of the total arable land. Second largest share was in production of industrial crops (20.51%), while the share of orchards and vineyards is at a very low level (0.27%) as well as and the production of vegetables (1.20%).

Given the very low share of fruits and vegetables in agriculture of Zrenjanin, the development could be aimed at creating the conditions for better use of natural resources (especially water resources), which would encourage the intensification of the production structure by better use of human resources.

Table 3. *Use of arable land by family farms in Zrenjanin (2011)*

Area (ha)	132,698.00
Land used (ha)	60,815.54
Cereals (ha)	40,445.05
Industrial crops (ha)	12,633.30
Fodder crops (ha)	1,694.24
Vegetables (ha)	762.59
Fruits and Grapes (ha)	174.26
Aromatic and Medicinal Plants (ha)	21.99
Planting material and horticulture (ha)	20.17
Fallow land (ha)	2,333.00
Other land	2,748.52

Source: RAH (2011)

According to the RAH (2011) the city of Zrenjanin in the Registry employs a total of 6,676 farms (6,621 family farms, 55 companies and cooperatives) with a total registered area of 86,612 hectares, out of which 60,816 hectares were cultivated in family farms and 25,796 by companies and cooperatives. Average size of agricultural holdings is 12.97 ha, which is three times more than the Serbian average of 4.34 ha.

Having all the above in mind it is certain that Zrenjanin district has all necessary resources for sustainable agricultural production. It is necessary to have an overview on the shifts in the labour market in order to foresee what might happen in the future.

Empirical data on Zrenjanin labour market

In spite of decreasing population of the Zrenjanin district it was to expect that there might by present a trend of diminishing unemployment. However, the size of decrease of over 20% (Table 4) is significantly above the volume of depopulation which equalled just above 7% (Table 2) in the period of ten years. Decrease in unemployment is even more emphasized for female population which was reduced by 28% in the period of three years.

Table 4. *Quarterly distribution of unemployed persons by level of education and gender (2010-2012)*

Edu.	G.	mar.10	jun.10	sep.10	dec.10	mar.11	jun.11	sep.11	dec.11	mar.12	jun.12	sep.12	dec.12
All	T	13143	12364	11247	11717	12673	12462	12018	11078	11034	10393	10106	10130
	F	6830	6340	5880	6061	6266	6186	6106	5696	5577	5251	4951	4871
I	T	4418	4082	3752	3928	4192	4094	3901	3536	3469	3279	3085	2998
	F	2373	2183	1980	2070	2153	2080	2005	1813	1739	1635	1545	1440
II	T	209	192	169	169	182	177	170	152	145	143	142	172
	F	83	60	55	56	55	54	60	48	46	48	43	54
III	T	3759	3577	3105	3158	3583	3443	3242	2914	2950	2830	2765	2785
	F	1467	1363	1257	1210	1244	1227	1174	1095	1070	1014	914	908
IV	T	3323	3120	2886	2947	3146	3182	3151	2880	2858	2626	2612	2594
	F	2090	1962	1838	1876	1934	1930	1943	1795	1761	1657	1574	1548
V	T	113	107	91	95	98	97	83	72	78	69	65	60
	F	24	27	28	25	24	29	26	19	21	19	14	16
VI	T	663	623	575	659	684	695	681	680	691	621	606	639
	F	402	364	350	399	413	433	442	428	435	382	367	397
VII-1	T	645	648	656	741	768	758	776	831	826	814	820	873
	F	387	376	367	417	435	427	451	495	497	490	488	504
VII-2	T	13	14	13	20	20	16	14	13	15	10	10	8
	F	4	4	5	8	8	6	5	3	8	6	6	4
VIII	T	0	1	0	0	0	0	0	0	2	1	1	1
	F	0	1	0	0	0	0	0	0	0	0	0	0

Source: *National employment service, district of Zrenjanin*

If we look at different levels of education of unemployed persons, it is to see that there are significant differences in the trends among them. Only one cohort had increase in unemployment level, namely persons with tertiary education, which are mostly not involved with agriculture. Focusing on agriculture, table 5 presents data on unemployed persons registered at local NES during the period of 2010-2012, by occupations groups important for agriculture and food processing.

Table 5. *Quarterly unemployment in the occupation group Agriculture, food production and processing by gender (2010-2012)*

Occupation	G.	mar.10	jun.10	sep.10	dec.10	mar.11	jun.11	sep.11	dec.11	mar.12	jun.12	sep.12	dec.12
Total	T	1.236	1.138	1.043	1.044	1.118	1.150	1.128	1.002	999	963	969	995
	F	780	697	636	640	657	672	665	602	585	573	550	546
Production of plants	T	419	409	395	381	420	436	415	359	399	371	348	371
	F	188	172	166	165	179	183	167	151	170	166	151	154
Livestock and poultry breeding	T	36	35	37	39	45	45	41	40	36	31	36	34
	F	21	18	19	20	22	24	22	22	19	14	17	16
Fishing and breeding of other animals	T	6	8	7	6	5	8	6	5	7	7	7	7
	F	2	3	3	2	1	3	3	4	4	4	3	3
Veterinaries	T	70	68	60	65	68	66	66	68	68	57	58	61
	F	38	35	29	33	31	32	32	31	32	29	28	21
Food and beverage processing	T	705	618	544	553	580	595	600	530	489	497	520	522
	F	531	469	419	420	424	430	441	394	360	360	351	352

Source: NES, Zrenjanin

From table 5 it is notable that decreasing trend explained in table 4 is also applicable for agricultural occupations. Moreover, there are emphasized positive trends for female population. However, if we look specifically on the trends of occupations directly related to agriculture, where we could exclude a subgroup of food and beverage processing, which belong to secondary sector, it is visible that decrease in unemployment is flatter and it accounts for around 15%. Therefore the supply curve on the labour market has a constant trend of shifting leftwards. In accordance to general economic laws it was to expect that the result would be increased cost of work, with a new equilibrium which would provide fewer jobs.

To complete the story of the labour market we need to give insight into employment data for the observed period in Zrenjanin (Table 6).

Table 6. *Population, employment and earnings trends in Zrenjanin (2010-2012)*

	mar.10	jun.10	sep.10	dec.10	mar.11	jun.11	sep.11	dec.11	mar.12	jun.12	sep.12	dec.12
Population	124501	124112	123536	123215	122920	122714	122115	122156	121516	120930	120256	119356
Total employment	29372	29115	28818	28923	29184	29012	28534	28346	28654	29011	29012	28954
Employment in agriculture	1346	1312	1315	1254	1298	1113	1080	1050	1029	1070	1113	1122
Real wage (RSD Dec.2009)	359049	315515	332158	359004	29171	312636	317131	36220	320105	300944	308462	328709
Wage in €	36623	31827	33722	37747	32986	36497	36849	42362	34745	31962	33792	38214

Source: *Own calculations based on data from Serbian Statistical office*

Having in mind that population in Zrenjanin is decreasing for over three decades, it is to expect growing number of elderly population, followed by increased share of pensioners. However in the observed period 2010-2012 there is only slight drop in overall employment by 2%, but in agricultural employment there has been registered significant decrease until 2012, with slow recovery afterwards. The real wages were decreasing over the whole observed period.

Table 7. *Average wages in Serbia (RSD, 2010-2012)*

	mar.10	jun.10	sep.10	dec.10	mar.11	jun.11	sep.11	dec.11	mar.12	jun.12	sep.12	dec.12
Total	33508	34161	34570	39580	35777	39322	38763	43887	40562	42335	40258	46923
Agri.	28978	29769	31444	34757	28912	31621	32603	36467	34252	36705	34979	40619
%	86,5%	87,1%	91,0%	87,8%	80,8%	80,4%	84,1%	83,1%	84,4%	86,7%	86,9%	86,6%

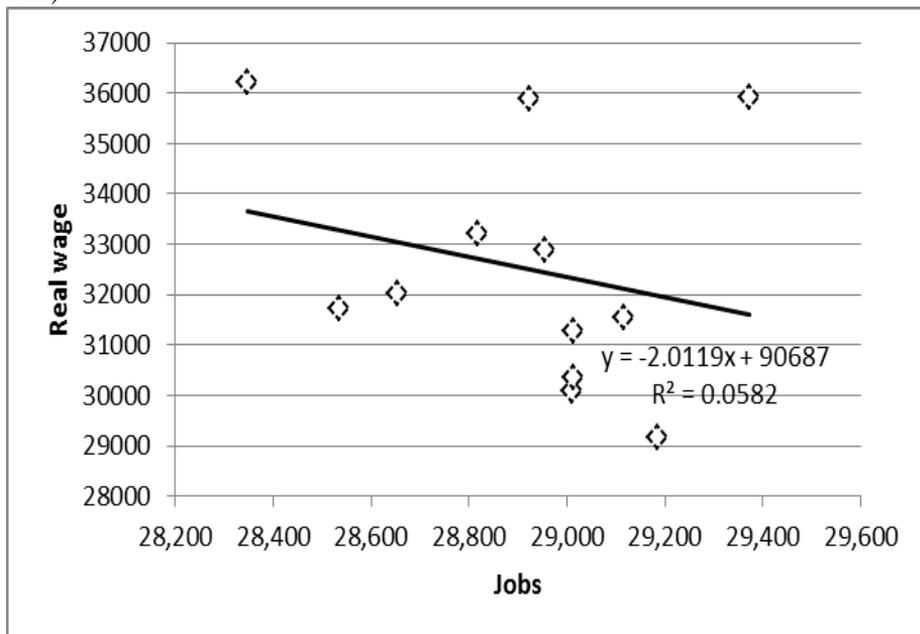
Source: *Serbian Statistical office, ZP11 report, several issues*

Since there is no data on the levels of wages in Zrenjanin district for persons being employed in Agricultural sectors, we may make estimation on its trends based on the relationship between wages in Serbia for total population and agricultural population (Table 7).

Discussion and conclusions

Having in mind the goal of the research, at first it is required to analyse supply and demand trends in labour market of Zrenjanin. Shifts in equilibrium on Zrenjanin Labour market in the observed period 2010-2012 are presented in graph 2.

Graph 2. *Equilibriums on Zrenjanin labour market (real RSD, 2010-2012)*



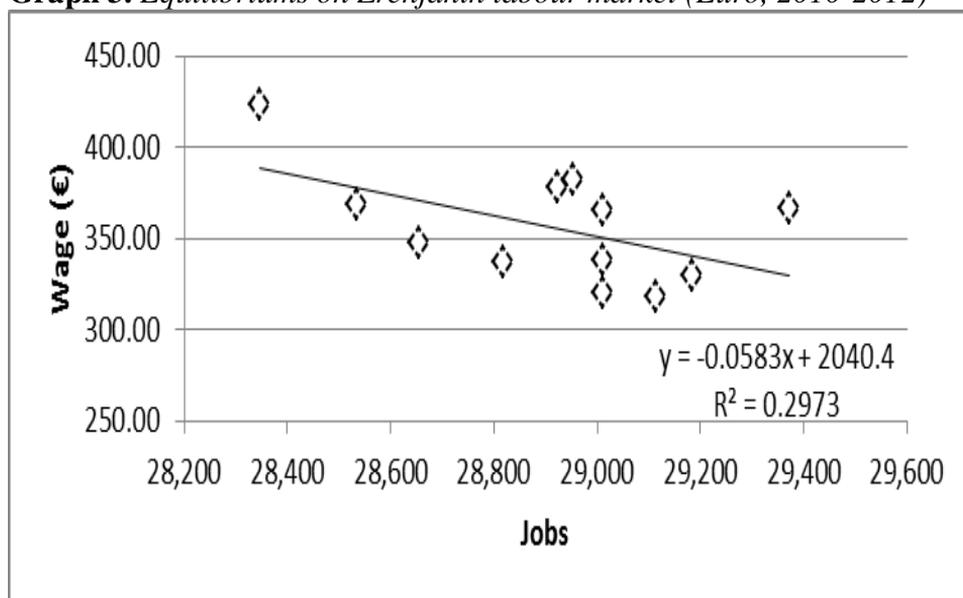
Source: *Authors calculations*

This graph shows that there might be possible extensive elasticity effects in the labour market of Zrenjanin, since the regression line shows very strong negative slope of the equilibrium curve for the observed period. This means that equilibrium real wage is strongly changing with the change of the number of employed persons. However R^2 is very low, and therefore we must not draw final conclusions from that observation. At the same time from table 6 we have seen that real average wage is decreasing in the district during the same period, which is unusual economic trend in the environment with decrease in employment and unemployment. Knowing that agricultural product are mostly sold on the prices set on the world markets, it is to conclude that it might be better to observe wages in € instead of local currency.

In that case, we have somewhat different trends (graph 3). Graph 3 shows that if we analyse the equilibrium by using wages values in euros, we will get more reliable regression formula, with R^2 being significantly higher. In this graph we have the expected slope of the curve, which is again negatively sloped, but with a milder angle.

This may be explained with the fact that unlike with real wages expressed in RSD, when using euro levels, the wages are not decreasing, but the opposite, they have upward trends as seen in table 6. From the economic point of view, that is quite expected knowing that equilibrium number of jobs has been reduced.

Graph 3. *Equilibriums on Zrenjanin labour market (Euro, 2010-2012)*



Source: *Authors calculations*

From this point on we may focus on agriculture. By using data from table 6 and 7 we are able to estimate wages in agriculture in Zrenjanin district, as well as to resemble the number of employed and unemployed persons in that occupation (Table 8).

Data from NES Zrenjanin is telling that there are only few unoccupied job openings for the whole observed period, and therefore we may summarize total supply on the labour market as unemployed plus employed persons, and demand may be equalled to employed persons.

Table 8. *Agricultural labour market in Zrenjanin (2010-2012)*

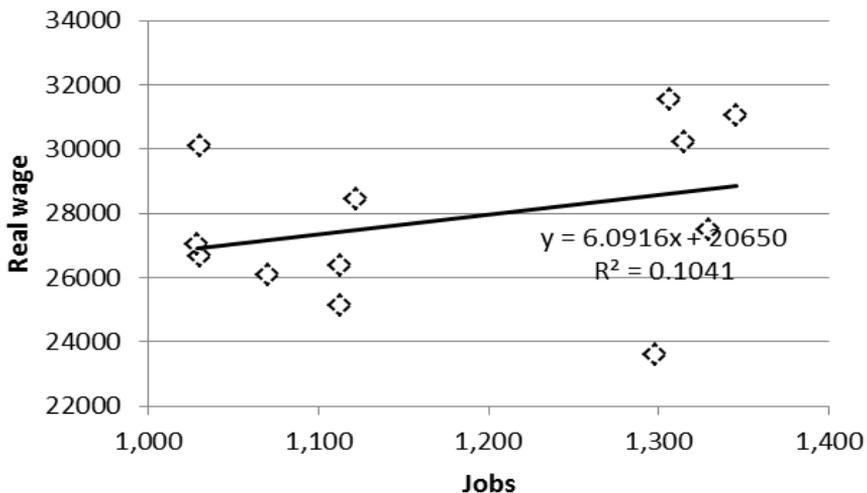
	mar.10	jun.10	sep.10	dec.10	mar.11	jun.11	sep.11	dec.11	mar.12	jun.12	sep.12	dec.12
Employed	1346	1312	1315	1254	1298	1113	1080	1050	1029	1070	1113	1122
Unemployed	1236	1138	1043	1044	1118	1150	1128	1002	999	963	969	995
Supply	2582	2450	2358	2298	2416	2263	2158	2052	2028	2033	2082	2117
Real wages (Dec.2009)	310509	27495	302122	315257	235735	251408	266735	300963	270308	260923	26367	284548
Wage (€)	316719	277352	306726	331471	266569	293493	309928	352001	2934	277,118	293,611	330,801

Source: *Table 5, 6, 7*

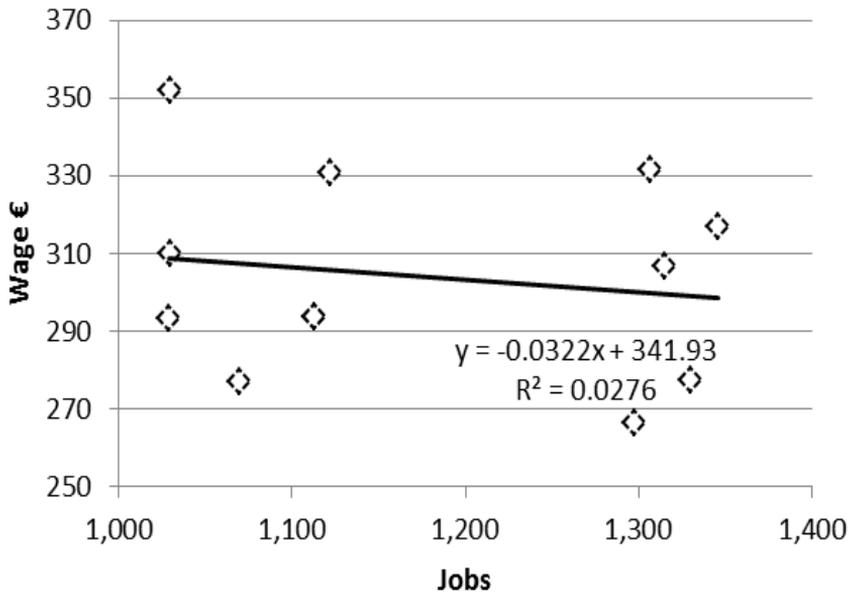
Similarly to the principle used for obtaining graphs 2 and 3, we may generate trends in agricultural labour market in Zrenjanin (Graph 4 and 5).

Unlike in total labour market in Zrenjanin, regression of equilibriums is showing weak R^2 scores. However it is notable that there is large difference in slopes in respect to the currency used for calculations, where RSD is showing positive and Euro negative direction of relation. From the basic economic principles, we know that the slope should be negative, therefore for the further calculations we will use wages in Euros as a variable influencing the trends in its labour markets.

Graph 3. *Equilibriums on agricultural labour market (RSD, 2010-2012)*



Graph 4. *Equilibriums on agricultural labour market (Euro, 2010-2012)*



Source: *Own calculations on table 8*

Since the equilibrium prices as well as shifts in supply and demand have shown some aspects which may cause variations in labour markets, we have now to focus on elasticity in order to get more precise justification. By applying formula (2) let us calculate elasticity of the agricultural labour market in Zrenjanin (table 9).

Table 9. *Trends in labour market elasticity for 3 months periods*

Period	apr-jun 10	jul-sep.10	oct-dec.10	jan-mar.11	apr-jun.11	jul-sep.11	oct-dec.11	jan-mar.12	apr-jun.12	jul-sep.12	oct-dec.12
Elasticity	0,13	0,02	-0,41	-0,11	-1,04	-0,94	0,10	0,07	-0,46	0,46	0,05

Elasticity for all but one of the 3 months periods is lower than 1 (in absolute values) which uncovers that the market is inelastic in the short run. However, for the whole period of 3 years elasticity is higher, $e = - 2.87$ which implies that there exists long term elasticity in the market. That means that market is still underdeveloped and inflexible in the short run, but over the period of 3 years it is able to cope with changes in the environment.

Finally it is necessary to try to determine which side in the labour market is more elastic. From table 8, it is clear that both supply and demand are decreasing in average over the observed period, but showing slight recovery in 2012. Supply side has shown much stronger negative trends. Therefore, in accordance to general economic principle, we may note that both supply and demand curve are shifting leftwards until 2012, and then shifting rightwards thereof after. In table 10 we present changes in demand and supply, as well as elasticity for all quartiles of the observed period. It is to note that wherever changes in demand are higher than changes in supply, elasticity is higher. That means that elasticity of demand curve is greater than the elasticity of supply curve.

Table 10. *Changes in elasticity, demand and supply for 3 months periods*

	apr- jun 10	jul- sep.10	oct- dec.1 0	jan- mar.1 1	apr- jun.11	jul- sep.1 1	oct- dec.1 1	jan- mar.1 2	apr- jun.12	jul- sep.1 2	oct- dec.1 2	To- tal
Elasticity	0,13	0,02	-0,41	-0,11	-1,04	-0,94	0,10	0,07	-0,46	0,46	0,05	- 2,87
Change in demand	-1,2%	-1,1%	-0,6%	-0,7%	- 14,3%	-7,5%	0,0%	-0,1%	4,0%	4,0%	0,8%	- 16,6 %
Change in supply	-4,4%	-4,5%	-0,3%	2,8%	-6,3%	-4,6%	-5,8%	-0,2%	1,3%	1,3%	1,7%	- 19,5 %

Having in mind all of the above, we have concluded that demand side in agricultural labour market in Zrenjanin is more elastic, which means that it is reacting more to changes in the wages, as well as to some other variables that might be affecting shifts in the market. Moreover it is to say that smaller elasticity of supply implies to possible under-education of participants in the labour market, and their no flexibility to accept changes in the wider economy.

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LABOUR FORCE AND MODERNIZATION OF LABOUR ON FAMILY FARM

Jovana Čikić¹

Abstract

Contemporary societies are difficult to understand without taking into account strong influence of knowledge, innovations and information on labour organization and practice, characteristics of labour force, etc. Therefore, scientification of labour has not bypassed agriculture. Nevertheless, the key issue is how this process (as an element of professionalization) occurs on family farms, which are dominant form of labour organization in agricultural production. The author analyses the influence of education (as a socio-cultural characteristic of labour force on family farms) on characteristics of farms' social vitality and readiness of householders to invest in factors of labour modernization. Deficiencies in formal education can be overcome by the diffusion of knowledge and innovation in agriculture, which enables creation of the advantages of family farms.

Key words: *education, labour force, diffusion of knowledge and innovations, family farm, modernization of labour*

Introduction

One of the leading agrarian/rural sociologists of today, J.D. van der Ploeg speaks of new peasantry (van der Ploeg 2008). Writing about rural development (in European context), van der Ploeg speaks of repeasantization which is „*modern expression of the fight for autonomy and survival in a context of deprivation and dependency*” (van der Ploeg 2008: 7). This statement leads us to a question: what are the main instruments of modern farmers in the struggle for family farms' survival?

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Contemporary sociology and economy speak of knowledge-based society and/or economy. One of the key characteristics of contemporary society is transformation from the society of labour to the society of knowledge (Šundalić 2012: 120). Knowledge becomes important because it influence the speed and scope of the diffusion of innovation. Also, innovation, “*besides focusing on studying, creativity and R&D, becomes comparative advantage of knowledge-based economies*” (Кулић 2012: 101). Therefore, the question is what happens with agriculture in knowledge-based societies and/or economies. It is evident that, in the previous half of the century, agriculture faced drastic changes in the production technology, labour organization, relation towards the market, environment etc. Those changes are foremost results of labour scientification that strengthens the dependency of agricultural production on variety of knowledge and information (especially, results of R&D).

If we observe Vojvodina, as a specific spatial, economic, social and cultural region of Serbia, we can conclude that some of its characteristics clearly indicate that Vojvodina is still agricultural and rural society, whether we wish acknowledge it or not. For example, according to Njegovan and Pejanović (2009: 178), 40 (out of 45) Vojvodinian municipalities are considered as rural, based on population density. The same authors qualify six (out of seven) districts in Vojvodina as rural. According to the Labour Force Survey (Анкета о радној снази 2013: 21), every sixth inhabitant of Vojvodina is employed in agriculture. Half of the rural households own family farm and 70% of rural population live on family farms. Over 80% of total Vojvodian area is agricultural land.

The question is how we can take advantage of those facts and provide us with regional recognition and competitiveness. The answer to the question, as well as answer to the previously mentioned question on instruments of farmers in the struggle for survival, lies in the necessity of diffusion of knowledge, information and innovations as an effective mechanism of adaptation to the constantly changing social and particularly market conditions.

We often speak of the role of (Vojvodinian) family farms in renewing rural economy, but it is necessary to examine the abilities of these farms to recognize and activate their potentials. If we agree that importance of knowledge in production (in general and in agriculture as well) increases over time, research of the educational characteristics of the labour force on family farms becomes even more significant. It provides us with knowledge on sociocultural characteristics and patterns, which influence decision making relevant to the farm production and, therefore, modernization of farm labour.

Modernization of labour on family farm

Family farm has been a frequent issue of elaborations and definitions (Grbić 1997: 18-20; Djurfeldt 1996). Nevertheless, regardless to all present differences in various definitions of one of the central agrieconomic and ruralsociological concepts, it is possible to single out constitutive elements of the family farm. Those are: agriculture, family labour force and family labour organization, property over land, family capital and mutual consumption (Grbić 1997: 15-17). Family farm is also a family model of agriculture (Zakić, Stojanović 2008: 45) with diversified production. However, farming is not only source of income, but way of life.

Family farm has always been based on labour force consisted of family members who live on the farm and depend on it². This mutual dependency between farm and family is much stronger than the fact that farm labour depends on available number of working members. It reflects the fact that labour on farm is always based on family relations. Family farm labour cannot be, even for analytical purposes, torn apart on work operations and tasks. It must be considered in the context of the totality of the relations between those who participate in farming³. Thus, Hennon says that family farm, as a form of family business, is *“complex because individual, family and business subsystems overlap. Boundaries are often diffused and individual issues become family and family issues become business issues, and vice versa. Family dynamics influence family and enterprise (family farm – A.N.) and contribute to successes or failure* (Hennon 2012: 254). This explanation contains all the specificity of family farming that influence possibilities for labour modernization.

Modernization of labour on family farm depends on characteristics of farm's social vitality (Čikić 2012: 50). Influencing the course and the outcome of the farm's adaptation to constantly changing social and economic circumstances, social vitality also determine the farm's biological, economic and social reproduction. Family farm that reproduces adequately⁴ is more prepared to modernize labour since modernization is recognized as a mode for improving

² Djurfeldt (1996: 341) speaks of a notional family farm that is characterized, among other, by family labour force as a base for farm reproduction.

³ According to Stojanov, this is the main difference between agricultural and factory labour. Stojanov (2004: 209) says: *„while the relations within the factory are solely determine by the work process and working roles – they are working relations – relations in peasant family and rural community are also determine by other roles and life processes“.*

⁴ This primarily means that reproduction of family farm enables achievement of objectives and fulfilment of family farm members' needs.

farm's reproduction and social vitality. Socio-cultural characteristics of the labour force (as an element of social vitality) are important factor that determines the needs and opportunities for modernization of family farming. They also influence willingness to invest in modernization factors.

Modernization of family farming is the cause but also the consequence of rural entrepreneurship (Чикић, Петровић, Петровић 2011). There is a positive feedback loop between rural entrepreneurship development and modernization of family farming, mediated by socio-cultural characteristics of farms and farms' labour force. Thus, members of family farm that reproduces adequately (this specially refers to economic reproduction) are more eager to participate in activities towards strengthening rural entrepreneurship. At the same time, members of those farms are keen to continue living in rural community and participate in changes aiming to improve the quality of life.

You do not have to be a sociologist to realize that contemporary agriculture differs from the traditional one in many ways. Scientification of labour is one of the crucial. Due to the development of labour division, agriculture, as a form of production, is not isolated but it is influenced by various factors. Therefore, in order to survive, family farm (as a principal organizational form in agricultural production) has to learn mechanisms of adaptation to those different factors and circumstances. If we put contemporary family farm and agricultural production in the context of knowledge-based economy and/or society, one basic hypothesis arises: knowledge, information and innovation are seen as an effective mechanism for farm's adaptation. Consequently, as socio-cultural characteristics of farm, farm householder and farm members determine the ability to adapt, another hypothesis come up: favourable educational structure of labour force and family farm's householders (especially, educational background in agriculture) should indicate farm's greater social vitality and willingness to invest in the modernization of farming. Education (which results in the possession of relevant information and the possibility of their adequate application) is, therefore, seen as a vital mechanism for better understanding of the production and requirements of farming modernization.

Method of research and data resources

The research of teoretical assumption on influence of education as socio-cultural characteristics of labour force⁵ on modernization of farm labour is based

⁵ Labour force includes persons older than 15 years who finished schooling, no matter whether they are employed on or of family farm. According to the census methodology, labour force does

on empirical data on labour force of so-called chosen family farms in Vojvodina⁶. Vojvodina is selected as a social framework for the research based on its spatial, economic, social and cultural specifics, shown in the Introduction. Data on family farms are collected on a random sample of 1096 so-called chosen family farms. All data necessary for the analysis are collected by the *System of information in agricultural extension of Vojvodina*. The *System* enables collecting data on various sociocultural and socioeconomic characteristics of farm householder, his/her family and family members, characteristics of utilised agricultural land and farm production, machinery and equipment, farm production facilities, economic parameters etc. (Petrović et al. 2007: 63-141; Vukoje, Koči 2007: 143-196).

According to the hypothesis, most of the data are focused on the educational structure of farm labour force. The analysis is particularly focused on the influence of householder's education on socio-cultural characteristics of family farm and his/her willingness to invest in modernization of farming.

Labour force and modernization of labour on family farm – conceptual and hypothetical framework

While thinking of the modern agriculture characteristics, the question of characteristics of modern family farm arises. First, agriculture is no longer the only economic activity that takes place on family farm. Due to the contemporary social and economic circumstances, family farms nowadays are often turning towards pluriactivity/multiactivity as a sort of survival strategy. Second, farm labour is mainly based on family labour force. Labour organization based on family relations and free of charge labour force is still great advantage of family farm. However, fluctuation of labour force between farms within local rural community or fluctuation of labour force from outside the local community is much more expressed today than in traditional societies. Hence, modern family farm functions beyond demographic family cycles. Third, modern family farm is, more or less, market integrated. Marketing is necessary factor in its economic

not include retired population (Попис, Становништво – књига 5 2003: 7). The minimum age for a person to be considered as a labour force corresponds with the methodological instructions. Finished schooling, as a criterion, is being taken into account to clasife persons who can and cannot be full-time active on family farm.

⁶ Those farms intensively cooperate with Agricultural extension service of Vojvodina (AESV). So-called chosen farms are leaders in agricultural production in local communities. Since 2007 (since data on extension work and farm characteristics have been systematically recorded) until the beginning of the 2012, extension agents of AESV have cooperated with more than 4000 so-called chosen family farms.

and social reproduction. It refers not only to exchange of goods and service (although, this is the most obvious), but to exchange of capital. Forth, family farming remains a way of life to farm members, regardlessly to the strength of market integration. Fifth, in terms of relations towards market, market position and characteristics of social vitality, modern family farm has better or poorer chances for reproduction, which shape its entrepreneurial preferences.

While observing contemporary Vojvodinian family farm, issue of entrepreneurship becomes even more relevant. Family farm is nothing but a form of private, precisely family entrepreneurship with the idea of activating and utilizing all available economic potentials in order to achieve reproduction goals. On the other hand, this is where the problem is. Recent history of Vojvodinian (Serbian, in general) agrarian relations shows that socialist perception of agricultural and economic development in general put family farm in a very restrictive surroundings. Restrictive social context has been quickly copied into the characteristics of family farms and the characteristics of those who were living on farms and of farming. As a result, many of family farms have reduced their reproduction to the level of the subsistence minimum or have been permanently shut down.

Therefore, it may be asked whether is Vojvodinian family farm an expression of private and/or family entrepreneurship or is it an answer to the imposed necessity⁷. This dilemma raises question of implications for farm reproduction, especially modernization of farm labour. By knowing the characteristics of rural and agrarian structure, it is obvious that one part of family farms is a result of imposed necessity. Those farms are caught in the vicious circle of simple reproduction, or, to be more precise, in the circle of minimal potentials and minimal readiness for labour modernization. From one generation to another, human, physical, social and cultural capitals of those farms erode which inevitably leads them to the regressive type of farms. What also must be taken into the consideration while researching modernization of labour and entrepreneurship development on family farms in Vojvodina? It should not be forgotten that those family farm is not acted entrepreneurially at least half of the century. Nowadays, Vojvodinian family farms are “forced” to be independant market participators, with no or very few guarantees. In circumstances of a relatively quick leap and even quicker expectations between these two extremes, the question is whether those family farms have business/entrepreneurial potential necessary for reviving the agriculture and rural economy.

⁷ No matter whether they are result of low social chances of the successor or there is a strong patriarchal pattern in family farm succession.

At the farm level, this potential implies totality of conditions that influence organization, functioning and success of production⁸. Hence, we analyse the influence of education as socio-cultural characteristics of labour force on farm's social vitality and opportunities of labour modernization. Labour force is observed as a human capital which means that "*members of this (family – N.A.) farms, particularly working members, by their number, activity, age structure as well as professional and physical qualifications determine agricultural and rural development*" (Božić, Bogdanov 2005: 69). The analysis is a way to have insight into opportunities to increase benefits and competitiveness of farms.

Labour force and modernization of labour on family farm – social context

While researching the influence of labour force's educational structure on modernization of farm labour, it is important to briefly point out the contours of the social background that determine main features of the family farm's labour force in Vojvodina. Thus, deagrarianisation is considered one of the key issues of Vojvodinian agrarian structure. Since 1950's, number and ratio of agricultural population in Vojvodina significantly decreases⁹. Naturally, deagrarianisation is necessary to reduce agrarian overpopulation. Nevertheless, the trouble with Vojvodinian deagrarianisation is in its dynamics. To sum up, deagrarianisation of Vojvodinian (as well as Serbian) agriculture did not occur solely under the influence of its modernization. This process is much more result of those factors which Puljiz (1983: 59) refers to as repulsive (they act as a negative factors, they force out of agriculture) and attractive (they act as motivation for the transfer to other, non-agricultural activities)¹⁰.

⁸ To understand each condition, as well as nature of their relations, family farm should be observed as a production system. It represents relatively self-contained set of elements and their relations, which enables organization and realization of the production process. Family farm is an open system. This significantly influences creation and manifestation of its economic potentials.

⁹ Until the WWI and shortly after it, Vojvodina was typical agrarian region. Half a century later, agricultural population accounts $\frac{1}{10}$ of total Vojvodinian population and $\frac{1}{4}$ of rural population. Active agricultural population accounts 13.7% of total active population in Vojvodina (Попис – становништво, књига 7 2004: 8-9). Data indicate high coefficient of deagrarianisation of Vojvodinian agriculture (0.82).

¹⁰ Main factors of Vojvodinian deagrarianization are: a) intensive post-WWII growth and development of non-agricultural sector according to the model of dual economy based on the use of surplus of capital from agriculture (Zakić, Stojanović 2008: 188), b) underdeveloped agriculture, c) unfavourable socio-economic status of the peasantry, d) favouring state sector of agriculture, e) restrictive policy towards family farms (measures of II and so-called small agrarian reform) and lack of organized social care for peasantry, f) rural migrations and rural exodus.

What are the consequences of such deagrarization? Characteristics of Vojvodinian deagrarisation significantly contributed to degradation of development potentials of agricultural labour force. It influenced demographic aging of labour force and enabled preservation of the unfavourable education structure of family farm labour force. Poor education structure additionally burdens opportunities for modernization of farm labour and the development of family entrepreneurship.

Labour force and modernization of labour on family farm – influence of education as a socio-cultural characteristic

Labour force on so-called chosen family farms in Vojvodina accounts 93% of total number of members in the working age contingent. High labour utilisation of working age contingent indicates that equality of working age and living age is still very much present on family farms in Vojvodina¹¹. Additionally, high employment-to-population ratio signifies that farming is for many a survival strategy because it provides self-employment possibilities. Labour force mostly consists of the family members full-time employed on the farm (84%).

Due to the central hypothesis, special attention is paid to the analysis of educational structure of the farm`s labour force. Within the modern business conditions, emphasizing the importance of the formal education might seem to be little undue. However, Todorović and Vojković (1999: 154) argue that *„education is related with productivity and the ability to adapt to new circumstances“*. Koković (2009: 158) says that education, as an investment, significantly influence improvement of productivity and contributes development of entrepreneurship. He also argues that *„investments in education gain several times greater effects on productivity increase than the investments in equipment. Specificity of this form of capital is that investments in education, with no regards to who is investing (society, company, individual), become individual property which contributes to the wealth of company and society in whole“* (Koković 2009: 159). Educational structure of the farm`s labour force should be analyzed in such context. In the market economy and knowledge-based economy, competitiveness is, among other things, based on the constant innovations of the production. On family farm, possibilities for the diffusion of innovations and labour modernization depend on the variety of social (and other) conditions. Characteristics of labour force and its willingness that, by learning, modify the way it works emerge as one of the important factors.

¹¹ High labour utilization of working age contingent of the agricultural chosen family farms` members (97%) confirms the conclusion.

Peasant`s mentality is often a starting point in many rural sociological researches of Vojvodinian (but also Serbian) labour modernization in agriculture (Вукосављевић 1983: 355-388; Ђurić 1975: 288; Mendras 1986; Stevanović 2008: 43-56). This concept or, to be precise, the idea of peasant`s conservatism is easily taken as an explanation for the failure of family farm modernization. Endogenous aversion to innovations works perfectly as a solution in the analysis of „bottlenecks“ in the diffusion of knowledge and innovation in Serbian agriculture¹². Education of family farm`s labour force undoubtedly contributes to the breaking of the peasant`s conservatism. To be precise, peasant`s conservatism loses its strength both due to the increase in the level of education of labour force and diffusion of agricultural knowledge in production (through the process of formal education).

General insight in educational structure, as one of the elements in the description of labour force (Bogdanović 2008) of so-called chosen family farms in Vojvodina shows its relatively favourable characteristics. Most of the labour force (57.9%) has secondary education. The ratio of those with the lowest and highest level of education is relatively favourable (3:1), comparing to similar ratio in educational structure of rural population in Vojvodina in general. Unfortunately, but as it was expected, labour force full-time employed on farm has less favourable educational structure. Among these members of farm`s labour force, there is eleven times greater share of those who have no formal education or have only primary education. Also, among these members of farm`s labour force, there is five times lower ratio of those who have college or university degree.

Labour modernization of family farm usually refers to the modernization of agriculture. Therefore, it is very important to analyse whether labour force have or have not agricultural education. Formal agricultural education facilitates achievement and development of additional necessary knowledge of the production process. It also allows labour force to understand better the requirements of the family farm as a complex production system. By having agricultural education, labour force easier detects and removes „bottlenecks“ in working experience and practice. In addition, it can easily identify niches in the working process suitable for introducing the innovation. Thus, it is assumed that labour force that has formal education in agriculture easier accepts expert

¹² Nevertheless, we should be very careful while using concept of peasant`s conservatism. The idea should always be observed in the context of peasant`s needs and characteristics of rural society, as well as changes that are expected and/or wanted.

advices on production and has better understanding of the importance of advices`implementation.

Only 12.7% of labour force of so-called chosen family farms in Vojvodina has formal agricultural education. If we observe agricultural education of labour force as one of the criteria of labour professionalization, it is obvious that this process is not present on family farms in Vojvodina. Labour force on so-called chosen family farms mostly has secondary agricultural education (77.9% of total labour force with agricultural education). Men account majority of the labour force with agricultural education (79.7%), so agriculture can still be regarded traditionally, as a male occupation. Most of the labour force with agricultural education is full-time employed on farm. Nevertheless, with the increase of the educational level, share of labour force that is full-time employed on farm significantly decreases¹³. It can be concluded that education (both agricultural and non-agricultural) is seen as an opportunity to escape from agriculture. On the other hand, the fact that majority of farm`s labour force has no formal agricultural education indicates that farming is, for many, not professional, but imposed choice. The absence of agricultural education among farms` labour force leads to a conclusion that agricultural education is not seen as an investment, but as a (unnecessary) financial, temporal and human expenditure. So, lack of agricultural education of farm`s labour force and (implicit) attitudes towards education as expenditure are seen as major obstacle in labour modernization on family farm. Besides research of the educational structure of total labour force, insight in educational structure of householders has great importance while analyzing possibilities of family farm`s labour modernization because it influence process of decision-making. Unfortunately, data on educational structure of the householders of the so-called chosen family farms in Vojvodina indicate partial professionalization of decision-making in agriculture. Every fifth householder has formal agricultural education. Majority of householders with formal agricultural education have finished secondary school (72.3%). Differences in ratio of male and female householders with formal agricultural education show that formal decision-making on farms and in agriculture is still regarded as a man`s job. Therefore, every fifth male householder and every tenth female householder have agricultural education (secondary, college or university). Formal agricultural education can be regarded as a foundation for householder`s positive attitudes towards extension service as

¹³ Full-time employed labour force on farms with secondary agricultural education account 82.5% of the total number of farm members with secondary agricultural education. On the other hand, only 52.1% of farm members with academic agricultural education are full-time employed on family farms.

socially organized form of education on agricultural production. According to the results of the research of extension service in Serbia¹⁴, majority of the extension agents of the AESV point out that the most intense cooperation they have with the farmers with more knowledge about production¹⁵.

Third level of the analysis of influence of labour force educational structure on modernization refers to the research of the householders' attitudes towards investing in factors of labour modernization, depending on the type and level of their education. Necessity of permanent adaptation of production to constantly changing circumstances requires that those who make decisions and run family farms understand direction and speed of necessary changes and innovations. Thus, it is assumed that higher level of education and, especially, educational background in agriculture, enables householders to see and understand better the importance of adaptations in farm production, both to the market needs and to internal socio-cultural characteristics of the farm. Specifically, this means that family farms of the householders with college and university degree and, especially, agricultural education should be more socially vital and more inclined towards investing in the production.

Data collected within the *System of information in agricultural extension of Vojvodina* only partially confirm hypothesis on influence on householder's education on social vitality of the farm (Tab. 1.). Average age of householder decreases with increasing level of education. Also, with the increase in the level of education: a) average size of utilised agricultural area in lease increases, b) share of householders that are deficient in farm machinery and equipment decreases and c) share of householders that are having problems with the farm machinery and equipment maintenance also decreases (which indicates favourable characteristics of technical basis of farm labour). Nevertheless, with increase in level of householders' education, share of family farms with the successor decreases. Also, share of the householders with college and university degree that are taking land in lease is less than the share of householders with the lowest level of education that are taking land in lease. This is because with

¹⁴ The research *Role of agricultural stations in agricultural extension of the Republic of Serbia* (2008) has been conducted on the total scale of extension agents employed in AESV and Agricultural extension service of Serbia.

¹⁵ It is assumed that with higher level of householder's education, his/her needs for new or additional information are more expressed. Hence, householder is more inclined to cooperate with the extension service. In addition, it is also assumed that with higher level of householder's education, his/her interest in finding adequate manners of agricultural production improvement and modernization is greater. Results of the research *Role of agricultural stations in agricultural extension of the Republic of Serbia* confirm both assumptions.

increase in householders` level of education, number of family farm with mixed incomes also increases.

Table 1. *Socio-cultural characteristics of householders, farm members and chosen family farms in Vojvodina, by householders` education*

<i>Socio-cultural characteristics of householders, farm members and family farms</i>	<i>Without education or primary education</i>	<i>Secondary education</i>	<i>College and faculty</i>
Total number of family farms	263	699	134
Ratio of agricultural and mixed family farms	1 : 0,23	1 : 0,60	1 : 1,48
<i>Socio-cultural characteristics of householders and farm members</i>			
Average of householder (years)	54,6	50,9	50,8
% of householders with full-time employment on farm	94,7	86,0	62,7
% of family farms with the successor	47,6	29,5	24,1
Average number of labour force full-time employed on family farm	2,9	2,3	1,8
<i>Socio-cultural characteristics of utilised agricultural land</i>			
Average size of owned UAA (ha)	16,8	16,0	16,1
Average size UAA in lease (ha)	22,2	23,6	25,1
Average size total UAA (ha)	35,4	34,6	33,7
% of family farms that take land in lease	84,0	78,5	70,1
% of family farms that irrigate crops	20,2	12,9	19,4
<i>Socio-cultural characteristics of technical labour base</i>			
% of householders who provide technical service in agriculture	42,2	44,6	29,1
% of householders who are deficient in farm machinery and equipment	91,3	92,8	89,6
% of householders who are having trouble with maintaining farm machinery and equipment	35,7	35,2	25,4
<i>Investments in production / factors of farm labour modernization</i>			
% of householder who plan to purchase agricultural land	61,2	91,3	83,6
% of householder who plan to purchase farm machinery	98,3	98,9	97,5
% of householder who are more inclined to purchase machinery in cooperation with other farmers	19,9	33,4	34,2

Source: *System of information in agricultural extension of Vojvodina; author`s calculation*

On the other hand, research results confirm the hypothesis of the influence of the householders` level of education on their willingness to invest in farming modernization. With the increase in householders` level of education, their willingness to purchase agricultural land also increases. This signifies householders` long-term interest to “stay on the land”. These householders are more inclined to purchase machinery in cooperation with other farmers. By that,

householders show not only the awareness of the importance of using the appropriate machinery, but also the awareness of the importance of farmers association as a mechanism to alleviate strokes aiming farm`s social vitality.

Table 2. *Socio-cultural characteristics of householders, farm members and chosen family farms in Vojvodina, by householders` education in agriculture*

<i>Socio-cultural characteristics of householders, farm members and family farms</i>	<i>Education in agriculture</i>	<i>No education in agriculture</i>
Total number of family farms	224	872
Ratio of agricultural and mixed family farms	1: 1,01	1 : 0,47
<i>Socio-cultural characteristics of householders and farm members</i>		
Average of householder (years)	47,3	50,7
% of householders with full-time employment on farm	76,3	87,8
% of householders with college and faculty degree	27,7	8,3
% of family farms with the successor	27,6	34,9
Average number of labour force full-time employed on family farm	2,1	2,5
<i>Socio-cultural characteristics of utilised agricultural land</i>		
Average size of owned UAA (ha)	17,6	15,9
Average size UAA in lease (ha)	32,5	21,3
Average size total UAA (ha)	41,5	32,9
% of family farms that take land in lease	73,7%	80,2%
% of family farms that irrigate crops	18,8%	14,6%
<i>Socio-cultural characteristics of technical labour base</i>		
% of householders who provide technical service in agriculture	44,2%	41,5%
% of householders who are deficient in farm machinery and equipment	88,9%	92,8%
% of householders who are having trouble with maintaining farm machinery and equipment	29,9%	35,2%
<i>Investments in production /factors of farm labour modernization</i>		
% of householder who plan to purchase agricultural land	88,4%	90%
% of householder who plan to purchase farm machinery	99%	98,5%
% of householder who are more inclined to purchase machinery in cooperation with other farmers	38,2%	29%

Source: *System of information in agricultural extension of Vojvodina; author`s calculation*

Research results verify the hypothesis that farms of householders with agricultural education are more socially vital. Furthermore, those householders are more inclined to invest in production (Tab. 2.). Householders with agricultural education are younger. Among them, there are three times more householders with the college and university degree then among householders with no agricultural education. They also have more utilised agricultural area,

both owned and in lease. They irrigate frequently then the householders without formal education in agriculture. Among householders with agricultural education, there is less ones that are deficient in farm machinery and equipment and less ones with the problems in machinery maintenance. Like householders with college and university degree, householders with formal agricultural education are more inclined to purchase farm machinery in cooperation with other farmers. Unfortunately, among householders without formal education in agriculture, there is much more householders of family farms with agricultural income only.

Conclusion

The growing importance of education in modern societies is the result of intensive application of scientific knowledge in the production process. In fact, the importance of education in a society is directly proportional to the characteristics of scientification of labour. In the agricultural and rural development's context, the issue of labour scientification applies not only to the diffusion and dissemination of knowledge towards the producers. It also covers the issue of generating the required knowledge and innovations which implies that *„the direction, scope and goals of the research in agricultural sciences depend (more) on other social circumstances such as financing and available resources, characteristics of scientific and technological development policies, legislation, market characteristics (preferences of the consumers), level of development of scientific knowledge on contemporary agricultural practice and scope and possibilities of their application“* (Čikić, Petrović 2013) rather than on users` requirements. To simplify, the issue of agricultural education does not stop at the formal education domain, even though it is undoubtedly important and, therefore, need to be modernized itself. Education in agriculture is much wider topic, which relates to the functioning of system of agricultural innovations, in general.

Research results shows presence of the connection between characteristics of educational structure of labour force (especially farm householders) and farm`s social vitality and willingness to modernize labour in agriculture. The relation is obvious when speaking of characteristics of educational structure of farm householders, especially their agricultural education. This indicates the significance of the relevant knowledge and information and their correct use in the process of decision-making that is a crucial element of farm management. Unfortunately, there is some insufficiencies in educational structure of farm householders and farm labour force that lead us to the conclusion that staying on

family farm and being a farmer is still not a free choice, but occupational necessity, for many farmers in Vojvodina.

At the point where characteristics of Vojvodinian agriculture and demand for its competitiveness meet, lies the issue of the diffusion of knowledge and innovation in agriculture. This process aims to “repair” insufficiencies in educational structure of family farm` labour force. As a process of extended education, diffusion of knowledge in agriculture aims to create advantages of the family farms (Ventura, Milone, 2004). If quality education is one of the most important features of human capital in knowledge-based societies and/or economies, it is evident why is permanent education (or gaining knowledge, information, skills, expanding the network of knowledge sources etc.) primary way to achieve advantages over others.

Investments enable achieving competitiveness and advantages in business. In knowledge-based societies and/or economies, education and investments are necessary and inextricably associated. As Borozan outlined (2006: 432; according to Jakovac 2012: 96) „*investments can increase knowledge and knowledge can speed up the realization of new investments which, by the theory of endogenous growth, make the growth unlimited*“⁶. This means that education in agriculture should be treated as an investment itself, like purchasing the land or machinery. Education, along with experience, enables farm labour force to review farm`s role and position in the broader social context (rural community, market, global society). It also facilitates farm`s labour force to analyse more adequately options for improvement of the production. Besides being factor without which modern (competitive) production is not possible, education is today basis of cultural capital. It implies the adoption of certain cultural patterns and norms. Strengthening cultural capital, individuals and groups acquire and develop the ability to adapt to current social circumstances, thus producing their own social status (Stojiljković 2010: 79).

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LONG-TERM STRATEGIC PLANNING IN AGRICULTURAL COMPANIES

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Abstract

A strategic plan is one of the most important documents for a business because it represents the results produced by systematic planning as well as setting a clear path for the future growth and development of a company. This paper focuses on strategic planning in today's world of business, with an emphasis on application in today's agricultural companies which are searching for this type of approach more and more in the way they do business due to their structural complexity. A case study was used where an agricultural company, as a result of research, carried out a five-year strategic plan by using a series of questionnaires and later translating the strategic options into financial implications for the purpose of defining priorities in business. A strategic plan provides a basis for an action plan therefore they are the main drivers of set investments, services and financial management.

Key words: *strategic planning, agricultural companies, financial implications.*

Introduction

“Within five years, if you're in the same business you are in now, you're going to be out of business”.

(Philip Kotler)³

Every company should have a defined strategy, in other words, a plan for the future (business strategy). Strategy is planning which is aimed at achieving the vision which differentiates one company from its

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³<http://www.pkotler.org/kotlers-quotes/>.

competitors, in a positive way. It contains the general direction the company is headed towards, as well as the details of the countless activities which take place within a company. For the most part, strategic success depends on whether or not a company has an enlightened and simple vision, as well as how the coinciding tasks are to be done in order to achieve the vision of the company. If too much emphasis is focused on activities, often times the vision itself becomes lost. Additionally, if the focus is intensively placed on the vision, then the operational side becomes neglected. Basically put, corporate strategy is at its core; defining the direction which needs to be taken in order to get to the desired results. Business strategy tells us what activities are to be carried out in order to achieve the corporate objectives. Organizations must ask themselves questions and answers created as a transitional solution, but the strategy of the business is still more than an ad hoc response (Dimitrovski, 2010). Business strategy deals with the decision making process defining which markets and what activities the business should be involved in, where we want to be and how we want to get there.

Strategy is decision making at a high level and management planning for the following purposes:

- Successful fulfillment of consumer needs;
- Moving business forward (organizing resources in the most efficient and effective way possible);
- Leading the competition battle (strategies and tactics which emphasize a competitive advantage);
- Achieving corporate objectives.

Corporate (or business) objectives are set at a high level and are quite different from any of the more detailed, functional objectives set at the functional levels of business. If the company is involved in several business or operations, it will need a corporate strategy, as well as business strategy for each particular job. Corporate strategy deals with problems of multi-business enterprise as a whole. Some examples of corporate objectives include the following:

- Sales profits (a traditional method used to measure the size and strength of the business - if profits rise, the business grows);
- revenue (and the highest level of revenue and profit attainable).

- Return on Investment (ROI⁴ is of great importance to capital-intensive companies);
- growth (sales volume, profits, revenue, earnings per share);
- market share (market share and industries owned by the company or its products);
- Cash flow (this may be similar to the target profit, but with focus on maximizing the net inflow of cash in business);
- Stock value (especially important for companies listed on the Stock Exchange);
- Corporate image and reputation (has grown in importance - objectives which are closer to Corporate Social Responsibility, product and service quality and business ethics).

One of the most important challenges that strategic management faces is in understanding the principle of strategic thought and its main purpose of creating strategy. A strategy is one of the most important documents when it comes to the way a company does business because it represents the result of systematic planning and defining of clear pathways for future growth and development of the company. In accordance to corporate policies, it is vital that staff members are included so that they can contribute to the planning process, through active participation in the form of proposing new business ideas, with the objective being the improvement of all businesses.

This paper will pay special attention to Delta Agrar, an agricultural company which operates within the frame of the large corporate system Delta Holding, and the development of its strategy as a guide for future operations. Agricultural businesses are extremely specific due to the fact that their primary business is agriculture, a branch of business which depends heavily on weather conditions. In cases where production risks are not entirely minimized with the aid of modern technology and insurance, the danger of operating for an entire year without profit exists. For this reason it is vital that planning is carried out, as well as monitoring market trends and cultivating those crops which are most sought after. In order to elevate your business to the next level, it is vital that you follow global trends, which in turn means the existence of a long-term business

⁴ ROI-Return on investment.

strategy. It is unfortunate that throughout the world agriculture faces a series of adverse circumstances: the negative effects of climate change, the degradation of farm land and its erosion, as well as extreme exploitation of the use of industrial farming methods, reduction of arable land and the issues concerning the different levels of agricultural subsidies given in rich and in poor countries. The last decade of the 20th and the first decade of the 21st centuries are characterized by continued population growth on a global scale paired with production and trade growth which is lower in comparison to the population expansion. Under these conditions, agricultural production becomes one of the most important items in the development strategies of countries and regional groups in the world. Serbian producers have yet to become unified so that they may perform together at large global markets and because of their small size, lack of adequate processing equipment and storage facilities, as well as lack of support from their government, they are often inefficient and unable to compete on the international market. The government's lack of any long-term strategy is also an important factor which has limited growth in this segment and its contributors on the market.

In order to define a strategy for agricultural development which will define and target investments and support, quality analysis must be carried out. Delta Agrar is a company which first and foremost deals with primary production and product sales. Within the frame of its primary production Delta Agrar deals with crop production, fruit and vegetable and livestock production. Sales refer to stock exchange turnover, agricultural technology, plant protection and nutrition and hybrid seedlings.

As Delta Agrar's operations include all of the above listed, development of its strategy is more complex and more demanding. Strategic planning should be viewed as a management development process and the relationship between objectives and resources of the organization and the opportunities and possibilities in the environment (Marjanović, M. et al, 2006). The most challenging aspect of strategic planning is in fact its implementation. Implementation of the plan includes the implementing of all activities which have been written out in practical terms, as well as achievement of objectives and strategic options which are in the plan. The strategic planning is actually an evolutionary form of business policies, which emerged as a result of the more difficult conditions in the environment (Hall, Litzenberg, 2000).

In order to successfully implement the plan, the very beginning of the process must coincide with the very beginning of the strategy planning process and it must be consistent throughout its implementation. Constant updating and monitoring of the realized action plans is of crucial importance for the entire strategic plan. The true strength of a company's strategic plan will be shown through business improvements as well as through its ability to lift the business to the next level. A strategic plan provides the basis for all action plans, so that the main drivers are set investments, services and financial management.

Prior to the start of any strategic plan, management must accurately answer the following questions:

1. What are we doing?
2. Why are we doing this?
3. With whom/How are we going to do this?
4. When should it be completed?

A Timeframe is a key step in developing a strategy; it involves defining the duration of certain activities. This is done at the beginning once we have defined the operational leaders according to activity (if there is more than one) and those who will supervise and provide guidance to the course of development of the plan. The timeframe is subject to the following phases:

1. The preparatory phase;
2. The formal launch of the project;
3. Data collection;
4. Analysis;
5. Synthesis and decision making;
6. Final presentation.

Each phase is divided into: activities that will occur during the given phase, defining objectives, cooperation of the collective and of course on the additional value which is to be achieved at the end of each phase. Control meetings with the operational leaders should be held during each phase during the development of the strategy because it is at these meetings that problems are defined and solved, including further steps in communication. Successful accomplishment of complex activities of strategic planning requires that managers have the appropriate knowledge and skills, creativity and modernize, change and develop their own view of the future (Savić, Janković, 2010).

An example of a schedule plan per phase, which is the result of the calculations done by the author while conducting research, may look like a strategy plan, which in the case of the development of Delta Agrar's strategy plan lasted 12 weeks (*table 1*).

Table 1. *Time dimension in development of the strategic plan*

Phase/time	Activities	Our cooperation	Value add	Deliverables
Preparation phase (1 week)	<ul style="list-style-type: none"> • Determine objectives • Planning • Discuss 	<ul style="list-style-type: none"> • Build common understanding on strategy 	<ul style="list-style-type: none"> • Create solid steppingstone 	<ul style="list-style-type: none"> • Preparation kick off including timeline, key deliverables, structure
Formal kick-off (1 week)	<ul style="list-style-type: none"> • The division of responsibilities • Discuss • Mission and Vision 	<ul style="list-style-type: none"> • Build common understanding on strategy 	<ul style="list-style-type: none"> • Kick-start process 	<ul style="list-style-type: none"> • Project plan
Project phase – data collection and analysis (6 weeks)	<ul style="list-style-type: none"> • Data gathering • Set up financial model 	<ul style="list-style-type: none"> • Support management to provide data and business plan input • Share and cross-check findings with management • 	<ul style="list-style-type: none"> • Standardized process • Independent view • Create client buy-in • Experience, standardized approach, support initial strategic vision 	<ul style="list-style-type: none"> • Preliminary findings • Comprehensive market and financial analysis
Synthesis & decision making (3 weeks)	<ul style="list-style-type: none"> • Implications • Define strategic roadmap 	<ul style="list-style-type: none"> • Priority/Risks/ • Decide on final choice 	<ul style="list-style-type: none"> • Translate strategic direction into financial implications 	<ul style="list-style-type: none"> • Quantified strategic options
Final Presentation (1 week)	<ul style="list-style-type: none"> • Present and support strategic choice 	<ul style="list-style-type: none"> • Preparation final presentation 	<ul style="list-style-type: none"> • Stakeholders alignment 	<ul style="list-style-type: none"> • Actionable plan and key conclusions

Source: *authors*

Key Elements of a Strategic Plan

A key part of any strategic plan is defining the three main concepts that provide an accurate picture of the company. The *Mission* defines the purpose of the company's existence. Mission shows the direction and the vision should provide knowledge about the expected future (Pejanović et al., 2010).

The *Vision* articulates the direction we're heading towards, or rather where we want to be, and the plan tells us exactly how we plan on getting there. We begin planning our activities once we have agreed on our vision. Strategic vision plays an important role in the initiation and implementation of strategic change. The management of modern enterprises needs to understand and accept the changes in many factors that determine the performance of the company. *Values* are made up of our operational philosophy or the principles which manage the internal behaviors acceptable within our organization towards our clients, partners and shareholders. Strategic values are important for the sustainability of the business, and they focus organizational efforts of a company and connecting them with the surroundings (Osborne, 1996).

The Executive Summary is the final overview of all key indicators and aims for further business. This short overview of the strategic plan is found at the beginning of the document. The Executive Summary should answer questions which are grouped in the following units:

I. Description

- Strategic direction, key areas of the strategic plan,
- Mission, vision and values,
- Moving forward and added value to the entire organization, steps forward in business.

II. Types of Analysis

- Historical, Financial overview,
- Overview of key strategic decisions,
- Overview of future steps to be taken,
- Line revenue and EBITDA⁵ (Earnings Before Interest, Taxes, Depreciation and Amortization),
- Overview – Capex⁶ (Capital expenditure), annual,
- Overview – CF⁷ (Cash Flow), annual,
- Overview of Key Drivers (assumed) of growth and any potential sensitivity.

III. Key Questions

- Where are we now and where do we want to be?
- What is our vision and mission?
- What is our future positioning and which segment are we competing in?

⁵ EBITDA-Earnings before interest, taxes, depreciation and amortization.

⁶ Capex-Capital expenditure.

⁷ CF -Cash Flow.

- What are the key growth drivers?
- What are the financial implications?
- What are the risks and challenges?

The document containing the complete strategic plan should have the following structure and frame which is compatible with the given questions:

1. Company Description

- Current situation, challenges and proposals;
- Current strategy: Product/market combinations, introducing market strategy;
- Analysis of key financial indicators over the past few years.

2. The Market

- Description of the effects of all market fluctuations on the business.

3. The Competition

- Secure insight into the direction in which the competition will move in the near future and how this will shape the market.

4. Strategy - Plan

- Predicting the implications of market trends and the competition's movement, defining strategic growth.

5. Finances

- Description of the company's five-year (or other timeframe) financial prognosis,
- Challenges management faces in giving prognosis and openly discussing the given predictions.

6. Implementation/Next Steps

- A description of implementation of the plan and the next steps.

Using the following analysis we ensure that the company description gains in relevance:

- a) Analysis of the company's business and identification of key elements of current proposals;
- b) Mission, vision and values;
- c) Organizational Structure of the company;
- d) Understanding the past and current role sales and base earnings play;
- e) Revenue and EBITDA divided by the field, product and sales channel;
- f) Consumer analysis, including the effects of key consumers and their shares regarding costs;

- g) Assessment of the market size and growth in relevant segments;
- h) Identification and understanding of the basic volume and dynamics of the market, including growth drivers and trends;
- i) Identification and understanding of market pricing, margins
- j) Analysis of market shares;
- k) Assessing the company's relative success rate;
- l) Assessing the strengths and weaknesses in relation to the competition;
- m) Scenario analysis;
- n) Assessing the company's ability to achieve its own strategic objectives, taking into account the company's strengths/weaknesses, resources, capacities, etc;
- o) Necessary investments;
- p) The financial model based on prior segments in the report;
- q) The income statement and cash flow;
- r) Defining key critical areas and the leadership structure.

Key questions that need to be answered in the following sections are grouped as follows:

1. Company Description

- What is our current proposal?
- What are our ambitions?
- How has the company conducted business in the past 3-5 years and what are its strengths and potential weaknesses?
- What are the key elements of our income and operational model?
- To what extent are we dependent on our consumers?

2. In the section which refers to the market:

- What is the prognosis and form of the market regarding demand and in what correlation is this with the company's strategic plan?
- What are the annual revenue estimates and margins for the planning period, which will be listed in the financial model?

3. In the section which refers to the competition:

- Performance in comparison with others?
- What is the strongest strategy for confronting the competition in future, taking into account our strengths and weaknesses?
- What is our targeted market share?

4. In the section which refers to the strategic plan:

- Taking into account the dynamics of the market and its implication on growth, what are all of the company's strategic options?

5. In the section which refers to finances:

- How will the most likely scenario influence the company's finances over the next five-year period?
- What are the predicted revenues and growth margins (%) and other financial implications (capital, financing, etc.)?

6. In the section which refers to implementation:

- How are we going to achieve this group of objectives?
- Who will be responsible for the functional areas?
- What are the associated costs?

Creating Process, the Greatest Obstacles and the Golden Rules

The strategic plan for each member of a company or its individual businesses has a solid foundation, based on facts, which supports the forecasted assumptions and basis for the establishment of the financial implications. The strategic plan does not provide an independent assessment of the company and the market, as the people involved in the development of the strategic plan are not able to objectively analyze the value of the company and the market situation, the strategic plan may include decisions which are not in the best interest of the company in the long-term. There is no clear ownership of the process, because people are reluctant to take ownership of it and a lack of process hinders support for any further expansion of the company.

As a result, the process takes longer than anticipated, which eventually interferes with the staff's daily workload and also takes the attention of management away from other matters. When talking about the shortcomings related to strategic planning, the underlying causes that lead to doubt the application of strategic planning is the lack of knowledge in four areas: a) what are the strategies and why they are important, b) how the strategy fits into the planning process, c) to develop a strategy, and d) how to apply the strategy in terms of current decisions (Koontz, 1976). The view that the strategic plan is a "visionary" document is another trap, because it only provides an overview at a high-level and includes strategic objectives which are too general to be carried out. The implementation of this strategy can be presented in different ways and it is difficult to define the following activities and understanding of the financial implications is not the objective, in this case. In addition to the above mentioned errors, there is a Golden Rule which is considered desirable to be adopted prior to creating such a complex plan.

A combination of independent observation and good knowledge of the company is the best practice because decisions made under these circumstances are based on facts, and the company's external partners are given an objective picture of the company's position, based on analysis of the strategic plan.

A clear division of responsibilities and involvement of management provides a solid basis for the execution of the strategy. Responsibility must be clearly assigned to team members at the beginning of the process. Control consultation is desirable and it is of vital importance that management is involved because they provide strong support for the project and allow for the introduction of the mission and vision of the company.

The strategic plan is concrete and based on facts; it is the translation of specific strategic objectives into financial implications. Defined strategic objectives are translated into a five-year financial forecast, taking into account market developments and corporate environments. The plan should include a limited number of strategic objectives and it is desirable that they are measurable. The conclusion of the document should be organized and written in such a manner that it is understandable to outsiders.

In order for the strategic plan to be done properly and professionally, is an important to carry out an analysis of the business, i.e. a description of the analysis that supports your conclusions. Together with the team, a reviewer with check whether the story will fully support the strategy and whether or not it will eventually provides the facts to support the financial assumptions. Constant contact with the project leader and the other teams and financial leaders is essential for consistency, progress, and exchange of information, experience and the cross-checking of whether or not the strategy is feasible-including finances.

Implementation of the Strategic Plan

The most challenging aspect of strategic planning is its implementation. Implementation of the plan includes the implementation of all that is written in practical terms, as well as the objectives and strategic options that are in the plan. Regular updating and monitoring of implemented action plans is crucial for the overall strategic plan. The true strength of the strategic plan will become apparent through improvements in business and its ability to raise the business to the new level.

The Strategic Plan provides the basis for action plans, so that the main drivers are set investments, services and financial management.

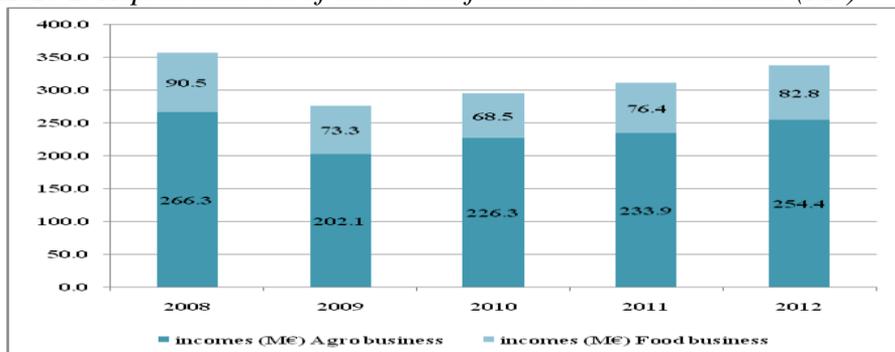
It is important to define what the investments will be in the coming period, as well as to define which projects with high growth potential to invest in so that our profitability increases at the same time.

Learning occurs on already-gained experience. Implementation is monitored in order to ensure that its effects are positive, and to make the necessary adjustments and improvements in order to take the next steps. Strategic planning is not just the writing of a formal plan; it is a commitment made by the entire leadership of a company to create a vision that the whole organization will live.

Example of Implementation of a Strategic Plan in The Company Delta Agrar

The company Delta Agrar, as the holder of Serbian agriculture, has been recognized as a leading group of innovators who dictate, introduce and implement global technologies in agriculture and the food production sector through continuous improvements in personnel and compliance with the strictest standards and laws in the field of safety and quality of finished products. This group includes 1,406 staff within its team. Delta Agrar is characterized by innovation and the ability to react quickly with regards to changes in their micro strategy and tactics and in times of economic adversity and shifting in the marketplace, which is at the same time imposed on the market as the only example of long-term survival and continued growth in the country and in the region in agriculture.

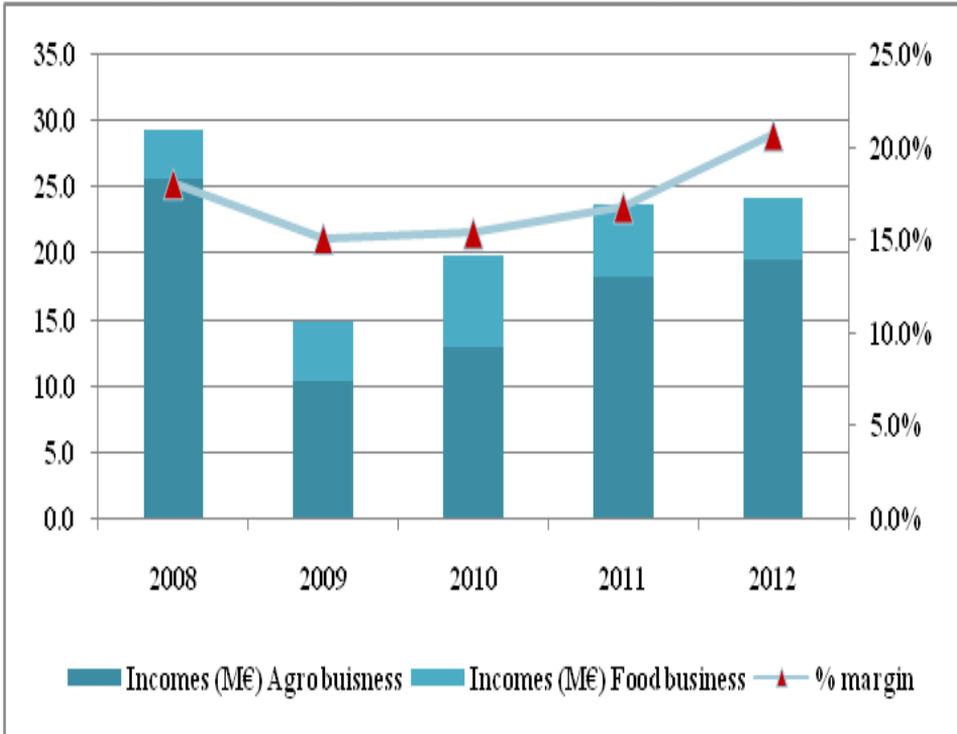
Chart 1. Representation of historical financial data –revenues (M€)



Source: authors' calculations

After reviewing historical indicators, *charts 1 and 2*, it is necessary to define the mission, vision and values of the company in order to make it easier to begin preparing the strategy plan.

Chart 2. Representation of historical EBITDA (M€) and margins (%)



Source: authors' calculations

Having in mind that the mission, vision and values define the strategic options, listed according to priority, they, objectively speaking, can be realized within an estimated timeframe.

A fact is that the trend in rising food prices, climate change and limited arable land are all key factors and a significant step toward the global market.

By increasing the land area cultivated by Delta Agrar, the company will be in a position to organize highly profitable production on a large scale, and bring the food production process full circle through tight vertical integration which will create better business results.

Table 2. Representation of strategic options with financial implications

	Strategic options	Description	Revenue contribution (M€)	EBITDA contribution (M€)	Capex (M€)
			2013-2017	2013-2017	2013-2017
Existing business	A. Expansion of primary production	Crop production on additional 20 ha	152.75	69.75	65.01
	B. Investment in livestock	Investing in pig farm sand feed mills	61.08	9.57	20.82
		Capacity expansion on cattle farms	29.22	4.79	4.31
	C. Investment in storage, production and processing facilities	New ULO storage capacity of 15.000T	41.77	3.81	20.41
		Rising new apple orchards	19.58	3.11	20.48
		Rising new pear orchards	1.25	0.68	7.02
		Glasshouse	1.59	0.77	6.09
		Nursery for plants	1.11	0.43	7.41
		Processing seed center in Sombor	7.94	1.25	4.54
	Total (M€) 2013-2017			316.28	94.17

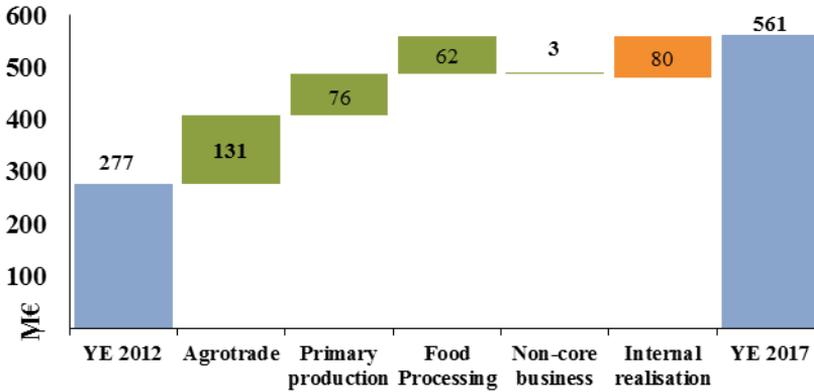
Source: authors' calculations

A graphic view of strategic options (*Table2.*) ,which is the result of the calculations done by the author while conducting research, where the strategic options of the company are clearly visible and listed by priority. Emphasis is placed on the order of options, because if implementation of the plan, through action plans, due to various internal and external factors does not go according to plan, the top management of the company has to know where to stop investments. Filling in the table must be the result of mutual work between management and the finance department, as financial experts must predict the financial forecasts for each individual option, i.e. it is necessary to predict the contribution of revenue and EBITDA, as well as the investments. Finally, at the end we can see what the contribution to revenues and EBITDA will be over a five-year period, as well as the necessary investments. In its five-year plan, Delta Agrar will invest in the expansion of primary production and in food production (investments in production capacity and product lines).

Presentation of Financial Forecasts

Delta Agrar’s strategic plan would not be complete without clearly presented financial indicators. All strategic options are translated into financial implications on which basis the final decision about how the business will run in the future are made.

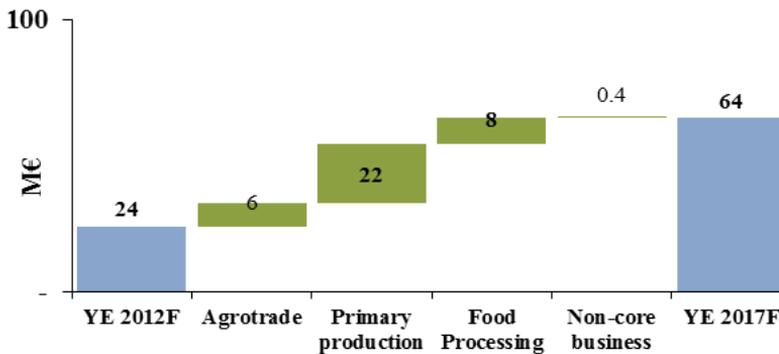
Chart 3. *Example of Revenue Bridge for the period from 2012-2017 year*



Source: *authors' calculations*

This *Chart 3.* shows the forecasted contributions to revenue per business for the requested period; the period of time it takes to draft the strategic plan. The sum of the initial income and of all the others, per business, should show the projected income for the year end.

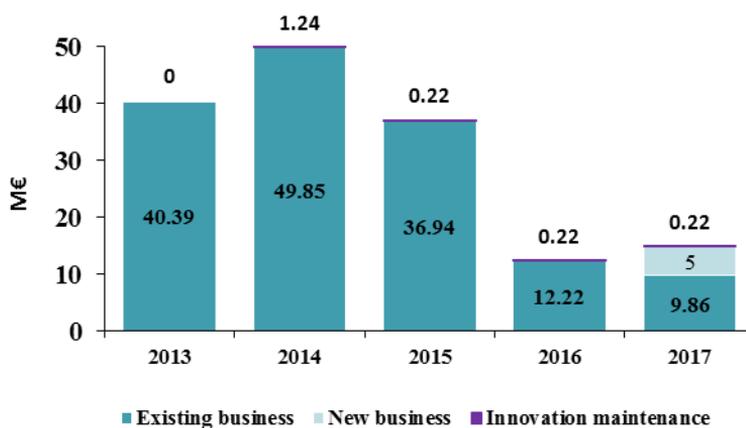
Chart 4. *Example of Ebitda Bridge for the period 2012-2017 years*



Source: *authors' calculations*

Chart 4. presents the forecasted EBITDA revenue per business for the requested timeframe; implementation of the Strategic Plan period. The sum of the initial EBITDA and all others, per business, should show the planned EBITDA for the year end.

Chart 5. Example of Capex by Year Bridge for the period 2013-2017 years



Source: authors' calculations

Chart 5. displays the required investment per strategic option for each year as forecasted by the strategic plan.

Conclusion

Strategy is one of the most important documents in business because it represents the results of systematic planning and setting clear directions for future growth and development of a company. In accordance with the corporate policy, it is of vital importance that staff contributes in the development of the plan, first and foremost by being actively involved in the form of proposing new business ideas, with the aim of improving all business. Giving a special spot to the implementation phase within the frame of the entire strategic process represents a decisive moment when the concept of corporate and strategic planning develops into the discipline of strategic management. By introducing implementation into management focus, the essential transitory phase from planning the company's development moves towards management.

Successful implementation of change means that it has been properly planned, that the necessary resources have been engaged, that the right measures and actions have been defined, but also that all of the subjective obstacles which stand in its way have been removed. Within this context, one of the more important questions remains and that is how to overcome resistance to change within the company.

In the implementation of Delta Agrar's Strategic Plan the greatest risk will be the lack of subsidies and long-term strategies for agriculture on behalf of the government, and the fact that most production is dependent on weather conditions.

Serbia's integration into the international mainstream, institutions and possible cooperation with individual medium and large producers, based on the principle of cooperative relations, are all big challenges.

It is important that the company accepts all challenges on the road to implementation of the strategy with great decisiveness. Only a company with stable values and a strong sense of team spirit, with clearly stated objectives can be a winner in modern business.

Strategic planning is a process which entails thorough analysis, graphic displays, determined direction and of course, achievement of defined goals.

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CONSUMERS' PREFERENCES AND CHARACTERISTICS OF CONSUMPTION OF FRUIT AND FRUIT PRODUCTS IN SERBIA

Marija M. Nikolić, Jasmina Arsenijević¹

Abstract

The results of research of consumers' habits and preferences in the consumption of fruit in Serbia are presented in the paper. The survey was conducted during June and July 2013 on the sample of 272 respondents. The results show that the highest percentage of respondents (36%) consume up to 200g of fruit per day, while with the increase in daily fruit consumption reduces the percentage of responds. Consumers usually buy bananas, apples and oranges, while pears are on the last place. Fruits are most frequently eaten in summer and purchased predominantly in urban green markets (48%). Quality is the crucial factor that influences the purchase of fruits, followed by a positive effect on health. The results indicate that there is a need to increase consumption of fruits, mainly of domestic production. Therefore, it is necessary to conduct significant marketing efforts to increase the consumption of fresh fruit in Serbia.

Key words: *consumption of fruit, research, factors, marketing, Serbia.*

Introduction

Fruit is an important element of various and healthy diet. Numerous studies indicate beneficial impact of fruit consumption on human health, and it is usually analyzes together with vegetables in the relevant literature. The daily consumption of fruit and vegetables can contribute to the prevention of various diseases (Agudo, 2005). In 2002 an expert consultation for the World Health Organization and Food and Agriculture Organization of the United Nations published a report.

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The experts concluded that a daily intake of fresh fruits and vegetables in an “adequate quantity” decreases the risk of cardiovascular disease and affects the reduction of cancer, obesity and diabetes (Pomerleau et al., 2005). Relevant institutions give different recommendations on adequate consumption of fruit, but it is interesting how the term “fruit” can be defined. According to the World Health Organization (WHO) report from 2003, which was based on 93 national reports, the definition of fruit doesn’t vary significantly in different countries, and most definitions specify that fruits are “fleshy part around the seeds of a plant, have a sweet taste and are most often eaten raw as a dessert or snack.”

Fruit is an important source of water-soluble vitamins and other antioxidant nutrients. Fruits and vegetables may prevent certain diseases if consumed in sufficient quantities (FAO/WHO 2004). What is considered to be sufficient amount of daily intake? Recommendations on consumption of fruit in the literature vary considerably. The World Health Organization recommends intake of 400 to 500g of fruit and vegetables per capita per day (excluding potatoes and other starchy tubers). In the report of this organization from 2003, as a minimum quantity is stated 400g of fruit and vegetables per person per day, in more portions (usually five), whereby the portion of fruit means one piece of fruit or one slice of a big fruit, a handful or one cup of fruit or 100-150g. Lock et al. (2004) estimated that the minimum-risk distribution for fruit and vegetable intake is 600g/day in adults, 480g/day in children aged 5-14 years and 330g/day in children aged up to five years, also in portions of about 80g.

Most recommendations are generally made for fruit and vegetable intake as a group, but there are separate recommendations for fruit. In the Netherlands, for example, is advised to eat two or more servings of fruit per day (approximately 250g) or two apples, pears, oranges, medium size banana, which are the most popular fruits in the country (Brug et al., 2006). In Australia the recommended daily intake is about 300g of fruit in at least two separate portions. The recommendations that can be found in domestic literature are generally slightly lower. Vlahović (2005) gives two different values: according to Dragaš (1989) the annual needs of fresh fruit per household member are 56 kg or 153g /day; while Vajić (1985) state that daily fruit intake should amount to 203 grams per day, and it should account for 11.6% in the structure of daily consumption. Štrbac (2007) recommend consumption of even 400g of fruit per day.

Regardless of the recommended values, in most of the world consumption of fruit and vegetables is well below the minimum. In fact, only a small percentage of the world's population consumes the recommended amount of fruits and vegetables. For this reason, WHO (2003) states that it is necessary to significantly increase the consumption of fruits and familiarize consumers with the benefits of consumption of this food through special marketing actions.

Methodology of research

The paper is structurally divided into two separate parts. After the introduction, where is underlined the need for consumption of adequate amounts and review of the recommended value of fruit intake, in the first part of the paper are presented the results of research on the consumption of fruits in the world and continents. Fruit consumption in the Republic of Serbia is in focus in relation to the recommended values.

Data on consumption of fruit on the global level were collected from the FAO database (Food and Agriculture Organization of the UN), which calculates the consumption of fruit using balance sheet method. In order to reveal Serbian position at European or world level, we used data on consumption of fruit in the last four years for which data are available, from 2006 to 2009. Beside these, we also used the data on consumption of fruit provided by the Statistical Office of the Republic of Serbia (SORS) which are published in the Bulletin Household Budget Survey for 2006-2011. According to these data, the consumption of fruit in Serbia is at a significantly lower level compared to the data presented in the FAO database, which is partly due to different data collection methodologies.

In the second part of the paper are presented the results of research on the consumption of fruit and fruit products, which was conducted in June and July 2013. Survey technique of questionnaire distributed electronically via the Internet was used, and the sample included 272 individuals. The survey was anonymous and the questionnaire contained 16 closed questions. To perceive the attitudes of consumption volume, market supply of fruit, and the impact of consumption of fruits and fruit products on the health and other relevant questions, we used a five-point Likert scale. Data collected through the survey were analyzed using mathematical and statistical methods in SPSS-21.

The aim of the paper is to identify patterns in the consumption, as well as factors that determine the amount of daily intake of fruit. We included questions related to socio-economic characteristics of consumers, their economic situation as well as questions aimed at learning more about the awareness of the respondents about the positive impact that fruit consumption has on health.

Data collected through the survey were compared with the SORS and FAO data on fruit consumption in our country with the aim of creating a more precise picture of the analyzed issues.

Trends in consumption of fruit in the world

Fruit production in the world, according to the FAO, in 2009 was almost twice as high compared to the production volume in 1980, reaching a level of 604 million tons. In the same period, the consumption of fruit increased by only 55% – from 46.8 kg to 72.9 kg per capita per year (Graph 1).

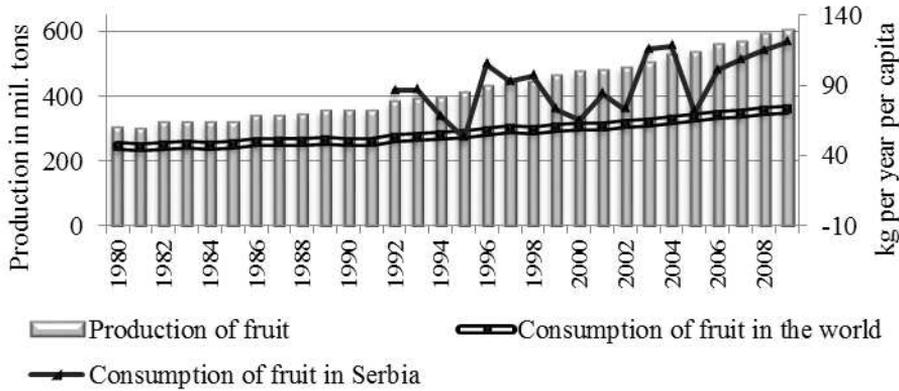
The highest growth rate in the period 1980-2001 had melons (FAO/WHO, 2004), that although some authors consider being vegetable plants, by characteristics and intended in human consumption belong to fruit.

Consumption of fruits in the world varies significantly, and the lowest is in the group of least developed countries reaching 41.7 kg per capita per year (average 2006-2009), while far higher values are recorded in developed countries (105.0 kg in the EU and 114.0 kg in North America).

Consumption of fruit below the world average, which was 70.9 kg per capita per year (for 2006-2009), had only countries with lower level of development: South-East and Central Asia, Africa, Net food importing countries, or Least developed countries, while consumption in Europe, Oceania, and the Americas exceeded this value.

The largest fruit consumption per capita per year was observed in the Caribbean (124.9 kg), Southern and Eastern Europe (124.4 kg and 123.7 kg, respectively) and North America (114.0 kg).

Graph 1. Production and consumption of fruit in the world

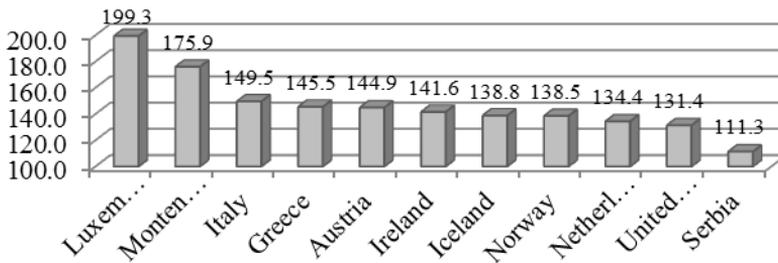


Source: Authors' calculations, according to the UN FAO data

Note: Data for period 2006-2009 are related to the Republic of Serbia, and from 1992 to 2005 to Serbia and Montenegro.

The average annual consumption of fruits in Europe in period 2006-2009 was 93.0 kg per capita, which is 31.2% more than the global average. Comparing to the 1992-2002 period, when the fruit consumption in Europe was 79 kg (Štrbac, 2007) we can observe an increase, although the deviation from the world average is almost identical. The most important consumers of fruits in the world are the residents of Luxembourg, Montenegro, Italy, Greece and Austria, and with the exception of Montenegro, these countries are traditionally large consumers of fruit. Despite the fact that Netherlands is on the ninth place of fruit consumption in Europe, about 70% of its population eats less fruit than recommended, and the amount of fruit consumed has decreased in recent years (Brug et al., 2006).

Graph 2. Countries with highest consumption of fruit in Europe (kg per year per capita – average 2006-2009)



Source: Authors' calculations, according to the UN FAO data

Consumption of fruits of 111.3kg per capita per year, or 305g per day as recorded in Serbia, which puts it on the 17th place in Europe, meets most of the recommendations for daily intake of fruit. However, according to data published by the SORS, Serbia has significantly lower consumption of fruits per household member. Considering the same period (2006-2009), the fruit consumption in Serbia was 54.6kg per year per household member, or 150g per day². Such a low consumption does not meet the minimum recommended daily intake of fruit and from nutritional point of view is unsatisfactory. Ognjanov et al. (2010) reported that fruit consumption per capita in Serbia is three times smaller than the average for the European Union. In the structure of fruit consumption in Serbia, apple is on leading position (Maksimovic, 2009; Vlahovic et al., 2005), although a relatively high proportion have citrus and bananas.

Factors that determine the consumption of fruit

According to the recommendations of the FAO/WHO (2004), activities aimed to popularize the consumption of fruits should be based on (1) availability, (2) price-accessibility, and (3) acceptance (in terms of quality, taste, fruits, and cultural differences). Ognjanov et al. (2010) report similar results noting that the availability of fruit (at home, in a nearby store or seasonal variation) is one of the most significant barriers to increased consumption of fruits; and fruit price is also highly ranked barrier. Vlahović et al. (2005) define factors that limit more significant fruit consumption in Serbia: low purchasing power of consumers, relatively high retail price of various types of fruits and habits of consumption – especially in processed fruits. In creation of appropriate forms of fruit consumption in children, an important role have accessibility of different types of fruit in home, and the attitudes, knowledge and behaviour of parents regarding healthy nutrition (WHO, 2003). Research conducted by the authors of this study confirmed these results: eight out of ten respondents believe that fruit prices affect the level of consumption (61.8% of respondents rated it as important, and 17.6% as very important factor when buying fruit).

² The Statistical Office of the Republic of Serbia publishes Bulletin Household Budget Survey annually, where from 2006 are recorded consumed quantities of food and drinks products. If the entire period for which data are available is taken into account, consumption of fruit in Serbia per household member would be 55.7kg per year, or 152.6g per day. However, in order to compare with the data available in the FAO database, we used the same accounting period, i.e. from 2006 to 2009.

Štrbac (2007) states that production volume; the level of income and nutritional habits determine consumption. According to the U.S. Centers for Disease Control and Prevention, daily requirement of fruits vary by sex, age and level of physical activity. Accordingly, they set the calculator to their website³ which enables consumers to calculate recommended daily intake of fruit in a fun and easy way. These actions allow consumers to see if they take sufficient amounts of fruit, and to use additional information presented on the web-site to learn what influence may have increased consumption of fruit on their health.

Besides actions of individual organizations aimed to promote the consumption of fruit, various activities carried out at national level are of greatest importance. In developed countries, promotion activities are organised for education of consumers about the consumption of fruit and vegetables and the recommended intake. In Australia, the campaign called “Go for 2 and 5”⁴ is conducted by mass communications in order to increase consumption of fruits and vegetables. Title of campaign is based on the nutritional needs of an adult that should include at least two servings of fruit and five servings of vegetables each day, whereby the portion is 75g of vegetables and 150g of fruit. In Canada, for over a decade is conducted campaign called “5 to 10 a day – Mix it up!”⁵, within which is created a web-site⁵ with a variety of contents: from the children’s drawing competition on the theme of fruit and vegetables, list of different types of fruit and vegetables with tips on storage, preparation, nutrition characteristics and recommendations for daily intake, up to ten reasons to consume these foods. Similar activities are implemented in developing countries, although much less frequently and to a smaller extent⁶. Studies have shown that most of promoting activities led to increased consumption of fruits and vegetables, at least in a short term (Pomerleau et al., 2005). It is therefore necessary to carry out continuous activities so that the level of consumption of these foods maintain or increase the recommended amount.

In our market, there is a lack of promotional activities directed to fruit consumption. As an exception we single out Mercator “5 a day”⁷ action

³ <http://www.cdc.gov/nutrition/everyone/fruitsvegetables/howmany.html>

⁴ <http://www.gofor2and5.com.au/>

⁵ <http://www.5to10aday.com/en>

⁶ More on national actions aimed at increase of fruit and vegetable consumption in developing countries in Pomerleau et al. (2005), Annex 1.

⁷ <http://www.mercator.rs/sr/akcije/5-na-dan/>

within which is offered to consumers five fruits and vegetables of different colours (blue-purple, green, white, yellow-orange and red) under favourable prices. Unfortunately, this action has remained relatively unnoticed in the general public.

Results of research and discussion

The subjects of study were selected randomly, without any pre-conditions, and prior knowledge of the research was given solely on the basis of a short introduction preceding the survey. Age and gender structure of the respondents is shown in Table 1.

Table 1. *Respondents according to age and gender*

	Gender		Age group				
	M	F	20-30	31-40	41-50	51-60	60+
Number of respondents	161	111	111	87	44	23	7
%	59	41	41	32	16	8	3

Source: *Authors' calculations, based on survey data*

The survey covered mostly people living in the four-member (32%) and three-member households (28%), followed by households with five or more members (12%), while two members (19%) and one member (8%) households were less common.

Structure of the respondents by territorial distribution was analyzed according to NUTS regions⁸ in Republic of Serbia. We found it to be uneven since the Belgrade region dominates with 66%, followed by Vojvodina region with 16% and Šumadija and Western Serbia with 11%, while the Region of Southern and Eastern Serbia is represented with only 7%. In terms of educational structure, respondents with a university degree (38%) and master's degree (27%) are most frequent. Highest level of education – PhD is represented with 9%, similar to respondents with higher education (7%), while the rest consists of respondents with secondary and primary education. Such education structure of respondents is particularly

⁸ According to the Regulation on the Nomenclature of the statistical territorial units – NUTS (Official Gazette of RS, no. 109/2009 and 46/2010) there are five functional units of NUTS 2 levels Belgrade Region, Region of Vojvodina, Region of Šumadija and Western Serbia, Region of Southern and Eastern Serbia and the Region of Kosovo – which was not covered by the survey.

important from the aspect of evaluating the existence of knowledge on favourable impact of consuming fruit and fruit products on health.

Most of the respondents are employed (77%), dominated by people with incomes of 40,001 to 60,000 RSD (38% of employed respondents), which corresponds to an average monthly salary without taxes and contributions in the Republic of Serbia in the period from February to May 2013. Every fifth respondent is unemployed, and they are mostly young individuals age 20-25 (65%), while the number of unemployed decreases with the increase of the age of respondents. The smallest group are retired ones – 3% or 8 respondents.

Fruits are usually purchased on urban farmer green’s markets (48%) and rarest in specialized stores and wholesale markets (3%). 23% of respondents purchase fruits in hypermarkets and 19% in local stores. It is interesting to note that only participants from Belgrade and Vojvodina region buy fruit in specialized stores and on wholesale markets, which could be explained by the difference in the level of development between the two regions comparing to others, the size of the market and the existence of specialized shops for fruit supply.

According to the survey, most respondents consume up to 200g of fruit per day (36%), and the number of answers is progressively declining with increasing amounts of fruit. Fewer respondents reported to consume between 200 to 300g fruit, and the least answers are in the group over 700g (Table 2).

Table 2. *Consumption of fruit (grams/daily)*

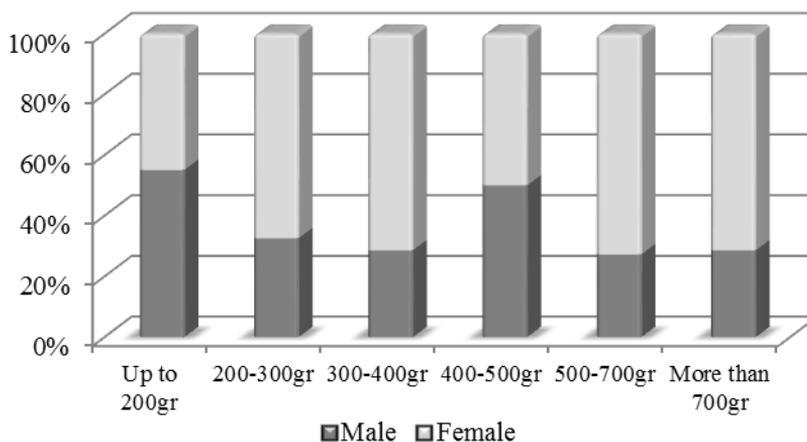
	Up to 200	200-300	300-400	400-500	500-700	700+
Number of respondents	98	89	49	18	11	7
%	36	33	18	7	4	3

Source: *Authors’ calculations, based on survey data*

T-test for independent samples was used to compare the fruit consumption by gender. Findings suggest that there is statistically significant difference of fruit consumption in men (M=1.95; SD=1,216) and women (M=2.33; SD=1.249); t (270)=-2.455, p=0.015.

It is interesting that the results of Croatian Health Survey from 2008 indicate no significant differences between men and women in terms of frequency of fruit consumption – only one third of men and 37.6% of women consumed fruit daily, while a significant percentage of respondents eat fruit only occasionally – 38.6% men and 36.8% women (Pucarín-Cvetković et al., 2011).

Graph 3. Consumption of fruit by gender

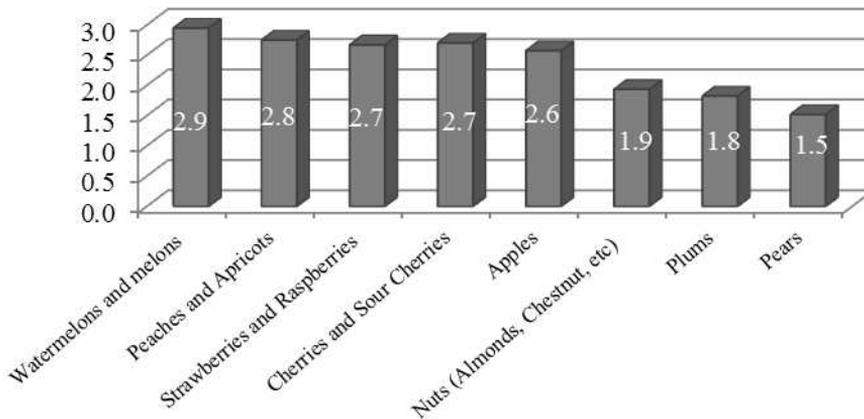


Source: Authors' calculations, based on survey data

The respondents also rated the frequency of consumption of certain fruits in maturity season over five-point Likert scale⁹. The highest grade of consumption in season had melons and watermelons (2.9), while plums (1.8) and pears (1.5) showed to be the least consumed. These findings are consistent with the research of Vlahović et al. (2005), which pointed out that in Serbia, in the period 1996-2002, melons were the second most consumed fresh fruit achieving 10.4kg per household member per year, while the consumption of plums and pears was on the last place (3.2 and 2.4kg respectively in the same period). Interestingly, there was no statistically significant correlation between the grade of fruit consumption in the season and region of residence (Pearson's linear correlation coefficient is $r=0.12$, $n=269$); in other words the consumption of fruit is not significantly determined by the respondents' residence.

⁹ The rates were: 5-two and more times per day, 4-once a day, 3-two to three times per week, 2-once a week, 1-once in two weeks and less.

Graph 4. *Evaluation of consumption of domestic seasonal fruit*



Source: *Authors' calculations, based on survey data*

Excluding the element of seasonal fruit maturity, most often are purchased bananas (25%) on the average for the whole year, followed by apples (24%) and oranges (23%), which makes three-quarters of the total fruit demand. Peaches and apricots, and berries are purchased almost equally (9 and 8% respectively) in the average for the whole year, while cherries are slightly less represented (6%). According to the low consumption score, pears (1%) and other fruits (4%) are the less frequently purchased.

Apples have a high share in the consumption of fresh fruit. Serbia is ranked on 31st position in the world with consumption of 16.8kg per capita per year (for the period 1996-2003). In addition, the consumption of apples in Serbia is below European, but above the world average (Maksimovic, 2009).

It is important to note that almost half of respondents (48%) claimed to buy tropical fruits (bananas and oranges) most often, in average for the whole year. The high share of citrus fruit in the fruit consumption in Serbia can also be identified on the basis of relatively high consumption rate. As in the case of seasonal fruits, respondents evaluated the consumption of citrus fruits throughout the year over the five-point Likert scale, with identical offered responses (see footnote 10). Based on the values of standard deviation, it can be concluded that 68% of consumers eat citrus and bananas from once a day to once a week (average grades for citrus are from 3.8 to 1.6; and for bananas from 3.9 to 1.5).

Table 3. *Descriptive statistics for consumption of tropical fruit*

	Citrus (oranges, lemon, grapefruit...)	Bananas	Other tropical fruit (pineapple, kiwis, date...)
N Valid	272	272	272
Mean	2.7	2.7	1.4
Mode	3	3	1
Std. Deviation	1.129	1.182	0.786

Source: *Authors' calculations, based on survey data*

Such frequent consumption of citrus fruits may be surprising especially if taking into account following facts: Serbia achieves significant fruit production, fruits and vegetables take over a quarter of its agricultural exports in the last eight years, and have the revealed comparative advantage in the global market (Božić and Nikolić, 2013).

However, let's recall that one of the basic preconditions for increasing fruit consumption is its availability, and that citrus and bananas are available (more or less) throughout the year in the domestic market, as well as that there is no seasonality in their production, as they are continuously supplied from import. Therefore, availability of tropical fruits in the market through the whole year and expressed seasonality of domestic fresh fruits can be decisive factors for the high proportion of tropical fruits in the consumption of fresh fruits in Serbia. According to the research conducted by Kaić-Rak et al. (2006) on fruit consumption in coastal parts of Croatia, citrus, bananas and figs are the most commonly used fruits, which in total are in accordance with the WHO recommendations: at least 400g fruit and vegetable intake.

According to the results, fruit is mostly eaten in summer (average score 4.2)¹⁰, than in spring and winter (3.7) and rarest in fall (3.6). Information that fruit is mostly eaten in summer is not surprising considering the fact that market is well supplied in that period, but the fact that in the fall fruit is rarest consumed (though still not negligible) is worrying.

¹⁰ Respondents evaluated the consumption of fruit depending the season on a five-point Likert scale with following responses: once a month and rarely - grade 1, once in two weeks - grade 2, once a week - grade 3, two to three times a week - grade 4 and ones a day - grade 5.

Table 4. *Evaluation of consumption of manufactured fruit by regions in Serbia*

	Jam/ marmalade	Fruit candy/sweet	Compote (stewed fruit)	Dry/candied fruit	Juice (100% fruit)
Belgrade	2.1	1.6	1.3	1.4	3.1
South and Eastern Serbia Šumadija and Western Serbia	2.6	2.1	1.7	1.9	3.0
Vojvodina Republic of Serbia	2.2	1.3	1.3	1.5	3.2
	2.2	1.7	1.4	1.5	3.1

Source: *Authors' calculations, based on survey data*

Processed fruits is most commonly consumed in the form of fruit juice (average score 3.1)¹¹, and at least through compote (Table 4). Interestingly, respondents from Belgrade and Vojvodina region consume all kinds of fruit (excluding fruit juice) less than residents of the other two regions. Given the differences in the level of development, and the distribution of family farms by region, significant consumption of fruit products may be explained with the increased distribution of domestic consumption for the case of Southern, Eastern and Western Serbia and Šumadija.

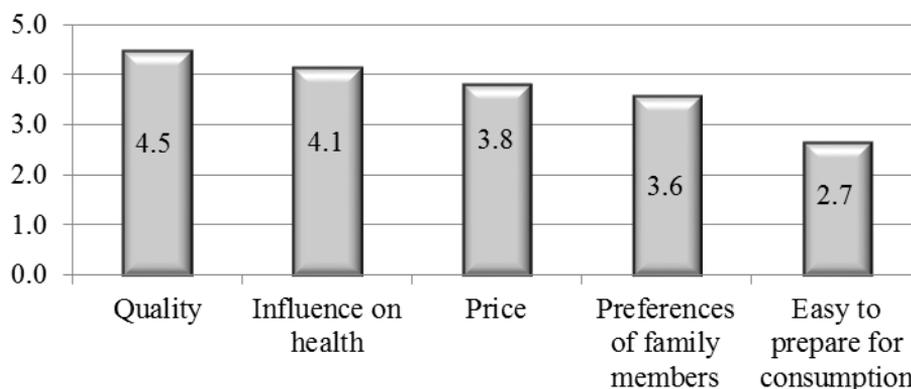
At the same time, fruit juice as a typical industrial product (unlike the other fruit products traditionally produced in households) is consumed almost equally in all regions of Serbia. One of the possible directions of further research should include an analysis of the role of marketing on the level of consumption of fruit juice, as it is more advertised than other fruit products.

The research results confirm general regularities observed in the relevant literature regarding the factors that have a decisive impact on the consumption of fruits and fruit products. The best rated factor influencing the fruit consumption is fruit quality (on a scale of 1 to 5, it is rated 4.5),

¹¹ See footnote 11

followed by factor of positive impact on health, fruit price, than the factor that family members prefer to eat it, but the least relevant factor is easy preparing (Figure 5).

Graph 5. *Factors determining the fruit consumption*



Source: *Authors' calculations, based on survey data*

Nine out of ten respondents are aware of the positive impact of fruit consumption on health, but only half of them (52%) believe that fruit offer in a local market is satisfying. In addition to the limited supply, economic factors have a significant impact on the level of fruit consumption. Fruit price, followed by the respondents' income, determine in high extent the amount of fruit daily purchased by households. Less than half of respondents (48%) believe that they can buy more fruit with current income, 12% is undecided, and 39% of them cannot afford increased fruit consumption. Despite this, 59% of respondents believe that they feed healthy, which implies that they are satisfied with the level of fruit consumption to some extent.

Conclusion

Fruit consumption increases more slowly than fruit production in the last three decades in the world. Even though the positive impact of fruit consumption on human health is empirically proven, the majority of the world's population does not consume sufficient amounts of fruit. Reduced fruit consumption is a characteristic of lower level of development and reduced purchasing power. Serbia is one of the countries in which the fruit is not consumed in accordance with the recommended standards.

The research results points to the critical elements in the consumption of fruit and fruit products, as well as in the interesting areas for further research. Although in defining the level of consumption of fruit and fruit products economic factors are highly ranked, the majority of respondents consume fruit for the beneficial health effects. There are different standards on the minimum fruit intake per capita per day, but the lowest limit can be considered as 200g per capita per day. Having this fact in mind, 36% of Serbian consumers do not take adequate amounts of fruit, although only one out of five has expressed the view that his/her feed was not healthy. It is obvious that there is a need that consumers in Serbia should be more educated about the positive implications of an increased intake of fruit. In this respect, the organized marketing activities are needed in order to raise the level of consumption of fruit and fruit products.

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POTENTIALS OF THE AGRARIAN-EXPORT COMPETITIVENESS OF SERBIA IN THE NEW EU-DANUBE BASIN

Milan R. Milanović¹, Simo Stevanović²

Abstract

The agrarian-export potentials of Serbia should be perceived in the context of those markets where the transport (differential-rent) component can be a significant factor of export competitiveness. The “new EU-Danube Basin” syntagm signifies the intention to identify the agrarian market space where the waterway of the Danube is the connecting “main artery”. It is the territory of the neighboring Danube basin new EU member countries (Hungary, Romania, Bulgaria, Croatia, and Serbia, as an associate member), as a sub-region with very similar agroecological resources, and at the same time the similar structure of agricultural production and possible agrarian export. The initial hypothesis is that Serbia has certain advantages and accordingly there is a change in the position and growth of the relative significance of the EU-Danube Basin market in its total agrarian exchange. Methodologically, the hypothesis is tested by means of several comparative indicators: the coverage of import by export, the coefficient of the relative advantage of agrarian export, changes in the dynamics and structure of bilateral exchange, as well as import as an expression of the efficiency of the utilization of agrarian resources. The basic sources of the data are national statistics and the UN and the FAO statistical bases.

Key words: *agrarian export, comparative advantages, coefficients, resources.*

Introduction

In spite of the “transitional distortion” of the total economy, and at the same time of the domestic agrarian market, agriculture and agroindustry

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are still referred to as the chief support of the Serbian economy in the international market in the future. Big changes in the domestic and the world markets, as a result of the neoliberal politics of developed countries, international associations and organizations (EU, CEFTA, WTO) have had and will be having an important influence on the competitive position of the Serbian agriculture. This relates to both its position in the global market and also the broadened EU market, on the territory of the formerly uniform Yugoslav market and in particular on the territory of the neighboring countries' markets. For a longer period, there has been a noticeable tendency of the extensification of the structure of the Serbian agrarian export, with an increasing share of cereals, raw and unprocessed products. Such a tendency has particularly been highlighted in the last ten years or so, when the unit export value of the majority of the most important export products, with pronounced oscillations, has been ranging around 200-300\$ but mainly below 1000\$ per ton. We must understand that in the export prices of such products there are relatively high unit transportation costs, which can essentially determine the competitiveness and overall economic effects of their export. For that reason, the potentials of the agrarian-export competitiveness of Serbia should primarily be perceived in the context of those markets where this transport, i.e. differential-rent component, to be more precise, can be a significant factor of export competitiveness. Particularly because of that, the "new EU-Danube Basin" syntagm, which is used in this paper, denotes the intention to identify the market space where the Danube river is the transport "main artery", including all the potentials and comparative advantages of this waterway. In that sense, the "new EU-Danube Basin" represents the territory of Serbia's neighboring Danube Basin new EU member countries – Hungary, Romania, Bulgaria, Croatia and Serbia (with the status of an associate member). On the other hand, this territory has very similar agroecological resources and, at the same time, a similar structure of agricultural production, which also intensifies the need for having the relative advantages and potentials of the Serbian agrarian export perceived in such an environment.

From the methodological point of view, the potentials and relative advantages of the agrarian export in an environment defined in such a manner are observed from several aspects in this paper. First of all, such a perception can be made via the indicators of the direct coverage of import by export, which only expresses internal agrarian competitiveness within a single national economy. However, the inclusion of several internal and external parameters in the analysis and the relations existing between

them provides us with a much more objective and more complex expression of agrarian comparative advantages. Therefore, it is obligatory that we calculate the indicator which, on the one hand, analyzes the sectoral (agrarian, in this case) export of a country in the context of the export of that sector of all the observed countries, and, on the other, in the context of the total export of that country and the total export of all the observed countries. In that sense, the coefficient of the relative comparative advantage of agrarian export, calculated and used in this analysis, represents an adapted RCA index (*Revealed Comparative Advantage*, Balassa, 1965), given the fact that comparisons are not made against the total world export but only against the total export of the selected countries. The next very important aspect of this comparative analysis is changes in the dynamics and structure of the bilateral agrarian exchange of Serbia and the countries of the defined sub-region. Finally, export results reduced to the unit of available (utilized) resources enable us to observe agrarian export as an expression of the comparative efficiency of utilizing natural agrarian-resource potentials. The basic sources of data for such a macroeconomic analysis were national statistical bases and the statistical base of the UN and the FAO, which provides the carried-out analyses with the needed comparability and necessary reliability.

Long-term characteristics of Serbia's agrarian export and import

The relative changes in the agrarian-export position of Serbia should also be perceived in the context of the market structure and agrarian potentials of the former common environment and today's new European one.

In that sense, the results of a comparative analysis are interesting (Milanović and Stevanović, 2012b) in the three status/systemically completely different conditions during the almost two-and-a-half-decade period (1988-2010), which has resulted in the three essentially significant long-term characteristics of the Serbian agrarian export and import, which regard: (a) the dynamics and coverage of import by export; (b) the agrarization of the total commodity export and (c) the extensification of the export structure (Table 1).

As far as the dynamics and coverage of import by export are concerned, we should bear in mind that, in the years immediately prior to the beginning of the so-called transition and the disintegration of the uniform Yugoslav market (1988-1990), Serbia had had an average *total export*

value of around 12,573 million USD and the total a total import of around 15,634 million USD, i.e. the coverage of import by export was 80%. About twenty years later (2008-2010), the average annual export fell (by 23%) to 9,704 million USD, whereas import increased (by 19%) to 18,552 million USD, so the coverage of import by export fell to merely 52%. Simultaneously, the average annual value of *agrarian export* (agricultural and food products of *Sector 0 – Food and Live Animals*) increased from 1,128 to 1,581 million USD, while *agrarian import* decreased from 1,374 to 792 million USD. The coverage of agrarian import (82% prior to transition) radically changed, so that Serbia had a convincingly positive agrarian foreign trade balance (even twice as big an export as an import of food). The depth of the problems of the economic exchange with foreign countries and the total Serbian economy, however, is illustrated by the fact that the total negative foreign trade balance multiply exceeded the value of the total agrarian export (Milanović and Stevanović, 2012b).

Table 1. *The long-term characteristics of Serbia's agrarian export and import, per periods, from 1988 to 2010*

	Export			Import		
	Ø 1988-1990	Ø 1998-2000	Ø 2008-2010	Ø 1988-1990	Ø 1998-2000	Ø 2008-2010
Value, in mill. USD						
a)	12,573.2	5,653.0	9,703.9	15,634.5	10,685.5	18,552.4
б)	1,128.0	838.6	1,581.5	1,374.9	792.2	792.3
Dynamics of changes (indices, Ø 1988-1990 =100)						
a)	100	45	77	100	68	119
б)	100	74	140	100	58	58
Coverage of import by export, % (import = 100)						
a)	80.4	52.9	52.3	100	100	100
б)	82.0	105.8	199.6	100	100	100
Share of agrarian in total export / import (%)						
	8.97	14.84	16.30	8.79	7.41	4.27

a) Total (all sectors of SITC); b) Sector 0-Food and Live Animals;

Source: Milanović and Stevanović, 2012b

The second important characteristic is the process of the agrarization of the total export. On the basis of the share of the agrarian sector in the structure of the total national foreign trade turnover, it is possible to see the asymmetry of the Serbian foreign trade structure when compared with the environment: the total export was agrarized relatively the most (the share of the export of food increased from around 9% to over 16%),

because, amongst other things, agrarian and total exports had opposite trends (the agrarian export grew and the total export declined).

The most significant long-term characteristic of the agrarian import and export of Serbia is the process of the *extensification of the export structure*, which can also be taken as an expression of the production-resource structure as well as an indicator of the level of agrarian techno-economic development. Before the beginning of the so-called transition (1988), the leading export products were those related to the field of cattle breeding (bovine cattle, fresh meat, tinned meat), as a more developed segment of the total agriculture then (Milanović, 2013). About twenty later, at the end of the process of transitional reforms and the “promised welfare”, the agrarian-production and export structure was reformed by “moving backward”: among the leading export products, there are no cattle products, and the main export products are for the main part raw materials, primarily cereals. The other EU-Danube Basin countries, too, have gone through a similar transitional change in the export structure.

The elements of the structure of the EU-Danube Basin agrarian market

The foreign trade exchange of agrarian products is here observed as the turnover of products from within Sector 0 of SITC (Food and Live Animals).

The agrarian export of Serbia in the last six-year period was continually increasing, up to a record amount of 2 billion USD in 2011, reaching nearly one-fifth of the total national export. The other countries had a similar growth pace, so that the agrarian export of this sub-region in the same period reached over 16 billion USD, i.e. around 7% of the total export of all the five countries.

The Serbian agrarian foreign trade, making one-fifth of the total export, with very high coverage and a respectful positive balance, together with a very dynamical increase in the value of the export of some significant commodity groups, undoubtedly accounts for a serious potential for development and the total macroeconomic and social stability. The relative importance of the agro-food sector in the total foreign trade exchange of certain countries can be noted by gaining a comparative insight into the share of agrarian export and import in the total exchange.

Table 2. *The total and agrarian export and import of the EU-Danube Basin countries, in mill. \$*

Countries		2006	2007	2008	2009	2010	2011
Export							
Serbia	a)	6428	8825	10972	8345	9795	11779
	b)	1062	1351	1477	1504	1764	2088
Croatia	a)	10377	12360	14124	10492	11811	13364
	b)	792	868	903	870	878	1003
Bulgaria	a)	15101	18575	22486	16503	20608	28165
	b)	979	1006	1796	1649	2225	2575
Romania	a)	32336	40265	49539	40621	49413	62692
	b)	786	875	1749	1773	2439	3167
Hungary	a)	74055	94591	108211	82572	94749	111217
	b)	3591	5089	6217	5297	6021	7338
Total	a)	138298	174616	205331	158532	186375	227218
	b)	7211	9189	12143	11094	13327	16170
Import							
Serbia	a)	13172	18554	22875	16047	16735	19862
	b)	580	746	1000	671	706	946
Croatia	a)	21502	25829	30727	21205	20067	22715
	b)	1442	1670	2033	1767	1695	2023
Bulgaria	a)	23269	30085	37015	23341	25360	32494
	b)	916	1304	1879	1764	1931	2324
Romania	a)	51106	69946	82965	54256	62007	76365
	b)	2211	3407	4567	3927	3671	4314
Hungary	a)	76979	94660	108785	77272	87432	101370
	b)	2413	3031	3833	3247	3537	4207
Total	a)	186028	239074	282367	192122	211600	252805
	b)	7563	10159	13312	11376	11540	13814

a) Total (all SITC sectors); b) Sector 0-Food and Live Animals.

Source: FAOSTAT, FAO statistical database: www.fao.org; <http://comtrade.un.org>

The comparative review of the share of the agrarian sector in the total foreign exchange trade (Table 3) shows that the Serbian total export is agrarized relatively the most in the region (around 18%), which significantly more than all the EU-Danube Basin countries; all the other countries have less than 10% of agrarian in the total export. On the other hand, Serbia has relatively the smallest agrarian import (around 4%), similarly to Hungary, and in the majority of the observed countries, that share ranges between 6% and 9%.

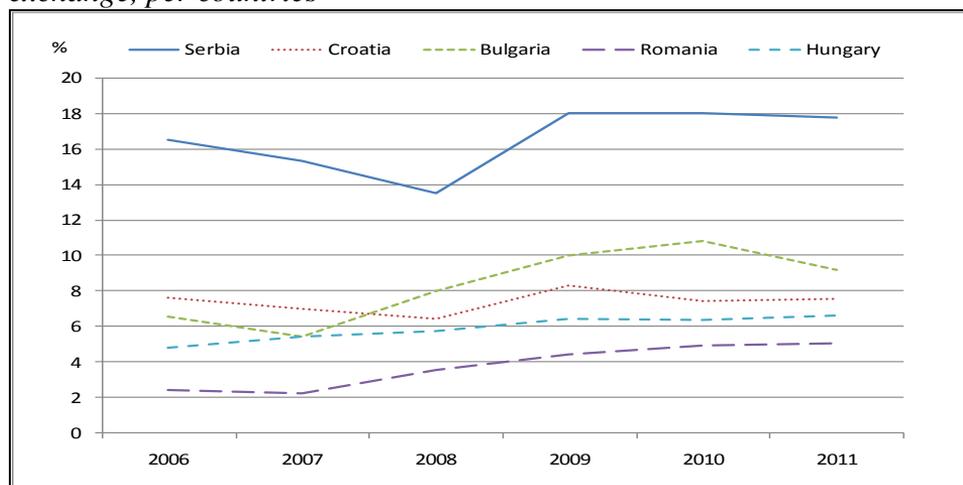
Table 3. *The share of the agrarian sector in the total foreign trade exchange, per EU-Danube Basin countries*

Countries	2006	2007	2008	2009	2010	2011
Agrarian e x p o r t (%)						
Serbia	16.5	15.3	13.5	18.0	18.0	17.7
Croatia	7.6	7.0	6.4	8.3	7.4	7.5
Bulgaria	6.5	5.4	8.0	10.0	10.8	9.1
Romania	2.4	2.2	3.5	4.4	4.9	5.1
Hungary	4.8	5.4	5.7	6.4	6.4	6.6
Total	2.6	2.3	2.9	3.7	7.2	7.1
Agrarian i m p o r t (%)						
Serbia	4.4	4	4.4	4.2	4.2	4.8
Croatia	6.7	6.5	6.6	8.3	8.4	8.9
Bulgaria	3.9	4.3	5.1	7.6	7.6	7.2
Romania	4.3	4.9	5.5	7.2	5.9	5.6
Hungary	3.1	3.2	3.5	4.2	4.0	4.1
Total	4.1	4.2	4.7	5.9	5.5	5.5

Source: as Table 2; processed by the authors.

The share of certain countries in the structure of the value of the overall agrarian export which is realized in the markets of those countries surely is a significant indicator of the export potential and comparative advantage of the Serbian agrarian export in relation to the markets of the countries of the EU-Danube Basin and a broader environment.

Graph 1. *The share of agrarian export in the total foreign trade exchange, per countries*



Source: processed by the authors.

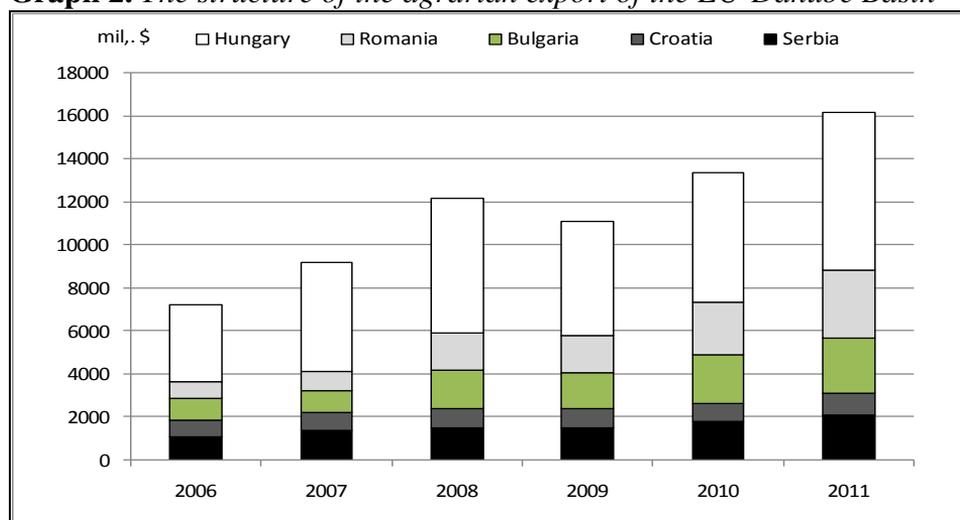
Table 4. *The geographical structure of the agrarian export of the EU-Danube Basin (%)*

Countries	2006	2007	2008	2009	2010	2011
Serbia	14.7	14.7	12.2	13.6	13.2	12.9
Croatia	11.0	9.4	7.4	7.8	6.6	6.2
Bulgaria	13.6	10.9	14.8	14.9	16.7	15.9
Romania	10.9	9.5	14.4	16.0	18.3	19.6
Hungary	49.8	55.4	51.2	47.7	45.2	45.4
EU-Danube Basin	100.0	100.0	100.0	100.0	100.0	100.0

Source: as Table 2; processed by the authors.

If the market space of the new EU-Danube Basin (Table 4) is only observed, it is obvious that Hungary is dominant, with a nearly 50% share, whereas Serbia's share is at a relatively stable but decreasing level of around 1/7 of the total agrarian export of this sub-region, with Croatia being the only one country to have a smaller share.

Graph 2. *The structure of the agrarian export of the EU-Danube Basin*



In view of the changes in the commodity structure of export, apart from the already recognized process of the agrarization of the total export, there is yet another negative tendency – the extensification of agrarian export.

The fact that there is an increase in the share of agrarian in the total export in all the countries (the most in Serbia), can only conditionally reflect the comparative export advantage of the agrarian sector in reference to the

other sectors, and can essentially be an expression of the deindustrialization and extensiveness of the total economy.

Table 5. *The five most significant products in the agrarian export of the EU-Danube Basin (ranked according to the value, per countries, in 2011)*

	Serbia	Croatia	Bulgaria	Romania	Hungary
1	Maize	Sugar refined	Sunflower seed	Maize	Maize
2	Fruit Prp Nes	Food Prep Nes	Wheat	Fruit Prp Nes	Pet Food
3	Sugar refined	Cigarettes	Rapeseed	Sugar refined	Sunflower oil
4	Sunflower oil	Chocolate Prsnes	Maize	Sunflower oil	Rapeseed
5	Wheat	Maize	Tobacco, unmanufactured	Wheat	Wheat

Source: <http://faostat.fao.org/site/342/default.aspx>

On the other hand, there is an obvious extensification of agrarian export itself, too: in the commodity structure, there are no cattle products among the leading export products, and the main export products are only those of the plant origin, primarily cereals (Table 5). So, agrarian export is focused on raw materials rather than on final products, which is indicative of a threat of the extensification of the structure of the total agricultural production and inevitably raises the problem of the opportunity costs of agrarian export.

Measuring the comparative potentials of agrarian export

Given the basic intention of this paper to determine the potentials and comparative advantages of the Serbian agrarian export as compared to the markets of the neighboring countries of the “new EU-Danube Basin”, two indicators will be used here: (a) the rate of the coverage of the total and agrarian import by export, and (b) the coefficient of the comparative advantage of agrarian export (as the adapted RCA index).

The rate of the coverage of import by export is derived from the relation between the export of products of a sector of a particular country and the import of the products of that particular sector of the same country in the observed year. It is assumed that, among the observed countries, those with a high degree of the coverage of import by export can have

comparative advantages and, therefore, can be marked as the bearers of the regional agrarian export potential.

As compared to certain countries and the derived magnitudes for the observed market (Table 6), there is an obvious advantage of the Serbian agro-food export (differently from the total coverage of export by import, below 60%). In all the observed years, agrarian export far exceeds import (even up to two and a half times), which is significantly more than all the observed countries. On the territory of the EU-Danube Basin, Hungary is the only one country to have a high coverage rate (around 170%), whereas all the other countries have a negative agrarian balance.

Table 6. *The coverage of the total and agrarian import by export*

Country/ region	Sector	Rate of coverage (%)					
		2006	2007	2008	2009	2010	2011
Serbia	a)	48.8	47.6	48	52	58.5	59.3
	b)	183.2	181	147.6	224.2	249.9	220.8
Croatia	a)	48.3	47.9	46	49.5	58.9	58.8
	b)	54.9	52	44.4	49.3	51.8	49.6
Bulgaria	a)	64.9	61.7	60.7	70.7	81.3	86.7
	b)	106.8	77.2	95.6	93.5	115.2	110.8
Romania	a)	63.3	57.6	59.7	74.9	79.7	82.1
	b)	35.6	25.7	38.3	45.2	66.5	73.4
Hungary	a)	96.2	99.9	99.5	106.9	108.4	109.7
	b)	148.8	167.9	162.2	163.1	170.3	174.4

a) Total (all SITC sectors); b) Sector 0-Food and Live Animals.

Source: *as Table 2; processed by the authors.*

As compared to certain countries and the derived magnitudes for the observed market (Table 6), there is an obvious advantage of the Serbian agro-food export (differently from the total coverage of export by import, below 60%). In all the observed years, agrarian export far exceeds import (even up to two and a half times), which is significantly more than all the observed countries. On the territory of the EU-Danube Basin, Hungary is the only one country to have a high coverage rate (around 170%), whereas all the other countries have a negative agrarian balance.

Yet, the rate of the coverage of import by export expresses only internal agrarian competitiveness within the framework of one national economy. Because of that, it is necessary that the indicator, which, on the one hand, analyzes the sectoral (agrarian, in this case) export of one country in the context of the export made by that sector in all the observed countries,

and, on the other hand, in the context of the total export of that particular country and the total export of the observed countries. Such an indicator could be the coefficient of the relative coverage of import by export, as a more objective and more complex expression of agrarian comparative advantages, which has already been used in some previous analyses.

The coefficient of the relative coverage of import by export is calculated and used in this analysis as the adapted RCA index (*Revealed Comparative Advantage*) (Balassa, 1965), given the fact that the comparisons are not made against the total world export but only against the total export of the selected countries. The following relation is the pattern for the calculation of this coefficient (see Bozic, Nikolic, 2013:18-20):

$$KPAI_{iz}^t = \left[\frac{\frac{I_{ij}^t}{I_{iz}^t}}{\frac{\sum_{i=1}^n I_{ij}^t}{\sum_{i=1}^n I_{iz}^t}} \right]$$

where:

- PIY_{ij}^t - the coefficient of the comparative advantage of agrarian export in t year
- I_{ij}^t - the export of the sector i of the country j in the t year
- y_{ij}^t - the export of the sector i of all the countries in the t year
- $\sum_{i(n-1)} I_{ij}^t$ - the total export of all the sectors of the country j in the t year
- $\sum_{i(n-1)} y_{ij}^t$ - the total export of all the sectors of all the countries in the t year
- t - years (2006-2011)

On the basis of the presented analytical tables, and by applying the algebraic expression (1), the *coefficients of the comparative advantage of agrarian export* have been calculated, expressing the agrarian export competitiveness of the observed countries between themselves in relation to a broader agro-food market potential of the regional environment, in this case in the *EU-Danube Basin* market, which is geographically close to Serbia.

A higher degree of the sectoral coverage as compared to the total coverage of import by export results in a relatively higher value of the KPAI coefficient. So, as we can see in Table 7 below, the countries with

the highest values of KPAI (with the most favorably related export and import) also have the highest comparative advantages and can be considered as the bearers of the export potential in a particular market.

Table 7. *The coefficients of the comparative advantage of agrarian export in the EU-Danube Basin market*

Countries	2006	2007	2008	2009	2010	2011
The calculated values of KPAI.						
Serbia	3.17	2.91	2.28	2.58	2.52	2.49
Croatia	1.46	1.33	1.08	1.19	1.04	1.06
Bulgaria	1.24	1.03	1.35	1.43	1.51	1.28
Romania	0.47	0.41	0.60	0.62	0.69	0.71
Hungary	0.93	1.02	0.97	0.92	0.89	0.93
Countries ranked according to KPAI.						
Serbia	1	1	1	1	1	1
Croatia	3	2	3	3	3	3
Bulgaria	2	3	2	2	2	2
Romania	5	5	5	5	5	5
Hungary	4	4	4	4	4	4

Source: *processed by the authors.*

The following can be concluded from the comparative review: the average export competitiveness of the Serbian agrarian sector is twice (and more) as big as the average competitiveness of the whole of the EU-Danube Basin market observed in this manner. This is rather clearly indicative of the conducted ranking of the countries according to the values of KPAI. The agrarian export of Serbia is first-ranked as compared to all the countries throughout the observed period. The ranking of the other countries has not essentially changed, either.

Agrarian export as an expression of the comparative efficiency of the utilization of resources

The territory of the sub-region of the EU-Danube Basin is around 61 mill. ha, around ½ of which accounts for agricultural land and around 1/3 – arable land. It counts a total population of around 53,1 mill. inhabitants (FAO, 2011), out of whom only 4.2 mill. (i.e. 7.9%) are agricultural population.

Out of the five countries, the three of them are very similar to one another (Serbia, Hungary, and Bulgaria) when their total territories (9-11 mill. ha) and in particular their agrarian resources are taken into consideration,

namely when considering their agricultural land (around 5 mill. ha) and arable land (around 3.2 mill. ha, with Hungary, however, having around 4.4 mill. ha); the other two countries are different from the aspect of their resources: Croatia is by almost three times as small and Romania is by almost three times as big. According to the number of their total populations and their agricultural populations, these countries are different from each other, similarly to their being different from one another when their agrarian resources are concerned.

Table 8. *Agrarian export according to the land resources and the populations, 2006-2011*

	USD per hectare per annum		USD per capita per annum	
	Agricultural area	Arable land	Total Population	Agricultural population
Bulgaria	335	524	229	6133
Croatia	645	955	195	4782
Hungary	601	1272	561	6912
Romania	128	200	84	1053
Serbia ^{*)}	304	468	156	1273
Average	351	504	217	2754

^{*)} *FAO data on the area and population refer to the whole territory of RS.*

Source: <http://faostat3.fao.org/faostat-gateway/>; processed by authors

The comparisons of the results of the agrarian export of these countries with their agrarian resources reveal the fact of big differences between them. The total agrarian export (Sector 0) collectively for all the countries and observed throughout the six-year period (2006-2011) reached around 69 bill. \$. Out of that, persuasively the biggest part of nearly one-half (48%), was achieved by Hungary. Having in view the similarities of the available resources, this immediately indicates big relative differences in the efficiency of using those resources. Namely, the export results reduced to the unit of the available (utilized) resources, enable agrarian export to be observed as an expression of the comparative efficiency of agro-industry or yet as an expression of a degree of the utilization of natural agrarian-resource potentials (Milanović, 2002b).

The positioning of the agrarian foreign trade of Serbia in the EU-Danube Basin

The total foreign trade exchange of Serbia with the EU-Danube Basin countries in the sector of agricultural and food products has been very

dynamic in the last few years (Table 8). In this relatively short period, big and unexpected changes have occurred, both in the volume and, even more so, in the structure of exchange: from around 130 mill. USD per annum (2006), the turnover reached around 680 mill. USD in 2011, i.e. 2.2 billion USD for the whole of the period; the negative relation between export and import at the beginning of the period was transformed into a pronouncedly positive balance.

An unexpectedly radical change was recorded by the Serbian agrarian exchange with Romania: the annual export increased from around 10 mill. \$ to even over 350 mill. \$, whereas import remained at the level of around 5-15 mill. \$ per annum, so that the value of the total export of agrarian products (around 926 mill. \$) is even nearly 20 times as high as the realized import (around 50 mill. \$).

Table 9. *The agrarian foreign trade exchange of Serbia with the EU-Danube Basin countries: in 000 \$*

		2006	2007	2008	2009	2010	2011	Total
Bulgaria	a	2499	5816	9087	33470	23178	28489	102539
	b	16212	10857	7800	13256	16839	24559	89523
Croatia	a	23281	31750	46001	44552	50389	78322	274295
	b	38006	36269	45416	44425	54595	63142	281853
Hungary	a	12523	28551	82589	62019	48403	63990	298075
	b	20737	17052	27219	26083	28607	52343	172041
Romania	a	10406	20206	53342	209558	280281	352699	926492
	b	5616	5005	8880	4233	9427	16362	49523
Total	a	13128	15751	282342	439605	513729	681917	2194341
	b	6	3					
		26257	31502	564684	879210	102745	136383	4388682
		2	6			8	4	

a – export; b – import.

Source: Statistical Office of the Republic of Serbia,

<http://webrzs.stat.gov.rs/WebSite/Public/ReportResultView.aspx>

The main cause for such a big nominal increase in exchange lies in only one product – that is an enormous increase in the export of mercantile maize: consecutively in the last three years, the export of maize from Serbia to Romania has been exceeding one million tons per annum! (This trade phenomenon deserves a special analysis.)

In the structure of the total agrarian exchange with the EU-Danube Basin countries, which is pronouncedly balance-positive with all the states

(except with Croatia), Romania dominates accounting for nearly 60% of the Serbian agrarian export. On the import side, Croatia dominates with around 47%.

Table 10. *The summary account of the agrarian exchange of Serbia with the EU-Danube Basin countries: the 2006-2011 period*

	Total turnover		Export		Import		Balance +/-	Cove- rage
	mln. \$	%	mln. \$	%	mln. \$	%	mln. \$	%
Bulgaria	0	8.7	8.7	6.4	23.8	15.1	13	114
Croatia	0	25.3	25.3	17.1	67.7	47.5	- 7	97
Hungary	0	21.4	21.4	18.6	61.4	29.0	126	173
Romania	0	44.5	44.5	57.8	146.8	8.3	876	1870
Total	0	100	99.9	100	299.7	100	1008	270

Source: *Statistical Office of the Republic of Serbia; processed by the authors.*

The significance of the markets of the EU-Danube Basin countries in the total agrarian exchange of Serbia is showing a radical increase: in the total export, the share of these countries has increased five times, $\frac{1}{4}$ of the Serbian agrarian export (over 520 mill. \$ per annum) is placed in this market, whereas the share of import remains relatively stable (around 15%).

Table 11. *Changes in the significance of the EU-Danube Basin in the total Serbian agrarian exchange*

		2006	2007	2008	2009	2010	2011
Total	a	2006	2007	2008	2009	2010	2011
EU-Danube Basin	b	4012	4014	4016	4018	4020	4022
Total	a	1062	1351	1477	1504	1764	2088
all countries	b	580	746	1000	671	706	946
Share of EU- Danube Basin (%)	a	4,6	6,4	12,9	23,2	22,8	25,0
	b	13,8	9,2	8,9	13,1	15,4	16,5

a – export; b – import

Source: *Statistical Office of the Republic of Serbia; processed by the authors.*

Conclusions

1. The analysis confirmed the initial hypothesis regarding the changes in the position and an increase in the relative significance of the market of the new EU-Danube Basin in the total agrarian exchange of Serbia: the share of these countries in the total agrarian export has increased fivefold

(from 5% to 25%), whereas the share of import has remained relatively stable (around 15%). Simultaneously, in bilateral exchange, the most dynamically increasing export is predominantly directed towards purchasers in Romania (58%), and import has prevalingly been derived from Croatia (47%). The structure of the agrarian foreign trade of the EU-Danube Basin countries, in which cereals (maize, wheat) are predominant, do represent an expression of the agrarian-production resources of those countries and also the confirmation of the significance of the Danube River and the relatively cheaper waterway transporting of these bulky raw materials.

2. Serbia's agrarian trading with the EU-Danube Basin countries, which makes one-fourth of the total agrarian export, with a pronouncedly growing trend and a very high coverage of import by export, can represent a respectful potential for development and macroeconomic stability. The risk of such positioning is a very extensive structure and currently prevalingly relying on one product (maize) and formally one export destination, although end users are almost all outside *the* destination.

3. The comparative analysis of the competitiveness of agrarian export shows that the agrarian export of Serbia has relative advantages in the sub-regional market of the new EU-Danube Basin, which is accounted for by high rates of direct coverage of import by export as well as specially calculated coefficients of the relative comparative advantage of agrarian export. However, the unit values of export as compared to the available agrarian-production resources account for big differences in the intensity and efficiency of the utilization of those resources.

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LABOR PRODUCTIVITY IN CATTLE BREEDING IN THE REPUBLIC OF MACEDONIA AND THE REPUBLIC OF SERBIA

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Abstract

Based on two-year research of five family farms in the Republic of Macedonia (RM) and four family farms in the Republic of Serbia (RS), the authors made an analysis of the efficiency of labor consumption in cattle farms. Cattle breeding in RM is carried out in a combined stable-pasture system, while in RS reversely in pasture-stable system. The efficiency of labor input is based on natural and economic indicators. In RM, in one hour of human labor, on average 32.36 l of milk is produced, while in RS 30.02 l, or 7.3% less, respectively. The gross margin in RM is 3.1 EUR/h on average, and in RS 2.3 EUR/h, or 25.8% lower.

Key words: *human labor, efficiency, cattle, labor productivity (l/h), gross margin (EUR/h)*

Introduction

Labor productivity represents the relation of quantity of product and the time spent for that production, and vice versa. Labor productivity in cow breeding largely depends on the herd - its number and structure by categories, breeds, breeding technologies, line of production, feed supplies and its quality, animal hygiene and prophylaxis, the degree of mechanization of production processes, etc. (Arsovski, 1972, p.127). Thus, the degree of output in relation to the human effort made in cow breeding depends on a vast number of factors (Markovic, 1964), which affect the realized production and the used work force (Peshevski, 1994).

Since the end of the 19th century, productivity has been an object of analysis and various measurements. However, along the way some difficulties appeared, especially concerning the determination of the

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product quantity. Mainly, the problem occurs when one wants to determine productivity based on the farm production with heterogeneous production structure. The heterogeneity considers products various in nature (grain, vegetables, fruits, grapes, milk, meat, wool, eggs, honey, etc.). In this case, one can not make a simple summation of production, hence should apply a common denominator. In so doing, the monetary value is the most convenient method of expression, though energy value or conversions to cereal units are also usable. Time consumption is relatively easily determined, and it is expressed as a total amount of the direct and indirect labor spent, though most often it is direct labor expressed in hours.

About forty-five years ago Arsovski (1972) studied the labor productivity in the then kombinat ZIK “Kumanovo” in Kumanovo, and he came to realize that labor productivity (with average labor consumption of 256.89 hours per animal) is 10.53 liter per hour. Peshevski (1992, 1994) studied labor consumption with dairy cows in ZIK “Skopsko Pole” in Skopje during the period from 1986 to 1988, and he found that it takes 138.1-179.0 hours per animal, while productivity expressed in energy equivalent was 97.67 – 121.94 MJ/h.

Analytical enterprise budgets based on variable costs are mostly used in countries with developed market economy, due to the dynamic changes of market conditions. The result of the analytical enterprise budgets based on variable costs is the gross margin (Vasiljevic and Subic, 2010, p. 80).

The gross margin of dairy cow enterprises at family farms in RS was studied by many authors. Vukelic and Novkovic (2009, p. 106) have determined that the gross margin per animal head varies between 47.83 EUR and 653.46 EUR or in average 288.9 EUR/head. The research by Subic *et al* (2010, p. 315) indicates a gross margin of 681.07 EUR/head.

The aim of this study is, among other, based on economics indicators to assess the efficiency of labor required in cattle production at family cow farms in RM and RS.

Method and data

To reach the given aim, we conducted a two year research (2009 -2010) with a direct survey of five cattle farms in the RM and four cattle farms in the RS.

In determining the level of labor productivity, to assess the efficiency of the labor input, we followed mainly the production-analytical method. In determining the gross margin, we used following formula:

$$GM = TI - VC,$$

where:

TI – total income, and *VC* – variable costs

The value expression of outputs and inputs is based on natural quantities and prices present on local markets. Furthermore, local prices are used in the economic evaluation of on-farm produced inputs (feed, etc.).

We established the direct consumption of human labor by an indirect way, *i.e.* based on the amount of wage costs. Accordingly, estimated labor costs (family and hired) in a two- year period are equal to 56 MKD/hour for the RM and 100 RSD/hour for the RS.

The part of the entire labor consumption on the farm level, which refers to dairy cows, is formed on the percentage of the main product value (milk) in the total amount of production.

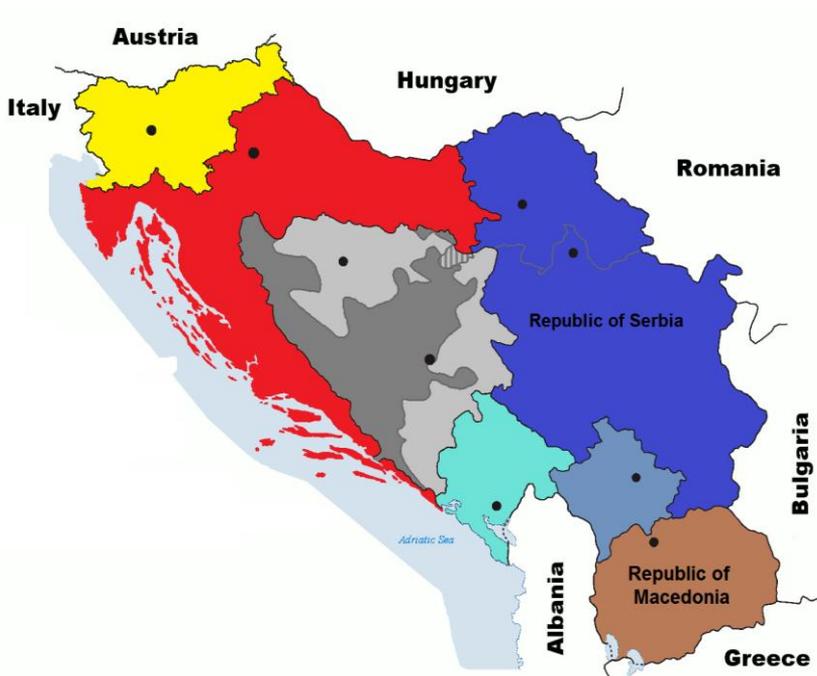
Inputs and outputs are expressed in EURs, due to comparative research of countries with different national currencies. Accordingly, the following currency relations are taken: the Republic of Macedonia 61.27 MKD/EUR in 2009 and 61.51 MKD/EUR in 2010, and for the Republic of Serbia 93.94 RSD/EUR, *i.e.* 102.90 RSD/EUR.

Results and discussion

The significance of agriculture in R. Macedonia and R. Serbia

RM and the RS are located in the center of Balkan Peninsula, in southeastern Europe. These neighboring countries (Figure 1) are autonomous parliamentary democracies, formed after Yugoslavia collapsed in the mid 1990s.

Figure 1. *Geographical position of RM and RS*



RM, with its 25 713 km², is 3.4 times smaller than the RS. Serbia is more densely populated: 82.85 inhabitants per km², compared to 79.88 inhabitants per km² in the RM. Both countries are mostly influenced by continental and mountain climate, with an exception of the Mediterranean climate, which occasionally reaches the RM. Both are highland areas, with heterogeneous natural conditions and soil structure.

Serbia has larger areas for cultivated production, because 57.2% of total territory is agricultural land, compared to 39.4% in Macedonia. Agricultural land in Macedonia is used by 192 675 farms, out of which 99.8% are family farms, while the are agricultural enterprises and cooperatives (297 subjects in total). In Serbia, the use of agricultural land is the same, but four times greater, and this has a positive reflection on size of the family farms. Their average farm size is 2.49 ha, and in Macedonia, 1.47 ha. The citizens of Serbia have 21.3% higher GDP than in Macedonia, whose GDP in 2009 was 3.253 EUR/per capita. However, Macedonian agricultural subjects have a higher impact on the GDP in relation to Serbia. This is due to the agricultural sector in Macedonia, which has 9.7% share in GDP, and in Serbia 8.5%. Nevertheless, the

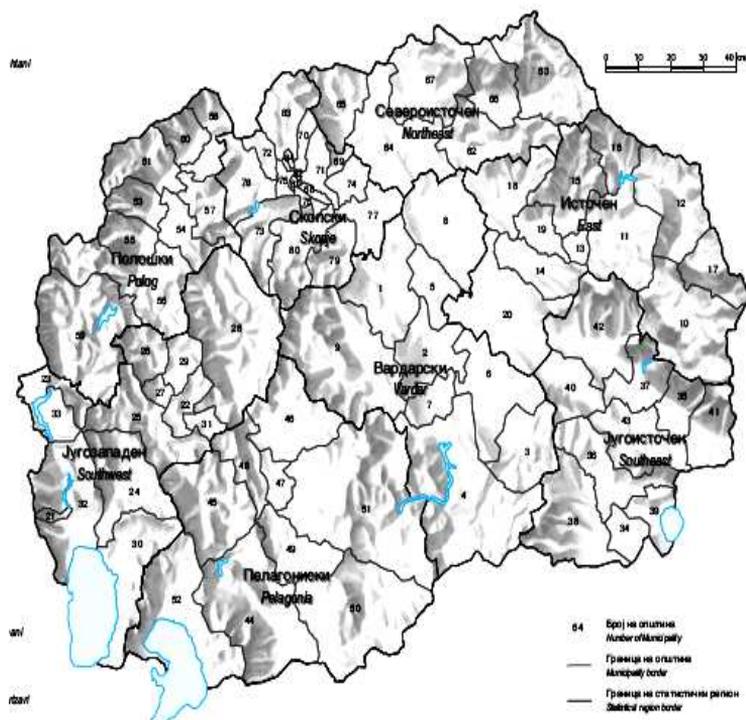
agriculture in Serbia has greater social influence than in Macedonia. There, 23.8% of all employees are engaged in agriculture, while in Macedonia 18.5%. In both countries, vegetables are a dominant product in the total value of the agricultural production. In 2009, vegetables had 69.3% share in Serbia, and 72.2% share in Macedonia. The livestock farming had 27-30% share, and agriculture services had less than 0.5% share.

Research conditions

Research conditions in the Republic of Macedonia

In the RM surveys were carried out in four statistical regions (Figure 2) Skopje area (Farm 1 and 2), one in the North-Eastern region (Farm 3), one in the South-Eastern region (Farm 4) and one in Pelagonia region (Farm 5). Each of dairy farms has Holstein-Friesian breed. Almost all farmers have their cows tied in mangers, with the exception of Farm 5, where they have combined breeding (stable and pasture).

Figure 2. *Regions in the Republic of Macedonia*



The farm capacity varies. The number of breeding cows (during our research) was between 18 and 32, and calves between 7 and 15 (Table 1).

All of the observed farms are family farms, registered as “individual farmer”, with the exception of the Farm 1, which is registered as “company with limited liability”.

These farms have milk production of approximately 6,386.5 l/per cow, which is 2.2 times more than the general average of the country. However, in 2010 milk production has increased among all farms (4.9% on average) compared to the previous year.

Animal feed comes mainly from self-production, but some of it (concentrates and milk substitutes) is obtained from local markets. Since the feed differs in quantity and quality, the production results are also different.

Table 1. *The number of cows and average milk production of the farms observed in the Republic of Macedonia*

Number of farm	Number of heads				Milk production (l/cow)	
	2009		2010		2009	2010
	Cows	Calves	Cows	Calves		
1	18	12	18	12	8,500	9,000
2	20	12	20	12	5,475	5,500
3	20	10	20	10	6,000	6,000
4	32	15	20	7	6,388	7,300
5	20	15	15	10	4,803	4,900
Total	110	64	93	51	6,208.7 ¹	6,575.3 ¹
Average per farm	22	13	19	10	6,233 ²	6,540 ²
dx	5.7	2.2	2,2	2,0	1,399.7	1,634.9
Cv	25.7	16.9	11.8	20.1	22.5	25.0
Iv	14	5	5	5	3,697	4,100

¹Weighted average

²Simple average

In cow breeding at Farm 5, the labor processes are conducted by family members, in Farm 1, 3 and 4 only by wage workers, while at Farm 2 they combined these two ways. Almost all of the work is done manually, except for milking, which is done with the use of mobile machinery.

Research conditions in the Republic of Serbia

In Serbia, the research included four cattle farms, all from Sumadija district and all with brown cows. Three farms (Farm 1, 2 and 3) are owned by individuals, small to medium in size, and the fourth is a large collective farm. Small and medium farms have family members and wage workers doing the work, except Farm 4 which has only wage workers.

The breeding technology in Farm 1 and 3 includes pasture, Farm 2 uses combined technology (stable and pasture) and Farm 4 only production in stables.

Stable breeding provides opportunity for dosing the food, which reflected positively on milk production (Table 2). However, this is not sufficient, because the milk production, even with this way of breeding, is lower (by 290 liters per cow) than the average production in the country.

Table 2. *The number of cows and average milk production of the farms observed in the Republic of Serbia*

Number of farm	Number of heads				Milk production (l/cow)	
	2009		2010		2009	2010
	Cows	Calves	Cows	Calves		
1	40	26	37	23	1,800	2,240
2	40	60	40	63	2,100	2,400
3	20	10	25	12	1,500	1,800
4	120	93	109	38	2,900	3,256
Total	220	189	211	136	2,427.6 ¹	2,743.9 ¹
Average per farm	55	47	53	34	2,075 ²	2,424 ²
Dx	44	37	38	22	602	610
Cv	80.6	78.2	72.1	64.9	29.0	25.2
Iv	100	83	84	51	1,400	1,456

¹Weighted average

²Simple average

Labor consumption

The labor consumption is determined in two levels. The first is at a farm level, i.e. common to all cattle categories, i.e. in this case, for dairy cows and calves. Moreover, this labor quantity is used for determination of labor productivity, due to assessment of efficiency of labor consumption with in monetary terms (EUR/h). The second level is labor consumption for dairy cows only, because of the assessment of labor efficiency by in liters per hour (l/h).

Annual labor consumption at the farm level in Macedonia (Table 3) maintains its relatively wide interval of variation (average Iv= 212.3). Here, the lowest labor consumption is at the Farm 5, and the highest at the Farm 1. The value of interval variation is confirmed by Arsovski's conclusions (1972) that labor consumption in cow breeding depends of several factors. We would add that it also depends on farm's legal status, and on the engagements in working processes.

In the RM, the limited liability company (Farm 1) "might" spend more money on the wages than necessary, probably because of profit depression. On the other hand, "individual farmers" (IF) always have lower labor consumption than other organizational forms of farming, because they do not have the means to increase wage expenses.

Table 3. *Labor consumption (h/animal)*

Farm's number	R. Macedonia			R. Serbia		
	2009	2010	Average	2009	2010	Average
1	285.7	285.7	285.7	110.6	85.8	98.2
2	120.5	167.4	144.0	51.5	50.0	50.8
3	238.1	188.9	213.5	118.7	90.8	104.8
4	114.0	198.4	156.2	87.9	53.2	70.6
5	61.2	85.7	73.5	/	/	/
Average	163.9	185.2	174.6	92.2	70.0	81.1
dx	93.9	71.6	79.6	30.1	21.3	25.1
Cv	57.3	38.7	45.6	32.6	30.5	30.9
Iv	224.5	200.0	212.3	67.2	40.8	54.0

Wageworkers or hired labor is less productive than family labor (members of a household), mostly because of lower degree of motivation due to relatively small wages for the performed work.

Cow breeding in the RS is somewhat more stable, probably because there is less divergence in the labor consumption (on average $I_v = 54.0$) than in the RM. The labor consumption at a farm level in Macedonia (average) is 2.1 times higher in relation to Serbia. This is because almost all observed farms maintain combined way of animal nutrition, precisely stable – pasture system of breeding.

The results showed that the cooperative cattle breeding has lower labor consumption in Serbia, especially when it comes to dairy cows (Table 4). There is also lower labor consumption (Farm 4) when higher degree of legal responsibility is present (for the cooperative property has standardized labor), or when labor is done by the member of a household (Farm 2) due to the higher degree of motivation towards more profit. However, in this case, pasture breeding at Farm 1, 2 and 3 has 96.4% lower average labor consumption, when compared to Macedonia.

Table 4. *Labor consumption (h/head)*

Farm's number	R. Macedonia			R. Serbia		
	2009	2010	Average	2009	2010	Average
1	384.9	395.3	390.1	125.9	188.1	157.0
2	149.7	230.3	190.0	71.2	121.0	96.1
3	276.3	283.3	279.8	133.5	124.7	129.1
4	167.4	232.9	200.2	125.3	55.0	90.2
5	94.1	106.1	100.1	/	/	/
Average	214.5	249.6	232.0	114.0	122.2	118.1
dx	115.9	104.4	108.9	28.8	54.4	31.1
Cv	54.1	41.8	46.9	25.2	44.5	26.3
I_v	290.8	289.2	290.0	62.3	133.1	66.8

Economic indicators in cattle breeding

The surveyed farms in Macedonia are economically stronger than Serbian (Table 5). Here, the realized value of cattle production is higher, on average 72.3%, compared to the researched farms in Serbia. This is primarily due to the higher (average of 64.8%) milk potential, but also to internal fertilizer evaluation, which Macedonian's farmers do. Comparative analysis of the purchasing prices of milk shows negligible difference. The purchase price of milk, in Macedonia, is on average 0.27 EUR/l (2009-2010), which is only 17.4% higher than in Serbia.

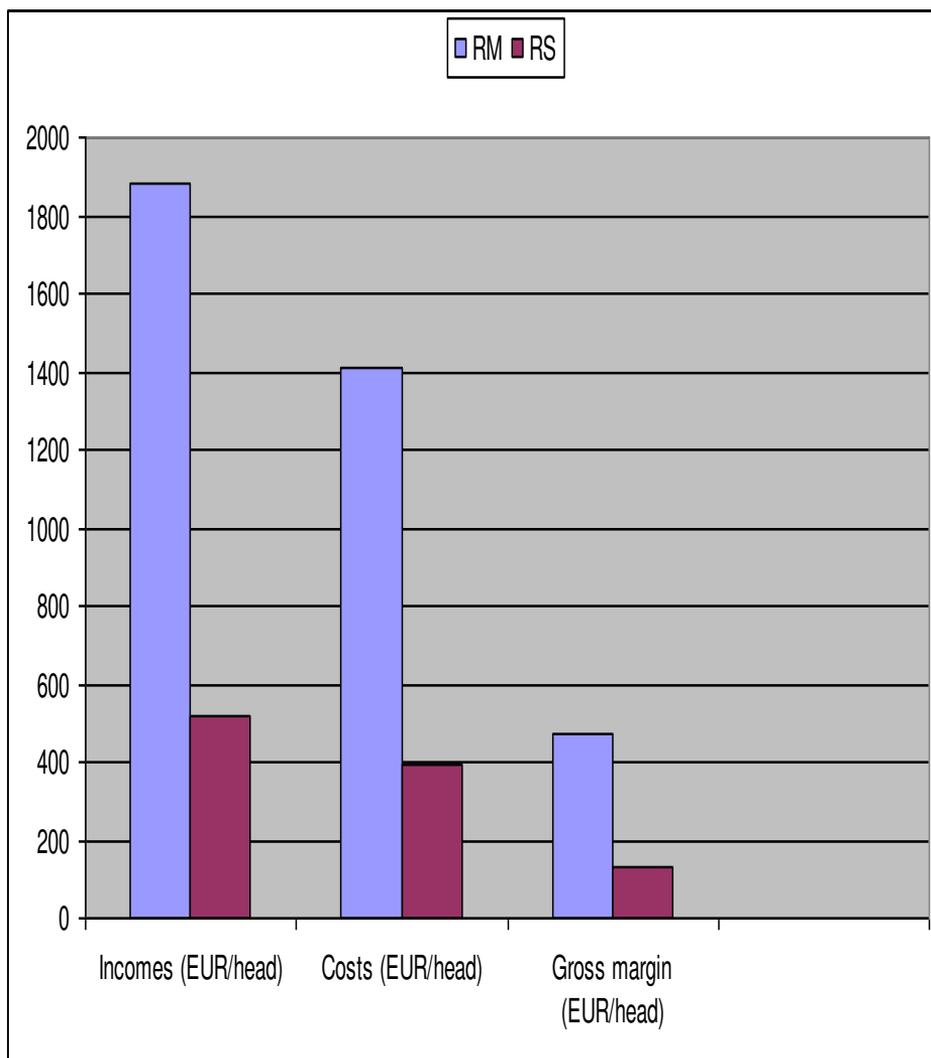
Table 5. *Economic indicators in cattle breeding (EUR/head)*

Farm's number	Indicators	R. Macedonia			R. Serbia		
		2009	2010	Average	2009	2010	Average
	Income	1,906.2	2,697.9	2,302.1	495.8	571.9	533.9
1	Gross margin	394.5	755.2	574.9	113.6	43.3	78.5
	Income	1,233.1	1,995.5	1,614.3	465.3	251.2	358.3
2	Gross margin	136.1	392.9	264.5	75.5	-40.2	17.7
	Income	1,557.9	2,244.2	1,901.1	340.9	268.1	304.5
3	Gross margin	330.8	498.7	414.8	213	91.2	152.1
	Income	1,576.4	2,880.8	2,228.6	631.9	1135.1	883.5
4	Gross margin	241	937.7	589.4	218.4	316.8	267.6
	Income	952.1	1,752	1,352.1	0	0	0
5	Gross margin	204.8	798.8	501.8	0	0	0
dx		364.2	471.9	402.9	119.5	412.9	261.4
Cv	Income	25.2	20.4	21.4	24.7	74.2	50.3
Iv		954.1	1,128.8	950	291	883.9	579
dx		102.3	224.4	133.7	71.7	152.7	107.5
Cv	Gross margin	39.1	33.2	28.5	46.2	148.5	83.4
Iv		258.4	544.8	324.9	142.9	357	250

Variable costs for farmers in Macedonia range from 1,183.7 to 1,637.4 EUR/head, and in Serbia from 329.2 to 452.1 EUR/head, meaning that costs in Macedonia are 3.6 times higher.

Macedonian farmers achieve 27.5% higher gross margin than those in Serbia (Figure 3).

Figure 3. Average economic indicators in cattle breeding

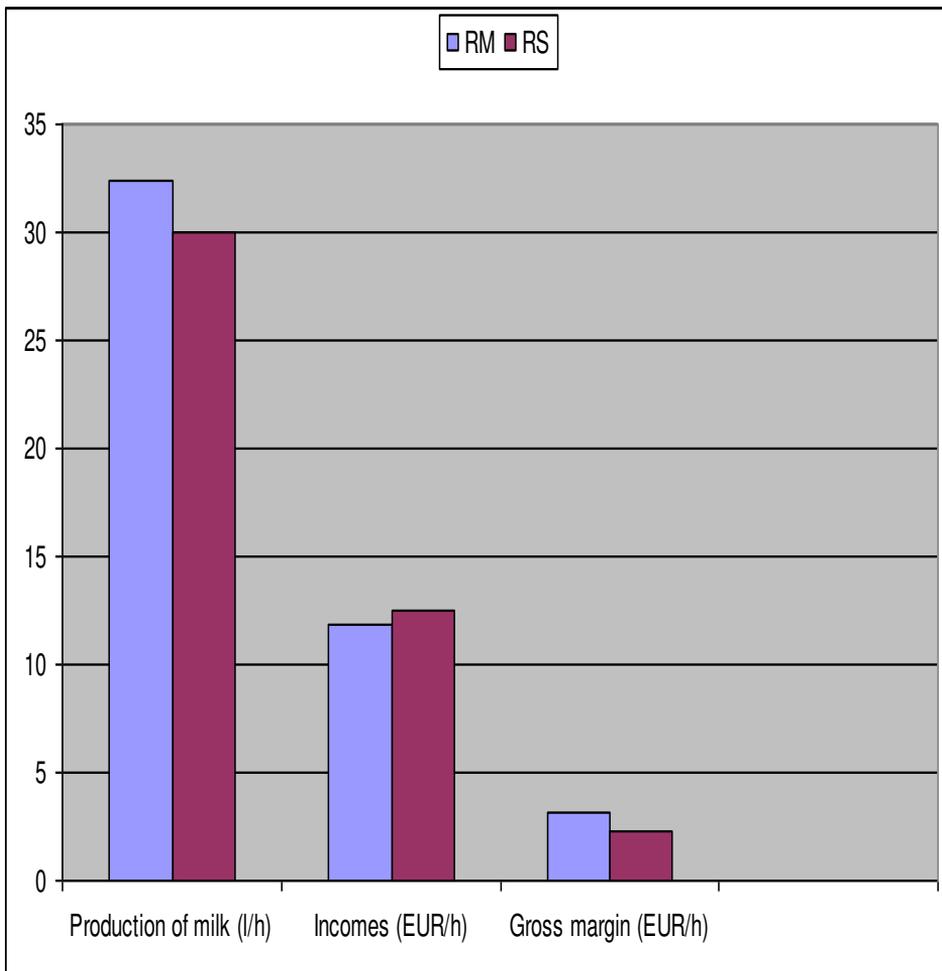


It is interesting, though, that both groups of farmers need only 25% to cover their inputs in cattle breeding.

Labor productivity

Macedonian farmers have higher efficiency in the breeding process. Here, the labor consumption is accomplished in the range from 21.17 to 51.04 l/h (Table 6). In the RS, the average milk production in one hour is 30.02 l/h (Figure 4), for there is 49.1% less labor consumption (due to the free-range system of breeding).

Figure 4. Average labor productivity indicators



Labor efficiency (expressed as a ratio of production value and invested labor) in Macedonian farms is more stable compared to Serbia, for the difference between minimum and maximum income is on average 13.94 EUR/h, versus 20.65 EUR/h, respectively.

In 2010 one cattle farm in the RS dealt with loss, so the gross margin was lower (on average 26%) compared to Macedonian farms.

Conclusions

The results of two year research of cattle farms in RM and RS show that cattle farms in both countries are middle sized, judging by the number of dairy cows per farm. Family farms in RM have around 20 dairy cows, and farms in RS around 40.

In RM the milk production per dairy cow is higher by 64.8% compared to those from RS because cattle are bred in stable-pasture system and in RS in pasture-stable system.

The different feeding system causes different consumption of labor; in RM they spend 53.6% more than farms in RS. Incomes (EUR/head) are higher on Macedonian farms, on average 261.4%, because milk production is higher, and, beside others, they value manure.

Natural efficiency among Macedonian farmers is higher, due to higher milk production per unit of invested labor. Labor consumption among Macedonian farmers is more efficient based on the farm income indicators.

Table 6. *Labor productivity indicators*

Farm's number	Indicators	R.Macedonia			R.Serbia		
		2009	2010	Average	2009	2010	Average
1	Milk production (l/h)	22,08	22,47	22,28	14,3	11,9	13,1
	Income (EUR/h)	6,67	9,44	8,06	15,15	4,93	10,04
	Gross margin (EUR/h)	1,38	2,64	2,01	3,47	0,37	1,92

2	Milk production (l/h)	36,56	23,88	30,22	16,31	19,83	52,98
	Income (EUR/h)	10,23	11,92	11,08	29,82	13,2	21,51
	Gross margin (EUR/h)	1,13	2,35	1,74	4,84	-2,11	1,37
3	Milk production (l/h)	21,72	21,17	21,45	11,24	14,44	12,84
	Income (EUR/h)	6,54	9,43	7,99	2,87	2,95	2,91
	Gross margin (EUR/h)	1,39	2,64	2,02	1,79	1	1,40
4	Milk production (l/h)	47,21	31,34	39,28	23,16	59,16	41,16
	Income (EUR/h)	13,83	14,52	14,18	7,18	23,52	15,35
	Gross margin (EUR/h)	2,11	4,73	3,42	2,48	6,56	4,52
5	Milk production (l/h)	51,04	46,17	48,61	-	-	-
	Income (EUR/h)	15,55	20,48	18,02	-	-	-
	Gross margin (EUR/h)	3,34	9,32	6,33	-	-	-
dx		13,69	10,37	11,59	19,48	24,70	20,27
Cv	Milk production (l/h)	38,32	35,76	35,81	75,97	71,82	67,52

Iv		29,32	25,00	27,16	42,61	47,26	40,14
dx		4,09	4,60	4,28	11,86	9,37	7,90
Cv	Income (EUR/h)	38,74	34,98	36,10	86,20	84,00	63,46
Iv		9,01	11,05	10,03	26,95	20,57	18,60
dx		0,90	2,95	1,92	1,32	3,66	1,50
Cv	Gross margin (EUR/h)	48,10	67,92	61,89	42,09	251,45	65,29
Iv		2,21	6,97	4,59	3,05	8,67	3,16

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INNOVATIONS, ORGANIZATIONAL CHANGES AND HUMAN CAPITAL IN FOOD INDUSTRY

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Abstract

Food industry is an important industrial branch in Serbia. After big upheavals in previous period and transition times, this branch is facing new challenges due to European integrations process in Serbia as well as other important changes in the area. Innovations are becoming one of the priorities in food industry in the future in order to respond to the challenges, reach the strategic documents aims and achieve growth. EU food industry experiences and knowledge on innovations are very important guidelines for the national food industry here. Food industry innovations are very specific compared to high-tech industries which are more attention intended by the researchers. Apart from food industry innovations, this paper takes into consideration the organizational changes strongly connected to innovations, as well as the human capital issue since the innovation success crucially depends upon it.

Key words: *food industry, innovation, organizational changes, human capital, Serbia, European Union*

Introduction

Serbian food industry is in the last stages of the transition phase which has dominated the economic life in Serbia since 2000 until present day. New times create new problems for the organizations and economy, and demand various and innovative ways of solving them. Challenges, chances and threats for the food industry are great in the following years; therefore this important branch of manufacturing industry and economy should be prepared to adjust to the new circumstances, achieve success and development.

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European integrations strongly influence the economy and industry development in Serbia. Food industry is no exception – passing through a turbulent phase, it is now turning towards new endeavors. The need for innovation is one of the most important since they are the key factor for competition and economic growth. The responsibility for reaching the aims proclaimed, as well as competition and sustainable development of this industry lies with food and drink producers, but also with relevant stakeholders, state agencies and public sector included.

Innovative practice and outcomes in EU food industry are an important source of knowledge for the food industry in Serbia. According to High Level Group (2009), this industry accomplishes 2% of EU GDP and includes 13.5% of all people employed in manufacturing industry. The economic crisis, turbulent surroundings, changes in the society, technological development and strong competition struggle make the EU food industry undergo the challenges, more need for innovation and research and development (R&D) activities investment. The changes in the area and relevant stakeholder influence contribute to the growing need of the companies to adapt to the surroundings through organizational changes which could be strategic in nature. The organizational changes and technological innovations influence each other strongly, and make the organizations more capable and competitive if realized successfully. The role of the human capital is the key in these processes. It is necessary for the companies to dispose of adequate and qualified employees able to meet the needs of the food industry, R&D, as well as innovation increase.

Food industry in Serbia-transitional phase and factors of influence in the following stage

While Serbia was a republic within SFRY, its food industry was ranged as medium developed. It used to show positive financial results for years, production growth, trade surplus, good results in employment; it was also an important GDP generator. However, at the beginning of the 1990s there was a dramatic fall in the economy due to federal state collapse, the winds of war and international sanctions. Although the food industry was more vital than most branches, it could not be the exception under such circumstances. The ex-republics market was lost, as well as the foreign one, cooperation with the developed countries was impossible, access to financial market and investors denied, and in crisis and hyperinflation conditions there could be no place for development.

The changes in Serbian economy since 2000 have been determined by the transitional processes where the food industry played an active part. Once dominant social ownership was almost completely gone, and most of the companies in this branch underwent some form of privatization. The food industry in Serbia overcame many different obstacles, as well as still adverse economic environment. Between 2001 and 2008 food and drink industry had a share of 5.5 % in Serbian GDP (and decreasing). Within physical volume of production in the same period, this industry had a 30% share in the complete manufacturing industry of Serbia (National rural development program, 2011).

Significant part of investments in the entire manufacturing industry consisted of the investments in the food industry. Between 2006 and 2008 the investments in food, drink and tobacco industry were 33.5% of the investments in the manufacturing industry (Strategy and industrial development policy for the Republic of Serbia for the period 2011-2020, 2011). The companies unable to beat the competition were closed down or in bankruptcy proceedings. A lot of companies are in foreign ownership now. In the meantime, many small and medium-sized enterprises tried to find their way. According to the Chamber of Commerce information, there are over 2,500 small, medium-sized and large enterprises registered in Serbia in the food industry.

The food industry has the largest share in the domestic manufacturing industry product demand structure. The food industry export also makes an important part of the Serbian exports (14.8%) according to the Chamber of Commerce information (2013); it is one of the few branches with a trade surplus. Its companies are active in the region; they are regaining the markets of the ex-SFRY republics and taking over new markets. Serbian companies are allowed access to the foreign markets. About 50% of export is to the EU countries, which is mainly the result of the country's European integrations orientation. The most important export of this branch in the area is to the CEFTA countries.

In the total number of people employed in the manufacturing industry in Serbia in the previous decade, there is over 20% in the food industry (statistical yearbooks). There was a productivity growth during the transitional period which influenced the work reduction, partly in production areas and partly in the activities with no value added. At the same time the profitability increased because this industry crossed from the loss area to the profit area in the first half of the previous decade. At

the end of the previous decade (2009), food and drink production had a net positive financial result worth 4.1 billion dinars (Strategy and development policy in the Republic of Serbia 2011-2020). Better business results within this industry led to workforce changes, resulting in more highly educated and professional staff.

Tendencies and future developments in this industry can be observed on the basis of two documents: Strategy and development policy in the Republic of Serbia 2011-2020, and Post-crisis model of the economic growth and development in Serbia. The strategy anticipates industrial production, investment and export growth, as well as faster reforms and European integration processes. The post-crisis model, like the strategy, predicts reindustrialization, public sector reforms, export growth, agricultural development, infrastructure improvement, information Society and employment growth. According to the Strategy, the food industry will lower its share in the manufacturing industry GDP by 2020 to 15% due to economic structure changes. According to the post-crisis model, the food industry will have 4.1% rate growth and 24% share in the Gross value added of manufacturing industry.

The strategy anticipates the food industry 12.2% share in the total exports. It also anticipates the manufacturing industry share in the total foreign direct investment intake by 2020 to rise to 40%, with the largest share of the food and drink industry. The number of employees in this industry is anticipated to increase, as well as in the manufacturing industry (it is anticipated 14% increase compared to 2010). However, the share of the food industry within the manufacturing industry is anticipated to decrease slightly to 18% in the next ten years.

The world changes constantly, the changes are various, often hard to predict and mutually unconnected. The start of the world economic crisis in 2008 becomes the focus of the analysts since it has led to dramatic global economy changes. In this paper we will limit ourselves to a few factors and tendencies up to 2020, global and regional, important for the food industry and significantly different compared to the previous years:

- Serbia's entering the decisive European integration process phase
- anticipated increase in food prices in the world
- wealth redistribution in the world
- technological changes
- demography changes and customer needs and preferences.

Process of European integration of Serbia. This year in June the European Council decided to open accession talks with Serbia. Analysts estimate that Serbia can become an EU member after 2020. The national market becomes completely open for all EU products during this time, and when Serbia gets the membership its products will be burdened with customs in the export markets of the CEFTA countries. It will make them less competitive, which means the loss of the acquired market positions. Serbian food industry should prepare for this situation and adjust to the new conditions.

Food price increase in the world. Food and Agricultural Organization and Organization for Economic Co-operation and Development predict the food price in the world to increase between 10 and 40 per cent. It is the consequence of the increase in demand, and slower production and productivity growth. The joint OECD-FAO outlook (2013) states that the governments should find ways to allow the food producers technology access in order to increase productivity and offer more products on the market. Food is not going to be cheap in the future, and all the partners in processes “from farm to fork” become aware of that.

Wealth redistribution in the world. The economic crisis has made visible what the analysts anticipated, and that is the economic wealth redistribution. According to PricewaterhouseCoopers prediction (2011), G7 countries (the United States, Japan, Germany, Great Britain, France, Canada and Italy) will not dominate the global economy by 2050. There is progress prediction for many countries – China, India, Brazil, Mexico, Russia, Turkey and Indonesia – which will overtake G7 in total GDP as early as 2020; other economies will progress as well, such as Nigeria and Vietnam. The economic growth in the recent third world countries also brings purchasing power increase to their population and opens new possibilities for food exporters.

Technological changes. Today we are the witnesses of great progress in computer technology, robotics, nanotechnology, genetics, biotechnology, space technology, artificial intelligence, etc. The things we could not imagine recently have now become reality in front of us. Technological changes of our age (a kind of new technological revolution) completely alter the ways of doing social or other business. According to Richair (2009), this revolution enters the social structure deeply, which make knowledge and creativity practically the most important production factors. Knowledge economy and society contribute to accelerating the

technology and social progress rate. Technological changes cover all branches of industry incontinently, food industry including.

Changes in demography and customer preferences. The changes in customer needs and expectations are an important environment pressure change bearer for the food companies. The customers change, their habits, needs and expectations also change, and they become more sophisticated in the articulation of their needs. The world goes through important changes in demography. Population aging, longer lifetime and demography structure change become European and even more global phenomenon. Nowadays, good health and physical looks maintenance become the imperative for many people, which influence the change in eating habits. Therefore, the market needs more products to meet the needs of various customer age or different generations.

Some of the key processes in the food industry in Serbia in previous times were connected to company ownership transformation, restructuring, workforce technological surplus, aid programs, profitability recovery, and this period is almost at the end. Strategic documents plans for the future and factors with strong influence on companies and the whole branch, causes the food industry in Serbia to turn its attention more to innovations. According to High Level Group (2012), the innovations are the main competition catalyst in food industry. The companies should also manage organizational changes and take care of the human capital in addition to innovations.

Technological and non-technological innovations

According to the Oslo manual (2005), there are four types of innovations: product innovations, process innovations, organizational innovations and marketing innovations. In literature it is common to name product and process innovations as technological innovations (Schmidt and Rammer, 2004) although according to the Oslo manual the word technological could imply high technology plant and equipment which is inadequate to some product and process innovations. On the other hand, innovations in organization and marketing are referred to as non-technological. Marketing innovations often coincide with product innovations, while organizational innovations coincide with process innovations. Companies can try to introduce only product or process innovations, or only one of the non-technological innovations, or a combination of all innovations above mentioned.

Product innovations are the introduction of good or service that is new or improved with respect to its characteristics or intended uses. These innovations are strongly market focused. Business process innovations are about the existing processes improvement and new process development and implementation. Process innovations can reduce costs, improve quality, produce or deliver new or highly improved products. They apply to both primary and support process innovations.

Marketing innovations represent new marketing methods implementation, including important design or packaging changes, distribution, promotion or price changes (Oslo manual, 2005). The difference between marketing innovations and other kinds of changes in company marketing instruments lies in marketing methods implementation not used by the company before.

There are many organizational innovations definitions. According to Pettigrew and Fenton (2000), the organizational innovations are the innovative changes in organization mainly relating to the nature of organization, its structure, arrangements, practices, beliefs, rules and norms in relation to the technical aspects. According to the Oslo manual (2005), the organizational innovations represent new organizational methods implementation into the company's business practices, work environment organization or external relations.

The organizational changes have a more general meaning than the organizational innovations, and they refer to an organization's actual situation changes. According to the Oslo manual (2005), organizational changes are innovations if they represent new organizational method implementation, the one not used in the company before. There are the exceptions, so that mergers and acquisitions are not considered as innovations, even if a company is conducting them for the first time. However, these activities can be classified as organizational innovations if a company develops or adopts new methods of organization.

Food industry innovations

The literature on food industry innovations is scanty. In comparison to high-tech and medium-high-tech industries innovations which attract more researchers' attention, food industry innovations are specific and therefore a challenge for both companies and innovators. In case of food industry innovations many parameters should be considered: safety,

health, taste, trust, price, identity, culture, customs, etc., in order to meet the customers' needs.

For all the specific things, we need to modify what is applicable in high-tech industry. For example, in case of mobile phones, computers or cars, the old models are easily recognized as technologically out of date and out of fashion. However, many customers still highly value traditional and unchanged food and drink recipes. Due to this fact that traditional products are valued by customers, new products in food industry are often not introduced as old products replacements, but added to the existing range of products and sold together with the ones long existing at the market (Sectoral innovation watch, 2011).

Food companies should be very careful to balance between innovations, precautions and product acceptance in their innovations efforts. A new food or drink product is not going to be accepted at a certain market if it disagrees with a certain community culture and customs. It is similar with process innovations-companies must often take care about the way of making a certain food or drink product-because the customers at some markets can demand even such things. An example of such a situation is a Halal certificate necessary in Islamic countries, demanding the rules and guidelines about food preparation and production according to the Islamic religious rules to be followed.

In this discussion we will use EU information. Community innovation Survey-CIS is used for innovation activities follow-up, conducted by the national statistics institutions; these data are distributed to the central EU statistics institution-EUROSTAT. That research is the main source of information for EU innovation statistics. According to the information of the Innovation Union Scoreboard (2013) Denmark, Finland, Germany and Sweden are the leaders in innovations. Serbia belongs to the moderate innovations group-its relative strengths being innovation support and finances, while its weaknesses lie in intellectual property.

The European Union is better than Australia, Canada, Brazil, Russia, India, China and South Africa. But it is still behind the world leaders in innovations-the USA, South Korea and Japan. The gap between EU and China is also becoming smaller. The European Committee created a strategic document in 2010 called Europe 2020: A strategy for smart, sustainable and inclusive growth. There are three mutually supplementary priorities in the very title of the strategy, where smart growth means

economy development based on knowledge and innovations. It is clear that this also applies to Serbian economy because of the undergoing accession process.

This discussion will be focused on the following: which food industry companies are innovative, considering the size (large, medium or small ones); which of the technological innovations get more attention (product or process innovations); which areas of food industry include more innovative companies and what is R&D investment level in food industry (comparing branches and company size).

Company size. The returns of the innovation process efforts increases in proportion to the company size, while the returns of the product innovation remains constant compared to size. According to the theory, the companies will choose more business process innovations with size increase. In case of product innovations, if only size is considered, no one can anticipate whether small or large companies will be more innovative (Petsas and Giannikos, 2005). Taking the information of several researches into consideration (Zakić et al., 2008), came to the conclusion that with the size of the company increases the business process innovation probability. In case of product innovations, the researches show that large companies also lead the way, although there are studies determining medium-sized companies to be more innovative. Small companies come at the bottom of the list in both categories.

The CIS 4 information published by Sectoral Innovation Watch (2011) for EU food industry companies present similar facts. Large companies are innovation leaders in new product introduction. But, there are much bigger differences between new product on the market introduction (32% for large companies compared to small ones and 20% compared to medium-sized ones) in comparison to new product for the company where small and medium-sized companies come closer to the large ones (the difference is 12% for large compared to small companies and 9% compared to the medium-sized ones). The latter case proves small and medium-sized companies to be successful in copying and imitation, and to have a learning potential.

Product innovation versus process innovation. One of the main ideas in industry evolution theories is that business growth moves the competition base from product to process innovation. According to the basic model suggested by Utterback and Abernathy (1975), early after a new industry

emerges the companies compete on the basis of product differentiation and invest a lot in new product development; as the market matures, they move the competition focus to costs and economy of scale, investing more into process innovation in order to make it more efficient and effective. Klepper (1996) points out that in mature industries companies pay more attention to process than product innovations.

According to Bartoloni and Baussola (2013), research based upon CIS 6 information, food industry companies compare the technological innovations among themselves: 53.3% introduce a combination of product and process innovations, 33.6% only process innovations and 13,15% only product innovations. This implies that companies introduce 2.5 times as many process innovations compared to product innovations, which is quite different from industry average of 1.4:1 for the process innovations.

Food industry branches. According to CIS 4 information (Sectoral innovation watch, 2011), in terms of aggregate innovative activities manufacture of beverages is the most prominent, with manufacture of prepared animal feeds and manufacture of dairy products to follow. The least aggregate innovative activities are in meat production, processing and preserving, and manufacture of other food products.

According to CIS 4 information (Sectoral innovation watch, 2011) considering product innovations new at the market, manufacture of grain mill products, starch and its products, and manufacture of dairy products are the most prominent ones. Manufacture of vegetable and animal oils and fats comes at the bottom of the list. When it comes to new products for the company, manufacture of dairy products and processing and preserving fish are the leading, while manufacture of vegetable and animal oils and fats come at the end.

R&D investments. When we look at the R&D investments according to OECD sources, companies invest less in food industry than the industrial average. This is also true if we consider European companies only. OECD data from 2009 for each country separately show that electric, electronic, chemical industry, equipment and engineering industry and transport services industry mostly invest more in R&D than food industry. On the other hand, food industry R&D investments surpass those in textile, basic metal, metal products or furniture industry.

According to CIS 4 (Sectoral innovation watch, 2011) information, most companies within food industry concerned with their R&D activities come from manufacture of grain mill, starch and its products, processing and preserving fruit and vegetable and manufacture of dairy products. The least companies included in R&D activities come from vegetable and animal oil and fat production as well as fish processing and preservation.

Large companies within food industry are more concerned with R&D activities than small and medium-sized enterprises. But, small companies receive most public funds. They use the largest share of the local and regional funds. Big companies use these funds least of all. It is an interesting fact that large and small companies use state provided funds (medium-sized companies are at the bottom). When it comes to EU funds, small companies use them the most, with medium-sized ones next. But these funds are smaller than local and state ones.

Technological advance brings along a great challenge and continuous need for innovation as one of the most important requests. According to High Level Group (2009), the investment level of R&D in EU food industry is far too low. It is necessary to increase and stimulate innovation in this area so as to keep the pace with competition, with a compulsory cooperation and appropriate private and public sector relations.

Organizational changes and human capital

The organizational changes and human capital are fundamentally connected to innovations. Innovation realization demands coordinate effort of several partners in organization as well as activity integration through organizational units. According to Lam (2011), the capability of organization to use innovation is a prerequisite for inventive resources and new technology successful usage. On the other hand, new technology introduction often cause possibilities and challenges for the organizations, leading to organization changes and new organizational forms appearance.

Literature on organizational changes identifies two important characteristics contributing to company survival. One of them is strategic flexibility concept – company's capability to quickly respond to changes caused by competitive environment. The other one is efficient adaptation – the company tries to use the resources more efficiently (statistical efficiency) and to survive under the given circumstances (dynamic

efficiency). The way of balancing the two efficiency types together with strategic flexibility increase contribute to the company's survival and its performances after the change (Grewal and Tansuhaj, 2001).

The environment changes cause uncertainty and face the business with a dilemma of cost cuts and resource protection versus new product investment, ventures and strategic organizational changes enforcement. This dilemma has been illustrated through the main strategies described in literature (Lamprinakos, 2012): proactive strategies, reduction strategies and ambidextrous strategies. Proactive strategies imply higher R&D expenditures, product quality and market diversification investment. Efficient strategies include business process improvement through higher efficiency, business rationalization and property reduction. These strategies, although less product innovation oriented, can contain important process innovations and non-technological innovations. Ambidextrous strategies ensure useful alternative since they allow a combination of operative cost reduction with new product and market development investments.

According to Bartoloni and Baussola (2013), more than a half manufacturing industry firms introduced technological innovations and organizational changes at the same time. The tendency towards organizational changes introduction is 5% higher in manufacturing industry compared to food industry. Companies often introduce organizational changes first and technological innovations afterwards. The data point out that 72% of food firms which introduced organizational changes also introduced technological innovations, indicating strong relations between organizational changes and technological innovations.

According to Bartoloni and Baussola (2013), process innovations are dominantly connected to organizational changes, which is in accordance with the theory. Process innovations demand a holistic approach since the organizations consist of interconnected components (Zakić, 2009). They demand not only information and process technology changes, but changes of many organization components: structure, various management systems (human resources management, performance measurement, different rules and procedures), changes in communication, team work, organizational learning and other organizational processes, stakeholder relations, even organizational culture as well. The effects of

integrations and process harmonization with other components are increase of process performance and complete organization improvement.

Innovation and organizational change success relies on human capital. The main knowledge leaders and carriers are people, so we can speak about people as the organization capital both literally and idiomatically. Turbulent markets and distinct competence impose a high level of business dynamics upon companies, high quality and precise business activity, relying mainly on quality of human resources (Vukotić et al., 2013). According to Gupta and Singhal (1993), people are the most important resource in innovative companies. Youndt et al. (1996), points out that innovation initiative strongly depends upon employees' knowledge, expertise and engagement as the key inputs in value creation process.

Education and qualification workforce structure in food industry is very important for this sector successful functioning and innovation rate increase. It is necessary to meet the labor market demands with adequate structure of education. This is indispensable in order to suppress the surplus in terms of work offer and stimulate workforce market demand at the same time.

Some of the occupations in food industry only need lower level of skills and knowledge. But, there is the other side of this industry with highly specialized or interdisciplinary staff necessary, especially for innovation activities. Food industry companies face difficulties in competent highly skilled workers recruit, especially in finding appropriate staff for R&D activities.

According to the High Level Group (2009), there is a lack of qualified and competent workers in this area, one of the reasons being the fact that food industry is not considered to being attractive enough as a career choice. The report states the need for complete food industry image improvement in order to increase the interest for knowledge and skills development relevant in food and drink production in the early stages of education. Public authorities and industry are not properly included in essential food industry skills identification, and school qualifications are not in accordance with company demands.

According to Stefanović et al. (2011), agro-industrial complex demands continuous education. There was initiative for different programs in

Europe, especially in Great Britain, for workforce knowledge and skills improvement. In 2005 52% of the companies in this industry conducted some kind of training, which is below the industrial average. The data get worse as company size decrease, with size and expense as the main obstacles (Sectoral Innovation Watch, 2011).

According to High Level Group (2011), human resources management is an important factor in food industry success in order for its production workforce to gain and develop necessary competences and skills. This is especially important for innovations. According to Gupta and Singhal (1993), the key human resources strategies in innovation encouragement are: (1) human resources planning – in order to determine personnel needs for effective innovations team creation, (2) performance evaluation – these activities connect personal innovation to company profitability, (3) reward systems – this strategy is used to motivate the employees for reaching innovation aims, (4) career management – long-term career goals are in accordance with organizational goals through constant education and training.

According to Chen and Huang (2007), besides knowledge, skills and individual expertise, the companies have to possess knowledge management capacities as well in order to reach effective human capital usage in organizational innovation expertise development. Knowledge management influences human resources and innovation performances strategies implementation relations.

Conclusion

Serbian food industry has undergone great changes in the last two decades; it shared the destiny of difficult political and economic situations in the 1990s, only to enter transitional flows and now almost finished ownership transformation in the previous decade. There is a projected reindustrialization in Serbia in the following years, where food industry plays an important role. The innovations are one of the keys to this industry future success, and besides innovations it is necessary to pay attention to organizational changes and human capital as well.

Due to the strategic orientation of the country to European integrations, opening the EU accession talks, and other important factors such as technology and demography changes (both in Europe and the world),

innovation practice and EU outcomes are very important for the food industry in Serbia. Therefore, we outline the following:

- Large companies are more innovative compared to the small and medium-sized ones, in case of product innovation there is much less difference in new product for the company compared to new product for the market which makes small and medium-sized companies skilled in copy and imitation processes,
- Food industry companies introduce much more process innovations, although more innovations are expected due to food industry maturity-companies should strengthen their product innovation efforts.
- Manufacture of beverages and manufacture of prepared animal feeds are the most innovative in aggregate innovation activities; in case of product innovations these are: manufacture of dairy products – far better than others in products new to the market, and manufacture of grain mill, starch and its products in products new to the company.
- Large companies dominate R&D activities; the fact that these activities are public funds helped in small and medium-sized companies bridges the gap between them to a certain extent.
- Organizational changes and technological innovations are closely tight together; the organizational changes conducted by companies largely lead to innovations, but the innovations also lead to further organizational changes (especially process innovations).
- We can notice an important lack of qualified and competent staff in EU food industry, which is unfavorable since the human capital is fundamental in innovations.
- The investment level in R&D is low, and there is a lack of staff in these activities, so European institutions will try to change this situation in the future in order not to leave the food industry behind its main competition in the world.

The food industry in Serbia will face great challenges in the future, so it should be ready to respond to them. Innovations are necessary, as well as organizational changes and human capital if we want to meet the customers' needs, the increase in demand, export increase, profitability increase and knowledge economy competition capability.

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PRESENT VALUE AND LIQUIDITY OF INVESTMENTS IN AGRICULTURAL LAND¹

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Abstract

The basic assumption used at the beginning of the research is that capital is invested in the purchase of agricultural land primarily for the purpose of conducting agricultural activities. This paper is aimed at determining what the highest price is when purchasing agricultural land. In this regard, the assessment of the investments in the acquisition of agricultural land in this research is carried out by using the method of the present value. In addition, the financial assessment of the investments in the acquisition of agricultural land is carried out. Regarding all considered models, those with the present value higher than necessary investments in its acquisition are economically justified. Of all models, the one with the highest present value is actually the most acceptable. The agricultural land can be paid best on the assumption that the prices of land will rise and that the investment is financed only from its own funds. Regarding the three considered ways of financing, the acquisition of land is financially acceptable only when it is financed from its own funds. The farms which purchase land in an established way will be more competitive.

Key words: *investments, present value, financing, agricultural land.*

Introduction

A much-needed improvement of business results and accelerated EU accession require a long-term investment of capital. However, an agrarian

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economy of the Republic of Serbia is facing the problem of the lack of capital for the needs for investments and a structural adaptation to requirements which are imposed as an imperative during the preparations for EU integrations. The lack of loans represents the main factor that limits the performances of family farms and their development. This problem is particularly noticeable in the agriculture of the Central and Eastern European countries (Dries and Swinnen, 2004).

Bearing in mind that the dominant impact on functioning of family farm and its business results are manifested by several organisational and economic factors, among which the farm size expressed by area of arable land is particularly noticeable (Todorović and Munćan, 2009) and that increasing the farm size leads to the change in optimal sowing structure, increase in the degree of use of labour of family members, increase in the degree of utilisation of work of own power machines, decrease in total fixed costs per ha and working hour and increase in gross margin at the farm level (Munćan et al., 2008), hence the need for investment in expanding the land through the acquisition of agricultural land is imposed as one of priority investment measures.

In order to see the whole problem and recognise the need and importance of the acquisition of agricultural land and farm size increasing, some basic data from this field possessed by the official statistics are processed.

According to the agricultural census for 2012, on the territory of the Republic of Serbia, the family farm averagely uses 4.5 ha of agricultural land. The largest areas of agricultural land are used by family farms in the region of Vojvodina (8 ha), then in the region of Šumadija and western Serbia (3.6 ha), the region of southern and eastern Serbia (3.2 ha), whereas on the Belgrade territory, the average size of used land per farm is the lowest and amounts to 3.1 ha. The largest number of farms regarding the agricultural land use have up to 5 hectares of land (over 75%), while the smallest share in the total number of farms is held by the farms that use the areas larger than 100 ha (0.2%).

From these data we can notice the problem of a small farm sizes. The results of the last agricultural census show that the situation in agriculture has been improved in terms of this, that is, it gradually leads to the increase of area, but that the increase is still slow and insufficient for achieving more significant progress in the business operations of agricultural farms.

The problem with small land estate is particularly noticeable in the farms engaged only in arable production. The agricultural producers engaged exclusively in arable production buy land to improve business operating results, and it is achieved through several factors:

- enlarging land areas results in higher incomes,
- existing agricultural mechanisation is better employed and
- working hours of labour force available on the farm (farm members) are better used.

Given the crucial importance of the ownership structure for business efficiency in agriculture it can be said that the unfavourable ownership structure as it exists at the level of the Republic of Serbia (Bogdanov and Božić, 2005) it is hard to be competitive and survive in the market in the conditions of an increasing competition.

Bearing that in mind, the aim of this research is to evaluate the capitalized value of agricultural land, that is, to determine the highest price of the agricultural land when it is purchased on the market in order to be used in arable production on the farm. Furthermore, the research seeks to determine how the method and conditions of financing the acquisition of agricultural land affect the level of the discount rate, and thus the level of capitalized value. Similarly, it is aimed at checking whether the investment in purchasing of land would be financially acceptable, in case that the bank loans are used in the structure of financing sources, i.e. the ability of the investor to regularly pay annuities for the raised loan will be checked.

Material and method

The basic assumption used at the beginning of the research is that capital is invested in the purchase of agricultural land primarily for the purpose of conducting agricultural activities and in that sense it is viewed as an investment which should bring a corresponding benefit (and allow expanding agricultural activities), and not as taking possession of agricultural rents (this variant of evaluation was considered by Todorović and Ivanović, 2012). For the purpose of calculating the capitalized value of the land purchased for arable production, we started from the assumption that the farm that purchases the land has already been engaged in arable production, so that this investment represents only an extension of the existing activities. Therefore, the acquisition of land does

not lead to the need for making investments in additional mechanisation for arable production, which is based on the fact that family farms in Serbia usually do not utilise sufficiently the capacities of agricultural mechanisation which is at their disposal.

The material for this research was collected during 2012 and 2013 by means of the interviews with the selected holders of family farms on the territory of the administrative region of southern Banat, as well as with the employees of the commercial banks dealing with loans in the field of agricultural production. The collected data were used as a basis for forming the following starting assumptions:

- the value of one hectare of agricultural land amounts to 11,000.00 EUR,
- the investor purchases 10 (ten) hectares of agricultural land,
- when purchasing the land, compensations up to 5% of the initial price of the land are paid,
- at the end of the planned period of using land the compensations up to 3% of its final value are paid and
- the planned period of using investments is 25 years.

Since it is the case of substantial funds whose investment has long-term consequences for business and operations of family farm, it is necessary to carefully choose the method which will be used for evaluating the investment.

The capitalized value of investment is a method frequently applied together with the method of net present value and it actually represents a subtype of this method. The difference between capitalized value and net present value is that capitalized value (unlike net present value) does not comprise the level of investments. This parameter essentially shows the highest possible level of investment which is still economically justified.

In this regard, the assessment of the investment in the acquisition of agricultural land in this research is carried out by the standard formula for determining the capitalized value of the land (since there is a limited economic life of the investment):

$$P = \left(\frac{b_1}{r^1} + \frac{b_2}{r^2} + \dots + \frac{b_n}{r^n} + \frac{B_n}{r^n} \right) - \left(\frac{u_1}{r^1} + \frac{u_2}{r^2} + \dots + \frac{u_n}{r^n} \right)$$

where:

- b – annual income from the investment,
- u – annual expenses for using investments (total costs minus depreciation and interest on investments),
- B_n – residual value (salvage value) of the investment,
- r – discount factor, $r = 1 + \frac{p_k}{100}$,
- p_k – discount rate,
- n – the number of years of using the investment.

When incomes and expenses are equal in all years, that is, when calculating the average annual incomes and expenses, the following formula is used:

$$P = (b - u) \cdot \frac{r^n - 1}{r^n (r - 1)} + \frac{B_n}{r^n}$$

where:

- b – the average annual income from the investment,
- u – the average annual expenses for using investments (total costs minus depreciation and interest on investments).

When the capitalized value is higher than the amount of necessary investments, then the investment is economically justified. If the capitalized value is equal to investments, then the investment is on the verge of being economically justified (in that case the net present value of the same investment is equal to zero). The above-mentioned concept is applied in the following calculations, along with certain corrections in terms of introducing the variant according to which during the observed period an increase in market prices of agricultural land can occur.

The question of determining discount rate when assessing economic efficiency of investments represents the question which has been often discussed and regarding which there have been contrasting opinions in the theory of investment (Gogić, 2002; Vasiljević, 1995). The level of discount rate essentially depends on the structure of financing sources and conditions of financing. In this regard, three different financing sources were taken into account:

- the first one is financing exclusively by farm`s own funds,
- the second one comprises 50% of financing by farm`s own funds, and 50% by means of loans from commercial banks and
- the third one is financing exclusively by borrowed funds (loan).

Depending on the structure of the financing of investment, according to Brigham and Gapeski (1997), the level of discount rate can be determined in three different ways:

- In the case when the investment financing source is exclusively from the borrowed funds, that is from loans, the level of discount rate is determined based on the level of the interest rate on borrowed funds.
- Then, when exclusively farm`s own funds serve for financing of investments. This case is rare in practice, and it is mostly found when relatively small funds are required for investments. Here, the level of discount rate is determined according to the principle of opportunity costs, that is, in practice the mostly used is the equalisation with interest rate which is obtained when the same sum of money allocated for financing of investment would be placed on long-term deposit in some of the banks (that is, in that one which gives the most favourable conditions – the highest interest rate).
- The most common case that is used in practice is financing of investments combining farm`s own and borrowed funds. In this case the level of discount rate is determined based on the level of interest on borrowed funds and on the basis of interest rate which can be obtained on farm`s own funds in the form of time deposits (opportunity costs). Namely, the weighted discount rate is calculated, depending on the ratio of invested funds from different sources of financing.

The level of discount rate can be determined in some other ways, but they are considered as less appropriate. Thus, Krasulja i Ivanišević (2007) mention as a less favourable way for determining the discount rate its equalisation with the average rate of yield for the given economic activity etc. Similarly, in economic practice, the discount rate (when assessing projects partly funded from loans) is usually equalised with the interest rate on loan funds, which is not in accordance with the above mentioned theoretical views.

Similarly, depending on the structure of financing sources, for discounting will be applied different rates, which will affect the level of capitalized value of the agricultural land.

The level of capitalized value of the investment in the acquisition of agricultural land in this case depends on the sowing structure which will be established on that land (Table 1).

Table 1. *Sowing structure on purchased land*

Arable crop	Share in sowing structure (%)
Maize	50.00
Wheat	30.00
Sunflower	10.00
Soya bean	10.00
Total	100.00

Source: *Authors` calculation*

The sowing structure formed in this way can faithfully represent the value of agricultural land for two reasons – approximately it corresponds to a real sowing structure of family farms in AP Vojvodina and meets the requirements related to establishing an appropriate crop rotation. Regarding this approach to the evaluation of land value, net cash flow will be determined as a difference between the income from investment and expenditures for using investments in the process of production.

While doing so, the incomes from the investments will be equal to the values of the products which are usually sold on the market (that is to the value of the main product). Thus, for example, in the wheat production the incomes consist of market value of wheat grain, whereas the value of straw (as a by-product which will not be necessarily sold on the market) will not be taken into account. On the other hand, expenditures will comprise external costs in arable production (do not comprise depreciation and interest).

Hence, firstly it is necessary to make calculations of maize, wheat, sunflower and soya bean on the basis of external incomes and external costs (Table 2), and then to discount net cash flow (taking into account investments and salvage value of investment) and thus to determine the capitalized value of the investment. Taking into account that the final

prices of most arable products for 2013 are not known we used the prices from the year of 2012 in our analyses.

Table 2. *Calculations and determination of net cash flow*

Indicator	Maize	Wheat	Sunflower	Soya bean
I Value of sold products per ha (1 x 2)	1,344.00	1,056.0	1,215.00	1,400.00
1. Yield (kg/ha)	5,800.00	4,400.0	2,700.00	2,500.00
2. Price (EUR/kg)	0.23	0.24	0.45	0.56
II Value of sold products per crops (I x number of ha)	8,004.00	3,168.0	1,215.00	1,400.00
III Total value of sold products for all 10 ha (incomes)				13,787.0
IV External costs of production per ha (1 to 6)	674.90	593.13	571.96	788.76
1. Seed	70.40	81.36	56.97	59.71
2. Fertiliser	274.44	257.59	255.31	243.58
3. Herbicides	55.31	20.74	20.56	61.91
4. Fuel, lubricant and maintenance of mechanisation	222.13	186.13	184.48	188.34
5. Taxes and contributions				165.00
6. Other external costs	52.61	47.30	54.63	70.22
V External costs of production per crops (IV x number of ha)	4,049.42	1,779.4	571.96	788.76
VI Total external costs of production for all 10 ha (expenditures)				7,189.52

Source: *Authors` calculation*

Further calculations presume the following cases:

- when the value of land does not change per year and
- when the value of land increases per certain rate every year.

Regarding the assessment of investment liquidity, in both investigated cases (when the land value does not change per year and when the land value rises at a certain rate every year) the annuity for loans is determined using the following formula:

$$d = A \frac{r^n (r - 1)}{r^n - 1},$$

where:

d – the annuity for loans,

A – the investment from loans,

r – interest factor, $r = 1 + \frac{p_k}{100}$,

p_k – interest rate,

n – the number of years of repayment of borrowed funds.

After being determined, the annuity is compared with the net cash flow and the financial benefit is obtained. When the land value does not change per year, net cash flow and financial benefit will be constant, and the conclusion related to the liquidity can be drawn easily.

On the other hand, when the land value rises at a certain rate every year, then it is necessary to show the change of the level of financial benefit per year in an appropriate table, so that a valid conclusion can be reached.

Results and discussion

If it is assumed that there is no change in the values of land throughout the period of its using and that the net cash flow is stable, when financing of investment is conducted by own funds (interest rate of 3%) the capitalized value is higher than the level of investments and the investment is economically justified.

The highest amount that can be invested for one hectare of land amounts to 16,584.34 EUR.

The capitalized value for 10 ha of agricultural land which is financed partly by farm's own funds, and partly by borrowed funds (ratio 50:50%) when the weighted discount rate is 6%, amounts to 109,198.92 EUR.

Since the capitalized value is lower than the level of investments, the investment is not economically justified, and if this investment were economically justified, the investment should not be higher than 109,198.92 EUR.

The capitalized value of 77,178.06 EUR, which is the value when the acquisition is made exclusively by borrowed funds (interest rate of 9%), is not economically justified since it is lower than the level of necessary investments.

Assuming that during the period of using investments the increase in the value of agricultural land by 2% occurs (thereby it will lead to almost negligible increase in expenditures, due to paying somewhat higher tax and contribution), when financing is done by farm's own funds, the investment is economically justified (Table 3), and land can be paid up to 19,491.46 EUR/ha.

Similarly, this investment is economically justified when its financing is conducted by combining farm's own and borrowed funds (Table 4) in a ratio 1:1, when weighted interest rate used for discounting is 6%.

Under the given conditions of financing (interest rate of 6%) the land can be paid up to 12,255.91 EUR/ha.

The acquisition of agricultural land is not economically justified when financing is done exclusively by borrowed funds (Table 5), with interest rate of 9% and when during the utilisation of land a gradual increase in its value occurs. At this point, the capitalized value is 83,174.49 EUR and is lower than the level of investments.

Regarding both analysed cases, that is, when there is no change in the land value during the period of its use as well as when during the use of the investment there is a rise in the agricultural land value, the investment is economically justified when it is financed by its own funds.

When the investment is financed either by combining its own and borrowed funds or exclusively by borrowed funds, then the investment is not economically justified.

Table 3. *The capitalized value of acquisition of 10 ha of land (financing by farm`s own funds)*

Year	Investment	Incomes	Expenditures	Net cash flow	Discount factor	Discounted NNT	Capitalized value
0	115,500.0	0.00	0.00	-115,500.00	1.00	-115,500.00	
1		13,787.0	7,357.82	6,429.18	0.9709	6,241.92	6,241.92
2		13,787.0	7,361.18	6,425.82	0.9426	6,056.95	6,056.95
3		13,787.0	7,364.62	6,422.38	0.9151	5,877.39	5,877.39
4		13,787.0	7,368.12	6,418.88	0.8885	5,703.09	5,703.09
5		13,787.0	7,371.69	6,415.31	0.8626	5,533.90	5,533.90
6		13,787.0	7,375.33	6,411.67	0.8375	5,369.67	5,369.67
7		13,787.0	7,379.05	6,407.95	0.8131	5,210.25	5,210.25
8		13,787.0	7,382.84	6,404.16	0.7894	5,055.50	5,055.50
9		13,787.0	7,386.71	6,400.29	0.7664	4,905.29	4,905.29
10		13,787.0	7,390.65	6,396.35	0.7441	4,759.48	4,759.48
11		13,787.0	7,394.67	6,392.33	0.7224	4,617.95	4,617.95
12		13,787.0	7,398.78	6,388.22	0.7014	4,480.57	4,480.57
13		13,787.0	7,402.96	6,384.04	0.6810	4,347.22	4,347.22
14		13,787.0	7,407.23	6,379.77	0.6611	4,217.78	4,217.78
15		13,787.0	7,411.59	6,375.41	0.6419	4,092.14	4,092.14
16		13,787.0	7,416.03	6,370.97	0.6232	3,970.18	3,970.18
17		13,787.0	7,420.56	6,366.44	0.6050	3,851.80	3,851.80
18		13,787.0	7,425.18	6,361.82	0.5874	3,736.90	3,736.90
19		13,787.0	7,429.89	6,357.11	0.5703	3,625.37	3,625.37
20		13,787.0	7,434.70	6,352.30	0.5537	3,517.11	3,517.11
21		13,787.0	7,439.60	6,347.40	0.5375	3,412.04	3,412.04
22		13,787.0	7,444.60	6,342.40	0.5219	3,310.05	3,310.05
23		13,787.0	7,449.71	6,337.29	0.5067	3,211.05	3,211.05
24		13,787.0	7,454.91	6,332.09	0.4919	3,114.97	3,114.97
25		194,253.7	12,731.37	181,522.29	0.4776	86,696.06	86,696.06
Sum						79,414.64	194,914.64

Source: *Authors` calculation*

Table 4. *The capitalized value of acquisition of 10 ha of land (financing by own funds and borrowed funds)*

Year	Investment	Incomes	Expenditures	Net cash flow	Discount factor	Discounted NCF	Capitalized value
0	115,500.0	0.00	0.00	-115,500.00	1.00	-115,500.00	
1		13,787.0	7,357.82	6,429.18	0.9434	6,065.27	6,065.27
2		13,787.0	7,361.18	6,425.82	0.8900	5,718.95	5,718.95
3		13,787.0	7,364.62	6,422.38	0.8396	5,392.36	5,392.36
4		13,787.0	7,368.12	6,418.88	0.7921	5,084.35	5,084.35
5		13,787.0	7,371.69	6,415.31	0.7473	4,793.89	4,793.89
6		13,787.0	7,375.33	6,411.67	0.7050	4,519.97	4,519.97
7		13,787.0	7,379.05	6,407.95	0.6651	4,261.65	4,261.65
8		13,787.0	7,382.84	6,404.16	0.6274	4,018.05	4,018.05
9		13,787.0	7,386.71	6,400.29	0.5919	3,788.32	3,788.32
10		13,787.0	7,390.65	6,396.35	0.5584	3,571.69	3,571.69
11		13,787.0	7,394.67	6,392.33	0.5268	3,367.40	3,367.40
12		13,787.0	7,398.78	6,388.22	0.4970	3,174.75	3,174.75
13		13,787.0	7,402.96	6,384.04	0.4688	2,993.09	2,993.09
14		13,787.0	7,407.23	6,379.77	0.4423	2,821.78	2,821.78
15		13,787.0	7,411.59	6,375.41	0.4173	2,660.24	2,660.24
16		13,787.0	7,416.03	6,370.97	0.3936	2,507.91	2,507.91
17		13,787.0	7,420.56	6,366.44	0.3714	2,364.27	2,364.27
18		13,787.0	7,425.18	6,361.82	0.3503	2,228.82	2,228.82
19		13,787.0	7,429.89	6,357.11	0.3305	2,101.11	2,101.11
20		13,787.0	7,434.70	6,352.30	0.3118	1,980.68	1,980.68
21		13,787.0	7,439.60	6,347.40	0.2942	1,867.12	1,867.12
22		13,787.0	7,444.60	6,342.40	0.2775	1,760.05	1,760.05
23		13,787.0	7,449.71	6,337.29	0.2618	1,659.09	1,659.09
24		13,787.0	7,454.91	6,332.09	0.2470	1,563.89	1,563.89
25		194,253.7	12,731.37	181,522.29	0.2330	42,294.44	42,294.44
Sum						7,059.13	122,559.13

Source: *Authors` calculation*

Table 5. *The capitalized value of acquisition of 10 ha of land (financing by borrowed funds)*

Year	Investment	Incomes	Expenditures	Net cash flow	Discount factor	Discounted NCF	Capitalized value
0	115,500.0	0.00	0.00	-115,500.0	1.00	-115,500.0	
1		13,787.0	7,357.82	6,429.18	0.9174	5,898.33	5,898.33
2		13,787.0	7,361.18	6,425.82	0.8417	5,408.48	5,408.48
3		13,787.0	7,364.62	6,422.38	0.7722	4,959.26	4,959.26
4		13,787.0	7,368.12	6,418.88	0.7084	4,547.30	4,547.30
5		13,787.0	7,371.69	6,415.31	0.6499	4,169.51	4,169.51
6		13,787.0	7,375.33	6,411.67	0.5963	3,823.07	3,823.07
7		13,787.0	7,379.05	6,407.95	0.5470	3,505.37	3,505.37
8		13,787.0	7,382.84	6,404.16	0.5019	3,214.03	3,214.03
9		13,787.0	7,386.71	6,400.29	0.4604	2,946.87	2,946.87
10		13,787.0	7,390.65	6,396.35	0.4224	2,701.89	2,701.89
11		13,787.0	7,394.67	6,392.33	0.3875	2,477.24	2,477.24
12		13,787.0	7,398.78	6,388.22	0.3555	2,271.23	2,271.23
13		13,787.0	7,402.96	6,384.04	0.3262	2,082.34	2,082.34
14		13,787.0	7,407.23	6,379.77	0.2992	1,909.12	1,909.12
15		13,787.0	7,411.59	6,375.41	0.2745	1,750.29	1,750.29
16		13,787.0	7,416.03	6,370.97	0.2519	1,604.66	1,604.66
17		13,787.0	7,420.56	6,366.44	0.2311	1,471.11	1,471.11
18		13,787.0	7,425.18	6,361.82	0.2120	1,348.67	1,348.67
19		13,787.0	7,429.89	6,357.11	0.1945	1,236.39	1,236.39
20		13,787.0	7,434.70	6,352.30	0.1784	1,133.45	1,133.45
21		13,787.0	7,439.60	6,347.40	0.1637	1,039.06	1,039.06
22		13,787.0	7,444.60	6,342.40	0.1502	952.51	952.51
23		13,787.0	7,449.71	6,337.29	0.1378	873.16	873.16
24		13,787.0	7,454.91	6,332.09	0.1264	800.41	800.41
25		194,253.7	12,731.37	181,522.29	0.1160	21,050.75	21,050.75
Sum						-32,325.51	83,174.49

Source: *Authors` calculation*

After economic analysis is carried out, it is necessary to conduct a financial evaluation of observed investments, that is, the ability to return the taken loans.

When the price of land does not rise, the investment is financed partly by farm`s own funds, and partly by borrowed funds (interest rate on

borrowed funds is 9%), and financial benefit obtained from the investment has a negative value and the investment is not financially acceptable:

Annuity = 8,570.10

Net cash flow = 6,597.48

Financial benefit = - 1,972.62

Namely, the annuities for the repayment of loans are higher than net cash flows and the investor is not able to return the borrowed funds. Even more unfavourable situation occurs when the investment is financed entirely by loans:

Annuity = 17,140.20

Net cash flow = 6,597.48

Financial benefit = -10,542.72

When the value of land rises in both analysed ways of financing, the same conclusion is drawn – a financial benefit is negative, so the investment is not financially acceptable (Tables 6 and 7). Obviously, this is not the case when the investment is financed entirely by farm's own funds, because in that case the annuity is not calculated.

Table 6. Calculation of loan repayment with change (50% financing from borrowed funds)

Year	Remaining debt	Principal	Interest	Annuity	Net cash flow	Financial benefit
1	55,000.00	3,620.10	4,950.00	8,570.10	6,429.18	-2,140.92
2	51,379.90	3,945.91	4,624.19	8,570.10	6,425.82	-2,144.28
3	47,433.99	4,301.04	4,269.06	8,570.10	6,422.38	-2,147.72
4	43,132.95	4,688.13	3,881.97	8,570.10	6,418.88	-2,151.22
5	38,444.82	5,110.07	3,460.03	8,570.10	6,415.31	-2,154.79
6	33,334.75	5,569.97	3,000.13	8,570.10	6,411.67	-2,158.43
7	27,764.78	6,071.27	2,498.83	8,570.10	6,407.95	-2,162.15
8	21,693.51	6,617.68	1,952.42	8,570.10	6,404.16	-2,165.94
9	15,075.82	7,213.28	1,356.82	8,570.10	6,400.29	-2,169.81
10	7,862.55	7,862.47	707.63	8,570.10	6,396.35	-2,173.75
Total		54,999.92	30,701.08	85,701.00		

Source: Authors' calculation

Table 7. Calculation of loan repayment with change (100% financing by borrowed funds)

Year	Remaining debt	Principal	Interest	Annuity	Net cash flow	Financial benefit
1	110,000.00	7,240.20	9,900.00	17,140.20	6,429.18	-10,711.02
2	102,759.80	7,891.82	9,248.38	17,140.20	6,425.82	-10,714.38
3	94,867.98	8,602.08	8,538.12	17,140.20	6,422.38	-10,717.82
4	86,265.90	9,376.27	7,763.93	17,140.20	6,418.88	-10,721.32
5	76,889.63	10,220.13	6,920.07	17,140.20	6,415.31	-10,724.89
6	66,669.50	11,139.95	6,000.25	17,140.20	6,411.67	-10,728.53
7	55,529.55	12,142.54	4,997.66	17,140.20	6,407.95	-10,732.25
8	43,387.01	13,235.37	3,904.83	17,140.20	6,404.16	-10,736.04
9	30,151.64	14,426.55	2,713.65	17,140.20	6,400.29	-10,739.91
10	15,725.09	15,724.94	1,415.26	17,140.20	6,396.35	-10,743.85
Total		109,999.85	61,402.15	171,402.00		

Source: Authors` calculation

Conclusion

The analysis of the capitalized value of agricultural land was conducted assuming that the land is purchased for starting arable production. Three possibilities of financing the acquisition of agricultural land were considered – only farm`s own funds, combination of farm`s own and borrowed funds and exclusively borrowed funds. Similarly, the variants when the price of land is higher or does not change its values are taken into account.

Regarding all considered models, those with the capitalized value higher than necessary investments in its acquisition are economically justified. Of all models, the one with the highest capitalized value is actually the most acceptable. The agricultural land can be paid best on the assumption that the prices of land will rise and that the investment is financed only from its own funds. Regarding the three considered ways of financing, the acquisition of land is financially acceptable only when it is financed from its own funds. The farms which purchase land in an established way will be more competitive.

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EDUCATION AND TRAINING EMPLOYEES AND LOCAL RESIDENTS AS PRESUMPTION TO DEVELOP RURAL TOURISM¹

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Abstract

There are two directions for the development staff needed for the rural tourism, formal and informal. In Serbia, the dominant type has been formal, so far. However, certain programmes which gave appropriate results on the field, belonging to the informal type have recently started. The thing which encourages the most is the positive attitude of the local residents towards the knowledge in the field of tourism which they should acquire and which could improve not only their incomes, but also the conditions they work and live in (rural infrastructure, superstructure, environment, etc.). Official bodies take place in this process and it is important to build adequate system of teaching people how to achieve better results and develop their local communities through rural tourism. The aim of the paper is to point out theoretical basis of formal and informal type of the development staff for the needs to develop rural tourism, with the stress on the programmes proposed for the education and training local residents.

Key words: *education, training, development, programmes, rural areas, tourism*

Introduction

Accelerated and exaggerated concentration of inhabitants in town centers and problems made by industrial production, have given assumptions for the appearance and growth of the need for the vacation in nature.

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World Tourist Organization (WTO)³, suggests that more than 75% of total tourist demand is, today, directed towards the natural areas, but, it is impossible to determine precisely the percentage directed towards the rural areas, since official statistics of the great number of countries (including ours) do not follow these indicators.

Urry (1991)⁴ points out the changes happened in the taste of consumers in the last decade of the twentieth century. He notices the appearance of the so-called “new service class“, which puts an accent on the need for consumption in the rural areas.

One of the critical factors in the evolution and development of rural tourist destination is identification of potential consumers, appropriate aimed market segment and the way in which to offer rural tourist products.

The right approach makes possible the making of assumptions for the existence of the so-called “loyal consumers” which is of crucial importance in gaining competitive advantages, which is insisted upon (*Porter E.M*, 2008, *Jobber*, *Fahay*, 2006, *Woodruff B. R.*,1997, *Piercy F. N.*,1998)⁵.

Today, in the state of growing competition and increasing demand for tourism, quality has become a condition for surviving on the market and gaining profit. Having in mind that rural tourism in Serbia is still in the initial phases of development, it is necessary to take into consideration all of the aspects for the improvement of quality (half-board and off-board supply).

Special attention should be given to the development of staff which should be enabled to provide an appropriate quality of services. Without the existence of well-trained staff, none of the constitutive elements of tourist destination practically have a large use value.

³<http://www2.unwto.org/> (25.10.2013.)

⁴Urry J., (1991): “*Cultural change and contemporary holiday making*”, journal *Theory, Culture and Society*, No.5, p.35-55.

⁵ Porter E.M, (2008): „*On Competition*“, published by Harvard Business School Press; Jobber & Fahay, (2006): „*Foundations of Marketing*“, McGraw-Hill Education International UK Limited, p.148; затим *Woodruff B. R.*,(1997): „*Customer Value: the Next Source for Competitive Advantage*“, *Journal of Academy of Marketing Science*, No. 2, p.148; као и *Piercy F. N.*,(1998) : „*Marketing Implementation: The Implication of Marketing Paradigm Weakness for Strategy Execution Process*, *Journal of Academy of Marketing Science*, No. 3. p.228.“

Receptive capacities of rural tourism as a starting point in the development of rural tourism

The ways of equipping receptive capacities and the types of services which will be provided in the above mentioned represent the basis for the development of rural tourism. Hence, the education of the local population is very important so that the capacity will be equipped in an adequate way, and the owners educated for providing services of a corresponding type and quality.

The characteristics of the development of the receptive capacities so far are:

- official record of their number and types does not exist at the moment (neither relevant ministry, nor Chamber of Commerce and Industry, nor National Tourism Organization of Serbia „TOS“ have records of this);
- the existing lists which can be found at various sources are incomplete and are not updated regularly.
- the list which shows in a most comprehensive way the accommodation supply of rural tourism is the one presented on the Internet site” *Rural tourism of Serbia* “ (table 2.).

Table 1. *Types and number of accommodation facilities in the rural tourism in Serbia*

FACILITY TYPE	TOTAL NUMBER
Apartments	40
Log cabins and „vajats“	25
Vajats	3
Cottages	23
Villas	33
Exclusive objects	3
Ethno villages	16
„Konaks“	11
Village houses	319
Farms	10
Village hotels	16

Source: <http://www.selo.co.rs> (25.09.2013.)

- The list is updated rather regularly, and the types of accommodation facilities are adjusted to the local types of rural architecture. However, the classification does not comply with the valid “*Rules about Terms and Conditions of Catering Services, the Manner of providing catering services, Classification of catering facilities and minimum technical requirements for planning and equipment of catering facilities*”(“*Off. Gazette of RS*”, no. 48/2012).

- Ministry of Education and Science, in collaboration with the EU, has financed the project of training rural population for providing services of appropriate quality to the tourists named "*Training for organizers of tourist accommodation in rural households*". The following classification of rural tourist households has been given, among other things, in this document: bed and breakfast households, family houses, farm households, households with the historical past, castles and country houses, „vajats“, farms, yards, taverns, huts. This represents the most comprehensive classification of rural tourist households which is in compliance with the "*Rules*".

However, none of the presented classifications haven't been officially accepted; hence, the problem of standardization of quality in providing services appears.

Due to the different interpretations and imprecision coming from the adopted *Rules*, their mutual harmonization and harmonization with the valid *Law on Tourism* is necessary (*Off. Gazette of RS*, No.36/2009, 88/2010 and 99/2011). It is also necessary for the agricultural producers to build a special relationship towards rural tourism so that they can put their resources in the function of its further development and to be trained for providing services of adequate quality. The system of education will play the "crucial role" in the making of this relationship. Just with the educated staff one can expect adequate quality in providing services and effects of its development.

Levels of management and required knowledge

There is a significant level of interaction and inter-dependence among managerial, educational, and professional and advisory elements. They represent "human capital" in the development of tourist destination.

World Tourist Organization (2007)⁶ points out that tourism is a labour intensive activity and that the interaction with the local communities is an important aspect of tourist experience. Well-trained labour force in tourism and the inhabitants ready to develop it are aware of the benefits and responsibilities that their developments carry. They represent the essential elements of this tourist destination and they should be managed in accordance with the strategy of destination development.

⁶UNWTO (2007): "*A Practical Guide to Tourism Destination Management*", Madrid 2007. p.1-2. http://pub.unwto.org/WebRoot/Store/Shops/Infoshop/4745/8BCE/AD9A/ECA8/048B/C0A8/0164/0B7A/071115_practical_guide_destination_management_excerpt.pdf (25.10.2013.)

The most important features of human resources are level of education (training) and years of working experience (Thrane, 2008)⁷. Good staff training provides quality in offering services, quality which represents one of the important factors for the repeated arrival of tourists to the destination (Seaton & Benet, 1996)⁸.

Bakic at al. (1999) point to the levels of management and the necessary skills of managers in tourism (table 1.)

Table 2. Levels of management and necessary qualifications of managers in tourism

Levels of management	Necessary skills
Operational level: -reception manager -manager of sales packages	- technical training - ability for the selection, motivation and management of employees (which are in direct contact with the tourists)
Intermediate level: - manager of products	- elementary education within the managerial domain - common knowledge about tourism
Strategic level: - manager of strategic jobs in a hotel, agency, etc.	- understanding of strategic planning within the domain of instruments of business policy. - possibility for successful communication with the other members of the staff because of the consensus of achieving aims
Leadership level: -directors of the company -leader team	- ability for vision and company management - innovation, courage, talent - stimulation of other employees for the activity

Source: Bakic O., Nikolic M., Bakic M. (1999): “Fundamentation of Tourism with the basics of hospitality”, Belgrade, Čigoja, p.123.

Doing business in tourism is, today, characterized by incessant innovations; hence, it is necessary for the management on all level to adopt formal knowledge, as well as to enable themselves to follow the innovations which appear daily in tourist management.

⁷Thrane C., (2008): “Earnings differentiation in the tourism industry : Gender, human capital and socio-demographic effects”, Tourism Management, 29 (2008), p.514-524.

⁸Seaton, A.V.& Benet, M.M., (1996): “The Analysis of Tourism Demand: Market Segmentation”, The Marketing of Tourism Product : Concept, Issues and Cases, International Thomson Business Press, London

Baum T., (1995)⁹ makes a distinction of competencies:

- for the problems of the managing of the guests (tourists) with care and sensitivity;
- for communication in written and oral form;
- for achieving positive work atmosphere in every way;
- for achieving professionalization in every way;
- for achieving positive attitude of consumers as well as a positive relation with them;
- to lead the employees to achieve the operations wanted.

Today, in literature, the term “*development of managerial staff*” is in wide use, and less and less one can hear terms such as training and education. This primarily comes from the reason that the former are considered to be an integral part of a process. There is in Serbia a formed system of manager education for the needs of tourism, which can be educated at faculties, high schools, secondary schools and private schools and universities, so-called “*formal educational system*”.

Special attention is given to the wide range of education (lectures, consultations, exercises, professional practice, professional school trips, company visits, visits of specialists, and so on). The model of “*complete separation*” has mostly been used in Serbia so far. Market orientation in doing business, the process of privatization, which represents long-term orientation of our economy, require inclusion and usage of other models in the educational system, where to the accent must be put on practice and training of the so-called “*informal educational system*”.

It is also of high importance for the process of management in the development of rural tourism for the staff to be educated on all levels of management, starting from the “top managers” to the “operational level”. In this sense, assumptions about how to vividly ease and speed up the process of managing the development of rural tourism can be made.

In rural tourism, a special accent should be put on the education of the so-called operational managing level. We are talking here about the local people which provide services for the tourists. It is necessary to develop the appropriate educational programmes. The aim of the programmes like these is to introduce

⁹Baum T., (1995): “ *Managing Human Resources – in European Tourism and Hospitality Industry – Strategic Approach* “, International Thompson Business Press, London, p.191.

developmentally determined households with the elemental knowledge about rural tourism, and the way of providing services. In this sense, the role of the system of informal education has become more and more powerful, as well as the influence of organizations, i.e. bodies (governmental and non-governmental) which would deal with trainings like these.

Formal system of the development of managerial staff for the need of tourism

All levels of management (top, operational and functional) should be subjected to the formal system of education. We are talking here about the staff management in private (companies, enterprises, and so on) and in public (official state institutions, ministries, agencies, tourist organizations, chamber of commerce etc.) sector.

Necessary (“*required*”) level of education depends on the needs and responsibilities. In private sector, for example, it is desirable for the owners of the appropriate hospitality facilities to have a university degree, although this is not the case in practice, in the majority of cases.

What can be said to be a critic of the formal education so far is the fact that it has been functioning to a large extent upon the model of complete separation. As an alternative, there is a model of the long-term cooperation of the educational institutions and the institutions of tourist agriculture. Also, formal system of education has been, almost completely, in the function of the development of young staff for the needs of mass tourism, while the other aspects have been marginalized.

Informal system of education

The education of the local population for the providing of the services of the appropriate quality to the tourists has been performed in a small way in Serbia. This role should be given and performed by the local tourist organization, regional chambers of commerce, units of the local government, non-governmental organizations, etc.

Insistence on the education of the agricultural producers, primarily the carriers of the developmentally oriented households, is a condition upon which the development of rural areas should be based. Programmes for the education of the local population are the basis upon which we must base the future development of tourism.

The expectations are that in this way, on the groundwork of the acquired theoretical basis and practical exercises in mastering specific knowledge in the field of tourism, agricultural producers will be enabled for planning, organizing, coordinating and managing of all the activities on the level of households, villages, that is to say, local communities as mini tourist destinations.

In the later phases of the development of rural tourism, for the further hastening of its development, it is necessary for the corresponding advisory services to perform the education and that, in the exchange of the information with the owners of the rural tourist destinations, give key contribution to the sustainable development of rural tourism in Serbia.

The proposal of the programme for the education of the local population for the needs for development of rural tourism in the Republic of Serbia

a) The way of the introduction local population with the rural tourism

The approach to the problem of education should be conducted in phases. In the first phase, it is necessary to raise the awareness of the local population about the importance of tourism for the development of local communities, with the accent on the importance of rural tourism. Programmes like these should be organized in the cooperation with the Tourist Organization of Serbia (National Tourist Organization of Serbia), local government authorities and regional chambers of commerce. It is necessary to organize courses for the carriers of the developmentally oriented households which show interest for the dealing with rural tourism. In this sense, so that the effects of the dealing with the activities like these should be visible, the priority should be given to the carriers of the *“developmentally oriented households”* which would show interest for the dealing with rural tourism.

It is necessary for the course attendants to be familiar with the chances offered by rural tourism. In this sense, one should point to:

- the role of tourism as a source of extra income for the local population,
- the strengthening of agriculture through the sale of the agricultural products to tourists,
- the possibility for the revitalization and construction of complete infrastructure in the rural areas,
- the impact the tourism has on the process of the prevention of depopulation,
- the impact the tourism has on the development of trade,
- the impact the tourism has on the development of traffic,

- the impact the tourism has on the development of service sector,
- the revival of cultural, manifestational and all the other ethnic features of the rural areas, etc.

It is necessary to make use of each opportunity which stresses the importance of tourism in the insurance of the economic growth, financial and social security of the local population, etc.

b) Topics which could occupy the attention of the inhabitants of rural areas

Having in mind the fact about a relatively low level of education of the local population, it is necessary to make a programme which would have to, as the first step, animate the local population and make the local population familiar with what the rural tourism actually is. Only in the later phases the local population should be informed about the standards necessary for the providing of the services of adequate quality.

Some of the themes which would occupy the attention are, for example:

- the term of tourism;
- pointing out to the social, economic importance of the development of tourism in the rural areas;
- illustration of complementarity in the development of tourism and agriculture;
- understanding the conditions for creating and showing the way for the organization of tourism in rural areas;
- the conception of marketing and its usage in tourism;
- the importance of the sustainable tourist development;
- the presentation of all of the aspects of tourism which can be implemented in a certain rural area etc.

After one cycle of theoretical lectures like these, one should pass to the education through the practical examples. Namely, it is necessary for the attendants to be familiar with the appropriate standards which the rural households must meet in order to be able to deal with rural tourism.

In this sense, the basis would lie in the valid “*Rules*“ (prescribed by the legislature of the state) as well as in the introduction of the local population with the standards prescribed by some important international organizations (such as, for example: *EUROGITES*¹⁰ standards and so on), then their comparison etc.

¹⁰ <http://www.eurogites.org/documents/> (25.10.2013.)

It is important to point out that the consensus about all of the issues in connection with the education and the ways in which the required standards should be presented to the local population must exist on all of the levels of management in the development of tourism, local, regional and national.

c) The ways to implement education in rural areas

Starting from the objectives mentioned, it is necessary to determine the phases upon which a cycle like this can be organized. Anyway, it could be organized in three phases:

- 1) Preparatory phase,
- 2) Implementation phase, and
- 3) Phase of measuring the achieved results.

Preparatory activities imply field work. It is necessary to finish:

- field visits,
- talking with the agricultural producers,
- forming work groups,
- location of space necessary for the realization of educational programme (local communities, houses of culture, schools and similar facilities),
- making, printing brochures and working material, both in written and in electronic form, etc.

In the second phase transition is made towards the process of direct education. Education could also, depending on the interests of the population, be conducted in phases. In the first phase of education, all of the attendants must be informed about a detailed programme of lectures.

Having in mind the complexity and demands for the conductioning of the programme, it is necessary for the education to be directed only to a certain number of rural households. We are dealing here with the competent carriers or the members of the registered developmentally oriented rural households.

Depending on the size of a populated place, educational programme should include no more than the twenty attendants. The attitude like this comes primarily from the reasons of efficiency that a course like this must have.

Some of the activities that will be undertaken in the first two phases (preparatory phase and the realization phase) are:

- meeting and talking with a large number of farmers;
- formation of small work groups of selected composition on the basis of gathered information;

- making and printing of the working material, in written and electronic form;
- organization and implementation of a range of theoretical lectures with an active participation of all of the attendants in the discussions after the end of the lectures;
- illustrations with the practical examples;
- during the course, it is necessary for some means of testing to be done as a way of revision, and so on;
- in the end, it is necessary to summarize the results of the joined work, and remove all of the possible ambiguities;
- It is necessary to insist on the future collaboration of all of the attendants.

The assumption is that the farmers, on the basis of the educational programme like this, would have an opportunity to:

- understand the role and place of the existing natural and social (anthropogenic) resources in a potential development of tourism;
- see the influence of tourism and its use in the social and economic development of village;
- estimate the effectiveness and efficiency of tourism in achieving its goals and interests;
- receive all necessary information about the experiences of other communities opted for this kind of rural development;
- on the basis of existing resources, see clearly their opportunities for development and start their own entrepreneurial spirit;
- understand the importance and role of sustainable development for the preservation of the environment;
- avoid the consequences of neglecting natural and social potentials of their own development;
- realize the importance of tourism for general social development;
- understand the risks in making their own incomes.

If one whole some system of “*development managerial staff*” would be formed on all levels, through the systems of education (formal and informal) it would be justifiably to expect that the quality of the services would raise to a higher level. With the raise of the level of knowledge of all interest groups (stakeholders) in the later phases of development of rural tourism, one could insist on a concept of the use of total quality management (TQM). We are talking here about the endeavors of all of the factors of the tourist chain of value (tourist cluster) to make an effort so that the tourists as the final consumers of services would be pleased.

If the tourists decide on a certain rural tourist destination, they would know in advance what level of service quality to expect. The application of the TQM concept would bring strategic and operational benefits in doing business, and would help in positioning tourists destination on the tourist market.

European experiences in the education and training local residents for the needs to develop rural tourism

Organization “*Rural Tourism International – Training Network*”¹¹ was founded in 2005. And it represents an association of organizations and educators of rural tourism. The goal of the organization is to provide quality training in rural tourism through the network connectivity and appropriate programmes and services of satisfactory quality. The organization was formed as a logical sequence of the programme “*Leonardo da Vinci*” financed by the *European Commission*, and lasted from 2001-2004. During the programme, the standards of quality in rural tourism, the so – called “*EU standards 2* “ were formed. These standards are binding for all of the member countries and are equal for the whole countries in Europe. The links of all the leading national organizations which follow the development of rural tourism in the parent state can be found on the official website of this organization. In this way, thanks to the Internet, an insight can be made into the dimensions of the development in Europe, that is to say, for each country separately, and in the ways of education of the local population.

a) The experiences of Ireland

“LEADER “programmes have given a strong impetus to the development of rural tourism of Ireland through the subsidized scheme of development of rural tourism. It was also planned to provide similar effects for the period 2007 – 2013. through the “*National plan and programme for the development of rural tourism* “ and “*National programme of rural development*”.

“LEADER“ groups from all of the corners of Ireland cover different issues in relation with the projects of rural development, such as, for example, organization of study trips abroad in order to gain necessary knowledge about models of organizing tourist activities in rural households (farms), than development and training of the farmers for providing services in tourism, writing and printing of different brochures and materials for training of farmers etc.

¹¹ <http://ruraltourisminternational.wordpress.com/about/> (25.10.2013)

The networking of farmers and different companies is conducted in an intensive way in order to strengthen the sector of tourism, and the information is exchanged through the Internet. The first website of this kind is, in fact, made in Ireland¹².

b) The experiences of Great Britain

The Government of Britain considers farm tourism to be a strategic force of rural economy, and in this sense, it gives a full support for its affirmation and invests in its development. The EU through the so- called “5b) developmental programme” has given a considerable contribution to the development of rural tourism in Britain. This programme has been operational for a period of 1994-1999. The programme covered 6 rural areas, thanks to which economic revival of these areas was made possible, and the rural households could receive capital investments for new projects in the field of development of rural tourism (“ farm tourism projects”), as well as all the help for the training in the field of marketing.¹³

The largest network of farm accommodation and major promotional organization of rural tourism of Great Britain has been operational since 1983. We are talking here about a network known as “Farm Stay” Ltd., the name of which was at the beginning “The Farm Holiday Bureau”. This network was formed by the *Ministry of Agriculture* and “English Tourist Board”.

Fifteen different regional tourist boards which are networked and work with the representatives of local communities can be differed on the field, the aim of which is to educate local population so that they would be able to provide services of satisfactory quality to the tourists. Local colleges are very often included and they also perform some sort of education of the local population. The attention is given to all of the elements relevant for the development of farm tourism and local communities. The lecturing cycle is conducted in phases and in cycles.

The experiences of Spain

At the national level, ASETUR (*Asociación Española de Turismo Rural*)¹⁴ appears as a major tourist marketing organization based in

¹² www.talktourism.ie (25.10.2013)

¹³ www.sfc.ucdavis.edu/agritourism (25.10.2013.)

¹⁴ <http://www.raar.es> (25.10.2013.)

“*Cantavieja*”. It is a member of the “*Eurogites*” organization. It was formed in 1994, in the process of regrouping 20 associations of the owners of rural households which offered accommodation services to tourists. In that way, it grew firstly into a regional, and then into a carrier of the organization of rural tourist activity for the whole territory of Spain.

Besides the national, there is a wide range of other small associations working on the regional level. Some of them are RAAR (*Red Andaluza de Alojamientos Rurales*), „*Unió de Pagesos de Catalunya*” (Catalonian Farmer Union)¹⁵ based in Barcelona etc.

Farmers’ unions dealing with rural tourism are present even on Spanish islands, and definitely, rural tourism is the most developed on the Balearic Islands.

The training of the farmers for providing services in rural tourism is conducted in courses, by the local unions, certain private companies, as well as the universities.

Harmonized level of training at the country level does not exist for the time being. There is a Government suggestion for the training and harmonized system of education to be conducted through the Ministry of Education, which would manage the trainings through the organization “*REDR*” („*Red Española de Desarrollo Rural*”).

The experiences of Austria

Austria is among the countries with a large experience in the development of rural tourism. The adaptation of the rural houses for the needs of providing tourist services has begun 1960.

Associations for the rural tourism are formed on the level of each province, while the biggest marketing organization working on the promotion of rural tourism in Austria is based in Salzburg („*Urlaub am Bauernhof*”)¹⁶. Eight regional associations in total are networked in the offer of the rural tourism of Austria.

„*Urlaub am Bauernhof*” promotes the concept of “*regular quality control*” and, depending on the kind of the offer, gives to the farms a corresponding “*emblem*” („*Beim Bauern zu Gast*”¹⁶), which determines the quality of the offer. It is

¹⁵ <http://www.raar.es> (25.10.2013.)

¹⁶ www.farmholidays.com (25.10.2013)

necessary for the farm to offer three domestic products, at least, grown or produced on it, so that it would be able to apply for obtaining this emblem.

The organization named "*The Association for Farm Holidays*" ("*Bundesverband Urlaub am Bauernhof*") is in charge for promotion of rural tourism and has an advisory role.

In "Burgenlandu", the project of education of the agricultural producers for the needs of developing rural tourism is carried out. The education is free in order to speed up the development. The educational programme has 120 classes in total and the accent of the lectures is on:

- general culture,
- organization and management,
- tax system,
- accounting,
- calculations and making of appropriate business plans.

These are obligatory courses, while the study of foreign languages (English) and home-made cooking, optional.

Conclusion

Accelerated development of rural tourism has started since the nineties of the twentieth century. The countries which have the most significant results so far are from the Western Europe. Realizing the importance of the rural tourism in removing numerous problems the rural Europe and North America are burdened with, then the countries of the Eastern Europe as well, people have started with its development. Shapes and forms differ from country to country, depending on the type of accommodation capacities and natural-geographic features of the rural areas.

The development of rural tourism in Serbia has been conducted spontaneously and has assumed different forms. Rural areas occupy more than 80% of the Republic and on these areas, according to the last Census, live 44% of total population. Hence, the conclusion about the importance of rural tourism for the tourist and economic development of the country in general can be made from this.

Publically proclaimed attitude about tourism as a chance for developing of rural areas, must not be just a "dead letter on the paper", it must flourish since we want to expect the benefits of its development.

Working on the formal and informal education of the staff is necessary. So far, the prevailing system for the needs of tourism has been formal. However, only with the development of informal system the process gains its full dimension. The expectation are, that in this way, on the basis of gained theoretical ground and practical exercises in mastering certain knowledge in the field of tourism, the agricultural producers will enable themselves for the management of all of the activities on the level of households, village, i.e. local communities as mini tourist destinations.

The quality of tourist products which can be found on tourist market will be improved in this way. If the process is carried out continuously, with the corresponding policy of promoting conditions for the development of rural tourism made by the Government and the units of local communities, it is justifiably to expect the long-term effects. However, it is important that other bodies include in this process (National tourist organization – TOS, Regional Chamber of Commerces, local communities, and also business entrepreneurs who have interest for developing rural tourism.).

Some of the programmes for the education have been carried out sporadically so far, which is not enough. It is necessary for all of the interest groups (stakeholders) to join the process of development of managers and to strengthen the process of their networking (both horizontally and vertically).

Through process of training local population would be enabled for providing tourist services of appropriate quality, and the effects would result in creation of the so-called “loyal consumers”. For the State it is important that parallelly build system of education (formal system) and training (informal system), of increasing knowledge people about advantages that tourism could bring to rural areas. It is important for the agricultural producers to build a special relationship with the tourism, and in correspondence with the acquired knowledge, put their resources (natural and social) in the function of its development.

Management techniques can help to improve results of developing rural tourism. One of these techniques is benchmarking. It can help us through systematic and continuous process of measuring our developing process of rural tourism with results which achieve leader countries, to get information which can help us in process of organization and take action to improve our business performances and on this way to become competitive on tourism market.

It is expected that the system of staff development for rural tourism, as time goes, improve. Also, it is important that all stakeholders will involve in these processes (formal and informal). This is one of the imperatives of development rural tourism. Practice has shown that only a trained staff is capable to providing high quality services and this is presumption for developing rural tourist destination.

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FARM ANIMALS SELECTION AIMED TO IMPROVE LIVESTOCK PRODUCTION COMPETITIVENESS

Radica Djedović¹, Dragan Radojković²

Abstract

A comprehensive selection work conducted systematically in the populations of farm animals over the last decades resulted in a remarkable genetic progress and positive phenotypic trend for the traits of interest. In cattle breeding, by introducing new methods, a genetic improvement in the milk yield traits of even up to 2-3% annually has been achieved. In recent decades the back fat thickness in modern pig breeds has been decreased by 75%, growth rate increased by 100%, however, a very slow progress has been achieved in the swine fertility. In the future the genetic progress in livestock production will be based on the achievements made in molecular biology, bioinformatics and computational biology. This will lead to a wide application of genomic selection whose usage could improve the accuracy of animal additive genetic value through reducing generation interval and thus result in the increase of selection effects.

Key words: *selection, cattle, pigs, competitiveness.*

Introduction

In recent decades there have occurred important changes in the improvement of farm animals intended for high quality production of livestock products among which the most important are meat and milk.

The essential progress, in this sense, comprise, among some other things, the application of selection, artificial insemination (particularly in cattle), new scientific discoveries in the field of molecular genetics such as: MAS

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selection (marker-assisted selection) and genomic selection (Andrabi and Moran, 2007; De Vries, et al., 2008; Schefers and Weigel, 2012), together with new alternative methods of animal improvement and nutrition. This has made faster genetic, ie. production and economic progress possible.

In cattle breeding, by introducing new methods, a genetic improvement in the milk yield traits of even up to 2-3% annually has been achieved Dekkers,1992; Wilcox et al., 2003; Norman et al., 2003. Annual genetic changes in milk yield, fat, protein, productive life, and daughter pregnancy rate in Holsteins born between 1980 and 2000 were on average 104 kg, 3.5 kg, 3.0 kg, 0.16 mo, and 0.11%, respectively (Shook, 2006).

The same situation can be found in pig breeding, where systematical work conducted in the last hundred years led to a remarkable genetic progress. Merks (2000) states that in the last 100 years, back fat thickness in modern pig breeds was reduced by 75%, the growth rate increased by 100%, however, little progress was made in the field of swine fertility. On the other hand, the author states that since the nineties of the 20th century, in most European breeding programs, annual genetic progress for a daily gain of + 20 g/day, for % meatiness + 0.5% and for litter size + 0.2 piglets/litter was achieved.

The selection of farm animals, as already pointed out, besides breeding and nutrition, represents one of the three primary pillars on which modern livestock production is based. Among them one is different from the other two in that the progress achieved by selection in terms of production and other traits has remained permanently in the population of domestic animals. It is also characteristic that the individual improvements achieved by selection over time in different generations virtually added and contributed to an overall animal genetic value.

Selection becomes more serious with greater reproductive capacity and longevity and less number of animals needed for maintaining population size. The programmes of genetic improvement are based on a large active population. Obtaining the desirable results demands both properly kept herd book and accurate control of production and reproduction traits. Structure and control of active population have a direct effect on testing conditions and selection success. With greater population the selection intensifies and the accuracy of the estimation of animal breeding value increases.

However, intensive selection for increased productivity of farm animals has led to numerous negative side effects. Thus, Prunier et al. (2010) report that high yielding pigs have greater difficulties in meeting the challenges of the environment and are more susceptible to stress and diseases, which is reflected in amplified physiological, immunological and behavioural problems. This will affect the redefining of breeding goals, where attention will have to be focused on the properties that have neither indirect nor direct economic value, so-called socially important traits (Kanis et al., 2005).

Problems mentioned can be solved by use of genomic selection resulting in the improvement of average quality of tested breeding animals, that is, the breeding value estimated accuracy (Djedović et al., 2012). A contribution of genetic selection is particularly reflected in the fact that it provides shortening of generation interval, thus increasing the genetic progress (Schaeffer, 2006). Moreover, the application of this kind of selection is important especially in the control of genetic defects and diseases, as well as for other traits with low heritability value (Boichard et al., 2010).

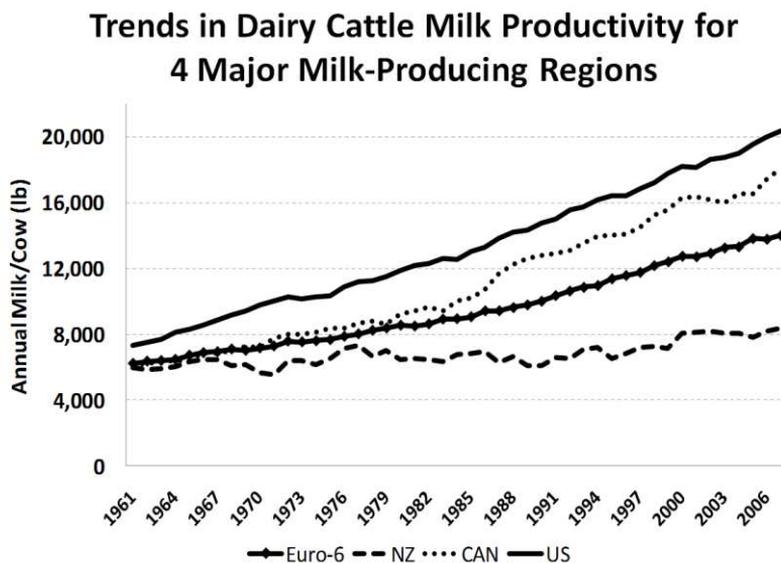
The objective of this paper is to present current and future challenges in cattle and pig selection in the most important species of farm animals in our country, and how these challenges could be dealt with, along with further directions of development to be taken in this research field in order to improve an overall market competitiveness of livestock production.

Attainable and current challenges and procedures in cattle selection

The programmes on cattle genetic improvement, particularly those designed for dairy breeds, based on traditional selection conducted in the last fifty years, were very successful and resulted in significant improvement of productivity. Before the use of artificial insemination, cattle genetic improvement was slow due to low reproductive efficiency, long generation interval and limited bulls testing per progeny. Upon its application the conditions were created for organisation of successful progeny bull testing and for intensive selection. In this way, by introducing new methods of determining the breeding value, genetic improvement of up to 2% annually was made possible.

The contribution of selection was related primarily to the estimation of breeding performance in bulls and cows (Brotherstone and Goddard, 2005; Andrabi and Moran, 2007). A principal approach in selection is the choice of individuals with the best genotypes aimed for the reproduction of the next generations of descendants. Real genetic values are mostly unknown, so the assessment of genotypes is being rather difficult. Therefore, different methods for assessing the bulls` breeding performance for milk yield traits have been applied, since they are sex restricted, occurring only in female animals.

Graph 1. Phenotypic trend of milk yield in dairy cattle for the four most important regions (Euro6, New Zealand, Canada, USA)



Source: FAO(2009) <http://faostat.fao.org/>

* Euro-6 represents 2/3 of the cow's milk produced in the EU in 2007

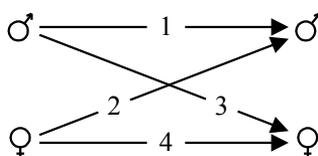
Source: FAO (2009) <http://faostat.fao.org/>

Production performance in bulls` daughters (progeny testing) has been used in this process. In the USA more than 1,000 Holstein young sires are progeny-tested each year, but fewer than 100 animals qualify for proven sires (Funk, 2006). The cost of progeny testing for Holstein young sire ranges from \$25,000 to \$35,000 (Funk, 2006). The structure and control imposed on the active population directly affects the conditions of progeny testing and the selection success (Mulder et al., 2006). With enlarging the population the selection intensifies and the accuracy of the assessment of bulls` breeding performance increases. A common practical procedure is to breed the future bulls from the best cows (1-5%) and bulls

(2-4 annually). When the breeding performance has been estimated, the bulls are chosen and used for insemination. Bulls` progeny testing lasts 63 months on average (Scheffers and Weigel, 2012).

A significant contribution to genetic improvement of milk yield can be accomplished through creating elite or nucleus breeding stocks. Such breeding stocks have a limited number of animals in relation to an overall and active population. If the number of bulls is limited there occurs a problem of increased homozygosity and inbreeding (Oltenacu and Broom, 2010). Undesirable effects of inbreeding are decreased by the type of mating, number of bulls` dams, number of bulls per dam and the number of bull-sires. It is also deemed important, from the breeding aspect, that the nucleus breeding stock should not be restricted or limited in any way. Faster improvement and better results can be accomplished by the use of high-quality sexed semen and embryo transfer. There are four possibilities of the application of selection in bulls and cows during insemination (Robertson and Rendel, 1950; Van Tassell and Van Vleck, 1991; Andrabi and Moran, 2007). An overall annual effect can be estimated in following way: BB - Bulls - bulls (43.2%), BC - Bulls - cows (17.8%), CB - Cows - bulls (33.1%), CC - Cows - cows (5.9%). The said distribution shows that the selection on bulls` parents (BB, CB) contributes to overall selection effect approximately by 75%, while the selection on progeny tested bulls contributes (BB and BC) approximately by 60%. (Picture 1).

Picture 1. Possibilities of applying selection on bulls and cows



There are three bull-related types of selection (1, 2 and 3) and one (4) dam-related selection, involving the dams of subsequent cow generations. Considerable changes are evident in the intensity and accuracy of selection, that is, in the generation interval between the four displayed types of selection. Selection of bull`s sires (arrow 1) is very intensive and accurate, selection of bull`s dams (arrow 2) is very intensive and less accurate, the selection of cow`s sires (arrow 3) is of different intensity and accurate, selection of cow`s dams is poor in intensity and less accurate, what can have different effects on selection.

The second part of the twentieth century will also be remembered as a period of significant efforts made in creating the models and methods of breeding evaluation, ie. animal additive genetic value. These efforts were particularly present in the territories of the USA and Europe, the latter being very conspicuous for developed dairy industry. The application of methods was performed gradually and parallelly with development of biotechnology in livestock industry. The basis for progeny testing of milk yield traits made sire`s numerous daughters that were realizing their production on greater number of farms. Therefore, in the first widely used model, Contemporary comparison, CC model, the daughters of the same age were compared among themselves. Due to inability to monitor genetic trend and competitiveness which existed between young and already tested bulls there began the application of linear methods whose theoretical basis was elaborated by Henderson (1953). Today among widely used models are BLUP method, the Animal model or Model of individual, Test day model, Random regression model and others.

Future challenges in selection of cattle

In conventional cattle selection the best parents were chosen on the basis of their own performance (phenotype), progeny performance (progeny test) and origin. Progeny testing (especially bull progeny testing) and use of positively tested breeding males has been the most successful in this sense. However, progeny testing significantly extends generation interval having an influence on the reduction of selection effects. A new way to overcome these problems has been obtained by the application of genomic selection (Meuwissen *et al.*, 2001; Dekkers, 2004; Gassaway, 2009; De Roos *et al.*, 2011). Genomic selection is a marker assisted selection where genetic markers covering an entire genome are used so that all loci of quantitative traits in linkage disequilibrium have, at least, one marker. Marker assisted selection which is currently used in animal production can be divided into three types (Hayes, 2007) according to the data they use: LE-MAS (based on DNA in linkage equilibrium with a quantitative trait locus); LD-MAS (based on molecular markers in linkage disequilibrium with QTL) and Gene-MAS (based on actual mutation causing the QTL effect).

Today a whole process is automatized and relatively cheap in relation to the price of breeding animal. Taking into account that genetic markers are not genes but only present in their proximity and due to recombinations between genes and markers, the accuracy of EBV

(Estimated Breeding Value) decreases from generation to generation unless there are new data obtained by the control of productivity. Therefore along with genomic selection the data on animal performance and the data on origin should be used as well. The application of genomic selection has resulted in the improvement of average quality in tested breeding animals, that is, in the accuracy of estimation of breeding value EBV.

A practical implementation of genomic selection in the USA started in 2007. In the first year, according to Gassaway (2009) genotyping was conducted on 56 947 samples. Number of samples, as well as the number of markers constantly increases along with research work and technology development. In genomic selection a silicone chips that can read millions of information are used. Well-known are the chips made by the Illumina firm. One example is the BovineSNP50V chip able to read 54 001 SNP markers (Gassaway, 2009). Development of this technology is very fast so today we can use the Bovine HD BeadChip, able to read 777 962 markers.

Procedure in genomic testing in the USA is conducted in such a way that the bull semen, i.e. bull semen doses, is transported to the breeders through selection organizations. The procedure of genotyping starts from the dairy cattle breeders who send the samples of breeding females to DNA laboratories; the sire or dam samples are sent to selection companies, from where they are sent further to DNA laboratories, while the genotyped samples are sent to the USA Ministry of Agriculture (USDA), where they are collected. The results are then returned to selection companies for further use. This system will be used until 2013, after which period every breeder will be able to send his samples via laboratory to the Ministry of Agriculture, where he will be given the results. The implementation of genomic selection in bovine improvement, Gassaway (2009) compares with the importance of the implementation of artificial insemination.

Bearing in mind that in the future dairy breed bulls and cows will be chosen on the basis of DNA markers, Goddard (2009) wonders if there is a need to establish a national evaluation of genomic value. The alternative would be that companies which sell bulls or bulls` semen should also sell DNA tests and perform genetic evaluations. This scientist believes that national genetic estimation would be more appropriate since all the national records would be included in calculating the most precise GEBV,

making, at the same time, a whole process much easier to the farmers. GEBV reliabilities for young bulls without progeny testing results in the reference population were between 20 and 67%. The reliability achieved depended on the heritability of the trait evaluated, the number of bulls in the reference population, the statistical method used to estimate the single nucleotide polymorphism effects in the reference population, and the method used to calculate the reliability (Hayes et al., 2009). This reliability, in fact, corresponds to the reliability of progeny testing conducted on 20-50 daughters, however GEBV increases the effect of selection per year in relation to progeny testing primarily due to reduction of generation interval. Because of decreased accuracy of GEBV in relation to progeny testing it is necessary to use a larger number of young breeding animals in practice.

International organizations for control of productivity in farm animals such as INTERBULL have already recognized the application of genomic selection in the evaluation of EBV bulls, hence the semen tested in this way can be found on the market (Goddard, 2009; Boichard et al., 2010). However, GEBV obtained by use of SNP markers now gives only partial information on animal true EBV.

Taking into account that genetic markers are in fact not genes but only present in their proximity, and due to recombinations between genes and markers, the accuracy of GEBV decreases from generation to generation if there are no new data obtained by the productivity control. Therefore, when applying genomic selection today we should still use data on animal performance, together with origin data, while the correction of SNP equation would also be necessary from time to time.

On the basis of aforementioned it can be concluded that the advantages of the application of genomic selection in dairy cattle are manifold: a) it is not necessary to use additional tools to identify and check single genes affecting the traits of interest; b) reliability of GEBV for young bulls is relatively high; c) generation interval is being shortened what increases annual effect, i.e. selection development.

According to Boichard (2010) in the future, dairy cattle selection will be propelled by three main factors: 1) after a long period of selection on production, most functional traits have been deteriorated, sometimes up to a critical point, and need to be restored. This is particularly the case with fertility, mastitis resistance, longevity, metabolic diseases, i.e. traits with a

low heritability and difficult for selection; 2) genomic selection offers new opportunities: genetic progress can be almost doubled and phenotype recording separated from selection and limited to several thousand animals; 3) new devices and sources could be used to generate new information. These new conditions will contribute to reorient dairy selection.

Attained and current challenges and procedures in pig selection

Conventional selection methods based on the use of animal production and pedigree data in the two last decades yielded very good results. This was confirmed by a number of published results displaying the annual genetic progress of commercially important pig traits. In the period from 2000 to 2005, the annual genetic progress on the 25% best ranked farms of Australian pig population was + 9.52 g/day for average daily gain, - 0.28 mm for back fat thickness, - 0.028 kg/kg for feed conversion ratio, + 0.20 mm for the muscle depth and + 0.28 piglets per litter (Hermesch, 2006). Danish company - DanBred announced that, in the last four years (2007 to 2011), an average annual genetic progress of + 2.10 g/day for average daily gain, + 0.10% of meat in the carcass and + 0.40 live piglets at 5th day (LP5) after farrowing per litter was achieved (Pig Research Centre, Danish Agriculture & Food Council, 2012). Dutch company – TOPIGS, in 2011, recorded increase in daily gain of 5 g/day, the meatiness of 0.5% and the number of live born piglets per litter of 0.7 compared to year 2010 (TOPIGS, 2012).

Such good results were achieved thanks to the use of modern pig selection approach which involves creating the broadest possible base for the collection of animal production and pedigree data. This was made possible by introducing modern information systems on pig farms and within breeding organizations. On the other hand, the use of insemination doses supplied by the centres for artificial insemination has allowed significantly greater exchange of genetic material between farms which further helped to improve the scope and quality of information used for the animal genetic evaluation (across boar herd evaluation).

In addition to boar conventional selection, based on real production data in test stations, today the breeding value of boars tested in farm conditions (field test) is also evaluated, and this type of test is used for the evaluation of gilts breeding value. In this way, the accuracy of breeding values of

both parents of the next generation of pigs is increased, enhancing significantly the effects of selection.

In the countries with developed pig production, the multi trait BLUP-AM (Best Linear Unbiased Prediction - Animal Model) using in full the available data and providing the maximum correlation between estimated breeding value and animal aggregate genotype is now commonly used to estimate the animal breeding value.

This can result in the highest possible genetic trends especially in low hereditary traits like litter size. In order to increase the accuracy of estimates of breeding value, which directly influence the achieved genetic progress, there is intensive work on introduction of other methods to estimate genetic parameters and breeding values. In the Republic of Serbia, generally, pigs breeding value has not been estimated by linear methods. In the cases when they have been used the most commonly method is the method of selection indices (Radojković et al., 2006). Besides this method, some attempts were made to show possible application of mixed model methods for sows breeding value estimation (Radojković et al. 2009), but unfortunately these activities led to no application of this method in the production practice.

Special contribution to the achievement of high genetic progress in carcass meat percentage was obtained by wider use of various devices that can, with maximum accuracy, measure fat thickness and muscle depth, both in live animals and pig carcasses. Increasing the accuracy of these measurements resulting in the application of modern methods in pig breeding value estimation that maximize the accuracy of these estimates with relatively high heritability of these traits, made this progress possible.

Genetic companies and/or national associations of pig producers in countries with developed pig production have already made serious reconstruction of their breeding objectives. This is primarily related to the redefinition of some traits, changing the importance given to the individual characteristics and the inclusion of some new traits. A good example of this are the traits included in the breeding goal of Nordic breeding organizations as shown in Table 1 (Rydhmer, 2005).

Table 1. Selection traits used by Nordic breeding organizations (Rydhmer, 2005)

Type of trait	Organisation	Selection trait
Reproduction	Norsvin	Age at 1st service; Litter size, born alive; Number of teats; Litter weight at 3 wk; Weaning to service interval
	Danbred	Litter size, alive at 5 days
	FABA	Age at 1st farrowing; Litter size, total born; Stillborn; Mortality of liveborn; Farrowing interval
	Quality Genetics	Litter size, born alive; Farrowing interval
Production	Norsvin	Growth rate (age at 100 kg); Carcass leanness; Feed efficiency (25-100 kg); Dressing percentage; Bacon side quality
	Danbred	Growth rate (0-30 kg); Growth rate (30-100 kg); Carcass leanness; Feed efficiency (30-100 kg); Dressing percentage
	FABA	Growth rate (30-100 kg); Carcass leanness; Feed efficiency (30-100 kg)
	Quality Genetics	Growth rate (birth-100 kg); Carcass leanness; Feed efficiency (30-100 kg)
Health	Norsvin	Conformation score; Osteochondrosis
	Danbred	Conformation scores; E.coli (MAS)
	Quality Genetics	Conformation scores; Osteochondrosis
Meat quality	Norsvin	Ultimate pH; Reflection; Intramuscular fat (Duroc)
	FABA	Ultimate pH; Reflection
	Quality Genetics	RN- allele (Hampshire)

Nevertheless the breeding objectives of presented breeding organizations in the Nordic countries at the beginning of the 21st century were almost identical, it is apparent from the data presented in Table 1, that there are significant differences especially in reproductive traits included in the selection objectives.

Future challenges in selection of pigs

How fast pig production capacities will increase in the future and what the final levels to be achieved will be, depends both on the development of interrelations in the pork production chain, and on the technology available to enable the realization of the defined breeding goals and planned genetic progress (Merks et al., 2012). Pork production chain includes all the links involved in the production starting from the producers of breeding pigs and finishers, through slaughtering and processing plants to the retail outlets, providing the final product to the consumer. In the late 20th century we had pig producers whose aim was to have lowest production costs, demand for the pigs of uniform quality for slaughter industry, the retail outlets demanded better processing quality, while the consumers appreciated quality that can be trusted.

Today, all these links try to maximise the value above cost and to compete together for sustainable pig production. For example, producers want to maximise value above cost for: (1) better feed conversion for lean tissue and (2) to maintain an optimal level of back fat thickness and muscle depth in order to secure maximum payment from slaughterhouses. Slaughter industry and sellers want more uniformity in carcass cuts and at the same time products differentiation, but they also want to avoid the risk of poisoning either by meat or residues contained in the meat. The consumers expect to have healthy meat free from zoonoses, little environmental pollution caused by the pig production (thin carbon footprint), appropriate animal welfare and that the pig farms be situated away from towns and villages.

To achieve these goals new phenotypes for: (a) vitality, (b) uniformity, (c) robustness, (d) health and welfare, and (e) reduction of carbon footprint will be required with maintaining, simultaneously, the production efficiency (Merks et al., 2012).

We have seen that genetic selection and better environment control have led to a significant increase in the level of pig productivity. Such high performance resulted in high physiological demands that may deteriorate animal health and welfare (Prunier et al., 2010).

In recent years, we have witnessed the rising concern of public and consumers for the conditions of livestock production and its general impact on the environment. Social development resulted in a growing awareness of livestock ethical and social aspects. This demanded for greater importance to be given to the socially significant traits in breeding programs, such as pig welfare and health, pig production impact on the ecology, health safety and pork sensory quality (Kanis et al., 2005).

Recently a significant progress has been made in the field of pig genetics and genomics by the integration of advanced techniques of molecular biology, bioinformatics and computational biology, and by the joint efforts of researchers in the swine genomics community (Fan et al., 2011). Number of mapped QTL is increasing. There has been great progress in the study of gene expression. Number of identified non-coding RNA has rapidly increased and their exact regulatory functions are investigated. An international consortium SGSC (Swine Genome Sequencing Consortium) and many other research institutes are working on the pig genome sequencing project and great progress has been

achieved. Recent developments in genome sequencing and next-generation of sequence technology have led to the production of 60K high-density porcine SNP chip. This 60K SNP chip was designed by selecting 64232 of SNPs selected from a total of over 549000 known SNPs (Ramos et al, 2009). It will serve as an extremely useful tool for various fields of research including animal genetic evaluation, whole-genome association and LD mapping, population genetics and evolution genomics studies.

This type of chip is needed for the application of genomic selection that represents the future selection of all types of animals. This method integrates genotypic, phenotypic and pedigree data for the breeding value estimation and marker assisted selection on a genome wide scale. Different methods for genomic selection (GS) have been developed over the past decade and simulations show that they can improve the accuracy of genetic value by reducing the generation interval (Meuwissen, 2007). Some of pig genetic companies have reported that they started with the implementation of genomic selection (Pig Research Centre, Danish Agriculture & Food Council, 2012, TOPIGS, 2012). Vuković et al. (2012) said that the future pig breeding programs without GS would not be competitive.

Conclusion

The twentieth and the early twenty-first century have seen big and significant changes in improvement and selection of farm animals for highly productive and high quality production of livestock products. Biological limits in the production of farm animals have not yet been attained. Further development of selection will be under a great influence of public and consumers preferences and will impose changes in breeding programmes goals that will not only be directed towards decreasing production cost and improving economically significant traits but greater importance will be given to functional and socially important traits such as animal welfare, health, longevity, safety and quality of animal products. Future genetic progress in the production of farm animals will be based on the achievements made in molecular biology, bioinformatics and computational biology. This will result in a wide application of genomic selection that can increase the accuracy of animal genetic value estimation by way of decreasing generation interval and thus lead to increase of selection effects.

Due to technological progress and introduction of microchips in the field of genomics it is made possible to reduce expenditures and to increase information available at genotyping. A whole process is today automated and comparatively cheap in relation to the price of breeding animal. The application of genomic selection in the disease control, as well as in the selection on traits with low heritability values is particularly important.

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SUFFERING OF WILD ANIMALS IN HUNTING-GROUNDS FROM APPLICATION OF AGRICULTURAL MECHANIZATION AND PESTICIDES

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Abstract

Suffering of wild animals in hunting-grounds, due to a man's irresponsibility, is a subject which answers to a complex issue of one economic branch (hunting) development. Inasmuch Serbia achieves hardly a developmental level, which have the surrounding countries, with similar climate, relief and type of game. Sequence of events can be stopped by using experts in this field. By accepting the insurance, the insurance company requires an accurate treatment towards the insured case, but also its separated measure and tracking of other kinds of damage. For such developmental project are necessary significant assets, as primary investments in quality hunting base and sure result of material protection from the insured harmful event. The insurance, if we take that risk, will determine the size and pay only for that damage. Then we will have to see a result of the management and undertaken measures and according to other factors. This is one of the approaches how to reimburse the assets and how to gain, if the game fund is not biologically protected from men's collateral negligence and unsynchronized actions in nature.

Key words: *game, insurance, damage, compensation, management, poaching.*

Introduction

With application of modern production technology in agriculture, which reflects in large machinery and increasing use of pesticides, more and

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more wild animals, which share their environment with men, suffer and become increasingly jeopardized.

The most cubs suffer from agricultural machines, with very serious injuries, which require long recovery and treatment. Outcome of the treatment is uncertain, as well as the recovery, if they are not put to death, on the spot, by a mower or a combine. All this represents a great loss for our already impoverish fauna. There stays open the possibility of a loss compensation by insurance in all hunting-grounds with defined corporative management, where this type of suffering must control, and causes of game fund decrease, as a national resource, must search in other types of damage, ensued by low-grade quality management. A basic purpose of the paper is to point out to an environment, in which develops this economic branch (agriculture-tourism).

State of agriculture in Serbia

Under numerous indicators, which were analyzed in the paper, agriculture (economy) of Serbia falls into work-intensive economic branches and is characterized by low level of agro-technique appliance. Consolidation of agricultural land leads to creation of “big” proprietors – farmers, which have a double role in the social development. On the one hand, the farmers appear as inputs' buyers (mechanization, pesticides, artificial manure, etc.), while, on the other hand, the farmers appear as outputs' sellers, which sets in motion food-processing industry. Besides the rural areas offer agricultural-food, wood products, etc. products to the market, those are places for vacation, tourism and life.

According to data on share of agricultural-food products in the total foreign trade exchange, there can conclude that it is about the products of great significance, especially for export, which occupies up to one fourth of the total export. On export side are the most common the products in form of raw material, mostly of plant origin. An opportunity of export increase reflects primarily in available agrarian resources, but, at the same time, agrarian policy, which has to speed export substantially.

There prevail small parcels and non-specialized livestock production

A common feature of Serbian agriculture and countries in surroundings is significant number of small husbandries with small property. Their high-

frequency share significantly decreases productivity of agriculture, and thereby agricultural production, which reflects negatively also to husbandries' income. Low income of agricultural husbandries reduces life standard, not just of an agricultural producer, but rural areas, as a whole, too. Facts speak for them selves: of 4.2 million hectares of arable land in Serbia, 87% is in private ownership, and only 13% belongs to the state and agricultural companies. Just 2.9% of arable land in Serbia is properties of 5,000 hectares; a number of husbandries are 700,000, of which a half registered.

Average size of husbandry³

<i>Country</i>	<i>Property size (h)</i>
European Union	17,7
Serbia	3,5
Great Britain	67,7
Denmark	46
The Netherlands	20
France	42
Luxemburg	45,3

Land property structure⁴

<i>Area of husbandry(ha)</i>	<i>Serbia</i>	<i>Bulgaria</i>	<i>Romania</i>
to 5	77.4 %	96.8 %	93.8 %
5–10	17 %	1.4 %	4.9 %
10–20	4.8 %	0.6 %	0.8 %
more than 20	0.8 %	1.2 %	0.5 %

Great number of elderly households

Ownership structure of a landowner is pretty diversified, because those who officially cultivate it are reduced, while „hobby” farmers – which is trendy – increase!

Stimulating fundraising for land purchase from elderly and non-agricultural households and their consolidation, is one of the possible options, as well as insisting on alteration on Law on Inheritance, where a priority in getting land have those who cultivate it and live on it.

³Source/literature no. 2

⁴Source/literature no. 5

Number of inhabitants fed by one active farmer by selected countries

<i>Serbia</i>	6
<i>Romania</i>	8
<i>Hungary</i>	9
<i>Bulgaria</i>	16
<i>Italy</i>	22
<i>Austria</i>	22
<i>EU</i>	26
<i>France</i>	35
<i>Germany</i>	46

Insufficient education of agricultural producers (farmers)

There is increasing number of those who deal with agricultural production, and not of agricultural profession. As agricultural producers appear those who come to capital, in some way, so they want to invest it now in agricultural production. Just then they realize that, if they want high and stable yields, they must apply the newest achievements of agricultural profession and to follow the modern technology.

Old agricultural mechanization updates slowly and is insufficient; dilapidated facilities for livestock breeding

A structure, a number and a state of available mechanization capacities does not provide the modern technology application in production, in optimal terms, which is one of the key factors for achieving high yields in healthy food production and realizing satisfying profit in area unit.

- Inadequate mechanization is a cause of many injuries and fatalities in traffic and in realization of production technology on a parcel.
- Domestic industry of tractors and agricultural machines, without an adequate support of the state, is not able to satisfy needs of agriculture, water management and forestry.
- Prices of tractors and agricultural machines of leading producers are too high for the most of mechanization users, which use over 86% of land.
- Technologically obsolete mechanization, of low technical condition, while using, makes great losses and damages to the products, as well as increased costs of application, by which increasingly aggravate the

cost of production and significantly harms the environment – land, water and air.

- General level of technical knowledge of most of land users (producers) is insufficient to accept and use rationally the modern imported technology.

Facilities for animals breeding have been mostly built in fifties of the last Century, and in period of crisis, in nineties, along with those facilities' maintenance failure, often have come to their complete devastation. New regulations, adjusted to the European Union regulations, do not allow the previous conducted breeding technology and require building new facilities (for example, the facilities must have outlets, restraint of animals is forbidden, poultry cage breeding is forbidden – only allowed is free floor keeping).

Disbalance of raw material prices for production and of agricultural products and increasingly less income of agricultural producers

Decreasing income of agricultural producers leads to decreasing investments. Prices of raw material for agricultural production grow year in, year out. Therefore a fuel is more expensive, so agricultural producers tend to decrease high costs of energy substances, by reduced processing. A quality seed is increasingly expensive, so uses a seed „from the attic”; of pesticides apply only those cheaper or use smaller doses. These all have the effect of small yields, which often do not cover the production costs.

Small number of experts in the field

In time when there existed big social properties, all graduated engineers of agriculture and PhDs of veterinary medicine, was easy getting to work. After done privatization, new owners, due to lack of production by which they started to deal, were not shown interests and a need for highly-educated personnel. Often they produce with insufficient knowledge, and some engage experts if necessary and for specific jobs.

Bad privatization of socially-owned husbandries

Today, when the privatization process observes from a specific time distance, there can conclude that condition in agriculture would be much better if there was taken care on who buys those companies and if he intends to continue the production, or he expects an easy gain, without

necessary investments. The privatization, generally, has passed unhindered in those firms, where the land was in public property, and the Agency here had no problems to sell. However, in most of cases, where the land was partly public and partly in social property, there were much difficulties, primarily regarding the land's demarcation, and then also organization of production, while practically, in that way were broken previous organizational, technological and infrastructural entireties. By tenders and auctions, until now, was sold 153 agricultural companies, estates and combines and there was earned about 280 million euro of profit. Of this number, for 38 agricultural companies was broken a contract on privatization, according to data of the Privatization Agency.

Lack of investments

In order to adjust to the current legislation, Serbian agriculture needs investments. Also in order to adjust to the following changes of the market and keep the existing level of sale/consumption, increase competitiveness and find new markets.

Agricultural producers finance the production and investments in several ways:

- from own incomes,
- from inputs' suppliers directly or through cooperatives (barter arrangements),
- others (friends, relatives,...),
- not investing or decreasing inputs.

The investments in agricultural sector are relatively modest in regard to the total size of foreign investments and range between 0.6% and 3% annually.

Expensive bank credits

An agricultural producer needs:

short-term credits in order to cover needs of financing the production until sale or collection of products,

- medium-term credits for fixed assets, which should last more years and cannot be funded from one production cycle, and
- long-term credits for purchasing land, building modern facilities for livestock production.



The agricultural producer can get the assets in form of a bank credit, from inputs' supplier or with the Ministry support. A bank cannot finance non-profitable productions and non-profitable producers, and today, many producers and production are such – with numerous bad experiences.

Ways of wild animals' suffering

The biggest and the most common damages, which animals can make, are in traffic and agricultural crops. In traffic is deliberately used a term “run of vehicle on the game”, and not inversely, because game is a weaker party, a party which regularly loses, so drivers should, especially if takes into consideration set warning signs for game on the road, drive more carefully and to drive slowly, so they could stop the vehicle in case of a need. In some hunting-ground, damages in traffic represent a main and maybe the only problem, regarding damages of game. For damages, made by wild animals, are responsible local hunting associations, but jurisprudence has taken the position that the hunting association is not obliged to compensate damage made in case of running the animal into the vehicle in motion on a categorized road, if there determines that the driver made the damage, because he did not adjust speed to road conditions, i.e. a traffic signalization. A road sign for danger of wild animals should be seriously considered and to adjust their ride. Traffic accidents, which include wild animals, are made during the whole year and during the day and night.

Animals start their crusade to crops at dawn. The most common target is maize. Corncobs they just tackle, and more than they eat, they break with their bodies, so damage is much bigger. On their visit testify hoof prints

and circles of fell down plants, ten or more meters in diameter. Around noon, they withdraw in groves, which protect them. No one can kill a wild animal, except in organized chase. Ploughmen are only allowed to fright and drive them away, so people burn rubber, throw firecrackers, use whistles in order to chase away intruders and protect their crops. For such damages are responsible the hunting associations, which are obliged to compensate the damage to agricultural producers. On the other hand, animals suffer in a way they get under various working parts of agricultural mechanization or are being poisoned by pesticides (rodenticides), which use in crop production.

Preventive activity

For the purpose of damage decrease of game should surely use experiences of others countries, which had worked a lot on various methods for damage decrease from and on the game. Therefore, aiming to remove the game from traffic roads was created palatability (edibility) of some plant species, with a goal to separate those unpalatable (Entzeroth 1978/79). In experiments in fenced area with fallow deer, red deer, mouflon, roe deer and red deer, was noticed that the game have not consumed species like *Pteridium aquilinum* (common braken), *Dryopteris filixmas* (male fern), *Urtica dioica* (common nettle), *Sambucus nigra* (black elder), *Cynanchum vincetoxicum* (swallow-wort), *Arum maculatum* (snakes head) and similar. In regard to it was suggested that those and other non-palatable species plant along roads, in order to remove the game from these zones and decrease damages in traffic. The district Kronach in Germany, for a long time, has managed the project „Wild und Straße“ („Wild animals and traffic”). They have decreased damages from the game in traffic by various methods, like scented fences, audio and video signals, informing public or warning signs. (source: <http://www.wildundstrasse.de> and Frankonia Jahreskatalog 2006/2007.).

Prevention of damage

Insurance of wild animals, in the world and in our country, too, apply in cases when animals are in zoos or in breeding places, i.e. in controlled conditions. They insure due to a risk of a permanent injury or mortality due to accidents. A condition for reception in animals insurance is that they must be healthy and capable for specific purpose and to be marked,

because of identification. In the world were some attempts to protect and insure wild animals in hunting-grounds, even wider in natural habitats.

Such attempts were done at first there where some species were jeopardized and whose survival was called in question only in case when a number of animals is so small that, someone who takes care of them, as well as an insurer, possible to identify each of them. This was rapidly given up from, while the insurance could clear the damage due to realizing risk of animal's death from accident, but thereby was not achieved a goal – survival and increase of jeopardized species number. It means that money got from the insurance could not bring back permanently lost animals.

There were attempts to insure wild animals in hunting-grounds, but the condition was the hunting-grounds to be fenced and the animals as a subject of insurance, to be clearly marked. Under the fenced hunting-ground has considered the territory on which are no traffic arteries and agricultural areas and on which people cannot move freely, but only with approval of a guarding service. The animals, who would be the insurance subject, should be clearly marked (ear tags, chips) due to their identification in case of damage appearance. Here was no interest of the one who manages such hunting-ground to insure the animals, while risks of which the animals would be insured, is extremely small. For example, suffering of animals by running into cars was eliminated. Lack of areas on which performs agricultural work, eliminates all risks which follow the agricultural production (suffering of animals from agricultural mechanization and pesticides' application).

There are very different measures for damage prevention of and from game, of different efficiency and require different financial investments. Among means which can set, later on, for prevention of damages, we can mention setting high, usually fire fences, which disables, by their dimensions, a passage of wild animals, unlike devices like „an electric shepherd“, which has no effects to game migration. Also, due to its dimensions, the device is, unlike the fences, mobile and useful on different places during the year. Those devices require a regular maintenance, as the fence, as well as open space in front of the fence. Moreover, the electric fences are not real physical barriers, but only habit barriers, where efficiency drastically decrease once when game realize that the barrier can be broken through. Supply of baffle means or warning signs does not require greater assets at once, but those assets mostly

become an annual expenditure, while they need to be renewed during the year, and efficiency is far less. Although most of drivers probably do not think of the possibility of running into wild animals during drive, no one can neglect the possibility of running out of game on the road, if he drives in the game natural surroundings. Since reduction of number of game dashes to cars aiming to protect nature and environment, it is necessary to regain consciousness of drivers and their introduction to innovations from this, increasingly frequent area.

By applying the modern production technology in agriculture, which reflects in large machinery and increasing use of pesticides, suffer more and more wild animals, which become more jeopardized by sharing the habitat with a man.

Of agricultural machines suffer the most cubs and with very serious injuries, which require long recovery and treatment. The outcome of treatment is uncertain, as well as the recovery, if they are not killed on the spot by mowers or combines. This all represents a great loss for our already impoverish fauna.

This way of animals suffering could substantially reduce if the attention of people who work in the field increase. It is necessary to take a look more carefully fields in which people get into with machines and to take a look if there is any animal in the field. They should install a device on machines by which frighten animals. Besides installing those devices, it is necessary to take care during a harvest and crops mowing, because massively suffer fawns and small rabbits, while a mimicry is a natural instinct to save cubs from natural enemies, but not from people (mimicry is hiding and inaction until the danger passes, because they cannot run fast from the danger, while they are still small). Often happens that adult rabbits and pheasants drive into lucerne bales. The fawns although are literally butchered beneath mowers, often are one, two or more legs cut, cut ears, flayed skin,...Even if they survive, there stay permanent health consequences, mutilated body and great stress after everything survived. There happens that, after hard injuries while they were still fawns, roebucks grow horns incorrectly. Hunters therefore kill them as spoilage...

According to the Hunting Law, clause 13, forbid work in the field (mowing, harvest) without frightening device, forbid burning weeds, stubble, reed, grass and other overgrowth, forbid covering open canals, lakes and accumulations by plastic and other materials, because if wild

animals fall into water, they drown, while they cannot get out due to sliding.

Penalty provisions, in clause 63 paragraph 2, refer to hunting associations, which do the mentioned activities or do not sue for game destroyed in this way. The penalty provisions for physical persons, who work in the field irregularly, without frightening devices, or every other activity required by the law, are immanent in clause 65, paragraph 4 of the Hunting Law. The penalties are not negligible (in million of RSD).

There should not touch fawns if they are not hurt during harvest, mowing and in any other way. Adequate help and care should be provided to hurt animals, but only until they grow, and then return them to nature, along with some professional support.

Wild animals suffer also from hunters, poachers, attacks of stray dogs, massive poisoning by pesticides and rodenticides, from irregular setting allowed and unallowed poisons, from loss of living space (roads, enlargement of settlements, closing green corridors for animals' movement, etc.). There must not dissipate the rodenticides on the fields, so it can be available to other animals, while in this way could cause poisoning of numerous roe deer, rabbits, birds, and dangerous poisons further spread from herbivores to carnivores and omnivorous animals, and at the end get to people, through the food chain.



(Im)Possibility of wild animals' insurance in hunting-grounds from suffering of agricultural mechanization and pesticides' poisoning

According to the existing tariff is not possible to insure animals which keep in extensive terms (outdoor), nor this allow the Common and Special conditions for animal insurance in the Republic of Serbia.

Insurance of agriculture in Serbia

What characterizes the insurance of crops and animals in Serbia

In Serbia do business 11 insurance companies, which deal only with non-life insurances, while six deal both with life and non-life insurance (NBS, 2012). The most of insurance premiums for crop and livestock production realize two insurers – Dunav and DDOR Novi Sad. Of the rest 15 companies, only few of them insure crops, yields and animals.

Insurance of crop and livestock production in Serbia is voluntarily. It conducts after the specified perils principle, where the main risk for crops is hail, then fire and thunder stroke, while regarding animal insurance, the main risks are mortalities, emergency slaughtering, as a consequence of a disease or an accident. Additional risks in insurance of crops and yields are storm, flood, spring frost, autumn frost, etc, and regarding the animal insurance, loss of calves or foals during the birth, loss of breeding ability of heifers and cows, loss of breeding ability of male breeding animals and theft of dogs. There evaluates that there are 450,000 registered husbandries, but a small percentage insures from risks which jeopardize crop production or animals.

Only 8% of arable areas and livestock fund are insured, and the amount of insurance premium was 11,25 million euro.

The state's role reflects in subsidizing of a part of premium or the total amount of insurance premium.

The state has introduced the insurance premiums subsidizing in 2007, and only for the registered husbandries, to which agriculture is the only income source. During the first two years, the subsidies were amounted 30% of premium, and since 2009 the subsidies have been increased to 40%. The state, for several years, has been trying, by subsidies apply, to stimulate the insurance of crop production and to improve the situation in this field, by returning a part of premium to the insured persons. This measure certainly gives good results and has been supported by an insurer and an insurance underwriter, but progress is

still symbolic. Unstable market and low accumulation of a branch have the effect of disinterest of producers for wild animals insurance.

For agricultural producers who barely provide financial assets for investing in production (seeds, fertilizers, pesticides, breeding or fattening animals, quality feed, health supervision, etc.), insurance of agriculture often represents unnecessary expense. Such state result, which has been present in our agriculture for a long-time, is a low increase in weight of animals, in comparison with countries with developed agriculture. Regarding such yields, i.e. increase in weight; there is no interest for insurance protection, unless the insurance price is not symbolic. The insurance companies are forced to reduce premiums, in order to consent the producers to insure their assets. However, by this policy, the insurance underwriters bring themselves in situation that they cannot provide large enough fund for covering damages, from realized premium. Therefore, their business in this field of insurance, as we have already mentioned, is pretty with caution.

Subject of insurance:

- The subject of insurance can be wild animals, which populate and to which is natural habitat a territory (hunting-ground) on which manage an insurance underwriter by game.
- Under wild animals consider wild mammals and birds, which, as a of general interest, protect and use in a way determined by the Hunting Law. It is game on which hunting has been permanently forbidden or forbidden in some period (closed season).
- The subjects of insurance cannot be:
 - Wild mammals and birds on the list, but in transit or flying over.
 - Ill and stunted animals and those suspicious of the disease.
 - Exhausted, stunted, blind and animals in bad condition.

Conditions for insurance signing:

- Territory of managing the game population of an insurance underwriter (hunting-ground, reserve) must be clearly defined (area and boundaries).
- Insurer is obliged to insure all species of wild mammals and birds which can be the object of insurance.
- Insurer must submit a correct number of units (individuals) by species of wild mammals and birds.
- Insurance is signed on time period of 1 year.
- Insurer is obliged, along with an insurance underwriter's compliance, to provide the treating veterinarian, which will, in case of a harmful event,

examine and determine a cause of injury, i.e. mortality of insured wild animal, individually or in cooperation with the relevant state institution.

- Insurer is obliged, along with insurance underwriter's compliance, to provide a hunting inspector, which will, in season of agricultural work, control the hunting-ground and application of measures which aim to protect the game.

Threats covered by the insurance:

- Insurance underwriter is obliged to pay insurance indemnity due to permanent injuries or mortality due to an accident.
- Under the accidents are considered damages, which can be inflicted to wild animals and birds by:
 - Agricultural machines in season of mowing or harvesting.
 - Application of toxic baits in season of poisoning field pests.
 - Application of pesticides in spring.

Threat which are not covered by the insurance:

- With insurance are neither comprised threats, not the insurance underwriter is obliged to compensate the damage, which appear:
 - out of season using agricultural mechanization,
 - out of season when poisoning harmful rodents,
 - out of season of pesticides' application,
 - due to other determined kinds of suffering,
 - due to selection according to natural features, loss of beauty, breeding ability or attractive value,
 - theft or disappearance,
 - due to old age.

Sum of the insurance:

- Animals insure to the amount which deals with the insured party, but it cannot be higher than a book value of animals.
- Animals' value determines by types and categories, and according to the current rule book.

Insurance benefit calculation:

- The premium amount determines according to proportion of wild animals species and their number, as well as a size of area covered by the insurance.

Liability of an insurer

Insurer is obliged to undertake the measures regarding maintenance, renewal and achievement of a number and quality of game, according to natural and other opportunities of hunting-grounds.

- Insurer is obliged to keep records of insured wild animals on their areas of management and to inform timely an insurance underwriter on all changes.
- When appears an insured case, the insurer is obliged to proceed as follows:
 - to report to the insurance underwriter immediately on the insured case, in written form,
 - in notification on appeared insured case should state species of wild animals, date and hour, as well as a place where it happened.
- If an insured animal wild animal or bird is alive after the harmful event, then care of an animal takes an insurer.
- Intensifies marketing activities aiming to promote crops, fruits and animals insurance
- Evaluation of damages make quickly and of high-quality, with short-term for compensation from insurance
- Participates in developmental programs, started by the state of a local authority.

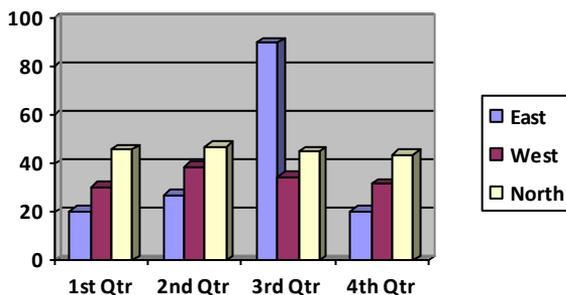
Liability of an insurance underwriter:

- Liabilities of an insurance underwriter to pay compensation for damages appeared due to an accident start at 24,00 of the day when the insurance was signed.
- After the damage report, an expert of an insurance underwriter is obliged to make its insight an assessment.

Determination and evaluation of damage and insurance compensation:

- Right of an insurer to the insurance compensation, due to realization of insured risk, is determined by an insurance underwriter's expert.
- Regarding injuries ensued by agricultural mechanization, the expert of an insurance underwriter determines and evaluates damage according to an insight on animal's injury and a record of a hunting inspector. The record of a treating veterinarian must contain a type of injury and a cause of its appearance, i.e. when and how has come to it.
- Regarding poisoning, which has as a consequence a wild animal mortality, the insurance underwriter's expert determines and evaluates the damage according to insight of a poisoned awild animal's corpse in the intended

facility and the record of the authorized state institution, which has performed an autopsy, in order to determine a cause of death.



- After done damage evaluation, the insurance underwriter's expert makes a record, which together with the record of the treating veterinarian and/or an autopsy report archives in the damage subject.
- Done damage calculates according to a negotiated value by types and categories of insured wild animals.
- If determines, by the record of the treating veterinarian and/or the autopsy record, that the damage did not occur of insured risks, by insight in the damage, than it is considered rejected.
- Damages for died wild animals settle according to the damage report, done insight of the damage, the record of the treating veterinarian, the autopsy report and the contracted value of the animals.

Special remarks

A problem is risks recording in the field, counting a real number of animals, health of animals suggested to be insured, age, desertion from one hunting-ground into another... A common characteristic of Serbian agriculture for this type of insurance are small parcels, a great number of elderly households, and old agricultural mechanization, low-grade quality, technologically obsolete and with low level of technical knowledge of a user. Besides, such configuration follows a small number of experts in the field.

Requirements of hunting resources' users almost do not exist, and damages have (not) been regulated facultatively. The state initiative in direction of insurance obligingless, as well as subsidies, misses while persons under obligation preferably solve the problems ad hoc, than they accept an obligation of paying the insurance premium.

The same effects affect also hunting holders, as natural resource, therewith their result depends on success of crop growing activity on their hunting area, and sometimes they cannot undertake a thing. Possibilities of more significant investment projects are almost impossible without determination of certainty of yield or its insurance, which stays as an emergency signal for measures for redefining of organization and hunting development in more positive environment.

Conclusion

Analysis of wild animals' suffering from pesticides and agricultural mechanization shows the problem of conducting quality management by a territory assigned to a hunting institution (company or public enterprise). Here, first of all, sees insufficient and unprofessional control of legally defined processes, to which this paper points out. Through an example of selected damages opens a question of their compensation significance, and then also the whole funding process of this field and total hunting benefits (material and immaterial). Insurance is surely the activity based on engaging an insurance underwriter in preventing and resolving the harmful events.

Aiming to realize the business, an insurance company is able to point out to a risk structure, which it takes over, but also the risks similar to them, but not comprised by insurance. In that way it forms conditions and requires universality and quality which the insurer must have. Nowadays are small number of hunting institutions able to fulfil partnership obligations and those are exclusively fenced hunting-grounds. That business is made by inertia and spontaneous. Continuously miss the preventive investments of insurance companies and does not increase the control over business plans realization. Finally, the insurance is a factor, which is able to provide reliability for bolder investments in technical-technological capacities and realization of multiple profitable hunting.

The damages by game and damage to them in traffic and agriculture are reality and a cost. There assumes that damages in the future will only increase, and thereby will grow also costs for prevention, as well as for those damages compensation.

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POPULATION VERSUS FOOD IN THE CONTEXT OF FOOD SECURITY WORLDWIDE

Raluca Andreea Ion¹, Dan Cristian Popescu²

Abstract

This paper tries to investigate the problem of food security and disparities among world's nations in those regarding food availabilities. It answers the questions: what is the currently state of food security in the world and how high are the gaps between food availabilities in different regions of the world? The research indicates that qualitative and quantitative differences that manifest in the world in terms of food consumption shows that where food is scarce and insufficient, it has no corresponding qualitative structure. The fact that food production increased, shows that hunger is due not only to the growing demographic factor, but also to the limited access to technique and technology of the poor nations.

Keywords: *food security, food availability, famine, malnutrition, under nourishment*

Introduction

This paper aims to investigate the problem of food security, reasons, gaps and disparities among world's nations. It focuses on answering the questions: what is the currently state of food security in the world and how high are the gaps between food availabilities in different regions of the world? According to Food and Agricultural Organization studies, 870 million people suffer from under nourishment in 2010-2012, 12.5% of the total population (or 1 in 8 people). Most of these, 852 million, live in developing states and underdeveloped countries (98% of population undernourished). Two thirds of the undernourished population lives in seven countries: Bangladesh, China, Democratic Republic of Congo,

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Ethiopia, India, Indonesia and Pakistan. 40% of undernourished is in China and India. The highest percentage of undernourished population recorded in sub-Saharan Africa 30%, with large variations from country to country (69% in the Democratic Republic of Congo, compared to 26% in 1990-1992).

The objectives of this paper are to identify the gaps between geographical regions and countries in those regarding food availabilities. The ratio population versus food production is analyzed, trying to understand whether demographic factor influence the state of food security world wide.

In pursuing these objectives, statistical data have been gathered and analyzed for long periods of time (1960 to present). Studies about food security are available, but this one tries to fill in the gap with answers to the questions: how high are the gaps between food availabilities in different regions of the world and what is the influence of demographic factor to food security? The results of this study put light on food security situation and could be useful for underpinning policies in the field.

Food availability and gaps

Food needs of people vary in relation to gender, age, work, weight, etc., the normo-caloric diet, according to World Health Organization and Food and Agricultural Organization, is about 3000 calories, 100 g protein daily / person. It must include:

- 25-30% fats;
- 11-13% protein;
- 55-60% carbohydrates;
- minerals.

Humanity is facing problems on malnutrition, which manifests itself in two forms: malnutrition, specific to underdeveloped and poor states in different countries, and overeating, characteristic to developed states and rich people from different countries.

Malnutrition is manifested in different forms: poor diet, unfair and unbalanced diet compared to physiological norms. The body's need for nutrients and non-nutrients is not provided with food, or quantitatively, not qualitatively here for a long period of time. The reserves of their own macro and micronutrients, protein, fats, carbohydrates, are consumed to

cover the physiological needs. Losses of weight, the resistance against aggressive agents from the environment, disturbed metabolism and endocrine etc. occur.

Overeating is a form of malnutrition in which nutrients are over supplied compared to the needs of the body in relation to normal growth, development and metabolism.

In the *Merck Manual of Diagnosis and Therapy* there are presented a number of nutrition disorders related to overeating:

- Overweight, obesity - childhood obesity, syndrome of hypoventilation obesity, abdominal obesity;
- Vitamin poisoning – hyper vitamin intake A, D, E;
- Overload of mineral toxicity.

Problems of malnutrition are identified by analyzing the indicator: food availability in different countries, expressed in calories and protein grams daily per person. These must be completed, however, with the diet structure to capture qualitative aspects, not only quantitatively nutrition. Qualitative structure of the daily ration is expressed by:

- The relationship between animal and vegetable calories and proteins;
- Daily availability of retinol and beta-carotene respectively the ratio of availability derived from vegetal and animal products;
- Other nutrients (vitamin, essential amino acids, minerals, etc.).

In table 1, data on food availability of the world's population, by continent and country types, are highlighted.

Table 1. *World food availability, by geographical area (calories and grams protein per day, per person)*

Calories / person / day

Geographical area	Total		Vegetal		Animal	
	2000	2009	2000	2009	2000	2009
Total world	2732	2831	2274	2330	459	501
Africa	2421	2560	2236	2353	185	207
North America	3775	3659	2751	2658	1024	1001
South America	2782	2951	2173	2286	609	665
Asia	2591	2706	2229	2277	361	429
Europe	3248	3362	2347	2437	901	925
Oceania	3010	3211	2074	2265	936	946

Protein (grams / day / person)

Geographical area	Total		Vegetal		Animal	
	2000	2009	2000	2009	2000	2009
Total world	75	79	47	48	28th	31
Africa	62	66	49	51	13	15
North America	115	112	43	41	72	71
South America	77	83	37	39	40	44
Asia	70	75	49	50	21	25
Europe	97	102	43	44	54	58
Oceania	96	98	34	36	62	62

Source: *FAOSTAT*

The availabilities of food in calories and protein have a growing trend in the last 10 years in all regions of the world. However, the disparities between the developed countries in North America, Europe and Oceania and the developing and underdeveloped countries in South America, Africa and Asia are evident, both in terms of consumption of calories and protein. The countries in the first category (developed countries) consume, on average, 3200-3600 calories per day, and the countries of the second group (developing countries) consume, on average, from 2500 to 2900 calories daily.

In structural approach, gaps remain regarding the consumption of vegetal and animal calories, the share of calories of vegetal origin in total calories intake is lower in the developed countries, compared to the regions of developing or underdeveloped countries: 73% in North America, 72% in Europe, 77% in South America, 70.5% in Oceania, 84% in Asia and 92% in Africa. Worldwide, the structure of daily food ration is 82% vegetal calories and 18% animal calories.

In dynamic, protein intake increased in the last 10 years, with 2-5 grams per day, per person. From the structural point of view, the world consumed, on average, 79 g of protein / person / day, of which 61% vegetal and 39% animal; differences between geographical areas in this case are obvious. The share of protein intake of animal origin is 63% in North America and Oceania, 56% in Europe, 53% in South America, 33% in Asia and 23% in Africa.

Other studies of the Food and Agricultural Organization show that, in the last 20 years, average calories consumption worldwide increased from

2,600 calories / person / day to 2800 calories / person / day. Of the 26 developing countries where food availability is 2,200 calories / person / day and below this level, 14 are located in sub-Saharan Africa.

Analyzing the statistics, it can be noticed that the qualitative and quantitative differences that manifest in the world in terms of consumption shows that where food is scarce and insufficient, it has no corresponding qualitative structure. Practicing a healthy diet concerns in general, countries in the developed areas of the world: North America and Europe. Practicing an unbalanced diet, low in calories and animal protein and low as regards quantity is specific to developing and emerging countries in Africa, Asia and South America.

It is appreciated that the consumption of food will greatly increase, on the one hand due to population growth, and on the other hand, the fact that developing countries will absorb the model of Western diet, especially the preference for meat. Roberts³ states that while increased consumption of meat will improve the health of many poor countries, this food diets geometric increase the overall demand for food because the meat is one of the most inefficient ways to get calories. According to studies in the field⁴, it takes 2.5 kilograms of grain (corn) to produce 1 kilogram of meat. Given the fact that currently, the area used for feed crops are growing, and, as the populations of Southeast Asia and Africa having largely vegetarian diets adopt the patterns of populations in Europe and North America, the need for forage crops will double. Given that the majority of the world's arable land is already under cultivation, and the demand for grain used as bio fuels (which currently represent a third of the U.S. corn) is increasing, worldwide surfaces are insufficient to support changes in the pattern of consumption and cereals market.

The world food crisis

The food crisis has manifested itself in different ways at certain times, in many parts of the world. The forms of the food crisis are:

- Inflationary food crisis due to rising prices of food products and consumer income reduction that does not have access to sufficient and balanced nutrition;

³ Roberts, P., *Sfârșitul hranei*, Editura Litera Internațional, București, 2009, pg.18.

⁴ Bran M., *Agro-Biodiversity Between Abundance Of Products And Environment Quality*, Quality – access to success, vol 13, S1: 52 – 57, 2012.

- Food crisis of overproduction which occur when the agricultural high yields are obtained, supported by farmers with bank loans, which can not be honoured because the prices of agricultural products in good agricultural years are reduced and therefore farmers' income reduced;
- Food crisis due to the lack of agricultural products on the market because of the reduced yields when environmental limiting factors occur: floods, late and early frosts, drought, etc.

Although the World Food Conference of 1979 declared the decade 80 as the second decade of development, with the objective to eradicate hunger and poverty, in that period was maintained the lack of food and, in some areas, the food crisis deepened. Some authors⁵ consider that due to destabilization of violence global food crisis (1972-1975), caused and compounded by drought in the Sahel and other regions, there were large power imbalances, famine and death.

Agricultural market crisis, manifested by large imbalances between supply and demand, has negative effects on most developing countries where agriculture is the only source of income. The implications of the crisis are⁶: non-equivalent exchange between states, braking agricultural development due to lack of capital, differences between industrial and agricultural progress.

Although there are large imbalances in the world food, agricultural surpluses in some countries can not be sold to others, either because of low purchasing power of the population, either because of support measures and protectionism in some countries. However, developing countries face difficulties in exporting to world markets due to strong competition from developed countries that sell low-priced food due, in turn, to support policy of domestic agricultural production.

The food crisis in developing countries, coupled with fluctuations in supply and demand and economic adjustment measures imposed by the oil crisis, bring difficulties in international agricultural trade.

The current global food crisis is not a crisis of resource depletion, as it was assumed at first glance, but a crisis of high prices of food products.

⁵ Zahiu, , L., *Agricultura mondială și mecanismele pieței*, Editura Arta Grafică, București, 1992

⁶ Ibidem, pg.69.

Rising prices in the past five years affected in different ways countries and regions. While Africa famine worsened, in Asia, countries have turned to stocks of agricultural products and foodstuffs. Asian states used to have a restrictive export policy, which led to a stable supply and prices in domestic markets. Other states had sufficient internal reserves to cushion the decline in imports. Most states, however, were forced to purchase food products in international markets, affected by rising prices.

Studies and statistics of the Food and Agricultural Organization⁷ show that, in dynamics, food prices increased in 2009-2012, compared to the base period 2002-2004. There is a strong increase in 2009 and 2010, indexes reaching values close to 190% at the end of 2009, and 220% at the end of 2010. Between 2011 and 2012 prices were stable but remain at a high level compared to the period 2002-2004: 210%.

Statistics show the price indexes increased for all agricultural products: cereals, oil and fats, dairy, meat and sugar. Cereals price index reached 245% in 2013 compared to the period 2002-2004, and that of oilseeds reached the level of 206%. Low values of soybean oil for bio diesel and reduced demand have prevented a significant increase in the index. Dairy price index reached 203% and meat products - 178%. Quotations for different types of meat shows small variations in prices for poultry and pork, while for other types of meat, prices remained about the same. Sugar price index is 259% over 2002-2004. FAO studies show that prices have declined in the past four months, due to increased production (supply) and the availability of export for the year 2012 to 2013, especially in Brazil and Thailand. Projections show an increase in sugar production in importing countries, leading also to a relaxation of price.

Food crisis will continue even if the prices of food are reduced, since there is a deep structural crisis in the global economy, driven by maintenance and increased disparities between North and South, uneven and unpredictable developments in world population, the existence of unequal relations between developed and the developing, maintaining underdevelopment. 75% of global resources belong to developed countries which comprise 25% of the world population, while 15% of the world population lives in North America and Europe.

⁷FAO *World Food Situation 2013*, FAO *Food Price Index*, <http://www.fao.org/worldfoodsituation/foodpricesindex/en/>, accessed in September 2013.

The gaps between developed and developing countries in terms of resources spent per capita are very high. It is estimated⁸ that 1 billion people in developed countries use, per capita, 32 times more resources compared to the developing countries.

The effects of the food crisis becomes apparent through drastic reduction of global food reserves, far beyond the minimum security, rising food prices on the world market, increasing developing countries' dependence on exports of developed countries.

As a result, the food crisis must be addressed multidimensional economic, demographic, and political.

Researchers⁹ argue that a second green revolution could solve the global food crisis, in the sense that resources could improve access to food for 1 billion chronically undernourished people, and in addition, provide food for a growing world population estimated to 2 up to 3 billion people over the next 30-40 years. Food production should increase by 70% by 2050 to adequately feed a growing world population¹⁰.

Population versus food

Demographic factors

Population growth is an issue discussed in many papers because of the consequences it has on food security. The world population is over 6 billion people and 99% of population growth, or about 80 million people a year, take place in developing countries. It is estimated that the population of Central Africa will increase by 193% between 2003 and 2050¹¹. About 90% of the world population lives on 10% of the land. Maximum population densities are found in the U.S., Europe, India and East Asia.

⁸ Diamond, J., *Collapse: How Societies Choose to Fail or Survive*, Allen Lane, 2005.

⁹ Wijkman, A., Rockstrom, J., *Falimentarea naturii: negarea limitelor planetei*, Compania, București, 2013.

¹⁰ IAASD, 2009, McIntyre, B., Herren, H., Wakhungu, J., Watson, R., *Agriculture at the Cross-roads*, Sintează a raportului, International Assessment of Agricultural Knowledge, Science and Technology for Development, Island Press

¹¹ Semionov, I., *Averile Pământului. O geografie economică pentru oricine*, Fundația Marco Polo, București, 2009, pg. 272.

But densely populated areas are not necessarily overcrowded, as long as they own sufficient resources for food, energy and water. The region with the largest population growth, Africa, faces the worst deficits of such essential resources.

To estimate the degree of satisfaction of food needs in the world, the relationship between population growth and increasing food production are analyzed. The latter, even if it has an upward trend in world, food situation has not changed: still remained a low degree of satisfaction of the needs of agricultural products in Africa - the continent most hit by famine, and Asia - the continent with the high population density.

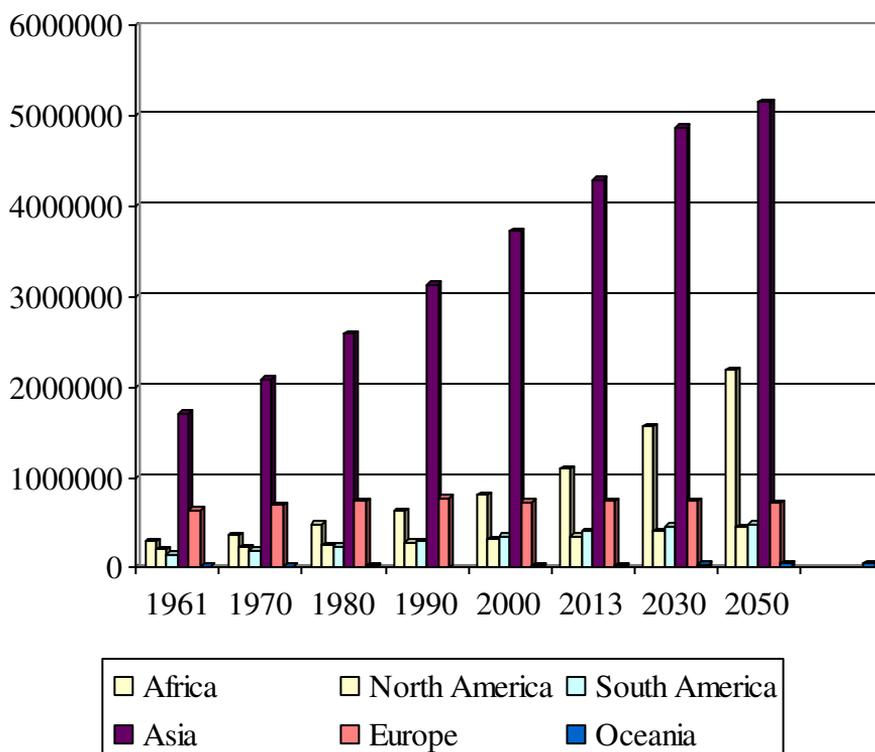
Global food situation and therefore food security are influenced by demographic factor. Data in table 2 show the dynamics of the global population in the last decades of the past, present and projected world population for 2030 and 2050.

Table 2. *Dynamics of world population, 1961 to 2013, forecasts for 2030 and 2050 (thousand persons)*

Geographical area	1961	1970	1980	1990	2000	2013
Total world	3085785	3687496	4443492	5296249	6122769	7130012
Africa	293662	368149	482806	635288	811099	1094735
North America	207562	231284	254453	281162	313288	353620
South America	151779	191462	240854	295577	347433	404901
Asia	1704840	2089418	2581949	3132855	3719042	4292817
Europe	637317	692764	738988	776947	726780	740878
Oceania	16104	19502	22970	26967	31130	38279

Geographical area	2030 *	2050 *
Total world	8321382	9306131
Africa	1562046	2191597
North America	401658	446864
South America	461497	488072
Asia	4867740	5142223
Europe	741232	719258
Oceania	47095	55235

* *Forecast*



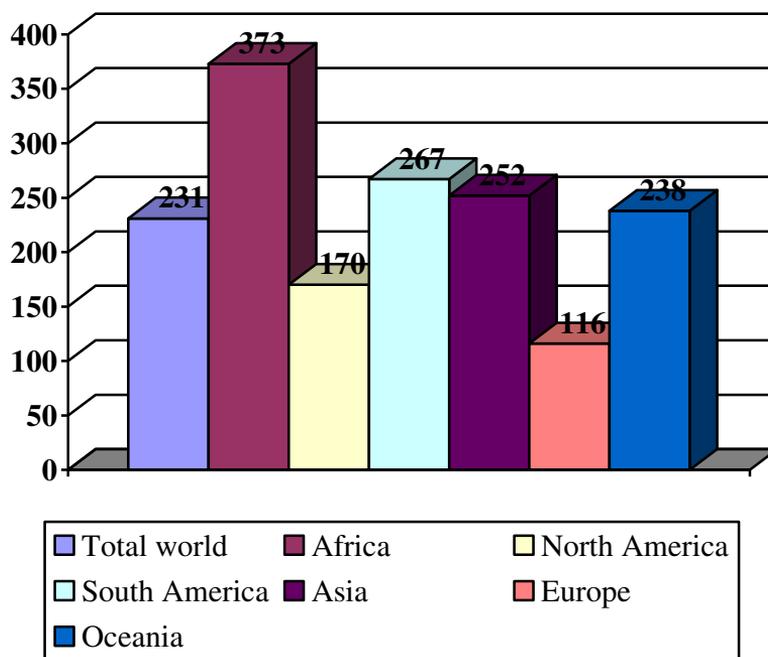
Source: *FAOSTAT*

Distribution of the world population is unbalanced: 75% is distributed in the north (about 60% in Asia, 10% in Europe, 5% in North America) and 25% in the south (15.3% in Africa, 5.7% South America and 0.5% Oceania). In Asia live 60% of the world population, 19.5% in China and 17.8% in India.

In dynamics, the last decade has had the fastest rate of population growth. The global population increased 2.31 times from 1961 to present. The fastest rate of population growth is recorded on continents: Africa (3.7 times), South America (2.6 times) and Asia (2.5 times), where the poverty level is higher than the world average. Emphasizing demographic disparities between developed countries and developing countries is a concern, especially as the world population increased from 3 billion in 1961 to 7 billion people today.

Table 3. Population growth, 2013 compared to 1961 (1000 persons, %)

Geographical area	1961	2013	2013/1961
Total world	3085785	7130012	231
Africa	293662	1094735	373
North America	207562	353620	170
South America	151779	404901	267
Asia	1704840	4292817	252
Europe	637317	740878	116
Oceania	16104	38279	238



Source: FAO, own calculations

According to estimation, the world population will continue to grow, so in 2050 it will exceed 9 billion people. Research in the field of population dynamics shows that the population explosion will not take place, due to the manifestation of phenomena that will limit it: natural disasters, diseases of the modern world, inadequate distribution systems resources, incompetent officials, family planning etc.

Globally, there are two kinds of trends. On the one hand, particular demographic phenomena manifests itself in a number of countries where the birth rate is low (USA, Japan, France, Italy, Germany and other Western European countries, the population dynamics during 2000-2013

is 112%, 100.4%, 108%, 107% and 99%). On the other hand, in some countries the population explosion is difficult to control. In China, the population increased from 1298268 thousand in 2000 to 1390528 thousand people in 2013 (107%), in India, from 1,053,898,000 to 1,275,138,000 people (121%), in North Africa (Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara) from 176165 thousand persons to 220016 thousand persons (124%).

Very rapid population growth in the 90s, from 2 billion people in 1928 to 5.7 billion inhabitants, in 1994, led to efforts from poor countries to meet minimum standards for life insurance. Many experts believe that natural resources and ecosystem services will be insufficient in the future.

Conference about Population in Cairo¹² led to a comprehensive action plan, whose main purpose was to radically improve the situation of women and to reduce the birth rate. The conference showed that measures to limit population growth, poverty reduction, increase welfare and reduce environmental degradation are closely interrelated and mutually reinforcing.

Reports produced after the Cairo conference showed that there has been significant progress: birth rates decreased significantly from an average of about 5 children per woman in the '50s to 2.6 in 2010. Declining birth rate is a determinant of welfare growth and prosperity globally. More than 70 countries have birth rates below 2 children per woman. These include: Canada, Australia, Japan and many European countries, but also countries such as Singapore, South Korea, Russia and Uruguay. In contrast, however, many countries in Africa, but also in countries such as Afghanistan, Yemen, Saudi Arabia, Pakistan, Guatemala, Bolivia, the average number of births for a woman is between 4 and 8.

Food production

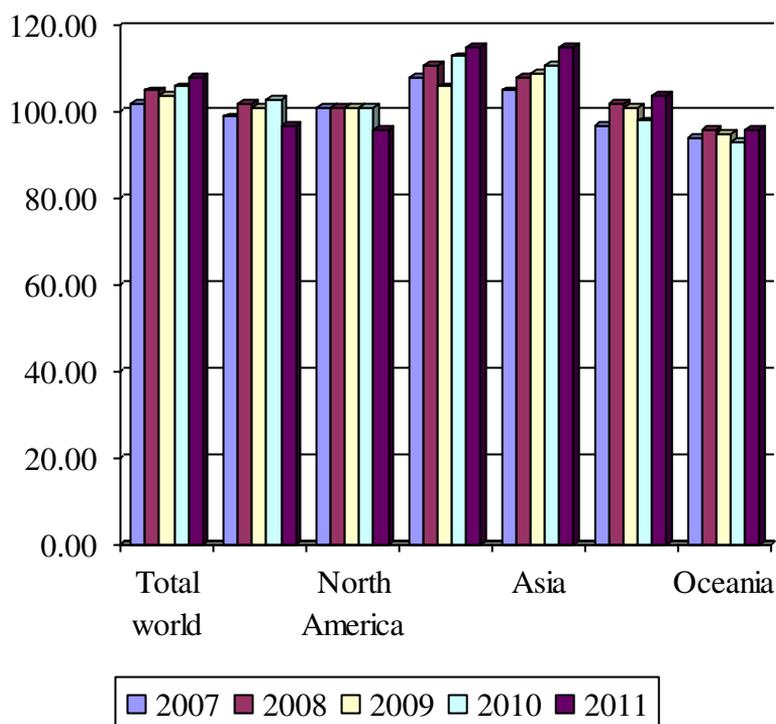
Analysis of population dynamics is accompanied by the analysis of production of food per capita. Data in table 4 show the indices of food production per capita between 2007 and 2011, with the base period 2004-2006.

¹² Wijkman, A., Rockstrom, J., *Falimentarea naturii: negarea limitelor planetei*, Compania, București, 2013, pg. 142

Although population growth puts pressure on food resources, however, the world, humanity has required daily nutrition, food production with an upward trend.

Table 4. *Indices food production per capita, 2007-2011, 2004-2006 = 100 (%)*

Geographical area	2007	2008	2009	2010	2011
Total world	102.57	105.25	104.71	106	107.9
Africa	98.79	102.2	100.8	102.9	96.89
North America	101.10	100.98	101.29	100.65	96.35
South America	107.84	110.91	106.15	112.59	115.41
Asia	105.50	108.23	108.90	111.52	115.29
Europe	96.71	101.96	101.32	97.97	103.77
Oceania	94.55	96.48	95.05	92.85	96.54



Source: FAOSTAT

Although food production increased in 2011 compared to the period 2004-2006, almost 108%, however, by continents, there are different trends: in South America, Asia and Europe food production increased (to 115% the first two cases and 103.7% in the latter case), and in Africa, North America and Oceania, food production has decreased (from 96.8%, 96.3% and at 96.5%) .

Table 5. *Production of main agricultural and food products, in 2013, per capita (kg / person)*

Geographical area	Grain	Fruits	Vegetables	Milk	Meat
Total world	362.85	89.46	152.54	101.97	41.69
Africa	143.52	78.19	61,98	33.28	14.34
North America	1227.30	78.91	104.43	275.48	132.45
South America	395.56	201.67	61,84	163.67	94.22
Asia	301.28	76.73	194.88	62.49	28.97
Europe	628.71	96.56	134.42	290.69	77.67
Oceania	1071.72	169.03	83.04	707.04	153.91

Source: *FAOSTAT*

Largest amount of grain per capita recorded in North America, 1227 kg / person, the greatest amount of fruit per capita - in South America, 201 kg / person, the greatest amount of vegetables per capita - in Asia, 194 kg / person, and the largest quantity of milk and meat - in Oceania, 707 kg / person and 153 kg / person. This structure of food production per capita reflects a certain specialization of its continents, focusing in Oceania in terms of animal products. USA is the largest producer of grain; the production of cereals has as main destination animal feed, followed by export. In Asia and South America, there are favourable conditions for the development of fruit and vegetable production, even in more cycles.

Conclusions

Taking into account all consideration above, we may conclude that qualitative and quantitative differences that manifest in the world in terms of food consumption shows that where food is scarce and insufficient, it has no corresponding qualitative structure.

Considering the low level of per capita food production in Africa and Asia, the food problem becomes acute in developing countries. Development in food production per capita shows that hunger is due not only to the growing demographic factor, but also to the limited access to technique and technology of the poor nations and food surpluses of the rich countries. Solving the equation population-food can not occur at a venture, but by implementing measures of economic and social restructuring of agriculture in developing states and systematic support of the international community, especially through investment and technology transfer.

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THE CONCEPT OF ECONOMIC EFFICIENCY IN AGRICULTURE

Rodica Chetroui¹, Ion Călin²

Abstract

The economic efficiency is a concept with a complex content, which expresses the useful effect achieved in an economic activity, in relation to the requested expenditures, or the effort for its realization. Through its applicative side, the efficiency (e) can be defined as a quantitative ratio between the effects (E) and the resources or efforts (R) made to obtain them, or, in other words, achieving maximum effect with a specified level of consumptions, or reaching the determined effect with minimum consumption: $e = E / R \max$ (maximizing the effects obtained per unit of allocated, consumed resources); $e = R / E \min$ (minimizing the resource consumption per unit of effect achieved). This concept is the most important qualitative indicator of the economic development, a key factor in accelerating economic growth. Applied in agriculture, it represents the obtaining the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials. Determination of economic efficiency must be based on knowledge of the elements that characterize the production effort and having three main sources: the optimal use of resources, rational use of labour and production management.

Keywords: *economic efficiency, effects, resources, agriculture, concept*

Introduction

The economic efficiency is a concept with a complex content, which expresses the effectiveness achieved in an economic activity, in relation to expenses claimed, or the effort to achieve it. So, the effect achieved on a value unit spent is higher, the economic efficiency will be higher [3].

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The term "efficiency" is used since antiquity and comes from the Latin language: *efficiens*, which in turn derives from the verb *ex facio*, which means "to obtain something from", idea found in both the pre-Roman civilization and in ancient Greece, where, in fact, the term economy (*oikonomia*) appears for the first time, meaning efficient management of family households [5]. The concept of economic efficiency should not be confused with the notion of economic effect, because it expresses only the results obtained and the concept of economic efficiency shows the effect in relation to expenditures incurred for its realization [7].

Material and methods

In the light of its applicative side, the efficiency (e) can be defined as a quantitative ratio between the effects (E) and resources or efforts (R) made to obtain them, or, in other words, reaching maximum effect, with a determined level of consumptions, or reaching determined effect with minimum consumptions:

$$e = E/R \text{ max;}$$

(maximizing the effects obtained per unit of resources allocated, consumed);

$$e = R/E \text{ min;}$$

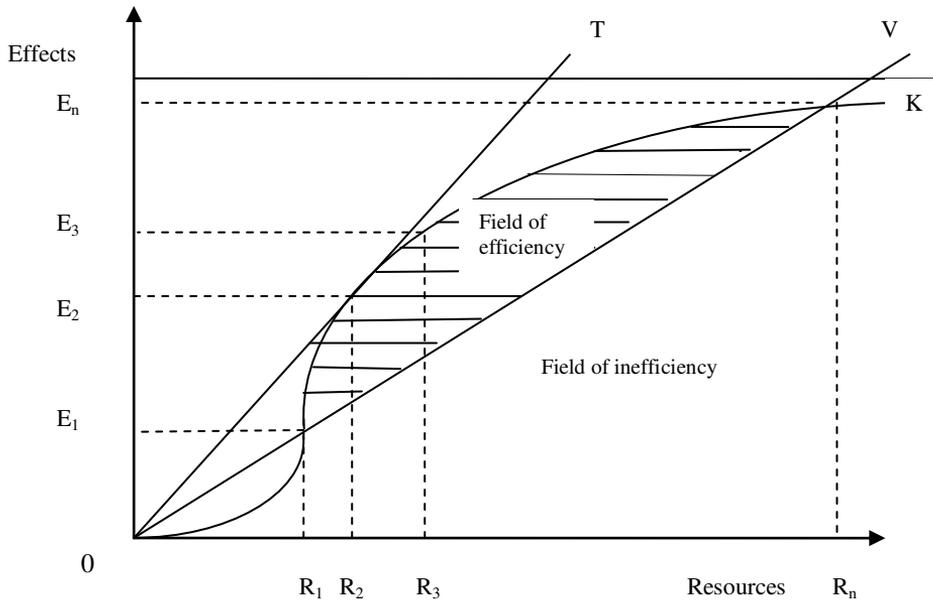
(minimizing resource consumption per unit of effect achieved).

The higher consumption of resources, there is increasing economic effects, but it is accelerated to a level of efficiency, and after a certain threshold of resource consumption, there is a degree of saturation and the effects achieved slowly grow, stagnate or fall [15].

Results and discussions

The dependence of effects of increasing the allocation of resources analyzing, it is found that this is a linear function of the type $E = f(R)$ and in a coordinate system, it is as follows (see Figure 1):

Figure 1. *Dependence of effects on efforts*



in which:

$R_1...R_n$ – levels of resource allocation

$E_1...E_n$ – effects corresponding to resources

V – minimum limit of efficiency

C – curve of maximum efficiency

K – limit of effects

Source: *adapting from Băjan G., 2009*

If the ratio effect / effort is above the straight line V, the activity is efficient, under it becomes ineffective. On the range 0 - R_1 , the activity is inefficient due to insufficient allocation of resources, efficiency curve being convex. The effect increases with increasing resource allocation, the curve becoming concave, but over time the blocking effect occurs, even the effects are significant and will enter in the field of inefficiency [2].

By their nature, resources may be material, energy, human, financial and others, and based on the criterion of regeneration, can be renewable (human, vegetal material, specific energy) or nonrenewable (materials).

The economic effects can be direct or indirect and depending on the activity purpose may be basic or complementary [13].

The theoretical approaches of the concept of economic efficiency appeared in capitalism, with different currents and economic doctrines:

- mercantilism – the first doctrine that affirms the importance of economic activity for the welfare of the nation;
- physiocrats (or power of nature) - is mentored by François Quesnay and as a doctrine is opposed of mercantilism, through a humanistic and liberal philosophy, arguing that freedom of change can be achieved with profit sharing all;
- Classics, whose representatives were Adam Smith, W. Petty, David Ricardo, J.P. Boisguilbert; Sismardi states that "the engine of economic development is freedom, not regulation";
- Malthusianism said that economic efficiency is dependent on population growth ("Essay on the Principle of Population");
- Marginalism considers that land, labor and capital contribute equally to the creation of value (represented by C. Menger, E. von Wieser, L. Walrns, Ph. Wicksteed, etc.);
- Keynesianism, mainly through its representative, Keynes aimed, first, the study of the factors of production and the use of labor and shows that the only way of economic development is state intervention, placing the increasing of economic efficiency in the center of dirigisme doctrine;
- Socialism – that expresses the economic efficiency as a ratio between labor and its outcome, in terms of the degree of satisfaction of the needs of society.

In Romania, an important contribution to the development of the concept of economic efficiency brought it Virgil Madgearu and M. Manoilescu. Virgil Madgearu, emphasizing the importance of peasant households, found that "where the capitalist economy ends its reckonings, the peasant economy should count the profits." M. Manoilescu had a great scientific contribution by "the constant Manoilescu", showing the gap between labour productivity in industry and agriculture, the first being superior of the second. [2]

The principle of efficiency, in its general form, involves three levels of analysis:

- Defining the set of solutions of technical and economic point of view;

- Choose effective solutions with the principle of saving resources, which means minimizing their consumption and maximize results;
- On the basis of the option, the choice within the effective solutions, to those considered optimal [4].

The economic activity from a unit is conditioned by regular flows exchanges with other economic agents, which are determined on the one hand, by the system inside (development of production), as well as the system outside (the market for products, inputs of force labor, materials, technology). Outside this continuous cycle, the energy of activities can be enhanced by stimulation and motivation of the workforce. Occurs thereby accelerate business cycles, materialized in products and then in money, targeting maximum effect.

The linguistic sense of the notion of efficiency shows that it is the attribute of all human action to produce the desired effectiveness. Protecting reserves and best use of resources require increasing role of efficiency criteria for decision-making within the activities. The necessity of economicity of material and labor use is generated by their limited level [13].

The analysis of economic efficiency is the main method of analysis of economic systems. Its application is based on the economic principle according to which decisions involve the allocation of rare resources (which takes maximum utility expression), distributed according to the requirements of competition [1].

The author mentioned here shows that the study of economic efficiency involves the analysis of relationships between resource costs for each variable, yields and risks of alternatives. The universal principle of Maupertius, that of the minimum action ("*desired goal with minimal effort*") suggests a fundamental question in defining efficiency ie what level of concordance between results and purpose the efficiency begins?

Referring to efficiency, Kotarbinski T. (1976) suggests that it is effective the action that ensures achievement of the aim in terms of minimal cost and S.G. Strumlin (1972) defines economic efficiency "maximum effect with minimum cost and shortest time."

The economic efficiency is a complex economic category, in which operation of economic laws is reflected and the most important part of economic activity is manifested: economic result (effect) [12].

The nature of effect has various forms of efficiency: production – productivity, savings - economy, profit - profitability. In the complexity of the hypostases and relations within an economic activity, there may be totally or partially effective activities, with different efficiency levels, between 0 (indifference) to 1 (total efficiency). Similarly, there are different degrees of inefficiency, compact interval being located between minus 1 and 1 [1].

Muresan V. (1986) defines efficiency with the relation "efficiency = effectiveness x economy", attracting attention to the fact that expenditures should be reported to the costs strictly necessary, at an optimal level determined scientifically minimal. The author mentioned above also shows that the quantitative aspect of the economic effect must be accompanied by its qualitative aspect.

The economic efficiency refers to the value of all inputs used to obtain a product. Its production is economically efficient where there is no other way of production in that it uses a less total amount of inputs. Of all the means of production technically efficient, must choose the one that attracts the minimum value of inputs, which involves economic efficiency [9].

This concept is the most important qualitative indicator of economic development, a key factor in accelerating economic growth. Applied in agriculture, it represents getting the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials [12]. Often, economic efficiency in agriculture is associated with social efficiency of agricultural production, due to food security strategy.

Efficiency is one of the criteria for scientific substantiation of the decision. In animal husbandry, economic efficiency can refer to the entire branch, the species or categories of animals, or the animal products [3].

Băjan Gheorghe (2009) shows that "the economic efficiency is the activity result expression of any forms of existing farming systems in agriculture. Cannot be conceived an activity in agriculture without taking into account a positive outcome."

The particularities of economic efficiency in animal production refers to the fact that the results obtained are reported both to reproduction animals and to the costs for yearly average number of animals; also, economic efficiency can be measured throughout the year, as costs and their recovery occur gradually [15].

Livestock production is the result of convergent factors of production action. These are the resources that participate in the development of production processes and that the results obtained depend on. Optimizations of production processes require knowledge of the factors of production and their role for their efficient use in breeding activity and exploitation of animals.

Inputs can be classified in:

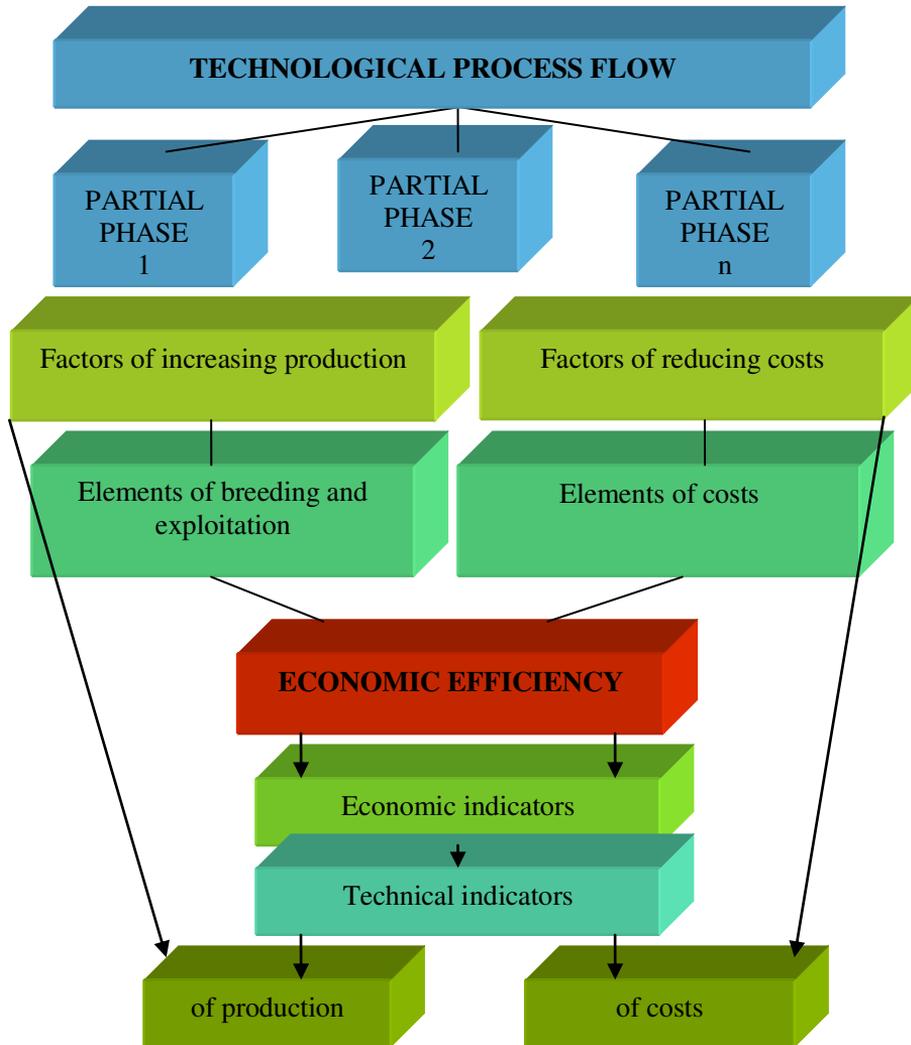
- Natural factors (temperature, precipitations, light, wind, soil, etc.);
- Economic factors (labor, livestock buildings, machinery and equipment, medicines, energy, etc.);
- Organizational and management factors, which provides a combination of other categories of factors [6].

Between the concepts of optimally and efficiency there is an interdependence, the optimum reflecting the steady state of economic activity, resulted from a certain way of allocating resources and economic efficiency expresses the capacity of factors of production to determine obtaining of useful economic results, with labor-saving.

Optimization of production activities allows concrete level foundation of economic efficiency, aiming at achieving maximum effect with existing means, or minimum total cost for the proposed production. The field of efficient solutions include a wider sphere, but the best solution is determined either by the amount of resources allocated either desired effect size [13].

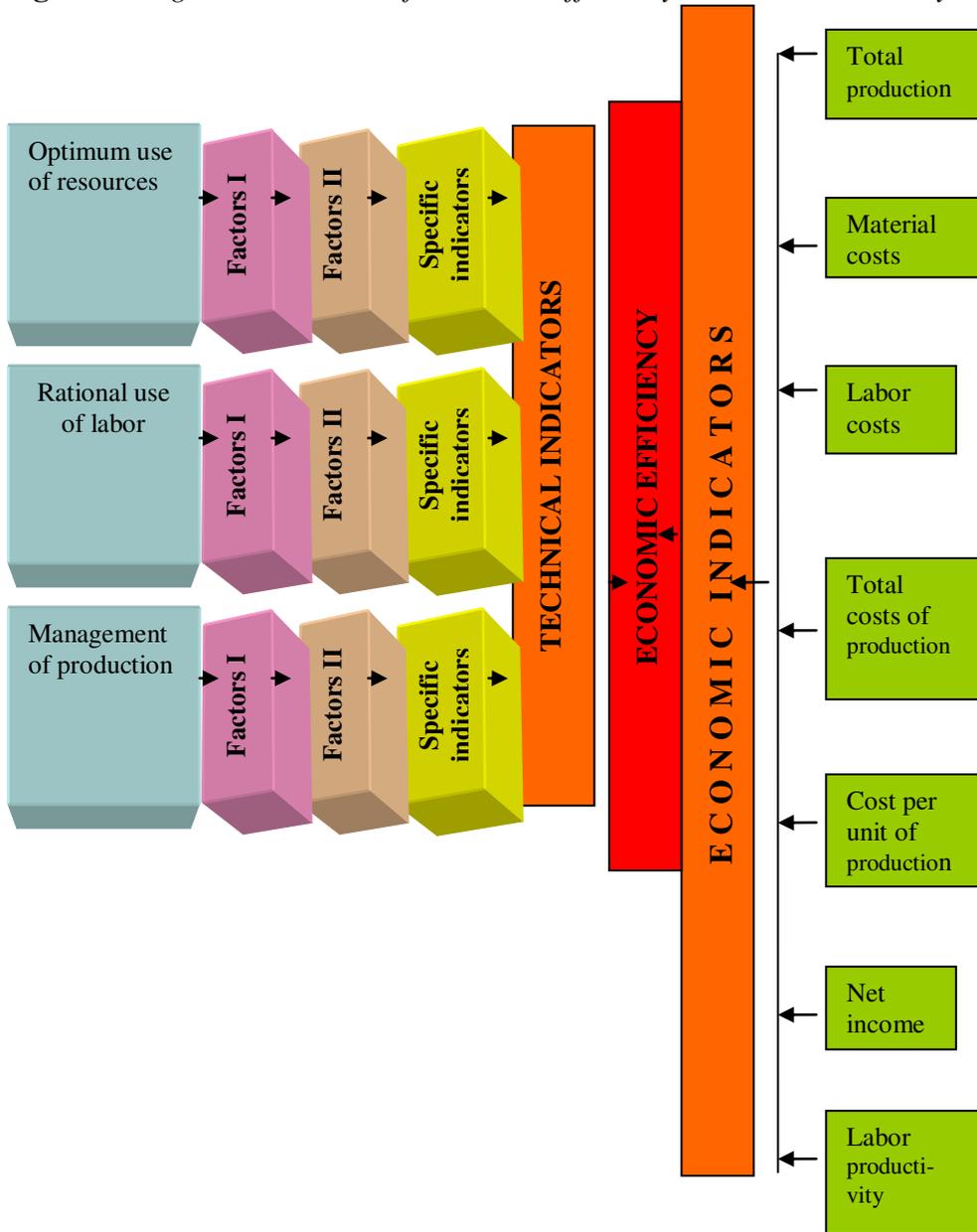
The content of the concept of economic efficiency in animal production refers to two basic elements, namely: achieving increased production of animal products and the allocation of production factors leading to reduced production costs [7] (Figure 2):

Figure 2. Organisation chart of the concept of economic efficiency content in animal husbandry



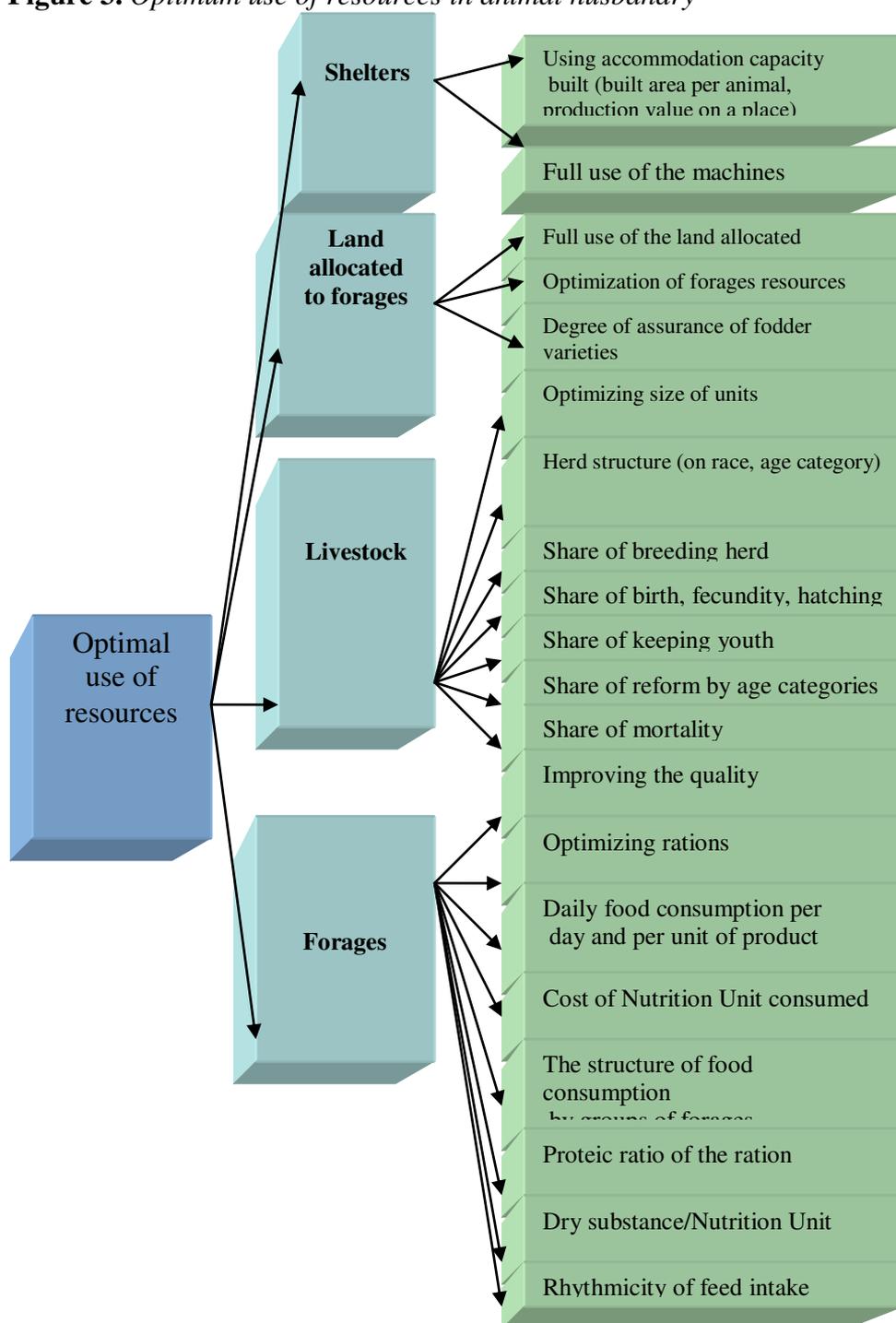
Source: *adapting from P.S. ADER 211/2011*

Figure 2. Organisation chart of economic efficiency in animal husbandry



Source: adapting from P.S. ADER 211/2011

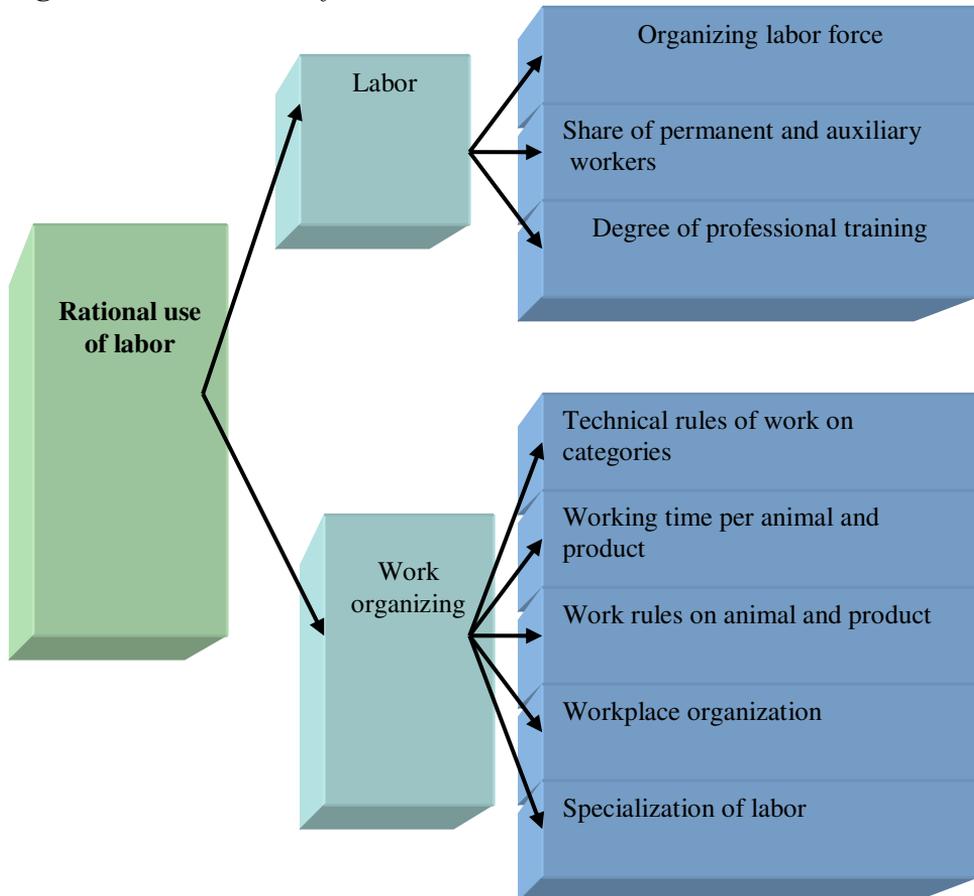
Figure 3. *Optimum use of resources in animal husbandry*



Source: *adapting from P.S. ADER 211/2011*

Regarding labor, its rational use is dependent on both first degree factors such as the number of workers and their organizing mode and other secondary factors (Figure 4).

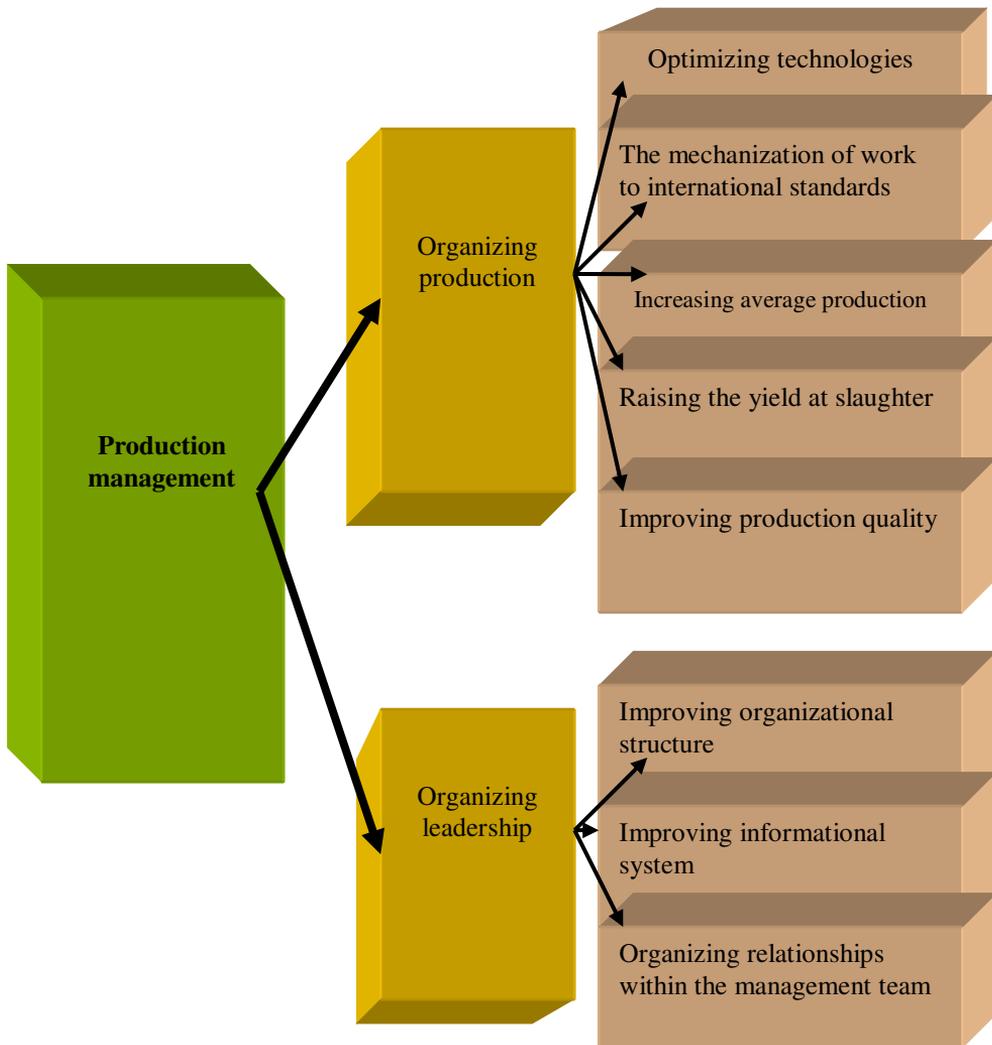
Figure 4. *Rational use of labor*



Source: *adapting from P.S. ADER 211/2011*

The third group of main factors that sums up the effort made to increase economic efficiency and can be quantified in the form of expenditures, is the management of the production (Figure 5).

Figure 4. *Production management*



Source: *adapting from P.S. ADER 211/2011*

The efficiency of the farm activity reflects the synthetic level of success or the success of the entire production and should characterize the different aspects of the activities. Therefore, although in general, effectiveness ratio of effect to the costs for a more complete analysis of the activity is necessary to analyze various aspects of economic and financial situation through a system of economic indicators. [17].

Conclusions

The concept of economic efficiency is the most important qualitative indicator of the economic development, a key factor in accelerating economic growth. Applied in agriculture, it represents the obtaining the maximum amount of production per hectare or per animal, with minimal expenditure of manpower and materials.

The efficiency can be defined as a quantitative ratio between the effects and the resources or efforts made to obtain them, or, in other words, achieving maximum effect with a specified level of consumptions, or reaching the determined effect with minimum consumption (maximizing the effects obtained per unit of allocated, consumed resources, minimizing the resource consumption per unit of effect achieved).

The concept of economic efficiency should not be confused with the notion of economic effect, because it expresses only the results obtained and the concept of economic efficiency shows the effect in relation to expenditures incurred for its realization.

The theoretical approaches of the concept of economic efficiency appeared in capitalism, with different currents and economic doctrines:

- Mercantilism: affirms the importance of economic activity for the welfare of the nation;
- Physiocrats (or power of nature): a humanistic and liberal philosophy, arguing that freedom of change can be achieved with profit sharing all;
- Classics: states that "the engine of economic development is freedom, not regulation";
- Malthusianism: economic efficiency is dependent on population growth;
- Marginalism: the land, labor and capital contribute equally to the creation of value;
- Keynesianism: the only way of economic development is state intervention;
- Socialism: the economic efficiency as a ratio between labor and its outcome.

The economic efficiency refers to the value of all inputs used to obtain a product. Its production is economically efficient where there is no other way of production in that it uses a less total amount of inputs. Of all the means of production technically efficient, must choose the one that

attracts the minimum value of inputs, which involves economic efficiency. The particularities of economic efficiency in animal production refers to the fact that the results obtained are reported both to reproduction animals and to the costs for yearly average number of animals; also, economic efficiency can be measured throughout the year, as costs and their recovery occur gradually.

Determining the economic efficiency must be based on knowledge of the elements which characterize the production effort and has three main sources:

- Optimal use of resources;
- Rational use of labor;
- Production management.

In animal husbandry, optimal use of resources includes:

- full use of accommodation capacity, machinery, facilities and land for forage base;
- optimizing the unit size;
- optimizing the herds structure and reproduction indices;
- optimizing the structure of fodder;
- optimizing the feed rations etc.

The main directions of actions on rational use of labor are:

- Sizing staffing;
- Substantiation of labor norms;
- Determining the best forms of work organization;
- Training and qualification;
- Correlation of staff incomes with work results;
- Motivating and promoting staff. [16]

Production management includes the following activities:

- Design and economic substantiation of production systems;
- Design and technology foundation for growing and exploitation of animals;
- Organization of production processes [11].

In achieving the desired effect, particular importance is the quality of the results obtained; therefore, the whole concept of efficiency is a qualitative concept.

Optimization of production activities allows concrete level foundation of economic efficiency, aiming at achieving maximum effect with existing means, or minimum total cost for the proposed production. The field of efficient solutions include a wider sphere, but the best solution is determined either by the amount of resources allocated either desired effect size.

The study of economic efficiency involves the analysis of relationships between resource costs for each variable, yields and risks of alternatives. It involves three levels of analysis: defining the set of solutions of technical and economic point of view; choose effective solutions with the principle of saving resources, which means minimizing their consumption and maximize results; on the basis of the option, the choice within the effective solutions, to those considered optimal.

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PERFORMANCE INDICATORS OF WATER AND SEWAGE COMPANIES IN SERBIA IN THE PROCESS OF ACHIEVEMENTS' COMPARISON (BENCHMARKING)

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Abstract

In order to assess their market position companies always have a need to compare with other companies. One of the contemporary methods of comparing with the companies is benchmarking. During the 2012 the Pilot project - Benchmarking of 15 water and sewerage utility companies in Serbia was implemented. The project was financed by the World Bank and implemented through non-governmental sector (IPM) and participating utilities, according to the methodology of International Benchmarking Network for Water and Sanitation Utilities (IBNET). The focus of the work was data reliability, following the principle of self-evaluation - external control. The project goal emphasize was put on company data reliability, while the comparison of indicators was put in the background. This paper presents the results, experience in 'knowledge sharing' and highlights the importance of benchmarking in the management and decision-making in municipal water and sewerage companies in Serbia. Benchmarking project of waterworks and sewerage companies in Serbia showed that through mutual cooperation these companies, in cooperation with non-governmental organizations (NGO), may self-organize and realize projects related to collection, analyzes and evaluation of data. The success of the Pilot project has enabled the expansion of activities in 2013, with more interested utilities and the inclusion of the government sector and additional work on accreditation principle.

Key words: *benchmarking, data reliability, indicators, water and sewerage.*

Introduction

Benchmarking can describe as a teaching process, which result from observation and analysis of positive experiences of others, in order to apply the stated

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experiences, along with necessary adjustments, aiming to improve own business. From application point of view, the benchmarking is a tool for tracking and improvement of performances by learning from the best practical examples and by comprehension of processes, by which those examples were achieved. In the paper was described the benchmarking process and its application possibility in public companies. The public companies affect the result of economy substantially also due to peculiarity of its activity, because they produce inputs for the whole economy, owe a lot to a private sector, they represent a great generator of insolvency, but also corruption, and thereby make a specific business climate in the country.

Therefore a suggestion for implementing the benchmarking, which results can contribute to controlling implementation in public companies, was accepted by the World Bank, as well as the obligation of complete project funding. During 2012 was realized a pilot project, called “Collecting and analyzing of performances' indicators of utility companies in Serbia for the period 2007-2011 (in further text “benchmarking I”). The project was encircled 15 utility companies of waterworks and sewerage in Serbia, and was implemented along with the financial support of the World Bank, through cooperation of non-governmental organization Inter-institutional professional network in a sector of Serbian waters (IPN) and companies-participants. The project was supported also by the Standing Conference of Towns and Municipalities (SCTM), and during work was used the methodologies of the International Benchmarking Network for Water and Sanitation Utilities (IBNET). The IBNET methodology is described in details in this paper.

A concept and tasks of benchmarking

Benchmarking is English word (benchmark – levelling point, standard, measure of value or a landmark according to which measure or compare other values). A basic idea of benchmarking is comparing own business with the strongest competitors. In our language, benchmarking still has no appropriate translation. Some authors translate benchmarking as a main number which can use for comparison. There are numerous definitions and interpretation of benchmarking concept, as well as the one it comprises. Many people equate benchmarking with copying competitors, even with an industrial espionage, and disclosure of strictly kept secrets. However, basically benchmarking means the business improvement and how to become better than the best.

The most important definitions of benchmarking are:

1. Harrington & Harrington, - „Benchmarking is a continuous process of identification, comprehension and adjustment of products, services, equipment

and procedures of companies with the best practice aiming to improve own business.”

2. Kaiser Associates: „Process of rigorous performances' measure opposite to the best practical companies' performances and using analysis aiming to convergence and overcome the best in the class.”

3. Robert C: Camp: „Benchmarking is a search for the best practices in industry, which lead to more superior performances. Benchmarking is a skill of determination how and why some individuals or companies do business better than the others.”

4. Boxwell stated that: „Benchmarking is not a brain activity. It is simply learning from others, identification, studying of others and improvement of own business according to what we have learned.”

5. Peter Drucker said that „benchmarking is the newest among tools for getting information on productivity. According to his opinion, every organization can do everything what does any other. Equalizing the quality with a leader in an industrial branch is a basic condition of competitiveness.”

Benchmarking considers measuring own results in regard to the results of others, as well as learning from others, primarily direct competitors. At first starts comparing the competitors' strategy with a personal strategy, and continues by comparing different business processes, products, technical solutions and functions of competitors with personal solutions and functions, aiming to reveal own current imperfections and assessment of possibility to become better than the competitors. In that way identify and apply the best solutions, in order to achieve the above-average business results and surpass consumers' expectations.

Benchmarking has a special significance for companies which do business in open economy. Products or services of these companies should base on competitive advantage and on differentiation of products and services in regard to a competitor. Benchmarking is a part of strategic management, which gives directions to a corporation, how to improve business processes and functions, technical solutions and a way of surpassing the existing problems. It points out to a need to stop the business which does not provide expected results and orientations toward new corrected procedures. Although, benchmarking does not represent a substitution for a strategy. By its self, it does not improve work, but contributes to realization of business goals. Benchmarking comprises different areas: activities management, designing management strategies, organization of businesses, research and development, management of human resources, etc. As a method, it can be used from case to case or continually, within designing the management strategy, as its integral part. There should implement systematically and in appropriate way, in case not to come to

negative effects. Today, benchmarking in companies is closely related to achievement of business excellence and the global level of products and services. Apply of benchmarking gives the companies a chance to increase the competitiveness on the global market and a stable market position. Achieving the competitive position on the market, among other things, bases on application of proved business experiences and results in the world. The business excellence is directly related to synergetic activity of quality and marketing functions. Benchmarking is based on evaluation of one company's competitiveness. It represents a permanent process of measuring products and services and business practice in regard to relevant competitors, or on competitors interesting to the company.

According to Harrington, this process includes: comparison of a company and its best parts with the best, without limitation neither to the same activity, nor the same country where the activity perform; comparing production and other activities in order to define the best; comparing products and services of the companies with the products and services of competitors which have leading results; comparing technical solutions of a company, aiming to choose the best equipment for specific situations; apply of the best defined process; planning future directions and active adjustment to new trends; fulfilling and exceeding the consumers' expectations. In accordance to everything stated, we can conclude that benchmarking represents learning process, based on someone else's business experiences, according to transformation of noticed business experiences into feasible standards - benchmarks. Theoretically observed, benchmarking can apply in all types of companies, starting from those which fight for survival, to those quite successful. Although, the researchers conducted by Ernst and Young LLP show that benchmarking apply is risky for the companies-losers, first of all, because these companies fight for survival, not a leader position.

Process of benchmarking realization by phases:

1. **Planning** (selection of area, identification of potential partners, defining processes and determining data sources and methods),
2. **Activity** (collecting data and selection of partners, determination of differences in regard to „benchmarking“partner and causes and future desired performances),
3. **Action** (communication with managerial structure, adjustment of goals and making plans and their implementations),
4. **Monitoring** (permanent control and supervision of processes).

Subjects of benchmarking analysis comparison:

1. **Quantity** (physical and financial):
 - Total income, recovering investments, efficiency, profitability, recovering invested capital, income by an employed, inventory and inventory turnover, etc.
2. **Quality** (non-financial):
 - Products quality, services quality, the most applied an indicator of a consumer's satisfaction.

Benchmarking as analysis of competitiveness

Benchmarking is a process of continuous improvement of a subject's business according to the best. To be competitive means to sell own product and services before the others, with achievement of better financial effects than other companies. Benchmarking is transformation to a higher level, i.e. determination of reasons for differences in performances. Competitiveness analysis speaks of an accurate positioning of organization in regard to competition, while benchmarking must give information on how to achieve those results. Benchmarking tends to achieve as better as possible competitive positions.

Benchmarking as controlling instrument

In modern business conditions of increasing complexity and dynamics, occurs increasing need for controlling as a professional support to management. Controlling, by its principles of coordination and integration, and using different instruments of operational and strategic management, helps the management in faster and better adjustment to internal and external changes. A controller, as an innovator, is a modern generation of controlling, by which introduce new instruments and methods, convenient for solving modern problems. Exactly benchmarking is one such instrument, which use contributes to increase of competitive ability of a company. Benchmarking ensures a continuous process of comparing the organization with others, aiming to find and implement the best business practice, due to insurance of long-term competitive advantage. Opposite to an opinion that for development of benchmarking are the most responsible productive companies, which have first started with its appliance, it nowadays equally successfully applies in banks, insurance companies, non-profit organizations, state institutions, health organizations, etc. The scope of apply is one of the reasons for increasing interest for benchmarking, not only in foreign, but also in domestic business practice.

In business practice, benchmarking is an instrument by which the organizations continuously compare and measure own business in regard to other

organizations, learn from the most successful and applies the acquired knowledge, aiming to increase efficiency of own business. There can compare products and services, business processes, technical solutions, strategy etc, aiming to comprehend personal imperfections and limitations, and also possibilities for their neutralizing or removals. The International Group of Controlling (IGC) defines benchmarking as an analysis and planning instrument, which bases on comparison of own organization with „the best in the class“ of the competitive organizations, but also of organizations in other activities. The application of benchmarking in business can assure numerous advantages:

- Quality improvement of products and services
- Improvement of business processes
- Decrease of business costs
- Increase of buyers' satisfaction
- Opening new business opportunities
- Directing to maximum achievement in business
- Achieving competitive advantage
- Increasing creativity within the organization
- Quality improvement of entire organization
- Profit increase.

The stated advantages of benchmarking are significant motivation in research of this instrument's characteristics, as well as its integration in a wider context of business management.

Review of the existing position of PUC (Public Utility Company) and key problems

As a consequence of the previous social-political circumstances inheritance and events during nineties, key problems which characterize and burden business and position of PUC are:

1. PUCs do their activity under a constant influence of political factors, which constrain independence of utility companies in making key business decisions:
2. PUC has no independence in disposition of property they use,
3. Due to a policy of administrative price limitation, subsidizing of population through the utilities prices and low collection, along with simultaneous costs growth and writing-off receivables, the PUC are financially depressed and often insolvent.
4. Owing to accumulated and inherited circumstances is present an administrative fragmentation, as well as dimensioning and overloading of some

functions within the PUC, and thereby also irrational organization and reduced efficiency in services provision.

5. In most of PUC, due to instable economic position, for a long time has been present a constant increase of needs and a chronic lack of working assets and investments for renewing the obsolete equipment and enlargement of communal infrastructure,

6. Disrespect of the environment protection standards,

7. Unbiased identification of internal organizational deficiencies is heavy due to lack of parameters, by which would provide comparing efficiency of same activities. If the problem in the PUCs business could define by priorities, which should encircle by transformation, then they would be:

- Systematic regulation of adequate prices level and business conditions,
- Systematic assumption of inter-municipal regional systems,
- Systematic assumption of business indicators („benchmarking“),
- Systematic elaboration of priority projects and necessary assets for renewal and development of infrastructure.

8. Problem of determination of services' economic prices.

One of the most significant questions, which puts first and which significantly burdens business of PUCs is that was not regulated an issue of systematic assumption of determination methodologies and approval of services' prices, at least to a level of business costs cover. Requirements – proposals for utilities price increase submit to a local authority for its consent, which is under supervision of the central authorities. Such method of prices determination brings some PUCs in unequal position, because the approval expresses in percentages to the current price, corrected by an inflation rate in the previous year. Regulated level, to which approves the amount is usually not enough to cover business costs. Those PUCs, which, for any reason (mostly under influence of the local political structures) have failed to submit a requirement for prices increase, are in situation to lag behind in level of income in regard to other PUCs, which have done it, even without good reason, from costs cover point of view. These manifestations point out to a fact that prices increase does not always base on real parameters of costs cover, but on administrative involving in PUCs' efficiency. In terms when the prices of utilities are insufficient to cover the real business costs, or the prices level in under the influence of local political factors, a PUC can resort to an option to indirectly increase its incomes, i.e. to reduce costs, in a way it will reduce a size or quality of services, which finally reflects in size and quality of services to consumers. In those PUCs, which prices of services, besides the allowed level of increase, are still under the level

necessary to cover cost prices, business will be still burdened by the same problem, while they are not provided the income inevitable to cover all costs.

9. Financing development of communal infrastructure

Due to lack of assets owing to insufficient price level, costs increase and poor collection coefficient, PUCs are in such position that they had to reduce the level of necessary investments in maintenance of the communal infrastructure. A chronic insolvency, caused by the stated economic factors and losses (on network) caused by technical obsolescence and inadequate maintenance, as a consequence of lack of assets, has reflected to the general neglect and bad condition of the communal infrastructure, i.e. to a need to engage assets to bring it to an acceptable level, which provides quality and safety of supply.

If condition of the communal infrastructure in Serbia would observe from aspect of adjusting to EU standards, excluding the general obsolescence, can tell that the most inconsistency and obsolescence in development, within the observed activities, is present in the field of waste water treatment, i.e. refinement of industrial waste water. According to some rough evaluations, the total needs for investments in utilities and infrastructure amount around 4 milliard euro (1 milliard for water supply, 2.1 milliard for waste waters and municipal waste and around 0.7 milliard for central heating, etc.). Each of the stated sources on necessary assets, anticipate the amounts which are multiple higher than annual sum of all municipal incomes and which would represent a significant burden for the budget of the Republic of Serbia.

In order to begin the procedure of renewal and development of the communal infrastructure, there is necessary previously (long-term/short-term) to assess planned a level of necessary assets for the current business and a level of assets for necessary investments for modernization and capacities enlargement. In regard to it, there is necessary for authorized state institutions to issue necessary standards of services which have to be satisfied, and it will finally provide also a data on technical conditions and inevitable investments. Besides, needs for investments would, besides technical criteria and public priorities, have to be adjusted to the EU standards requirements, too. When considers with plan this dimension, define the priorities and prepare projects, there is necessary to search for financing sources, intensively and hurriedly. The financing sources for revitalization and construction of new infrastructure are, due to small capacity of a local authority/PUC unit, i.e. the state, are limited to the most 25-30% of own share for the priority projects, or, as more likely, from credits of developmental and commercial banks, while the rest, of around 70-75%, could be provided from donations. When considers the possibility of taking credits, there should

take into consideration the existing credit potential. According to some data from 2007, the credit potential of the local authority's units of the Republic of Serbia, was used 34%, i.e. 66% of credit potentials of towns and municipalities, at the republic level, has been available for servicing all types of crediting.

Participants at the project and working method

In the project Benchmarking I, i.e. comparison of waterworks and sewerage effects in Serbia during 2012, have participated 15 utility companies from the following municipalities and towns: Leskovac, Raska, Sjenica, Novi Sad, Vrbas, Becej, Negotin, Svilajnac, Subotica, Sremska Mitrovica, Horgos-Kanjiza, Bac, Novi Pazar, Kladovo, Novi Becej.

Data were collected at annual level, for the period 2007-2011. For a calendar year 2011 was made the data reliability assessment, by a methodology suggested by the International Benchmarking Network for Water and Sanitation, while for older data (2007-2010), it was never done. There was applied a self-evaluation principle, along with external control of other water supply-participant's auditor, i.e. there was used a principle of mutual support among companies. In this way was put a focus to a social significance of benchmarking, as a tool which can serve for establishing communication, identifying the best practices which need to face with and pairing companies which can work at mutual strengthening of capacities. It is interesting to mention that colleagues from big companies (for example, from Novi Sad) have helped the colleagues from smaller companies, who would probably have insurmountable problems while working at the project, if there was not the specific support (e.g. from Bac). Besides the data from Bac could not get a passing grade due to absence of measuring water inputs into the system, the existing data were collected, there was pointed out to necessary improvement of measuring equipment, while representatives of IPN from the Water Supply System Novi Sad think about a way of further support to the colleagues from Bac, aiming to improve the data reliability. Establishing such cooperation based on solidarity, in situation in which is our state, has even higher significance than achieving desired data reliability, i.e. in this way, benchmarking gets its full confirmation. The described case of cooperation between the companies is not an isolated case and exactly that solidarity has provided a successful implementation of the project Benchmarking I, in spite of a fact that it had been implemented from March to June 2012, i.e. during the election-campaign, than two rounds of presidential and local elections and negotiations on government structure, with great turn after a month. Such challenging conditions were surpassed with solidarity among the companies.

List of data and their classification

The data were classified in 4 categories: Institutional data (1-11; 38-43), technical data (12-37), data on incomes (44-57), and data on costs (58-70). The data on incomes and costs are shown in this paper. In addition is given a list of all institutional-technical data of companies-participants, collected during the project:

Institutional data

1. A number of settlements with water supply services, 2. Number of settlements with sewerage services, 3. Total number of employees, 4. Total number of employees – water supply, 5. Total number of employees – sewerage system, 6. Total population on the territory of providing water supply services, 7. Total population on the territory of providing sewerage services, 8. Population serviced by water supply, 9. Population serviced by direct water supply and by common taps, 10. Population serviced by public fountains, 11. Population serviced by sewerage, 38. Amount of a bill for household, which spend 6 m³ of water, 39. Fixed monthly subscription for services of water supply and sewerage system – category population, 40. Fixed monthly subscription for services of water supply – category population, 41. Fixed monthly subscription for services of sewerage system – population, 42. Average price of water connection, 43. Average price of sewerage connection.

Technical data

12. Number of water connections, 13. Number of water connections with correct water gauge, 14. Length of distributive water supply system, 16. Duration of water supply (hour/day), 17. Number of consumers with breaks in water supply, 18. Number of sewage connections, 19. Length of sewage system, 20. Number of sewage blockades, 21. Produced water (MIL. m³/year), 22. Invoiced water (MIL. m³/year), 23. Invoiced water by measuring on correct water gauges (MIL. m³/year), 24. Invoiced water – population (MIL. m³/year), 25. Invoiced water to population by direct water supply (MIL. m³/year), 26. Invoiced water to population by public fountains (MIL. m³/year), 27. Invoiced water to industry and commercial consumers (MIL. m³/year), 28. Invoiced water to institutions and others (MIL. m³/year), 29. Invoiced water as measured amounts in whole in other water system (MIL. m³/year), 30. Required number of tests of processed water to a residual chlorine, 31. Realized number of tests of processed water to residual chlorine, 32. Number of tests of processed water, negative to residual chlorine, 33. Total collected sewage system (MIL. m³/year), 34. Collected sewage system from population (MIL. m³/year), 35. Collected sewage system from industry and commercial consumers (MIL. m³/year), 36. Collected sewage

system which was primary purified (MIL. m³/year), 37. Collected sewage system which has the least secondary purification (MIL. m³/year).

The list of all financial-economic data of companies-participants, collected during the project:

Data on incomes

44. Total operating incomes, 45. Total operating incomes – population, 46. Total operating incomes – industry and commercial users, 47. Totally invoiced for water supply, 48. Totally invoiced for sewage system, 49. Totally invoiced for water supply system – population, 50. Totally invoiced for water supply system – industry and commercial users, 51. Totally invoiced for water for institutions and others, 52. Totally invoiced for water distributed in mass to other water supply system, 53. Totally invoiced for sewage system – population, 54. Totally invoiced for sewage system for industry and commercial users, 55. Total debits, 56. Total annual receivables.

Data on expenses

57. Total income from water supply system and sewage system, 58. Total operating costs of water supply system and sewage system, 59. Total operating costs of water supply system, 60. Total operating costs of sewage system, 61. Labour costs, 62. Electrical energy costs, 63. Costs per a contract for third parties, 64. Total value of fixed assets including works in progress, 65. Gross value of fixed assets including works in progress – water supply system, 66. Gross value of fixed assets including works in progress – sewage system, 67. Subsidies or budgetary assets placed in a company, 68. Loans of commercial banks or bonds owner, 71. Total consumption of electrical energy, 72. Total consumption of electrical energy for water supply system, 73. Total consumption of electrical energy for sewage system, 74. Total consumption of electrical energy for other services and administrative buildings.

Basic economic business principles

In business process, the results should be higher than investments. Basic economic principles of companies' business manifest as a pretension to realize as better results with as less investments. The company's business results manifest in form of: physical product or service, value of production (total income as its monetary form) and achieved profit. Investments in business process of the company can manifest as: labour expenditure, production elements costs (energy, raw materials,..).

More precise expression of basic economic business principles represents:

Productivity principle – expresses by a relation between a realized physical volume of service and real labour expenditures. If the company produces more kinds of products, which differ mutually, a physical size of production cannot be expressed by a unique measure unit: market price of a service and standardized working-hours for a product unit. In order to calculate the realized productivity, there is necessary to determine: realized physical size of production, realized labour expenditures and indicators which caused a size of realized service and labour expenditures. In business planning, the company must know factors, which stipulate productivity. In these factors belong the effects which can affect the relation between the realized results and labour expenditures, and basic division is on objectively and subjectively conditioned factors.

Efficiency principle – represents a requirement for realizing as higher income with as less costs of production elements (including also natural resources, by which dispose). In order to calculate realized profitability, it is necessary to determine: realized production value, real costs of production elements and factors which caused a size of realized production value and real costs of production elements,

Profitability principle – expresses a requirement to realize as higher profit with as less engaged assets. In order to calculate realized profitability is necessary to determine: realized profit, real sum of engaged assets (capital) and factors which caused a size of realized profit and a real sum of engaged assets.

Implementation of productivity, efficiency and profitability principle

Implementation of productivity principle undertakes with adequate measures: 1) by elimination of subjectively conditioned factors effect, and 2) by increasing the existing objectively conditioned productivity. The company must permanently aspire for changes, due to requirements of consumers, i.e. service users. Implementation of the productivity principle represents just one of conditions for successful business of the company.

Implementation of efficiency principle: efficiency represents the expression of rationality of production elements expenditure (including consumption of natural resources). It reflects a relation among production and total costs, unlike productivity, by which evaluates rationality of labour expenditure, so therefore is more comprehensive the method of economic business success control of the company. Implementation of profitability principle does not end with accomplishing objectively conditioned profitability in the specific period. The

company has to improve its business in order to fight more successful with competition. Profitability, as an indicator, is wider and more comprehensive way of economic business success control in regard to productivity and efficiency. It encircles all elements of investments and business results. It considers a final expression of business success. All stated business principles are built-in in legislation, which relates on communal services performers, but there is still a problem with their apply.

Economic business principles of companies of water supply and sewage system in Serbian legislation in 2013

The basic goal for a company foundation is to realize profit. As activities of general interest are regulated by special laws, it is also a different motive of a founder (state, autonomous province and a local authority unit) to found a company which performs a general interest activity. A goal of foundation and business of public company is arranged by the clause 6 of the Law on Public Companies (Official Gazette of RS, no. 119/2012). A public company founds and does business owing to:

- Providing permanent performance of activity of general interest and regular satisfaction of users' needs,
- Development and improvement of doing the activity of general interest,
- Providing technical-technological and economic unity of the system and its development compliance,
- Profit gain,
- Realization of other statutory interest.

By the principles for determination of utilities' prices manage with quality of service (clause 25 of the Utilities Law – Official Gazette of RS, no. 88/2011):

- Applying the principle „a consumer pays“,
- Applying the principle „a polluter pays“,
- The principle of price sufficiency to cover business expenses,
- Compatibility of utilities' prices with the accessibility principle,
- Absence of price differences between different categories of consumers, except if the difference bases on different costs of providing utility.

With these principles, the basic economic business principles are not disturbed, but on the contrary – proven. A public company, which perform the activity of water supply and sewage system, arranges the issue of profit according to the Public Company Law, p. 12, Profit distribution and method of covering the loss, clause 49:

- Decision on profit distribution is made by the Inspecting Committee of the public company, with compliance of a founder,
- By decision from paragraph 1 of this clause, a part of assets from profit directs to a founder and pays up on the account for public revenue payments,
- Decision on method of loss cover is made by the Inspecting Committee of the public company, with compliance of a founder.

Whether and in what extent the companies show business of water system's basic activity (to supply users with water) and sewage system's basic activity (collection, drainage and waste water purification) according to reliable data, by which express the basic economic principles, is a subject of experts' self-research in the companies, which have involved in the project Benchmarking II. Through first external data audit of water supply companies participants at the project, implemented during August of current year, through a real simulation of external audit, external auditors together with internal data auditors, have started to work on making the Instructions for Audit Implementation. The Instructions will contain an assessment method of compliance the company's acts with legislative frame, and as bases for expressing the current state of water system and sewage system and expressing business results in certain period. The instruction was planned as one of the IPN working results at the project Benchmarking II, aiming to serve the companies during the creation of internal act, by which arrange the internal audit work (technical and financial). A base for establishing the internal audit is in the Rulebook on common criteria for organizing, standards and methodological instructions for work and reporting of the internal audit in the public sector (Official Gazette f RS, no. 99/2011).

Internal evaluation of regulatory framework can serve for:

- Making a chapter „Legal framework“ in the Annual Business Program, and
- As one of the analyses of a basis for preparation and proposal of projects for work success indicators improvement, as in the Annual Business Program, as well as in the Long-term and Medium-term plan of work and development.

Evaluation of data reliability

According to the IBNET recommendations, the data evaluation is classified in 5 categories:
 Grade 1 – Data based on reliable note, procedures, analyses, which were regularly documented and recognized as the most reliable.

Grade 2 – Generally, as well as the evaluation 1, but with minor imperfections. Some documentation misses, calculation is outdated, relying on unofficial reports or was made a minor extrapolation.

Grade 3 – Extrapolation among two reliable data.

Grade 4 – Based on the best assessments of employees in the company, without measuring and documented files.

Grade 0 – No available data.

In accordance to got grades, there draws an average grade for each of data categories. One of the conditions for a utility company to be accredited is that got indicators must be based on data, for which were evaluated that their reliability level is at least 70% for each individual category (institutional, technical and financial data).

Good and bad characteristics of benchmarking analysis

Benchmarking analysis should make in situations when we want to come to specific comparative data with the best organization in the business field, in which our organization is. Errors that occur are a consequence of not taking into consideration a geographic and macro-economic power of a region, for example, Novi Sad is comparing with New York. In this case, comparing destinations should be the most powerful in the region. There also happens the replacement of thesis – benchmarking analysis and comparative analysis. That is to say, the procedures for evaluation are the same, but by the comparative analysis we compare our position in regard to competitors, and by benchmarking analysis we want to come to data how to make a better position on the market, with comparison of the best in practice in the specific region.

Results and observations

In accordance to collected data for 15 companies, which have participated at the project, for the observed period 2007-2011, can ascertain the following general conclusions: Three is no share of private capital; continual water supply of population has been provided (24/365); there is no basic water supply by public fountains; increase of water supply network 1%/year; increase of sewage system network 2%/year; decrease of population - number of consumers (except in case of Novi Sad); decreasing trend of value of distributed and calculated water; trend of increasing price of water and canalization; there is no privileged tariffs for destitute consumers; fixed monthly fee for a service applies in small number of companies; only 3-15 companies-participants have secondary purification of waste water. It is important to point out the absence of privileged tariffs for

destitute population, which represents one of the basic conditions for socially-responsible making of tariffs which could provide self-sustainability of water supply and sewage system. In graphs 1-4 was given a review of several characteristic indicators, calculated according to the collected data. In order to avoid eventual discussions on individual cases, which must be analyzed in details, in the graphs were not given the companies' names. In this case, data were shown in increasing series according to the published EBC reports. After ended process of collecting and evaluation of data for 15 companies, there was formed a base of all data and indicators, which provide every individual company to compare its indicators with other companies-participants. Besides, the most characteristic indicators of participants were posted on the web-site of the International Benchmarking Network for Water and Sanitation Utilities (IBNET), where was the possibility of comparing indicators on the global scale with companies worldwide.

Graph 1. Key indicators in 2011

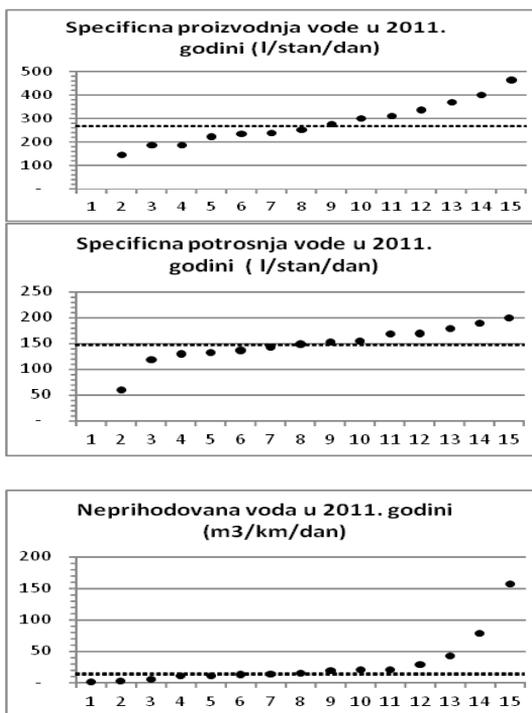
Average value of this indicator for 2011 amounts around 270 l/per capita/day (sample of 15 companies)

Average value of this indicator for 2011 amounts around 145 l/per capita/day (sample of 15 companies)

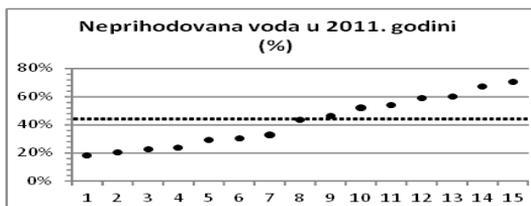
Around 120 l/per capita/day is losing in the system

Average value of this indicator for 2011 amounts around 25 m³/km/day (sample of 15 companies)

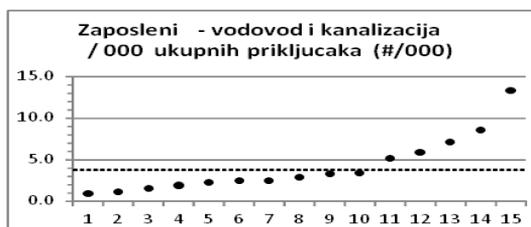
In 20% of companies, value is around or over 50 m³/km/day



Average value of this indicator for 2011 amounts more than 40% (sample of 15 companies)



Average value of this indicator for 2011 amounts almost 4 employees/1000 inhabitants (sample of 15 companies)



Source: *Birmancevic, B., Nastic, S., 2012.*

Due to work limit, here could not be shown all used indicators, and which were got by crossing over the collected data. For comparison of utility companies' financial indicators, which work in accordance with the general business conditions, are favourable customary indicators of company's business. The simplest indicator would be ratio of total operating incomes and total operating expenses. Their ratio is shown by indicator of operating costs cover. As special indicators were separated the largest groups of costs: labour costs, electrical energy costs, costs per contract for third parties, the same is important to perceive fixed assets value. For more complete financial review of company functioning, is very useful the indicators review of Total Liabilities and Total Receivables, as well as their mutual ratio. Owing to perceiving services quality and business efficiency, is very good to perceive losses proportion in the network, etc.

Conclusion

Benchmarking requires from public sector's manager to compare their functions, not just internally, but also with other best departments in public sector and/or the best companies. Indeed, there are differences in ethos and culture between public and private sector, however, invitation to the public sector to focus on the results, can fulfil only by understanding and learning from the best in practice, both in public and private sector, along with starting creative and adequate changes. Benchmarking is no more the private sector monopoly. The public sector institutions in most of western countries use benchmarking to meet the permanent challenge to provide maximum money value, top quality with the lowest costs.

The pilot project Benchmarking I, i.e. the project of comparing the Serbian water supply and sewage system companies' success indicators, has shown that the companies, in cooperation with non-governmental sector (IPN) can organize independently and to realize collection, analysis and evaluation of data through mutual cooperation. The focus in the project was put on data reliability on own company, while comparing indicators was put in the background. Thereby avoid the tendency for competition, i.e. adjustment of data with other participants, and emphasizes a need for undertaking measures in order to make some data more reliable. Generally noticed imperfections refer to a way of measuring distributed water – there are not always reliable measurements, measurements of water consumption - % of incorrect water gauge, absence of GIS database on water supply and sewage system network, etc.

Benchmarking project of waterworks and sewerage companies in Serbia showed that through mutual cooperation these companies, in cooperation with non-governmental organizations (NGO), may self-organize and realize projects related to collection, analyzes and evaluation of data. Success of the pilot project from 2012 has enabled the work prolongation also during 2013, with more companies-participants – 25 from entire Serbia, as well as the initiative for expansion of cooperation at the project with water supply systems in the south-east European region. In the project Benchmarking II, which has started in April, until December 2013, a special attention has been put on imperfections' documentation in measurements. The results of the project „Benchmarking II“, as well as the instructions for connection of water supply and sewage system companies to planned national benchmarking in Serbia, as well as the international initiatives, will be published in November 2013.

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STATISTICAL MODELING AS A WAY OF RESEARCHING ECONOMIC LAWS

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Abstract

In this paper, we will point out the possibilities of researching economic phenomena using statistical modeling. Stochastic model (stimulation model, Monte-Carlo model in imitational aspect) enables research of complex systems of every type, so it can be used in researching economic laws. The possibility of including non-linearity, dynamics, stochastic nature of some occurrences, makes it possible for the stochastic model to be made adequate to reality. The essence of statistical modeling is for the process of a complex system functioning to be mimicked by arithmetic and logical operations, in such successiveness of natural processes, which is characteristic for the process that we are modeling. Imitation of aleatory factors is done by using aleatory numbers.

Key words: *Modeling, economic laws, random variables.*

Introduction

Statistical modeling shows the possibility of using potential resources due to a great number of random variables.

In the Russian Federation, the Monte-Carlo method is most commonly used and it is often referred to as the statistical testing or statistical modeling method, thereby emphasizing its experimental-statistical character.

Monte-Carlo method (method of statistical testing) is a numerical method of solving various tasks by modeling aleatory sizes. The Monte Carlo method is associated with the idea of creating such an artificial stochastic

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process which would have all the necessary features of the studied system and which is implemented using a computer.

As such, it is applied anywhere where significant description is possible in the tasks, however the tasks themselves should be of strictly deterministic content. Therefore, the main task of this method is to determine the probability of events and mean values of aleatory sizes based on test results.

The aim of this paper is to show the possibility of using statistical modeling in researching of economic laws as well as setting up the basic algorithm. Setting up the statistical modeling algorithm will be pointed out by introducing Thiele's differential equations in the insurance policy model by using prospective reserves on premiums.

Defining, characteristics and significance of statistical modeling

Model (deterministic) of a real process (phenomena) is represented by an algorithm that enables for the course of that process to be presented (with a certain degree of accuracy). In fact, the "arithmetic" model of the process (phenomena) is an algorithm, which allows for a certain succession of moments of time t_i ($i = 1, 2, \dots, n$) to determine that process's state (based on the information of the state in time t_i , the state is determined at the time t_{i+1}). However when the process is described by a differential equation, where the main variable is time t , "arithmetic" model represents an algorithm of numerical solving of that equation.³ Theorems of existence of that solution express the deterministic nature of the process.

When analyzing complex systems we operate by aleatory (random) sizes, aleatory phenomena: knowing the system's state in the moment t_i , we cannot unambiguously determine the system's state at some future time t_{i+1} , we can only determine the probability of the system's state in the moment t_{i+1} . It is the so-called stochastic model which can only give stochastic characteristics of the process flow.

Regarding the task of managing the production process with a complex internal structure, analytical methods of determining statistical

³ Asmussen S. and Kroese D.P., *Improved algorithms for rare event simulation with heavy tails*, Advances in Applied Probability, 38:545–558, 2006.

characteristics of output sizes of the system have serious limitations.⁴ Specifically, in the study of complex systems it is necessary to solve complex tasks of aleatory nature (when the application of analytical methods shows to be very complex or even infeasible).

Therefore, complex systems are not studied analytically, but a stochastic process is modeled and statistical grading of probability or expected value is used to approximately solve the given task. In describing such processes, logical connections (for example, in manufacturing processes, connections which express the succession of their functioning etc.)⁵ and forming algorithms play a major role, which allow determining system status in discrete alternation of time intervals.

Solving problems of determining statistical characteristics of output information of complex systems can be achieved by modeling, using methods of statistical testing (the Monte-Carlo method). Based on existing parameters and state of the system at the time t_i , his condition at time t_{i+1} is modeled. In doing so, each time one of the possible variants of successive states of the system at moments t_i ($i = 1, 2, \dots, n$) is obtained.

If such reproduction is repeated several times, statistics of "the outcome of the process"⁶ will be close to statistics of the modeled object, under the condition that the stochastic characteristics of the model match (with sufficient accuracy) the characteristics of the modeled process.

When modeling, for example, the queuing task under aleatory emergence, failure is expected; by aleatory size, with different layout law, we understand the time of continuous work of the serviced device, time spent on its repair etc.⁷ Multiple reproduction of a process (phenomenon) is replaced by modeling of a given process in a given time interval.

⁴Genkin B.N.: *Rasčot optimaljnih sistem obsluživanja oborudovanja i rabočih mest*, Lenjingrad, 1967. page 174.

⁵Gnedenko B.V., Danieljan E.A, Dimitrov B.N., Klimov G.P, Matveev V.F.: *Prioritetnije sistemi obsluživanja*, MGU, 1973. page 232.

⁶Ljusternik L.A.: *Neskoljko zamečanij o statističeskom modeliraovanii*, „Matematičeskie vaprosi upravlenija proizvodstvom“, v.1, MGU, 1969. page 33.

⁷Golenko D.I.: *Statističeskie metodi v ekonomiičeskih sistemah*, „Statistika“, Moskva, 1970. page 38.

Statistical modeling is a numerical method of mathematical modeling, which consists of imitation of real processes, through the reproduction of natural phenomena and processes, in successiveness, which expresses real mutual connections and dependencies. It is a very convenient tool of researching complex economic systems (enterprises, branches, economy as a whole), in order to solve the problem of perspective character (for determining the structure of the system), as well as for operational management of the system.

Statistical modeling includes systems, formalized in the form of a queuing scheme, by creating the appropriate modeling algorithm⁸, which is implemented on computers, and imitates the behavior and mutual interaction of system elements by including the acting aleatory factors. Statistical modeling of complex system functioning process assumes the inclusion of aleatory factors, which are described by most different laws of probability distribution (hence the name - statistical).

In that way, as a statistical model of the complex system functioning process, an algorithm appears written in an algorithmic language. By using this algorithm, with given values of system parameters and initial conditions, as well as including of aleatory factors, characteristics of the system are evaluated, as envisaged in the research program and necessary to solve practical problems.⁹ Algorithm allows reaching, not only the specific values of the characteristics that we are interested in, which are necessary for quantitative research, but for qualitative research of systems as well.

We will point out some characteristics of the statistical modeling method.

Statistical modeling implies on elements of qualitative. Logics of this method and the consequences of its use depend on the accessibility of its elements. The use of statistical models is not possible without a qualitative analysis of the approach and logic of these models. If we

⁸ The structure of the modeling algorithm is determined by the structure of the model. In fact, it slightly depends on a set of unknown sizes. Realization of the modeling algorithm is, in fact, stimulation of the phenomena that are the studied process, with preservation of the logical structure, alteration of the flow in time and, in particular, information about the state of the process.

⁹ Ljusernik L.A.: *Neskoljko zamečanj o statističeskom modelirovanii*, „Matematičeskie vaprosi upravlenija proizvodstvom“, v.1, MGU, 1969. page 32.

neglect the qualitative research, in this sense, we would have frequent indeterminacy of models.

Statistical modeling enables solving very complex tasks, and has significant advantages over analytical methods and other forms of modeling.

The main advantage of statistical modeling lies in the possibility of solving problems of exclusive complexity: researched systems can at the same time contain elements of continuous, discrete and discrete-continuous effect, to be subjected to the influence of many aleatory variable factors of a complex nature, to be described in the appropriate timetable of probability, given on the set of realization and so on.¹⁰

On the other hand, research of stochastic processes, by using analytical methods to find the solution or finding solutions using approximate numerical methods is associated with difficulties due to getting links that contain as unknown, the laws of distribution or the mean values, variances, correlation functions etc. by which we analyze the process.

This circumstance is becoming more important in cases of describing dependencies between aleatory factors and unknowns by complex non-linear relations. In addition, consumptions of time and material resources in the implementation of the statistical model are insignificant in comparison with the expenditures of applying other methods. At the same time, the results obtained by statistical modeling, by their value in practical solving of problems, are often close to the results obtained by other methods.

Although statistical modeling is increasingly developing as a methodological approach for complex systems, it cannot be boasted with developed unified models¹¹. In fact, in this area a number of problems are

¹⁰ Četirkin E.M.: *Teorija massovovo obsluživanja i jejo primenenije v ekonomike*, „Statistika“, Moskva, 1971. page 137.

¹¹ In order not to form the model for every complex system over and over, extracting of the most important classes of the complex system is done and unified models for the classes as a whole are formed. Solving the unification of formalized schemes and modeling algorithms problems would contribute to, not only speeding up of the formation of models for complex systems relevant to the practice, but enable the transition to the study of some of their general properties as well. Today, in practice,

still waiting for the appropriate involvement and solutions: result of modeling always has a special character and corresponds to fixed values of the system parameters and initial conditions (it is impossible to generalize the results obtained in terms of forming analytical dependence, which is a general deficiency of numerical methods); it's complex and difficult to form modeling algorithms, and also very complicated to obtain optimal solutions (due to high time consumption in realization on computers); for system analysis it is usually necessary to model its process of functioning multiple times, with varying initial task conditions; also in the concept of the model, certain elements can easily be wrongly formulated; for convenience in practical application, unification of modeling algorithms and their parts is required (sub-programs), which describe the different elements of a complex system, operationalization of economics and the growing recognition of statistical modeling have opened a number of problems in terms of analysis and inclusion, algorithms, aleatory factors relevant for economic activity.

As the difficulties of specified character are easily manageable, statistical modeling is expanding and increasingly introduced into practice. Statistical models, still mostly undeveloped are the actuality of economic thought.¹² In fact, they are used to perform general study of dynamics of complex systems functioning, and qualitative results are got which are related to such properties of processes, such as stability, etc., as well as highlighting quantitative and qualitative principles of the considered systems.

The importance of statistical modeling consists in the fact that in "complex environmental conditions it makes it possible to more fully review the factors that influence the behavior of the system, its potential and the results achieved."¹³

Method of statistical studies (Monte-Carlo method)

The Monte-Carlo is a numeric method based on stochastic approach by which mathematical problems are solved by using random variables. This

special models are still formed for each specifics complex system and since recently for every formulated task.

¹² Buslenko N.P., Kovalenko I.N.: *Lekcii po teoriji složnih sistem*, „Sovjetskoe radio“, Moskva, 1973. page 87.

¹³ Tourki M.: *Markovljevi lanci i procesi u upravljanju ekonomskim sistemima*, „Savremena administracija“, Beograd, 1974, page 6.

method is used when it is not possible to get the results analytically or when it is needed to check the results obtained by using another method and it is useable on all mathematical problems. The Monte-Carlo method was used since 1930, under other names and it got its name in 1946 from mathematicians and physicists. Its studying and intensive use began after introduction of computers because of large amount of data that needed to be processed. It is used in different fields of science, amongst which is finance. First use in finance was introduced in 1964.

As already highlighted above, therefore, statistical modeling enables an approximate reproduction of a system functioning. As such, the method of statistical modeling was firstly applied in modeling of aleatory structures (size, function), whose stochastic characteristics were the same as solutions of the given analytical tasks.

Simultaneously statistical grading of these characteristics have been repeatedly done in order to approximately solve the corresponding analytical task. This procedure is named method of statistical testing or the Monte-Carlo method.¹⁴ It was later noted that this method can be applied to study the process of complex systems functioning, on which aleatory factors act, i.e. a method appeared, called statistical modeling. Due to fundamental differences of these two aspects of statistical testing, it's expedient to have different terms to label them. Statistical modeling is a more appropriate name to call a method of studying complex systems, using imitational models, and by the name Monte-Carlo - a numerical method for solving analytical tasks.

Random variables are obtained based on numerical algorithms however the problem that occurs is that after a certain series of numbers those values are repeated. For this reason it is necessary to provide a long enough sequence of numbers so that the period of number repetition is long enough in order not to use the same values for random numbers. To get the approximations as close as possible it is necessary to generate a high amount of random numbers. Numerical algorithm should be written in such way so that the values obtained are the same on every computer.

The components of the method are: elaboration of statistical models of the studied real processes, modeling of random variables with a given law of probability distribution, solving problems of statistical grading theory.

¹⁴ Pengelly J.: *Monte Carlo methods*, 2002. page 10

Thus, in the method of statistical testing special tasks of statistical price theory appear. Therefore, this method is often referred to as "the assessor of values"¹⁵ of aleatory size distribution characteristics.

The practical value of the Monte-Carlo method is in the fact that it replaces natural testing with results of calculations, which operate with random sizes. Therefore, the required characteristics of the studied process that are needed can be determined without the use of equations that describe the change of the given process.

Namely, task solving by the Monte-Carlo method is practically possible only with the help of computers. Therefore, it is characterized by simplicity and universality.¹⁶ This is the method type preferred for solving problems when minimum work is done by man and maximum by a machine. In addition, the Monte-Carlo method, often allows the economy of means: instead of performing expensive (and sometimes impossible) natural experiments, different system variants are modeled (e.g. management organization in a system) and from them optimal one is chosen.

When using the Monte-Carlo method, economic experiment is replaced by examining the numerical model of the economic process, based on some of its starting characteristics, or the rule of aleatory size distribution in the observed process. Computational algorithm method involves a program for the application of a probable testing, whose realization is achieved through modeling. For organizing of modeling: tables of random numbers, aleatory numbers on an electronic computers etc. can be computed.

The accuracy of calculations by the Monte-Carlo method (using statistical testing) may be improved by its modification, through combination of deterministic methods. Another important source, which improves the accuracy of the Monte-Carlo method, is the selection of stochastic model with as little variance as possible. The theory route of the Monte-Carlo method is rapidly developing. Therefore, there is no basis to consider the Monte-Carlo method less reliable.

¹⁵ Hammereley J.M., Handscomb D.C.: *Les methodes de Monte-Carlo*, Dunod, Paris, 1967. page 64.

¹⁶ Buslenko N.P.: *Matematičeskoe modelirovanie proizvodstvennih processov na vičisliteljnih mašinah*, „Nauka“, Moskva, 1964. page 313

The application of the idea of the Monte-Carlo method, in studying complex systems, found its expression in the method of statistical modeling. It is very important for simulating economic systems and phenomena. Namely, as “in aleatory sizes, simulation scheme is necessarily followed by laws of probability”, it is necessary on one hand, “if the laws of probability are known” to select for “the case, the elements of a given schedule” and, on the other hand, “when they are not known” to use “the Monte-Carlo method to simulate events (arrival, failure, departure, etc.)”.¹⁷ Simulation models are of great importance because they are used to “investigate and solve stock problems, investments, acquisitions and sales, product policies, transportation, queuing, etc.”¹⁸

Use of Thiele's differential equation and Monte-Carlo simulation

Monte-Carlo simulation has many applications also when it comes to insurance policies. However, we will only framework those that can be easily applied to all types of contracts without the need to solve Thiele's differential equation.

Equality between the net present value of payments to the insured and premiums that the insured pays to an insurance company is not necessarily true after the sale contract. Therefore, we need to know how these differences change over time. Insurance companies need to know reserves on premiums, i.e. the amount of money that must be invested in order to be able to pay all expected future obligations to the insured. This is actually a conditional expectation of future payments, conditional on survival of the insured up to a point u . We call them prospective reserves on premiums, because they take only future payments into account.

Prospective reserves on premiums $V_x(u)$ at the time $u \geq 0$ of an insurance policy, where the insured is aged x at the time the contract was signed (at time 0), and is still alive at the moment u , is defined as the difference between the conditional expectation of future payments to the

¹⁷ Zečević T.: *Teorija operacionih istraživanja*, Beograd, 1970. page 258.

¹⁸ Njegić R., Tourski M.: *Statistička analiza simulacionih modela ekonomskih sistema*, Godišnji sastanak Jugoslovenskog statističkog društva, Zlatibor, 30, 31. maj i 1. juni 1974. page 2.

insured and the conditional expectation future premiums (conditioned by the event that the insured person is alive at the moment u).¹⁹

The main advantage of Thiele's differential equation is that, with respect to future payments, it can be used to calculate the initial premium $\Pi(0)$ equalizing it with $V_x(0)$, with the help of net premiums principle. We can use it to (re)design a contract or premium rate by choice, the total amount paid or the sum in the event of death. Since, Thiele's differential equation describes the dynamic evolution of expectations, those expectations can be directly calculated by using the Monte-Carlo simulation.²⁰ More specifically we can simulate the lifespan of the insured, calculate significant flows of payment, do it N amount of times, find the average value of the results obtained, get an approximation of prospective reserves $\hat{V}_x(0)$, and only then (re)design a contract. The important thing with this approach is that we do not need the mortality rate and interest rate to be deterministically specified (Assumption 1.). In this more general case and in situations where we have contracts relating to the shares (equity linked), there are generalizations of Thiele's differential equations which are derived using financial mathematics based grading.

In the generalized case, the so-called value of prospective reserves cannot be justified by the large numbers law. Under Assumption 1, the only uncertainty that remains is the lifespan of the insured, so because of the law of large numbers it can be said that the amounts paid on average are equally divided to several different clients. If, on the other hand, the uncertainty of interest rates and stock prices enter future payments, then taking the expected value of a proposal for the value of reserves can only be justified if payment can be reproduced on the financial markets.²¹ For this reason it is better to talk about the mean values of the prospective reserves.

Algorithm 1: Simulations (of mean values) of prospective reserves of the insurance policy

¹⁹ Vukić D.: *Monte Karlo metode u aktuarskom modeliranju*, Master rad, Novi Sad, 2012. page 38-40.

²⁰ Korn R., Korn E., Kroisandt G.: *Monte Carlo Methods and Models in Finance and Insurance*, Chapman & hall/crc, Financial mathematic series, 2010. page 27.

²¹ Bikić M., Franulović I., Kitić M., Salković M.: *Monte Carlo metoda i njena primjena u financijama*, Projekt kolegija slučajni procesi u sustavima, Zagreb 2007. page 134-138.

For $i = 1$ till N

1. Simulate the life span of the insured $l_x^{(i)}$.
2. Simulate the trajectory $r^{(i)}(t), t \in [0, \min\{n, l_x^{(i)}\}]$.
3. Calculate all of the contract payment based on life span $l_x^{(i)}$, discount them by the appropriate discount factor $\exp\left(-\int_0^t r(s)ds\right)$ and add to them to get $\hat{V}_x^{(i)}(0)$.

After that an approximation (of the mean value) of prospective reserves should be calculated:

$$\hat{V}_x(\mathbf{0}) = \frac{1}{N} \sum \hat{V}_x^{(i)}(0) \quad (1)$$

The risk of deviation from the (approximated) average values inherited from those calculations, automatically hedged by the law of large numbers should always be considered (for example, calculating the average life expectancy of the insured).

Application of the statistical modeling method to solve practical tasks of queuing systems

Based on the information highlighted above about the statistical modeling method it can be said that the method can be used calculate the value of each value given in the set of the implementation process of functioning of the studied complex system (provided that the appropriate subprograms are provided in the formed imitational model).

The most important indicator, which is primarily the topic of research, is usually an indication of the effectiveness of the system, which is understood in the broadest sense of the word.²² Having the ability to find the values of indicators of effectiveness, a series of tasks (using the model) can be solved, namely:

- Assess the effectiveness of different management principles;
- Asses the variations of the complex structure of the system;

²² Buslenko N.P., Šrejder J.A.: *Metod statističeskijh ispitaniij (Monte-Carlo) i jevo realizacija na vičisljiteljnih mašinah*, Gosudarstvennoe izdateljstvo fiziko-matematičeskoj literaturi, Moskva, 1961. page 231.

- Assess the impact of changing various parameters of a complex system, or its separate elements (and also initial conditions).

The method of statistical modeling is applied for solving a large number of various practical tasks of queuing theory. In fact, there is very significant experience in applying the method of statistical modeling (Monte-Carlo) for solving problems of the theory of queuing, with very broad assumptions about the character of the course of requirements and the characteristics of working of the queuing system.

Blocks of modeling algorithms, which mimic the process of servicing requests in the queuing systems, are sets of logical and arithmetic operations which achieve an imitation of formally described rules of choice of requirements from a row and accessing servicing devices, checking of a large number of conditions (device is busy or free; serving such request is finished or it is extended; are there requirements in the row or not, etc.), and also calculating the parameters and properties necessary for checking the conditions.

The modeling results are the grades of quality of queuing indicators, as the mean values of aleatory sizes (time waiting in line, time for finding demands in the system, etc.) or frequency of aleatory event (termination, business of channels etc.) based on a large number of implementation of models.

The method of statistical modeling, which uses the modeling algorithms of this type, has received wide distribution. However, the practice requires further expansion of its tasks, included in this method because:

- **Request's character** - the condition of similarity of the event flow has proven to be limiting.²³ In this regard, the flow of demands is considered as a flow of aleatory vectors whose components are the moments of arrival of requests and their parameters. Description of the requirements, such as vectors, affects not only the methods of imitating requirement flow, but also the implementation of a number of blocks of modeling algorithms. In fact, the modeling algorithm should include the circumstances that set the parameters

²³ Many requests, which are encountered in practice, are necessary to be described, not only at the moment of arrival in the queuing system, but with a number of parameters, which characterize their individual characteristics, in order to formulate mathematical models adequate to real process.

(which exist in the system), checking logical conditions, and also queuing time, waiting time and so on which can in general depend on the parameters of the request.

- The necessity of including **reliability** of elements of the queuing systems and evaluating the **influence of firing** on the quality of queuing. For the inclusion of these factors in the modeling algorithm operators are introduced, which imitate by using aleatory numbers, moments of element failure and length of repair (as aleatory size with the given laws of distribution). Methodology of forming these operators is by using the principles of imitation of the flow of similar events. In the modeling algorithm it is necessary to introduce operators (which reflect the consequences of element failure of the queuing system), and also blocks that mimic the repair process and so on.
- Finally, processes are important in practice, for which events are "demand is served" aleatory (with probabilities that depend on the request and size parameters, which are determined during the modeling - the moment of release and the number of channels, moments of failure and recovery of elements, time required to find the demand in the system, etc.) and, besides that the output (after servicing) parameters of the demand have aleatory values (which are described by the laws of probability distribution). The method of statistical modeling includes these processes as well. In fact, blocks can be imported in the modeling algorithm that calculate the corresponding probabilities or distribution laws and then imitate the aleatory events and sizes with the help of aleatory numbers.

Therefore, the mentioned amendments are introduced in the modeling algorithm, which contributes to a significant expansion of the sphere of application, in practice, ideas and methods of the queuing theory and statistical modeling.

Another advantage is quite distinctive for statistical modeling method over analytical methods of the queuing theory, and in fact – results are obtained on the model, which relate not only to the established regime of queuing, but for transitional regimes as well, ones occurring at the beginning of the process when the queuing system gradually transfers

from a state of complete vacancy into an established regime of stationary occupancy.

Lately, due to needs of practice, really complex systems are researched by the methods of queuing and statistical modeling, systems with a large number of interrelated elements and automatic control that is achieved through collection and processing of information.

This requires special mathematical schemes, which allow description of such systems and methods for their modeling. As an example, queuing system of very general form can be given, reviewed in the work of N.P. Buslenka.²⁴

This system consists of queuing channels (which have very wide properties) and general unit (which provides information storage and management of queuing processes). This paper provides an algorithm based operator scheme, which provides research of the system using the method of statistical modeling.

Various systems with multiphase queuing are of great theoretical and practical interest. The research problem of multiphase queuing systems is easily solved by the method of statistical modeling.²⁵ In the queuing algorithm from the previous phase, serviced requests with parameters are included, which can be used to model the queuing process for the following phases. The essence of statistical modeling of multiphase queuing systems lies in presenting the history of each request at all stages of handling.

To the expansion of queuing systems, which are researched by using statistical modeling method, and perfection of methodologies of mathematical description, forming of the modeling algorithms and implementing them on computers, contribute the results given in papers devoted to specific groups of queuing systems, and applied for the description of relevant types of real objects.

Queuing systems and their methods of statistical modeling are applied in research studies of various processes associated with analysis of:

²⁴ Buslenko N.P.: *O rešenii metodom Monte-Karlo zadač, svjazannih s massovim obsluživanijem*, Trudi 4-vo Vses. matem. sjezda, 1961, t.2, Lenjingrad, page 326-329.

²⁵ Gnedenko B.V.: *Besedi o teoriji massovovo obsluživanja*, „Znanije“, Moskva, 1973. page 139.

economic systems; technology and organization of industrial production; different transport systems; communication; reliability of technical means; network planning and management methods and so on.

Research subject included in statistical models of transport systems, which are described as queuing systems, is very broad and includes not only the process of transport vehicles movement, but also a number of other processes.

Here we consider the processes which are, from the practical point of view, directly associated with functioning of transportation as a system, and namely: overhaul of transportation equipment, transportation of goods, loading and unloading work, organizing transport of goods and passengers etc.

In the field of communication, particularly in telephony, queuing theory has multiple traditional applications. Although most of the tasks of this type are solved by analytical methods of the queuing theory, it does not diminish the necessity of applying statistical modeling method.²⁶

Very close (both from the point of view of setting tasks and modeling methods) to the discussed issue are the issues of assessing reliability of technical resources. The method of statistical modeling is used for imitation of aleatory moments of failure and downtime of the apparatus, moments of renewal of their working ability, and also for the consequence that failures and interruptions of the device generate.

In doing so the notion on the failure of character flow can be significantly expanded (compared to analytical methods of queuing theory), also the downtime and renewal moments, and the mechanism of influence of element failure on the quality of complex systems work as well.

Problems close to the tasks of the queuing theory, occur in conjunction with network planning and management methods.

Therefore, statistical modeling is widely used to solve practical problems of the queuing theory.

²⁶ Klimov G.P.: *Stohastičeskie sistemi obsluživanja*, Nauka, Moskva 1966. page 45.

Conclusion

The most universal method for researching economic laws is the method of statistical modeling of stochastic processes (method of statistical testing), because in principle, it allows exploration of real stochastic processes, in which there is no analytical relationship between statistical characteristics of the input and output systems, but complicated relationships between system elements.

Monte-Carlo method has become an essential tool in risk management and Monte-Carlo simulation has become an essential tool in the pricing of derivatives and risk management. These applications have encouraged the research of new Monte-Carlo methods and renewed interest in some older techniques.

Description of major economic systems, based on queuing theory concepts and their use in analysis, statistical modeling methods, proved to be (based on past experience) inefficient. However, specific elements of these economic systems are investigated successfully in that way.

Recently, significant results in the area of modeling of manufacturing processes of various types were obtained, for which multi-channel multi-stage queuing systems had great importance.

However, along with the development of theory and practice of modeling of primary groups of manufacturing processes, attention of researchers was directed on research study of production of specific products or a narrow class of manufacturing processes as well. In addition, the methodology of continuous production process modeling has an important theoretical and practical significance, which is now under development. However, there are already results related to the problems of modeling of some specific manufacturing processes of continuous character.

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SPECIFICITY OF RANGE OF PRODUCTS IN TERMS OF INTERNATIONALIZATION OF TRADE

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Abstract

The internationalization of trade indicates the possible direction of growth and development strategy trading companies in international and global scale. This business can be done ad hoc, but is a careful design and targeting activities. In other words, it is necessary to carefully establish possible internationalization strategy based on clear and proven marketing guidelines. Thus comes to the fore marketing dimension of internationalization of trade, which is based on the expression of specific marketing mix. As the range of products the main instrument of the marketing mix, the case studies in this paper are characteristic of this instrument in terms of the internationalization of trade. The premise is that a range of products starting point for business in foreign markets, where they exhibit their specificity. Testing this hypothesis will be carried out through the analysis of strategic alternatives in the design of the product range, product quality management and the trade mark.

Key words: *range of products, internationalization, trade, quality, trade mark.*

Introduction

Trade has quickly gone from local to international activities. In today's conditions, the internationalization of trade becomes inevitable and irreversible process. Relying on theoretical explication, internationalization is possible to observe with evolutionary, matrix and global aspects. All these aspects indicate that the internationalization of trade strategies with a strong marketing impulses. In fact, many commercial companies have achieved remarkable results through broad horizons and marketing stimuli. All this confirms the thesis about the interconnectedness of international marketing and internationalization, and the marketing dimension of internationalization of

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trade. In terms of the growing internationalization of trade, marketing, guiding and received an advisory role since it directly contributes to the introduction of the international business environment and market opportunities, market perception and attractiveness of the prospect of some form of business, and the integration of all business functions towards achieving the set target markets.

On the other hand, marketing experience and marketing ability of the company are an important factor in the successful implementation of the strategy of internationalization of trade. In such conditions, it is manifested specificity in the creation of marketing mix. The range of products is an essential marketing tool that in terms of internationalization exerts its specific features, which are the subject of this paper.

Range of products in the business of international trading companies

The range of products is the main tool of marketing mix trading companies, and therefore strategies to foreign markets. The business of international trading companies come together to highlight specific product range, taking into account the differences that exist between the various foreign markets. In this sense, the creation of the product range is not an ad hoc activity, but strategically designed the project with a detailed elaboration of the elements, such as quality based on international standards, product categories and trademarks.

Specificity of creating of range of products - the base of operations in foreign markets

The range of products is the base of operations of trading companies. Based on the range it is defined the entire business activity and scope of trading companies. In addition, in its creation companies tend to be on the appropriate and to be associated with meeting the needs of consumers in a way to do better than the competitors, with profit maximization. For this reason, trading company should constantly work on creating an appropriate range, its sizing and determining the strategy, which applies to both domestic and foreign market.¹

¹ Ćuzović, S., Sokolov-Mladenović, S. (2007), Izvori konkurentske prednosti trgovinskih preduzeća u Srbiji, Tematski zbornik *Razvijanje konkurentske prednosti preduzeća u Srbiji u uslovima evropskih integracija*, Ekonomski fakultet, Niš, str. 15-26.

Importance range of products is all the greater if we start from the core functions of the trade company, which is to provide a “range of products and services “to consumers.²

This perspective, the range plays an essential role in the strategy of trading companies, contributes to the image and is an important component of the marketing mix. The portfolio can be seen as a commercial product that the company offers to its customers,³ and an assortment of all the goods that are the subject of commercial activities of the company.⁴

Performing on the international market, trading company is aware of the importance of a range of products for success in the chosen market. Due to the evolution of trade institutions and the dynamic changes in the environment, there is a strategic reorientation of the question “what to sell on the international market?” To the question "whether the foreign market to sell the same product ranges as well as the domestic?"⁵

In an attempt to answer this question, the theory and practice of international marketing crystallized three strategies to create range of products for foreign markets.⁶

1. create a range of products identical to that company offers domestic market,
2. adjustment a range of local market conditions, and
3. creating a innovative range of products designed to meet the needs of global markets.

Implementation of previous strategies range of products along with the strategy of communication enables retailers to successfully apply one of five strategic alternatives, as can be seen from Table 1.

² Levy, M., Weitz, B.A. (2004), *Retailing Management*, 5th edn, McGraw-Hill, New York, p. 7.

³ Leader, V.G., Kyritsis, N. (1990), *Fundamentals of Marketing*, Stanley Thornes (Publishers) Ltd., London, p. 90.

⁴ Lovreta, S., Petković, G. (2002), *Trgovinski marketing*, Ekonomski fakultet, Beograd, 2002.

⁵ Ćuzović, S., Sokolov-Mladenović, S. (2012), Marketinška dimenzija internacionalnih trgovinskih kompanija s posebnim osvrtom na tržište Srbije, *Ekonomске teme*, br. 4, Niš, str. 571-595.

⁶ Kotabe, M., Helsen, K. (2004), *Global Marketing Management*, John Wiley&Sons, Inc., New York, pp. 328-330.

Table 1. *Strategic alternatives in creating of range of products for foreign markets*

Strategy	Product features or needs satisfied	Terms of use of the product	Opportunity to purchase products	Product strategy	Communication strategy	Rank strategy- from the cheapest to the most expensive
1	Same	Same	There is	Spreading	Spreading	1
2	Different	Same	There is	Spreading	Adaptation	2
3	Same	Different	There is	Adaptation	Spreading	3
4	Different	Different	There is	Adaptation	Adaptation	4
5	Same	-	There is not	Invention	Invention	5

Source: Keegan, W.J. (1996), *Multinational Product Planning: Strategic Alternatives*, *Journal of Marketing*, Vol 33, p. 58-62.

The first strategic alternative implies that trade in foreign markets perform with the same range of products using the same communication strategies as well as the domestic market. Historically, trade company which first started expanding the business beyond national markets have applied this strategic alternative. In addition, a small company with limited resources prefers this strategic alternative, since it does not require high costs of adjustment. Also, apply it to those businesses that target the “global ” section with similar needs. Strategic alternative that combines the same product and the same communication strategy (so-called " dual spread ") is generally more production-driven than it is market- driven. The greatest benefit that provides businesses is savings from economies of scale.

The second strategic alternative involves a combination of strategies range identical to that of the domestic market with customized communication strategy with consumers. First of all, we start from different cultural factors and competitive conditions in international markets, due to which trade company decides that the current range of products offered to consumers using different communication strategies and adapting to the conditions of the local market. Despite the fact that this alternative offers tremendous savings from economies of scale, companies have high costs on the basis of custom communication strategies.

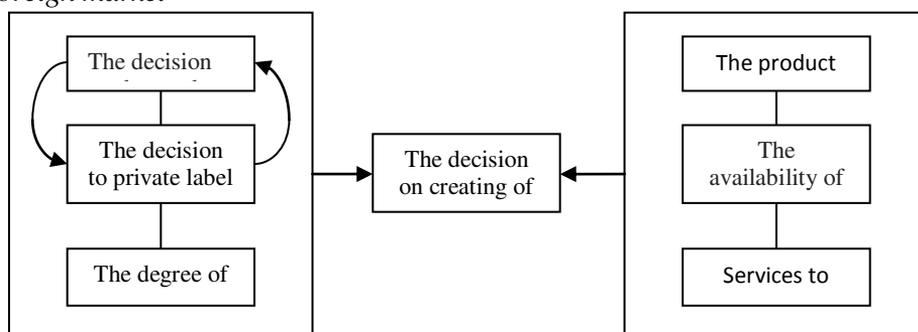
The third strategic alternative involves a combination of strategies customized range of products of local market conditions, with the use of the communication strategy identical to that used in the domestic market. The local market conditions often favor the adjustment range of products, which can be done from the width, depth, product categories, until the introduction of new private label.

The fourth strategic alternatives, taking into account differences in cultural, political, economic, demographic, geographic and other factors, international market, combines the strategy of customized range of products and customized communication with foreign customers (so-called "dual adjustment"). Lately, it is used by most trading companies in the process of expanding operations outside the national market.

The fifth strategic alternative, in its implementation, is the most expensive, considering that involves an inventive approach to portfolio strategy and communication with customers in foreign markets. This strategy is applied Retailers which carry the name "global", trying to develop a global range for the global market with the same needs and requirements.⁷

What would be an alternative to decide a trade company depends on a number of factors. First of all, keep in mind that this is a strategic project designed to analyze the factors from existing product lines, products with trademarks and their degree of adaptation to the life cycle of a product, system availability and distribution services to consumers in selected international markets. This can be seen from Figure 1.

Figure 1. Factors influencing the decision to create the product range for foreign market

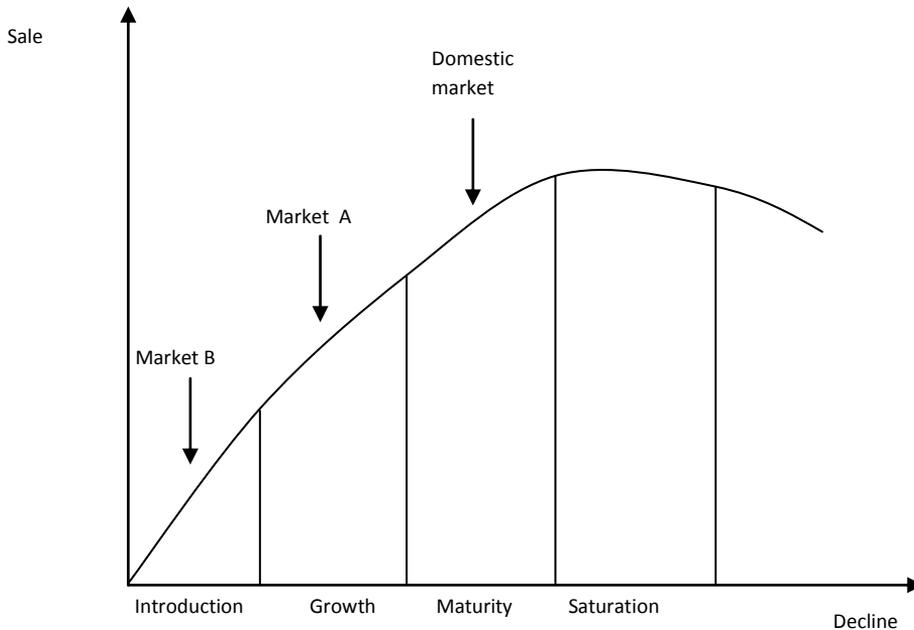


Source: Ghauri, P., Cateora, P. (2006), *International Marketing*, McGraw-Hill, New York, p. 317.

As you can see from Figure 1, it is important to the decision to create range of products on the international market and the product life cycle, and the phase in which the products are placed on the domestic and foreign markets, as can be seen from Figure 2.

⁷ Practice has shown that the strategic alternative innovative products mainly applied manufacturing companies, such as at Black & Decker, Procter & Gamble, and others.

Figure 2. *The product life cycle in foreign market*



Source: Ghauri, P., Cateora, P. (2006), *International Marketing*, McGraw-Hill, New York, p. 325.

As you can see from Figure 2, the product in the domestic market is in its mature phase, while in international markets A and B at the stage of introduction and growth, which may require knowing all the attributes of the product in countries where there is currently implementing and growth. All this necessitates adaptation strategies range needs of the local market.

Management quality in terms of internationalization of trade

Trade companies, in its product range, offer to consumers products of different manufacturers and products of domestic and foreign manufacturers. Having before it the choice of different products, consumers, both domestic and foreign markets, opt for those that have a high level of quality. These products ensure the safety and satisfaction of needs and requirements for consumers, while for trade companies carry to satisfied customers translate into loyalty. Given these facts, its range of commercial companies structured in such a way that its components are products of high quality , that is, products whose quality is in accordance with ISO 9000 (or ISO 9001:2000), ISO 14000 (or ISO 14001:2004) and HACCP.

The requirements of standards ISO 9000 (ISO 9001:2000) and ISO 14000 (ISO 14001:2004)

Performed on the selected foreign markets, trading company strives to offer consumers products that are regarded as "high quality". As such guarantees are used standards play an important role in providing security, reliability, and protect consumers from unscrupulous traders and manufacturers. Thus, the entry of the foreign market is no longer enough just quality, but also an internationally recognized proof of the quality of an ISO 9001:2000 (QMS Quality Management System - Quality Management System), which is an updated version of ISO 9000.⁸ The quality management system is the only standard that can be used for the certification of management in the business world, given its following requirements ensuring customer satisfaction, meeting customer requirements, and evaluating a company's ability to meet customer requirements through internal or external control.

That is really about the standard that consumers can be guaranteed "high-quality" products evidenced by the eight principles on which this standard is based:⁹ 1) A company that is focused on the consumer, 2) leadership, 3) involvement of employees, and 4) Process Approach, 5) System approach to management, and 6) Continuous improvement, 7) Making decisions based on facts, 8) Mutually beneficial supplier relationships.

Respect for these principles to the achievement of the goals in the business of international trade company, which is reflected in the following: greater accountability and awareness of employees, greater customer loyalty, better use of time and resources, increasing the level of customer satisfaction, faster identification of products and services, better market opportunities, lower losses, higher profits, and continuous improvement of quality and efficiency. In addition to the previously described standard ISO 9001:2000 for retailers operating in the domestic and international markets and the importance of structuring the range of products that meet the requirements of ISO 14000 and updated version of ISO 14001:2004 (EMS - system of environmental management). This standard indicates the management of a company's impact on the environment, resulting in both the domestic and foreign markets in the preservation of life and working environment.

⁸ Ćuzović, S., Ivanović, P. (2010), *Inovacije u trgovinskom menadžmentu*, drugo izmenjeno i dopunjeno izdanje, Ekonomski fakultet, Niš, str. 307.

⁹ *Sertifikacija*, br. 1/2009, str. 16.

Environmental management system, through the implementation of ISO 14001:2004 is an important tool for the management of products, services and processes of a company which directly or indirectly affect the environment and contributions:¹⁰ expenditure reduction, facilitating the implementation of laws, and improving the overall personal health, improve relationships with local authorities, suppliers and associates alignment with the policies of environmental management companies, insurance preventive measures and timely prevention of environmental disasters, increase the value and confidence the company has in the market, lifelong learning in the field of environmental protection, improving the overall image of the company, and achieving competitive advantage in the international market.

The implementation of the environmental management can be achieved by reducing the total expenditure of the company, and consequently, an increase of productivity and wages, which is one way of creating a competitive advantage in the international market. Increased earnings derived from finding ways to reduce waste, for its timely and adequate removal, as well as the efficient and rational use of energy in order to save. In addition, this standard requires the certification of critical processes established by the company and its full cooperation for taking corrective measures and law enforcement requests. All this contributes to the reduction, by mistake or intent caused by environmental disasters, and therefore huge fines.

Previously exposed to the benefits of the implementation of ISO 14001:2004, supports the thesis of the necessity of structuring the range of products under this standard, the companies operating in the domestic and foreign market. Consumer needs and wants differ from market to market , but the fact remains that their common denominator emphasized the need to environmentally sound products. As evidence that the structure of the portfolio companies is trading these products, just the standard ISO 14001:2004, indicating its relevance and necessity of implementation.

Requirements of HACCP standard

In the structure of portfolio trading companies which internationalize their business largely it is dominated by food products. The production and sale of these products are the most important aspects of quality, and safety. The commitment of all those who come in contact with these products is to ensure that all preventive measures in order to provide the market , high quality , but

¹⁰ Same, p. 20.

also the safety of products for the health of consumers. In other words, by offering these products in the international market, trading companies acquired predisposition for creating and maintaining long-term competitive advantage. This also raises the issue of consideration of HACCP and production and sales in accordance with it. HACCP standard means Hazard Analysis and Critical Control Points.¹¹ Implementation of the HACCP concept aims to ensure the quality of food "from farm to fork", which includes equal responsibility of producers, transporters, and trade. Generally, HACCP is a logical, scientifically based management system of production and sale of food products, which enables: 1) identification and assessment of potential hazards, i.e. any physical, chemical or biological risks at all stages of food production, including all process and distribution, 2) determine the necessary measures for their prevention and control, 3) the assurance that these measures will be successfully and effectively implemented.

Unlike control of finished products at the end of the production process, HACCP is a preventive system that ensures food safety in every step of production and sales. Is developed specifically for each product / product group or process, and should be defined and set up to suit the specific conditions of production and distribution of any product in particular.

Past practice has shown that EU companies that operate with food have become significantly more selective in dealing with suppliers from outside the EU, requiring a strict application of the HACCP system. From the standpoint of the market, manufacturers and exporters of food products from outside the EU who want to sell their products on the EU market must in its business activities include procedures for food safety and implement the HACCP system in their companies.

Only by meeting these criteria, the company acquired the requirements for the implementation and maintenance of HACCP systems, contained in the following seven principles:¹² 1) Implementation of risk - risk analysis, identification of risk - risk that may arise in the process of production and sales, 2) Determination of critical control points (CCP) is a point in the process where there may be a risk - risk. 3) Determination of critical limits, maximum or minimum values, by which the biological, chemical and physical hazards control, to them, seemed to prevent or to completely eliminate and 4) establishing procedures / process for monitoring CCPs , the procedures to

¹¹ Ćuzović, S. (2006), *Menadžment nabavke*, Ekonomski fakultet, Niš, str. 305.

¹² *Sertifikacija*, br. 2/2009, str. 22-27.

ensures that the CCP remains in critical limits , 5) Establish corrective measures - measures in the event that monitoring shows that CCP is not in the critical limits ; 6) Establish procedures/processes for verification - procedures and confirm that the HACCP system is effective and works well; 7) Establishing and maintaining effective records and documentation - documentation of the HACCP system is working well.

The above described principles underlying the HACCP system indicate that it is a very serious procedure and quality assurance for safety of food products. This is particularly important in terms of performance at different international markets, given that the HACCP system guarantees consumers hygiene and safety of food products that are found in the structure of portfolio trading companies.

Requirement of HALAL and KOSHER standard

In addition, previously exposed to quality standards, creating a range of trading companies become more important KOSHER and HALAL standards. HALAL is an Arabic word translated in our language means allowed legally. The word pervades the living Muslims and refers to something that is allowed or legal in all spheres of life. It is important to note that among the Muslims and their diet of faith and HALAL standards established Muslim holy book the Koran and the practice of the Prophet Muhammad more than 1400 years. Term for the opposite HALAL means and contraband, illegal, is Harem. In the Koran it says explicitly what is forbidden, and when the food and drink is important, it is not permitted to use pork and alcohol. Meshbuh term means something is fishy and that as such it cannot be used until it is established which of the two conflicting groups he belongs. It is also the job HALAL certification agencies. HALAL certification is used in the food industry, pharmaceuticals, cosmetics, chemical industry, manufacture of clothing, footwear and furniture and other industries. I HALAL standard imply that the specific products that are subject to certification are not banned substances in any form or quantity. Certain food products, for example, may contain certain additives or emulsifiers which are composed of Islam banned substances, which are prohibited for Muslims.

It is estimated that in the 2008 year of HALAL products spent more than 580 billion dollars, of which only about 200 billion food. Bearing in mind that the market seems a population of about 1.8 billion people, or a quarter of the world population, the trade companies which are present in different international

markets is important to the structure and have a range of HALAL products, which will meet the consumers of religious orientation.¹³

KOSHER is a word that means good, clean, valid for use by Jewish religious law. In the Torah, Leviticus, there is a list of what is allowed Jews and all that they are not allowed to use. KOSHER standards have nothing to do with health standards, but only with Jewish religious laws and relate to food. Jewish rules on what is allowed to consume and what not, are the most stringent in the case of the religious world. Interestingly, the KOSHER certificate accepted by the Muslims. In the process of obtaining KOSHER certificates, all the ingredients used in a factory, all the raw materials must have KOSHER certified. If the product needs some vitamin or something, then that vitamin must have KOSHER. Simply put the entire factory or in the manufacture, must be KOSHER.¹⁴ KOSHER that important in the design range of international trading companies is the fact that the vast KOSHER market, primarily in the United States. Only in New York City has two million Jews, and KOSHER products consumed and non-Jews. In American supermarkets is almost no product that does KOSHER certified.

Managing private label

With market orientation, trade companies are becoming more aware of the value provided by the focus on the brand and brand products. Accordingly, their activities are focused on brand building which is essential to attracting consumers in various international markets, but also for differentiation with respect to domestic and foreign trade chains.

Architecture of private label

In the modern business environment, as a symbol of identification and differentiation from the competition, there is brand name.

There are many definitions of brand. Different definitions of brand products at the same time pointing to the fact that a brand new name, sign or symbol by which products the product is easily recognized by the market and thus reduces the risk of consumers being misled if they appear similar products.¹⁵

¹³ *Progressive Magazine*, br. 48, 2008, str. 32.

¹⁴ *Progressive Magazine*, br. 49, 2008, str. 32

¹⁵ Sokolov, S. (2006), *Uloga trgovine u kreiranju vrednosti za potrošače*, magistarska teza, Ekonomski fakultet, Niš, str. 175-178.

In the context of branded products, it is necessary to point out that there is a difference between the brand manufacturer and private label. Very often, the brand manufacturer is well known to consumers, even before buying, and represents the maximum quality. If trading companies in its portfolio are exclusively branded manufacturers, this means that it is a small business, Web retailers, discount stores or commercial enterprises whose credibility is based on the well known name brand products, or the strategy of low prices.

However, at a time when trade companies are becoming more powerful in the market, there is a brand- product of the trade mark or trade. Private label represents the name that has been designed by a trade company, a name that is more profitable for a trading company, which leads to customer loyalty.

In developing its own brand and branded products trading company can focus on one or more categories of brands. Thus, the theory and practice of knowledge of the four categories of private label: ¹⁶ a premium brand, generic, imitating the exclusive co-brand.

Premium brand is a form of private label products in terms of quality, but also save the cost, can be compared with the well-known producer brand or brands. Examples of premium trademarks are Wal-Mart's Sam's Choice, Tesco Finest, St.Michael Marks & Spencer, Woolworths Select, etc. Generic brand targeting price-sensitive consumers and covers the main products that are offered at discount prices. An example of this is the supply of milk or eggs in supermarkets or underwear in discount chains. Imitating private label recalls producer brand in terms of appearance and packaging, and generally refers to the products of lower quality and lower price. Imitating private label products can usually be found in drugstores.

The exclusive co-brand is private label which has been developed by manufacturers, often in cooperation with trade company, which has exclusive rights to its sale. The simplest form of co-branding is when a manufacturer introduces different models and different features of a product which is sold by various commercial companies. For example, a product exclusive co- brand the different variants we meet at various trading companies. A lot more sophisticated form of exclusive co- branding is when a manufacturer is developing an exclusive product or category for a trading company.

¹⁶ Levy, M., Weitz, B.A. (2009), *Retailing Management*, McGraw-Hill, Irwin, p. 386-387.

In addition to these brands or categories of trade mark, trade companies in the process of internationalization of the business may be focused on the following strategies of brand:¹⁷

1. Strategy "umbrella brand" - where all the objects of a company selling the same brand, in many cases, differentiated by sub-brands;
2. Strategy "the familiar brand" - where a group of stores has a trading company of different brands,
3. Combined strategy- that of a particular group of stores using a strategy "umbrella brand", and the second group used the strategy of "the familiar brand."

These strategies, for example, well-known international trading company, can be seen from Figure 3.

Figure 3. *Brand strategy on the example of different trading companies*

Brand strategy	Trade company	Private label
"Umbrella brand"	Tesco	Tesco Extra, Tesco (Superstor), Tesco Express, Tesco Extra
	Edeka	Edeka aktiv markt, Edeka neukauf, Edeka center
	Systeme U	Marche U, Super U, Hyper U
Combined strategy	Coop	Coop, Coop Pronto, Coop bau+hobby, Coop City, Coop@home, Interdiscount, TopTip, Impo, Christ
	Migros	M, MM, MMM, Migros Restaurant, m-electronics Globus (robne kuće), OBI (kao franšiza), Office World, interio
"Familiar brand"	Metro	Metro Cash&Carry, Real, Media-Markt, Saturn, Kuhhof
	Kingfisher	B&Q, Castorama, Brico Depot, Screwfix, Koctas
	Casino	Geant, Casino, Leader Price, Monoprix
	Carrefour	Carrefour, Dia, Champion, Ed, Minipreco, Ooshop.com
	DSG International	Currys, Dixon, Dixon.co.uk, PC City, Electro World,Elkjop

¹⁷ Zentes, J., Morschett, D., Schramm-Klein, H. (2007), *Strategic Retail Management*, Gabler, Wiesbaden, p. 125.

Creating and functions of private label

Intense competition in the domestic and international markets stimulating effect on trade companies to the structure of the product range is those with its trademark or brand. This business orientation involves creating a brand that has the following characteristics:¹⁸ is different from the competition, reflects the image quality at a low price, there are independent of the company, providing significant value to consumers. Every successful brand building by trade companies involves respect for the principles of diversity product over the competition. In that sense, the companies reflects an orientation to brand their entire organization must be seen as an entity that is focused on creating a brand. Illustrated by the observation Bridson and Evans¹⁹ that the orientation of the brand in the context of trade, seen as a multidimensional synthesis which includes organizational values, beliefs, behaviors and practices. Consequently, to create a brand capacity is required, such as diversity, functionality, quality, added value and symbolic value for consumers.

Each orientation of the brand increases the performance of the company as a result of the construction of four key benefits:²⁰

1. advantage of range of products - construction of different brands from the competition;
2. benefits of customer service - an additional level of service in retail stores;
3. advantages of communication - promoting functional characteristics of branded products;
4. advantages of business formats - reflect the brand personality.

These elements point to the integration of brand and commercial environment in which companies operate. Also emphasize the importance of value for consumers and different brand personality, which is important for differentiation trading companies operating in various foreign markets. However, when building a brand it is important to trade company goes through certain levels or stages, which will enable it to successfully position itself in the market. As confirmation of this thesis is to research scholars and Burt, in which trade company goes through six levels of trade mark or brand, as can be seen from Figure 4.

¹⁸ Alexander, N., Doherty, A.M. (2009), *International Retailing*, Oxford University Press, New York, p. 310.

¹⁹ Bridson, K., Evans, J.(2004), The Secret to a Fashion Advantage is Brand Orientation, *International Journal of Retail and Distribution Management*, Vol. 32, No 8, p. 403-415.

²⁰ Same

Figure 4. *Levels of brand development by trading companies*

<p>Level 1: Non-branded products Character: products to meet basic needs Context: demand exceeds supply Consumers: basic knowledge about the usefulness of the product</p>
<p>Level 2: Brand as a reference Character: physical attributes differentiate the product Context: competitive pressure stimulates the differentiation Consumers: the products are identified on the basis of differentiation</p>
<p>Level 3: Brand as personality Character: brand personality provides differentiation Context: delivery of products similar physical attributes Consumers: knowledge leading brand self-expression</p>
<p>Level 4: Brand as an icon Character: reflecting the importance of networking and identity Context: brand educate the consumer society Consumers: consumers accept the brand to create identity</p>
<p>Level 5: Brand as a company Character: the complexity of identity generates multifunctional communication between stakeholders and companies Context: sophisticated brand Consumers: Consumers are involved in creating interactive brand</p>
<p>Level 6: Brand as a policy Character: brand regulated by different causes Context: heterogeneity of social value system Consumers: self-actualization through brand affinity</p>

Source: *Burt, S. (2000), The Strategic Role of Retail Brands in British Grocery Retailing, European Journal of Marketing, Vol. 34, No 8, p. 875-890.*

Passing through the previously levels of brand development leads to corporate branding, which is especially important in the process of internationalization of trade. This importance stems from the fact that corporate branding is not just a branding company for wider reflection of the relationship of the company with various stakeholder groups. Corporate branding through trade company is able to better differentiate and position itself in the "minds" of stakeholders which enables it to build value that is easily identifiable.

Authors Balmer and Greyser²¹ corporate branding trading company linked to the six "C" (character, culture, communication, conceptualizations, constituencies, covenants):

- Character - indicates factors that create a different entity. It can be tangible and intangible assets of the company or the company's activities, a market that it serves, corporate assets, corporate structure, type of organization, corporate philosophy and corporate history;
- Culture - indicates the set of beliefs, values and assumptions of employees drawn from the history and heritage of the company;
- Communication - points to different forms of communication with customers and other stakeholders;
- Conceptualization - indicates the perception of the corporate brand by consumers and key stakeholders. These perceptions may be latent and affect the behavior and views of the company;
- Constituencies - appeal to different groups of stakeholders, such as employees, investors and the community, allowing the company to operate in different markets;
- Covenants - point to informal agreements with the company's customers and other stakeholders, who have the loyalty and trust in the corporate brand. In contrast to the visible property of the company that makes the entity, these agreements indicate emotional assets that reflect a strong bond with the brand stakeholders.

Thus, corporate branding is not just branding companies and products that make up the structure of the range. Based on the above facts, we can conclude that the trading companies in the process of internationalization of trying to get a good position in selected market by building the structure of corporate brand.

Conclusion

Internationalization of trading companies can't be done ad hoc, but is a careful design and targeting activities. In other words, it is necessary to carefully establish possible internationalization strategy based on clear and proven marketing guidelines. Thus comes to the fore marketing dimension of internationalization of trade, which includes a set of complex activities, from selection, market research and selection for performance, pending a decision on whether to perform with standardized or customized "package" deals. In these circumstances, marketing is taking on an advisory and guiding role, so that

²¹ Balmer, J., Greyser, S. (2006), Corporate Marketing, *European Journal of Marketing*, Vol. 40, No 7-8, p. 730-740.

research confirms that those commercial companies that have marketing experience and marketing capabilities meet all prerequisites for the successful implementation of the strategy of internationalization. Starting from theoretical explications range of products and its strategy to work, we aimed to highlight the specificity of the product range in terms of the internationalization of trade. The starting hypothesis we tested through the analysis of the concept of quality management and private label.

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AGRARIAN POLICY OF SERBIA – IMPLICATIONS FOR AGRICULTURE AND AGRO-INDUSTRIAL SECTOR*

*Stanislav Zekić, Miloš Tošin***

Abstract

Development strategy after World War II implies the discrimination of individual holdings and encourages large state/publicly owned estates in agriculture. The result is the creation of the dual production structure and uneven development of agriculture as a whole. The period, marked by the transition processes in all the former socialist countries of Central and Eastern Europe, is characterized by the UN sanctions and the imposed model of a closed economy in Serbia, which further contribute to the modest reform process. In the period after the year 2000, the country has been opening to the world and creating conditions for the start of the reform process. However, this period is marked by the absence of a clear strategy for the development of agriculture, with great instability of agrarian policy as a result. Such a policy has significantly affected the production and performance of agriculture and the state of the agro-industrial sector.

Key words: *Agrarian policy, Agriculture, Productivity, Agro-industry, Serbia.*

Introductory Notes

The political changes after the Second World War cause the development of agriculture in Serbia based on ideological model of transformation, which means the socialization of production relations in agriculture. However, since the Soviet concept of cooperatives is not adopted, the

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development of individual sector is restricted and the large agro-estates are promoted. The result is the creation of the dual production structure and uneven development of agriculture. In Serbia, the transition to a market economy is facilitated because the majority of agricultural funds have already been in private hands. However, during the nineties, the initial transition period¹ is characterized by the influence of many non-economic factors that significantly decelerate the process of agricultural transformation, which involves overcoming the problems inherited from the past. Nevertheless, after the country is opened, the agricultural policy of Serbia has been burdened by budgetary constraints and an *ad hoc* approach without clearly formulated strategy. On the whole, the primary goal should be the preparation for the process of joining the EU single market, which basically means improving of production potential and increasing agricultural competitiveness. In addition to the agricultural production, it is inevitable to monitor the agro-industrial sector, which makes a unique system of food production together with agriculture.

Serbian agricultural policy during the pre-transition period

In the period after the Second World War, the socialist transformation is a basic concept of the development of the Yugoslav (Serbian) agriculture. It anticipates the creation of large-scale commodity production, based on large state estates, with the use of science and technology achievements, scientific organization of labor, socialization of the production process and overcoming of private property. Economic motives do not dominate the former agricultural strategy; the goal is the development of agriculture and change of socio-economic conditions in agriculture and in rural regions.

Implemented in the period from 1945 to 1953, the concept of collective farms has not brought about the desired results and there are serious problems in food production.² After abandoning the collectivization of agriculture, the so-called bimodal agricultural strategy is defined, promoting the dual character of agriculture. This development strategy favours the social sector; although the individual peasant farms are

¹ In the paper, period after in 1990 marked like transition period, while the period 1945-1990 is called the pre-transition period.

² The objective of collectivization is quick liquidation of private ownership of land and basic assets, and the creation of farmers' cooperatives and large agricultural estates, which are supposed to contribute to increased agricultural production and then solve the existing problem of food deficit.

allowed, their development is significantly restricted. Namely, the public sector of major commodity production is referred to as the advanced sector of modern agriculture. It has thus been state privileged and supported by the concentration of land and capital, as well as by intensive use of bio-chemical and mechanical inputs. On the other hand, the private sector is identified as the traditional sector of petty commodity production and in many ways restricted in its development - there are limited possibilities of expanding the land fund (land maximum), procurement of machinery is banned and so on. Input production, processing industry and distribution are the public/state property. At the end of the eighties, 85% of arable land, 80% of conditioned livestock, and as much as 97% of the total number of tractors are in private ownership. However, in relation to the concentration of basic funds, the private sector lags behind, in terms of social marketability of production according to the purchase - 43% compared to 57%, respectively (*Statistical Office of the Republic of Serbia*). This fact clearly indicates the semi-natural character of individual sector production and more extensive production in relation to large social enterprises, which is particularly evident in the passive mountainous areas.

In the period from 1989 to 2000 several laws concerning social ownership transformation into private property are voted in Serbia: the so-called Law on Salaries and the Law on the Social Capital (the Federal Law) in 1989. In 1991, the Law on Conditions and Procedures to Transform Collective Property into Other Forms of Property is adopted by the Assembly of the Republic of Serbia; however, the effects of privatization are significantly reduced by the 1994 amendments to the Law. In 1991, the Law on the Land is voted, and in 1992 the Law on Transformation of Socially Owned Agricultural Land to Other Forms of Property is adopted, with the main purpose to prevent the sale of public assets of the companies which have the agricultural land acquired under the Law on Agrarian Reform and the Regulation on Nationalization. Nevertheless, the privatization of agriculture has not much advanced³ until 2001, when the Law on Privatization is adopted, which is supposed to carry out the privatization of socially owned capital. The Law anticipates the sale of capital through public tenders and auctions, as well as the transfer of capital without compensation to employees and citizens.

³ In the period 1989-2000, the private share of total agricultural land increases from 82% to 85%, of livestock from 81% to 90%, while the number of tractors in private hands remains the same - 97% (SGJ 1990, p. 241 and SGJ 2001, p. 204).

On the basis of the Law many agricultural estates are privatized, however, many of these privatizations are reversed, since the customers of the enterprises did not fulfill the obligations. The process of privatization of agro-processing companies is improved in the first decade of this century, especially in the beer industry, tobacco industry, confectionery industry and the like, where the share of foreign capital is significant. The privatization process runs more slowly in the area of primary production - sugar factories, mills, etc., while most problems occur in the industry for input production (*Zekić S., 2008*).

Agricultural policies during the transition period

During the nineties, Serbia is a politically and economically isolated country, which experiences the bombing by NATO at the end of the decade. The overall political and economic situation imposed the closed economy model, with the main objective of agricultural policy being the food security of the population.

The Serbian agriculture budget, formed in 1996, mainly targets at supporting livestock, so the largest funds are allocated for milk premiums, which in some years reach almost a half of the agricultural funds. In crop production, the production of industrial crops is mainly supported, which partially destabilizes the domestic market of wheat and corn.

The market support is dominating in the first years after the 2000, with still the largest share for milk premiums, although not to the same extent as before. On the other hand, the crop production premiums increase. The direct support to farmers is limited to defining the protective prices for wheat, but also for other products to some extent. In addition, there also exist subsidies for the purchase of agricultural land.

Export subsidies, for meat, milk, fruits, vegetables and other food are very modest. Price and trade liberalization is also characteristic for the period after the year 2000, so the import protection for agricultural products during this period is significantly decreased, as well as the extensive consumer subsidies. The customs tariffs are increased for meat and meat products, and to a lesser extent for milk and dairy products, while they are reduced for oil seeds and fruit, industrial and medicinal herbs, coffee, tea, spices, fruits, etc. (*Bogdanov, N., 2004*)

In the following years there is a growth in the agricultural budget funds, as well as the increased funding for measures of structural support. Since 2004, the price support has been reduced, and the inputs have been subsidized more significantly, as well as the credit support to farmers; since 2006, farmers' incomes have been more supported. There have been some measures for support of rural development since 2004, however, the support for investment programmes of rural regions in Serbia is very modest, which is caused by severe budget cuts at the macro level. From 2007, the payment per hectare for all farms from 0.5-100 ha is introduced, which has become the dominant form of agricultural subsidies, as other forms of support are either abolished or reduced.

This type of support is reduced later (there are even some attempts to leave it completely and re-introduce the price support) and the incentives for livestock are increased. Generally speaking, the period after the year 2000 is characterized by unstable agricultural policy, which results in uncertainty for farmers and other participants in the production and distribution of food.

Land potential and structure of agricultural production

Serbia manages a respectable land potential, with a high share of agricultural and the arable land in total area, significantly higher than the EU average, especially than the average in the Region⁴ (*Table 1*).

Table 1. *The availability of agricultural and arable land*

State	Share of agricultural area in total area (%)	Share of arable area in total area (%)
Serbia	57.9	41.1
REGION	36.5	19.8
EU-27	44.6	28.5

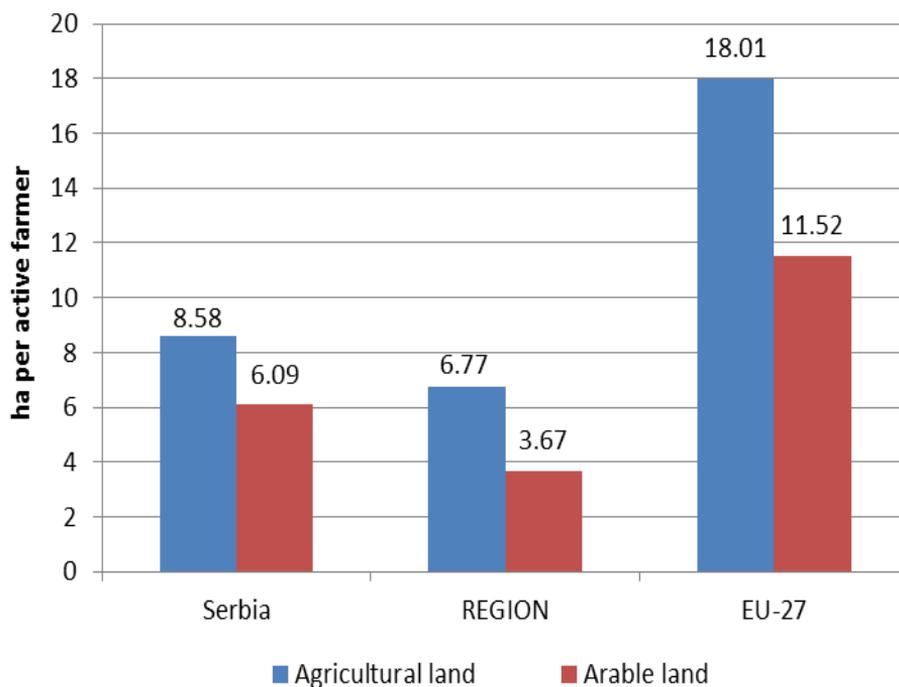
Note: *Data for 2011.*

Source: *The authors' calculations on the basis of FAOSTAT.*

⁴ The term Region comprises the following countries: Albania, Bosnia and Herzegovina, Montenegro, Croatia and Macedonia. Croatia is classified in this group since it will become a member of EU from 1st July 2013.

However, the availability of land resources is better reflected if available areas are expressed by the active farmer⁵ (Figure 1). If compared to the average of the EU countries, it can be seen that Serbia has little agricultural and arable land per person employed in agriculture, which indicates the relative agricultural over-employment. However, Serbia has a favorable resource structure compared to the average of other countries in the Region, which is relatively low due to the very unfavorable land/agriculture ratio in Albania.

Figure 1. *Agricultural and arable land per active farmer*



Note: *Data for 2011.*

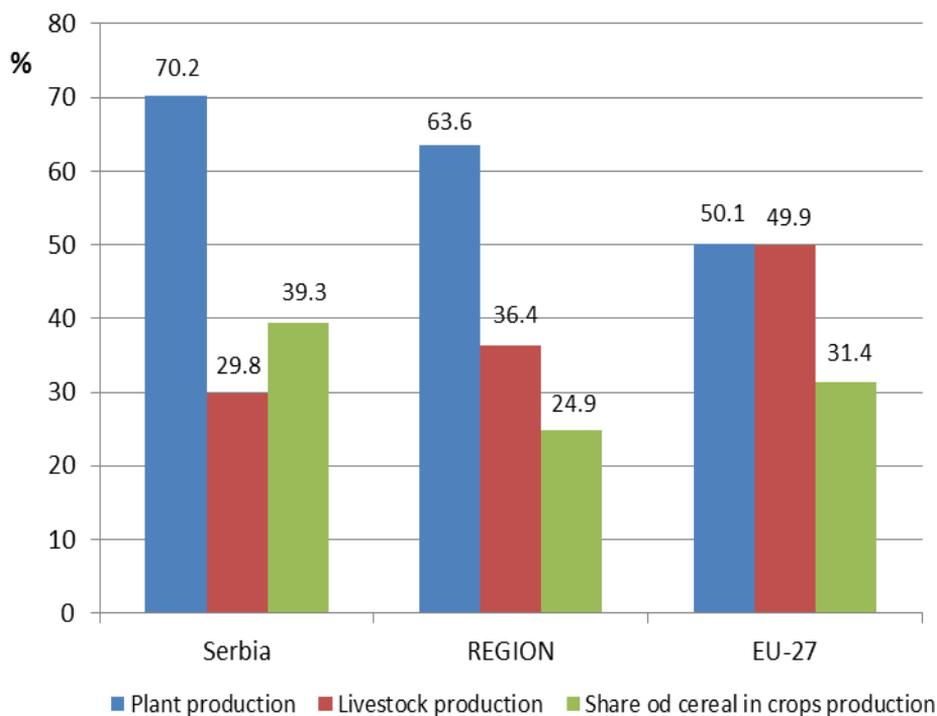
Source: *The authors' calculations on the basis of FAOSTAT.*

From the aspect of agricultural production structure in terms of relative crop production and animal husbandry, Serbia is not much different from other countries in the Region, with the little lower share of livestock production and little higher share of cereals in total plant production.

⁵ The term *Active farmer*, in the article, refers to *economically active population in agriculture* according to the FAOSTAT methodology.

In relation to the EU, Serbia has much more extensive production, dominated by crop production with more than 2/3 of the total agricultural production. Such unfavorable production structure, in terms of inadequate participation of livestock production and the low level of utilization of the production potential of livestock, implies the irrational use of the basic factors of agricultural production - land.

Figure 2. *The structure of agricultural production*



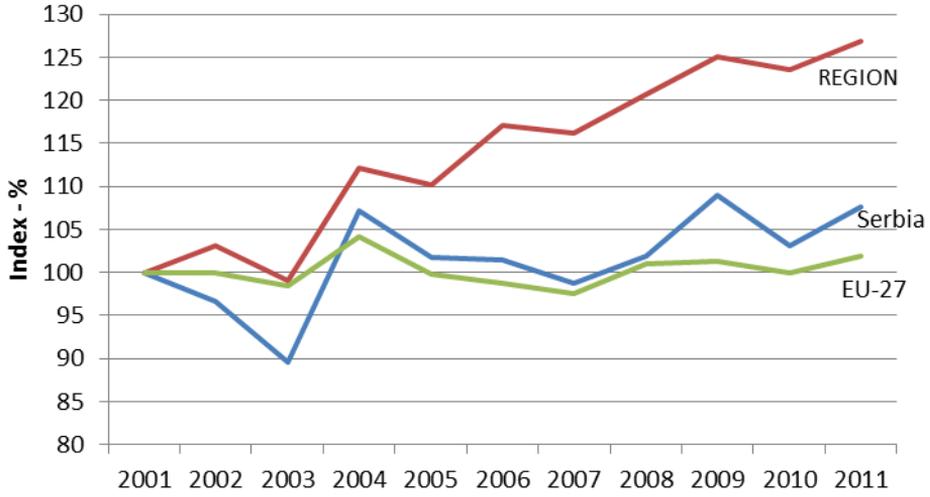
Note: *Data for 2011.*

Source: *The authors' calculations on the basis of FAOSTAT.*

Main characteristics of agricultural production

In the last ten years the agricultural production in Serbia has been incremental - about 1% a year on average, although there is a noticeable lag behind the countries of the Region, with the average annual rate of 2.59%. In the analyzed period, the EU countries do not have a strong growth in agricultural production, which is expected due to the changes in the Common Agricultural Policy, which do not stimulate the growth of production.

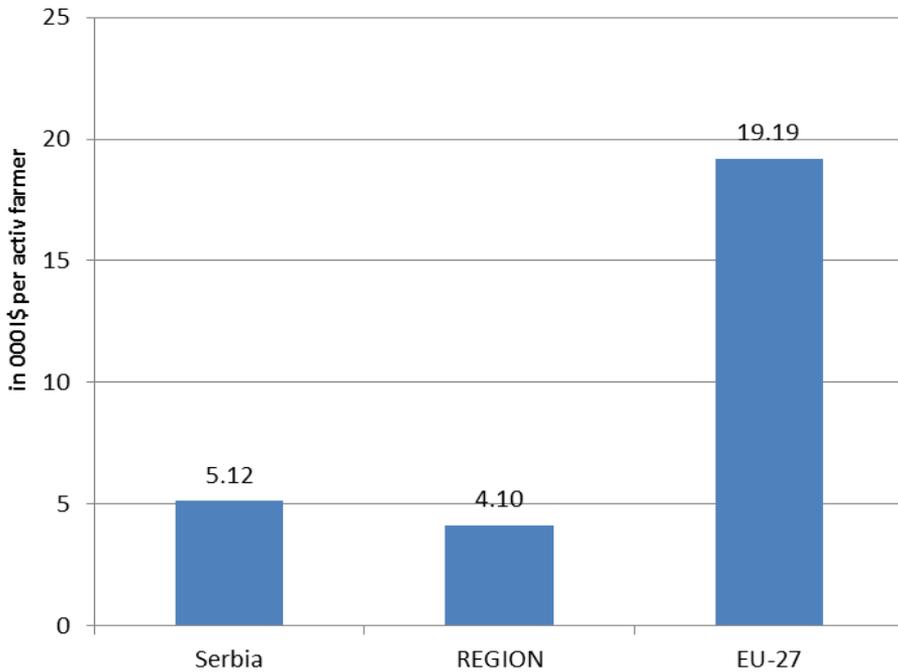
Figure 3. *The dynamics of agricultural production*



Note: 1989 = 100.

Source: *The authors' calculations on the basis of FAOSTAT.*

Figure 4. *The level of labor productivity*



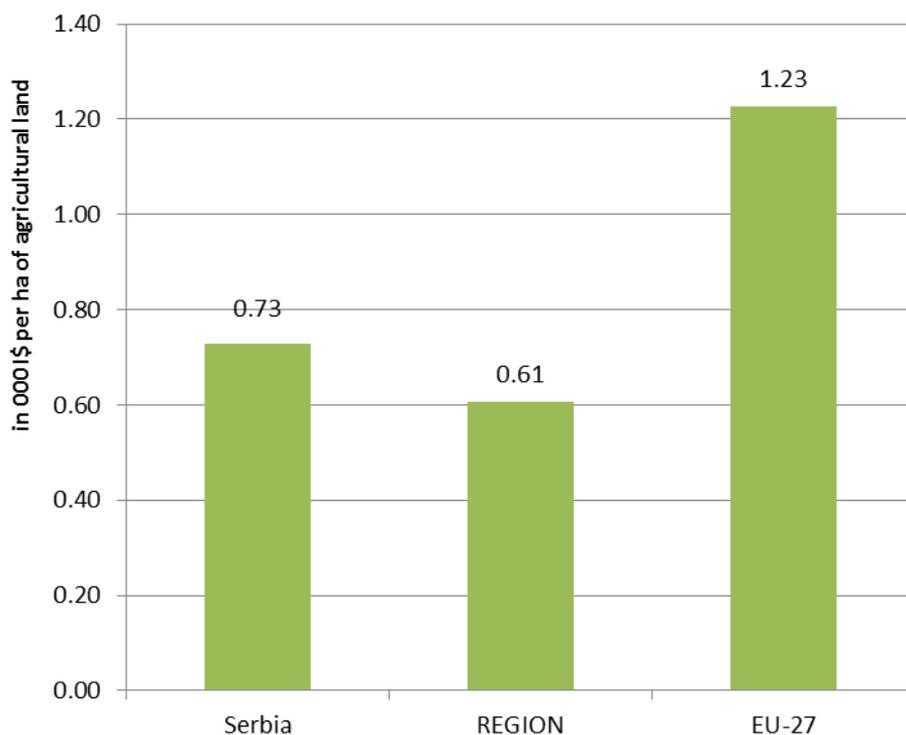
Note: *Average for the period 2001-2011.*

Source: *The authors' calculations on the basis of FAOSTAT.*

From the standpoint of productivity, the lag behind the EU, both of Serbia and the Region, is noticeable, so the ratio between the EU and Serbia is 1:3.75, in the analyzed period.

The higher level of final agricultural production per active farmer in Serbia, compared with the regional average, is primarily due to very low labor productivity in Albanian agriculture, which certainly reflects the regional average.

Figure 5. *The level of land productivity*



Note: *Average for the period 2001-2011.*

Source: *The authors' calculations on the basis of FAOSTAT.*

The situation is somewhat better for Serbian land productivity, and the ratio between the EU and Serbia is 1:1.68. The relatively low level of land productivity in Serbia (compared with the EU) is primarily due to ratio of crop and livestock production (*Figure 2*), i.e. already mentioned extensiveness of production in terms of dominant crop production with relatively extensive plants - cereals, mainly in dry land farming system.

Development Characteristics of Agro-industry

After the stagnant development process of the 1980s, during the last decade of the 20th century, Serbian agro industry⁶, as well as the whole industry, has negative development features. The period 1989-2000 is characterized by the reduction of agro-industrial production which contributes to the industrial production decline rate of 7.9%.

Additionally, the decline in production is mostly pronounced in animal feed production⁷ (10%), while food processing, being the dominant sector of agro industry, declines 5%. The production decline is much less severe in tobacco production and processing (1.4%) and beverage production (0.7%). In the former economic and political environment, in 1993, under the economic and political sanctions by the international community, in the implicitly "imposed" model of closed economy, the sharp decline and the lowest production output occur in food processing (51% compared with 1989) and beverage production (71%).

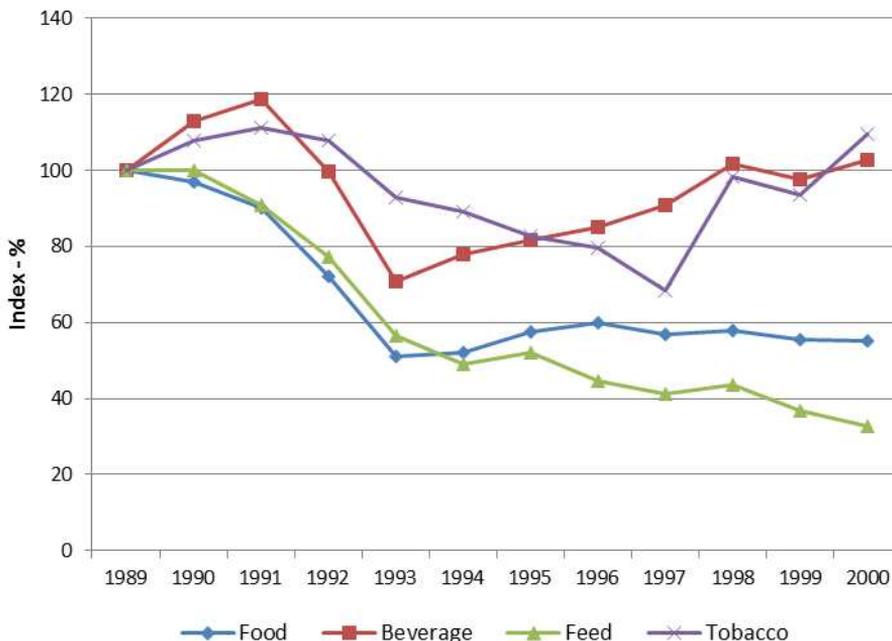
The following positive development trend is very slow in food processing, so in the last year of the twentieth century and after the "humanitarian" intervention of NATO in 1999, it reaches only 55% of food processing volume achieved in 1989, while the beverage production, with significant fluctuations, reaches the pre-recession and pre-transition output level.

Animal feed production has the trend of decline by 2000, when it reaches the lowest volume. In tobacco production and processing, the production volume tendentially declines by 1997, and after a three-year growth, it achieves the production volume of the year 1989 (*Figure 6*).

⁶ In this paper, the agro industry consists of food production (or processing industry), beverage production, animal feed production and tobacco production and processing, according to the Classification of Economic Activities from 1977 (*KD 1977*), or food and beverage production and tobacco processing according to CA 1996 (*KD 1996*), and food production, beverage production and tobacco processing, according to CA 2010 (*KD 2010*). For more details see the publication "Classification of Activities" ("Klasifikacija Delatnosti") issued by Statistical Office of the Republic of Serbia.

⁷ Production performances of animal feed production are mainly determined by retarded development characteristics of livestock production and the relatively high level of import dependence on the components used in the production of balanced concentrate animal feed.

Figure 6. *Agro-industrial Production in Serbia (1989-2000)*



Note: 1989 = 100.

Source: *The authors' calculations on the basis of Statistical Office of the Republic of Serbia.*

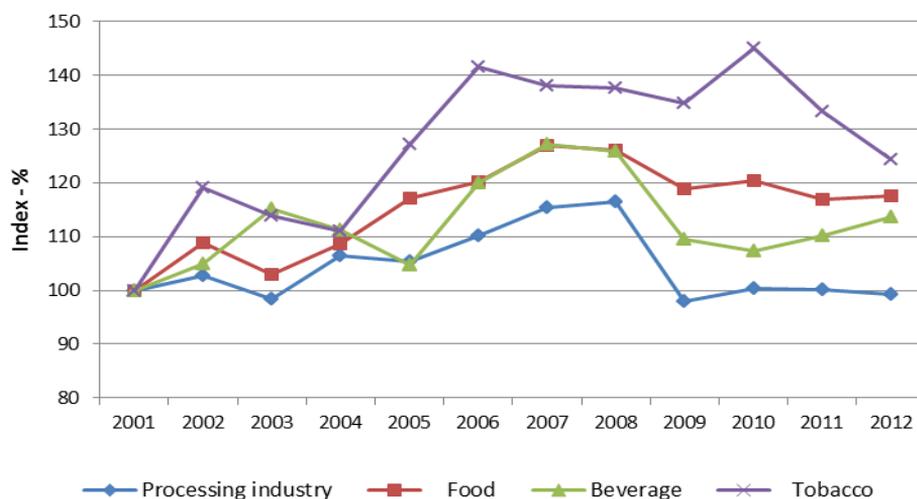
The tendential decline in the volume of production in the period 1989-2000 is accomplished with the reduction of employment in all areas of agro industry, with simultaneous and even more pronounced decrease in labor productivity in the food processing, beverage production and animal feed production, being basically the consequence of the closed economy model imposed by economic sanctions. Only tobacco production and processing shows the tendency of labor productivity growth.

Serbian production capacities of agro industry, built mostly in a very different economic environment including the size of the domestic market as probably its most important feature, in the first half of the 1980s are utilized approximately 80%, compared with the projected capacity⁸.

⁸ The official statistics has published the data on the utilization of the projected and technical capacities. This paper analyzes the utilization of the projected capacity including the year 2000, which by definition of projected and technical capacities, show higher degree of utilization compared with the technical capacity. However, since the

The stagnant level of utilization of production capacity of agro industry and the entire industry of Serbia in the 1980s significantly and rapidly decreases at the end of that and at the beginning of the next decade, which is caused by the abovementioned narrowing of domestic market, as well as by very limited opportunities for exports in the period after international sanctions of 1992, followed by abrupt and high liberalization of foreign trade without adequate measures to protect domestic production. The significant increase in the level of capacity utilization is achieved only in the tobacco production and processing⁹, with the "moving" around or above 50% in the 2000s, which is still significantly below the pre-recession and pre-transition period. In the same period, in the other segments of the agricultural industry, the capacity utilization is approximately 40% in food processing, just under 40% in beverage production, and about 30% in animal feed production.¹⁰

Figure 7. *Agro-industrial Production in Serbia (2000-2012)*



Note: 2001 = 100.

Source: *The authors' calculations on the basis of Statistical Office of the Republic of Serbia.*

utilization trends of both of them are almost the same, the concentration only to the projected capacity does not question the results of the analysis.

⁹ Tobacco production and processing is, together with oil and derivatives sector, the segment of the economy that is in the highest degree exposed to the black market, which has the significant impact on its production performance, and the "filling" of the budget and the settlement of general social needs.

¹⁰ Details on the problems of capacity utilization and the level of achievement and loss of potential output see: *Gajic, M., Lovre, K, Zekić, S., and Trkulja, D., 2003.*

Locating the analysis of development characteristics of agro industry in the transition period 2001-2012, when the economic system significantly changes and the process of European integration begins, leads to the conclusion that the development process is characterized by the positive development trend. The most pronounced increase is in the tobacco processing (2.2%), while the lowest growth rate in the agricultural industry is in the beverage production (0.7%). In the food processing¹¹, as the dominant segment of the agro-industrial production, the average growth rate is 1.5%, and it has the greatest weight in determining the development of agro-industrial production performance. The detrimental fact is that the tendency of growth in the food processing and beverage production after 2008, and in the tobacco processing after 2010 is inverted to the tendency of decrease (*Figure 7*). This is another supplementary indicator that the process of de-industrialization is not stopped, because the overall tendency of growth in whole processing industry after 2008 is "inverted" to the tendency of decrease, and on the average, the production in the processing industry has been declined at a rate of 0.1%.

In this period, the tendency of output growth is accomplished by reduced number of employees in all areas of agro industry, with simultaneous and pronounced increase in labor productivity, which is the positive development feature. However, in the context of the aforementioned data on the degree of production capacity utilization, the extremely emphasized reduction of employment in agro industry and the whole processing industry indicates the imperfection of the economic system in the regulation of the impact factor of the transition recession, property transformation and the like.

Concluding Remarks

After the Second World War the agriculture in Serbia is developed in conditions of bimodal strategy development, which means privileged large state/socially owned properties, while the private sector is restricted in various ways. Such agricultural policy leads to the creation of a dual production structure, where large agro-estates are "islands" of modern

¹¹ It should be noted that the data for this period are given by the Classification of Activities from 2010 (KD 2010) and that there exist significant differences compared with the earlier classifications, the most important being the fact that the animal feed production "is attached" to the previous food processing.

agriculture in the "sea" of relatively underdeveloped agriculture on small semi-natural farms. The conditions for the transformation of socialist agriculture and its integration into the market economy system are introduced in the nineties. However, the substantial progress is not achieved in this period, basically as a consequence of non-economic factors, such as the UN sanctions and the war in the surrounding countries and in Serbia itself. Only after the year 2000, the country has opened to the world and created conditions for accelerated reform process.

However, the lack of a clear strategy and the budget limitation has conditioned a variable agricultural policy without a clear goal, which derives an uncertain surrounding for farmers. In addition, the problem of duality has still been pronounced, making it difficult to formulate appropriate policy, which should enable agriculture to develop as a whole and to the greatest possible extent, as well as to adapt to competitive pressures, inevitable on the path to EU membership.

Generally speaking, Serbia has relatively good land resources; however, the problem is unfavorable resource structure, i.e. insufficient labor supply of land. This means that the Serbian agriculture has a relatively large share of labor input, which is primarily caused by the development stagnation of non-agricultural sector, which is unable to employ the surplus labor from agriculture. In addition, the production is very extensive, dominated by crop production with the prevailing cereals and a marginal share of irrigated land.

During the nineties, negative development characteristics are present in all sectors of agro industry, in which the decline in production is accompanied by the decrease in employment. Excluding the tobacco production and processing, in all other sectors – food, beverages and animal food processing – there is the decrease in productivity. In the period 2000-2012, the output growth in the processing industry increases together with the further reduction of number of employees in all sectors, leading to the increase in labor productivity.

However, at the end of the first decade of this century, the agro-industrial production is re-reduced. The degree of capacity utilization in the food processing in Serbia is inadequately low and the slightly higher utilization of installed capacities exists only in the tobacco industry.

The analysis of production performance and the degree of utilization of projected capacity clearly indicates that in the last twenty years, the agro industry of Serbia "has developed" at a pace that is well below the determined economic parameters, but also below the required level, indicated by the aggregate domestic demand and balance of payments. Such development trends will be more fatal, not only for the agro industry, but also for the whole economy of Serbia. The solution must be sought in a clear and precise definition of development objectives and economic and political instrument operationalization for their realization.

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OPERATIONAL MANAGEMENT OF IRRIGATION WITH THE AIM OF AGRICULTURAL HOLDING DEVELOPMENT

Svetlana Potkonjak, Ksenija Mačkić¹

Abstract

We presented a model of irrigation systems management, which was developed and partially tested on an actual system. The research has shown that irrigation management on a agricultural holding cannot be observed regardless of other agro-technical operations. That is why such methods ought to be developed inseparably from the overall management of agricultural production on a agricultural holding. In order to improve the management of irrigation systems, more advanced methods and technologies should be used (GA,GIS). On a agricultural holding in Vojvodina the testing of a suggested management model was initiated. Firstly, the optimization of production structure was performed, indicating that much better economic and production results of irrigation operations can be achieved. For the same system, a data base was created, based on which the costs of irrigation by crops were calculated. In the following season, system management will be aimed at the reduction of irrigation costs.

Key words: *irrigation, agricultural holding, management model*

Introduction

Irrigation links the two most important factors of agricultural production: water and soil. The common goal of this melioration system is to provide the optimal water regime necessary for the growth of plants.

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Irrigation systems management in the cases of surface water use, can hierarchically be observed at several levels: the river basin → regional hydro-system → large local system → small local system. Research shows that it is at least the regional hydrosystem that should serve as the starting point (Potkonjak S., 2010).

If observed at the level of sectors, irrigation within agriculture presents the largest water consumer. Apart from agriculture, the same watercourse or hydrosystem is also reflected on by: industry, energetics, navigation. In the conditions of limited amounts of water resources, distribution of water among users becomes even more complex.

In recent years, the theory of management of systems which can also be applied on irrigation has considerably advanced (sustainable management, integral management, GIS technology). Moreover, regarding classical methods of network planning and management (CPM and PERT), genetic algorithm is used more extensively. There are several typologies of models and methods of management (Giupponi C., et al., 2006).

Having in mind the significance of irrigation for the development of agricultural production, especially on the territory of the Danube region in the Republic of Serbia, where the large areas are in question, the research of the management of these systems can be approached from different aspects and by using different methods.

The research in this paper is based on the development of a contemporary model of irrigation systems management, which can be applied in this area as well. A data base was also created for the chosen irrigation system, on which the further testing and improvement of the developed model will be realized in the following season. The obtained results are supposed to show whether the planned reductions of irrigation costs are achieved, along with the yield increase of certain crops.

Potential models and methods of irrigation systems management

For agricultural crops with high irrigation costs with respect to the realized gross product, irrigation control presents the primary question regarding the management of: water resources, equipment and work force.

The strategy of irrigation systems management should be developed before the irrigation season (Potkonjak S., et al., 2010) by:

- Choosing the optimal production structure (according to the chosen function of criteria and limiting conditions system), as well as
- Designing the orientational irrigation program (time, amount of water, equipment), based on which the decisions for irrigation systems management are made.

Modalities of irrigation management are quite different for particular crops, soils and other conditions. A range of programs and software has been developed in order to solve this problem, theoretically in the first place, and then in practice for a specific area.

When dealing with processes of irrigation systems management, numerous models which use contemporary methods of operational research have been developed. Several models which use different methods for dealing with the processes of irrigation systems management are presented. There are also numerous program packages available (software) which could be adapted to our conditions.

MODEL A: The amount of water in this case is limited by the volume of the reservoir or the capacity of a pumping station, where the precipitation is taken into consideration. By using a deterministic model of dynamic programming (Potkonjak S., 1993), the model is formulated in the following way:

Objective function:

$$\max_{u_{ij}} \sum \sum \alpha^{t-1} \cdot b_{ij} \cdot (w_{ij} - w_{ij}^2)$$

Constraints:

a) $0 \leq \sum u_{ij} \leq x_i \leq Q_v$

b) $x_{i+1} \equiv \min(x_i - \sum u_{ij} + q_i, Q_v)$

where is:

b_{ij} – price of product, din/t, by crops "j" in season "i" ,

α - discount factor,

w_{ij} - quantity of total water that the crop "j" receives in season "i", mm

q_{ij} - quantity of water that the crop "j" receives in season "i" natural rainfall,

u_{ij} - quantity of water to be added to the crop "j" in season "i".

In this case, the criterion is the choice of integers u_{ij} thereby maximizing the present value of the income from the sale of the crop.

MODEL B: The amount of water in this case is limited by the volume of the reservoir or the capacity of the pumping station. Assumed precipitation is in this case treated as the accidental variable with the probability of occurrence. Unlike the previous one, this problem is solved by stochastic dynamic programming (Potkonjak S., Srđević B., 1997).

Constraints:

a) $0 \leq \sum u_{ij} \leq x_i \leq Q_v$ u_{ij}, x_{ij} – are integer

b) $\sum p_i \{k_i\} \equiv 1$ - probability of precipitation that is calculated.

MODEL C: Using genetic algorithms (GAs) for optimal management of sprinkle irrigation networks is presented on real irrigation system in Italy (Nicolini M., 2012). This model contains specific objective function and constraints. Mass and energy had included in a nonlinear two-criterion function. Using this model the author solved the problem of optimal pressure that is addressed through the placement and regulation of pressure reducing valves.

The formulation of this problem is:

$$\min : f_1 = n_v$$

$$\min : f_2 \sum_{k=1}^{N_f} \sum_{i=1}^{N_n} w_k l_{i,k}$$

subjected to:

$$H_{i,k} \geq H_{req,i}$$

$$n_v \leq N_v$$

where is: n_v – number of valves in a generic solution, N_n – is number of nodes in the network, w_k – is weight associated to load condition k , $H_{req,i}$ – is required head at node i , N_v – is maximum number of valves allowed.

MODEL D: Using genetic algorithms (GAs) for choice of optimal cropping pattern (Raju S., Kumar N., 2004). The objective function is to maximize net benefits with constraints such as continuity equation: land and water requirements, canal capacity, reservoir storage restrictions and cropping pattern considerations. This model has been applied on Sri Ram Sagar Project in India.

General form of the model is:

$$\text{Objective function: } BE = \sum_{i=1}^n B_i A_i$$

Following constraints

$$\text{Continuity equation: } S_{t+1} = S_t + I_t - R_t - O_t \quad t = 1, 2, \dots, 12$$

Crop area restrictions:

$$\sum A_i \leq CCA \quad i = 1, 2, 3, \dots, 10 \text{ for Summer season}$$

$$\sum A_i \leq CCA \quad i = 1, 2, 3, \dots, 10 \text{ for Winter season}$$

Crop water requirements:

$$\sum_{t=1}^{12} \sum_{i=1}^{10} CWR_{it} A_i \leq R_t$$

Canal capacity restriction:

$$R_t \leq CC \quad t = 1, 2, 3, \dots, 12$$

Live storage restrictions:

$$S_t \leq LSP \quad t = 1, 2, 3, \dots, 12$$

Cropping pattern constraints :

$$A_i \geq A_{i,\min} \quad t = 1, 2, 3, \dots, 10$$

$$A_i \leq A_{i,\max} \quad t = 1, 2, 3, \dots, 10$$

Where is: i – crop index, B_i – neto benefit from cultivation of different crops, A_i – area of crop i grown in the command area (ha), S_{t+1} – reservoir storage in the reservoir at the end of month t (Mm^3), I_t – inflows into the reservoir during the month t , (Mm^3), R_t – Releases from the reservoir during the month t (Mm^3), O_t – spillage from the reservoir during the month t (Mm^3), CCA – cultural comand area, CWR_{it} – crop water requirements for crop i in month t (meters), CC –canal capacity, m^3/sec , S_t – reservoir storage volume, LSP – maximum live storage capacity of the reservoir, $A_{i,\min}$, $A_{i,\max}$ – min and max limits of the cropped area.

Genetic Algorithms in this investigation is found to be an effective optimization tool for irrigation planning and can be used for more complex systems involving non-linear optimization.

MODEL E: In this model (Otieno F., Adeyemo J., 2011) is presented the multi-objective cropping pattern modeling of a farm in the Vaalharts irrigation scheme in South Africa. The cropping pattern model content three function criterions and three constraints.

Criteria of opimization are: maximize total net benefit in monetary terms by different crops, maximize total agricultural output (tons) and minimize the irrigation water use (m^3). They developed multi-objective differential evolution algorithm (MDEA). This model used to solve problem on farm, size 77,1 ha. MDEA methodology content several steps (8).

General form of this model is:

Objective function 1: Maximization of total net benefit

$$\text{MaxNB} = \sum_{i=1}^N (TI_i \cdot A_i) - (A_i \cdot CWR \cdot CW) - (C_{ov} + C_{HE} + C_{FL})$$

Objective function 2: Maximization of agricultural output

$$\text{MaxAP} = \sum_{i=1}^N \{ [Y_i \cdot A_i] / 10000 \}$$

Objective function 3: Minimization of irrigation water

$$\text{Min Vol} = \sum_{i=1}^N (CWR_i \cdot A_i)$$

Where is: NB-net benefit on the whole farm, N-is number of crops, TI – is the total income of ith crop in rand per annum, A_i –is the area where ith crop is grown in m^2 , CVW_i - is the crop water requirements for crop i, C_w – is cost for water per m^3 , C_{ov} -is the overhead costs per annum, C_{HE} – is the household expenses per annum, C_{FL} – is the fixed liabilities per annum.

Constraints 1: Total area

$$\sum_{i=1}^N (A_i) \leq \text{Total area of farm}$$

Constraints 2: Monthly release

$$IRD_t \leq \text{max available water on farm}$$

Constraints 3: Minimum and maximum planting area

$$A_i \leq A_{i\max}$$

Where is: NB-net benefit on the whole farm, N-is number of crops, TI – is the total income of ith crop in rand per annum, A_i –is the area where ith crop is grown in m^2 , CVW_i - is the crop water requirements for crop i, C_w – is cost for water per m^3 , C_{ov} -is the overhead costs per annum, C_{HE} – is the household expenses per annum, C_{FL} – is the fixed liabilities per annum, IRD_t – is the irrigation demand in month, t – is total of crop water requirements for all the crops in month t, $A_{i\max}$ - is the maximum area where each crop should be grown.

This model can be adapted to any irrigation scheme with minor modifications.

MODEL F: Alberta Irrigation Management Model (AIMM) help producers in their irrigation scheduling decisions. The model simulates the growing conditions and crop water use of 52 different crops. Output from AIMM is:

- Graphical and tabular reports of daily soil moisture condition, evapotranspiration, climate data, irrigation application amounts, surface

run-off and deep percolation for any number of fields or sites within fields;

- Predictive assessment on crop water requirements and irrigation timing for designated near-future time periods;
- Record keeping for crop production information such as fertilizer and chemical use, seeding rate, crop yields, pumps and pumping record information, irrigation application and rainfall.

With minor changes, this model and software could be adapted to our production conditions.

Development of the model of irrigation system management

A model of this kind can be designed during and after the realization of irrigation project. In this case, it is necessary to select models which will represent the case in practice in the best way, creating for it at the same time an adequate program, which will calculate on a computer all the parameters relevant for irrigation systems management, by using the course of collected data and adequate methods.

When creating such models, it is essential to be familiar with the role, significance and functioning of the irrigation system on a farm which operates in our conditions and on the territory of the Danube region in Serbia. In addition, existing connections with a water management company or regional hydro-systems in charge of supplying water for irrigation, have an impact on the management of the local irrigation system (large or small).

When creating a potential model, previously gained experience served as a starting point in this problem field. Several models developed both in our country and worldwide used for the similar purpose were studied.

Overall, the model should contain all the parameters which are relevant for the management of agricultural production in the conditions of irrigation, and it can be elaborated according to climate and hydrological conditions of a specific area.

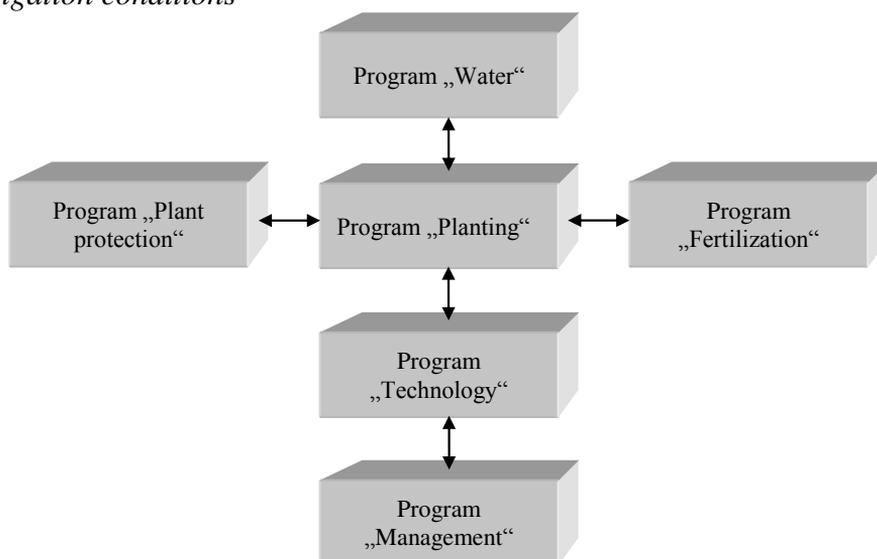
A model of management of agricultural production in the conditions of irrigation should provide information about:

- Optimal representation of particular crops and their expected yield,

- Optimal distribution of irrigation water during the season and the irrigation calendar,
- Optimal fertilization plan for particular crops (types and amounts of fertilizers) and realization schedule,
- Optimal plan of plant protection of particular crops (types of chemical substances and amounts) and realization schedule,
- Optimal mode of agricultural production management, regarding the previous plans.

In this case, the model of operational management which would appropriately connect the irrigation system with the process of agricultural production in the production conditions on the territory of the Danube region in Serbia, would encompass several major programs.

Figure 1. *Complex management model of agricultural production in irrigation conditions*



Source: *Authors own illustration.*

The function of particular programs would be the following:

Program PLANTING – based on several more important factors of agricultural production (soil, water, machines, work force, processing capacity, market), this program researches the optimal production structure in the conditions of irrigation and calculates the function of criteria.

Program WATER – researches the balance of available water, calculates the annual norms of irrigation and norms of watering for particular crops, adjusting them to the production structure.

Program FERTIGATION – elaborates the optimal fertilization plan (manure and mineral fertilizers) according to the production structure, determines the optimal fertilization period and calculates the norms of effectiveness of work force and mechanization.

Program HEMIGATION – elaborates the optimal plan of crop protection according to the production structure, determines the optimal period of protection and calculates the norms of effectiveness of work force and mechanization.

Program TECHNOLOGY – for each crop from the program “PLANTING”, production technology is created in accordance with the available factors and the optimal schedule of realization of particular work operations. In this case, irrigation is included as the agro-technical operation and management is related to all the objects which belong to the irrigation systems (pumping station, pipes and canals, mobile equipment).

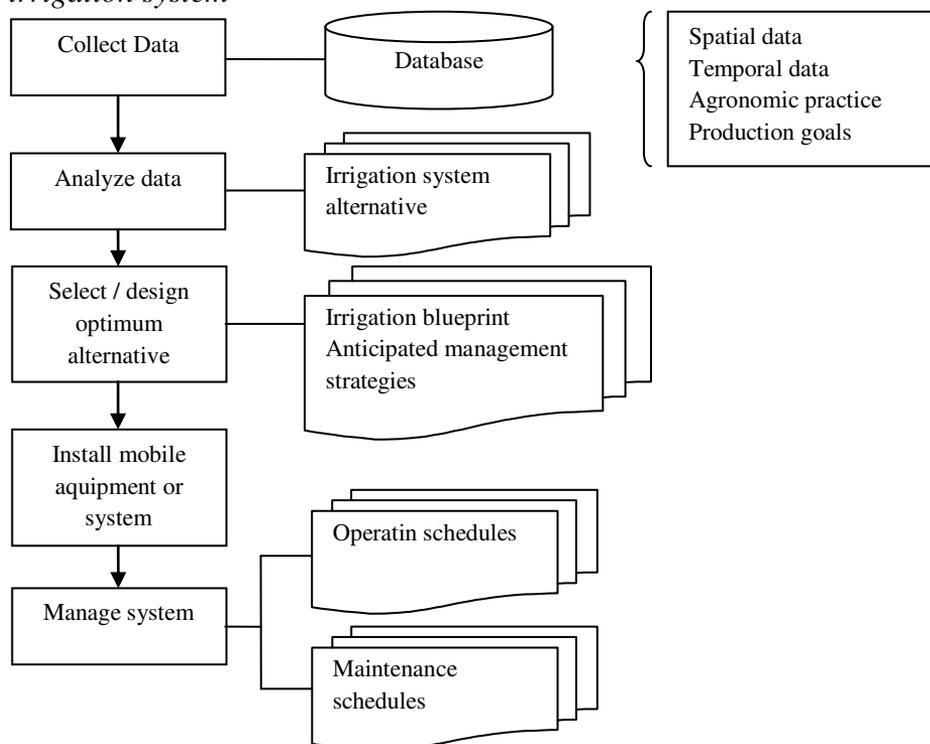
Program MANAGEMENT – manages agricultural production by monitoring the realization of the operational production plan (daily, decadal, monthly) for each of the crops individually.

In order to realize the management process successfully, it is necessary to have appropriate data bases available, which would be connected with certain programs. In this case, the algorithm for creating the data base for the management of the irrigation system is suggested, Figure 2.

The data base in the current conditions is formed from: operational bookkeeping of a farm which possesses the irrigation system, by using GIS, data gathered from the hydro-meteorological station, data from the regional hydro-system which provides water supplies and other sources.

The simplest case of developing the model of the irrigation system management is when there is only one crop (orchard, vineyard, hop field) and drip irrigation or micro rain irrigation. On the territory of the Danube region in Serbia, there are numerous examples of such systems of irrigation (current and future) (Potkonjak S., Zoranović T., 2012.)

Figure 2. Algorithm for the creation of a database for the management of irrigation system



Source: Authors own illustrations.

In such cases it is possible to manage the production process depending on individual types of soil and various amount of water added during the vegetation period. Management relates to achieving the maximum net-income for the particular type of crops and types of soil, i.e.:

$$(\max)NP = UP[\hat{P}] - c(\hat{d}_t, \hat{p}_t)$$

T – total number of irrigation periods during the period of vegetation,

\hat{P} - the state of potential yield in the period of time t,

\hat{d}_t - amount of necessary water, the variable which is managed,

NP – expected net-income,

UP[\hat{P}_t]- total income at the end of the season,

t = T – after settling the costs of harvesting,

$c_t[\hat{d}_t, \hat{p}_t]$ - costs of crops irrigation, with the state of yield \hat{p}_t in the period of time t , with the amount of water \hat{d}_t . These costs include the costs of processing and treatment of crops which were carried out, as well as the costs of used water.

Management is subject to restrictions, including the limited total amount of water, Q , available for the irrigation during the vegetation period, i.e.:

$$\hat{d}_t \leq \hat{Q}$$

The symbol (\wedge) marks the variable continuity, brackets [] for continuous functions, whereas the parenthesis () show a function defined by an index. The model is solved by using dynamic programming.

In the case of presence of a larger number of crops, the choice of the optimal structure of agricultural production turns into a more complex problem, which is also the case with the further production management, due to a larger number of factors and restrictions which are to be taken into consideration. With this aim, the optimization- simulation model was developed and tested on a large local system. Apart from irrigation, it included other factors of agricultural production important for achieving successful production and economic results particularly in dry years. These are work force, agricultural mechanization, livestock, processing capacities and the market. The model is one-dimensional, because it only performs the allocation of land to individual crops depending on the set limitations.

General form of the model is:

Objective function: $(\max)D = \sum_{i=1}^n d_i \cdot x_i$

Limiting factors:

I Area of irrigation system: $\sum_{i=1}^n x_i < PS$

II Agrotechnical limitation – max. and min. proportion of individual crops are included

$$\text{III Water consumption: } \sum_{i=1}^n c_i \cdot x_i < QW$$

$$\text{IV Irrigation system capacity: } \sum_{i=1}^n q_i \cdot x_i < QS$$

$$\text{V Mechanization (tractors and harvesters): } \sum_{i=1}^n p_i \cdot x_i < RT$$

$$\text{VI Labour power (permanent and seasonal): } \sum_{i=1}^n r_i \cdot x_i < RS$$

VII Capacity requirements (cattle farming, processing, marketing):

$$\sum_{i=1}^n p_i \cdot x_i < b_k$$

Where is:

D – total foreseen net profit, €; d_i - net profit for individual crops, €/ha; x_i – surface under individual crops, ha; i – number of crops ($i=1,2,3\dots n$); PS- available area of system, ha; c_i – water consumption (m^3/ha) for individual crops; QW- available water quantity, m^3 ; q_i – watering hydromodule, l/c/ha; QS - system capacity, l/s; m_i – machine labour rate, h/ha; r_i – man labour, h/ha; RT - available machinery capacity, h; RS – available labour capacity, h; p_i – yield for individual crops, t/ha; b_k – individual capacity requirements, t; k – capacities number ($k= 1,2,3,\dots K$).

Application of the model in practice – case study

Forming the data base

Application of developed methodology of irrigation systems management on the territory of the Danube region in Serbia, was initiated on the irrigation system located in Vrbas. The gross area of the system amounts to 2096 ha, whereas the net area amounts to 1813 ha. Mobile equipment is made up of 11 mobile “Center Pivots”, 2 “Linears” and 16 “Tifons” with

a rail. The stable pumping station which supplies water to the system is of 870 l/s of capacity, with 7 pumping units inside it. The total length of pipes is 32100 m. Irrigation water is supplied from “Kula-Mali Idjos” canal.

In the vicinity of the irrigation system there are important food industry capacities (sugar factory, oil factory, cold storage, butchery) as well as the industrial factories for production of mineral fertilizers and pesticides.

The farm to which the irrigation system belongs has its own finishing and processing facilities (silos, grain dryer, selection station, dairy). It also owns agricultural mechanization (tractors of all categories, combines, implements).

There are 300 workers of different qualifications with full-time employment at this farm.

All these make the data base (as technical-technological indicators) and are used for developing of the production technology for certain crops and services.

In addition to these, the data base encompasses the economic data as well. They are the following: input and output costs, yield by crops, people and machinery work usage, analytical calculations for certain production and services, fertilization plans, plant protection, irrigation.

Application of certain program packages

In this phase of the research, within the “PLANTING” program package, the optimization of production structure according to the suggested model was performed in the first place. For choosing the optimal structure, the suggested model, a personal computer as well as the LINDO program were used. The obtained results are shown in table 1.

From the theoretical aspect, for this area of the system it is possible to achieve a more intense and profitable production structure (there is a lack of vegetables, fruit). However, the restrictions in this case were processing capacities and workforce. Optimization results would also be more favorable if the genetic algorithm, GA, was used instead of the suggested model of linear programming, LP.

Table 1. *Optimal structure of production in irrigation*

Variable	Crops	Area, ha	Expected yield, t/ha	Expected profit, €/ha
X ₁	Wheat	245	6	80
X ₂	Barley	200	5	240
X ₃	Maize	344	14	430
X ₄	Soybean for seed	290	4	230
X ₅	Segar beet	344	70	300
X ₆	Silo maize	100	40	92
X ₇	Maize for seed	290	4	600
X ₈	Soybean,double cropping	245	3.5	400
X ₉	Sunflower,double cropping	200	3	210
	Total	2258		708620

Source: *Authors own results.*

Table 2. *Cost allocation of irrigation on crops*

Var.	Crops	Area, ha	Annual rate of irrigation, m ³ /ha	Fixed costs of irrigation, €/ha	Variable costs of irrigation, €/ha	Total costs of irrigation, €/ha
X ₁	Wheat	245	900	250	53	303
X ₂	Barley	200	800	250	47	297
X ₃	Maize	344	2000	359	115	474
X ₄	Soybean for seed	290	1800	359	104	463
X ₅	Segar beet	344	2400	359	137	496
X ₆	Silo maize	100	1600	359	92	451
X ₇	Maize for seed	290	2400	359	137	496
X ₈	Soybean, Double cropping	245	1200	109	70	179
X ₉	Sunflower, double cropping	200	800	109	47	156
	Total	2258				865580

Source: *Authors own calculation.*

During the irrigation season 2012/2013, the usage of water for irrigation by crops (m³/ha) was monitored. Within the “TECHNOLOGY” program package, analytical calculation on the exploitation costs of the irrigation system based on the fixed and variable costs was carried out. These costs are divided by crops as shown in table 2. It can be noticed that these costs are significant for particular crops. In this case it is necessary to achieve the yield increase in irrigation with certain crops which could settle the following: total irrigation costs, increased costs of harvesting, transport, drying, storage and marketing.

In this way, we gathered the data which have an impact on the irrigation system management, and will be applied in the following production season.

In order to reduce the irrigation costs, it is possible to pay particular attention during the following agricultural season in the phase of system management, to the following individual costs: maintenance, amount of water taken, energy and work force.

Conclusion

The process of managing of irrigation systems particularly on the territory of the Danube region in Serbia, presents a complex set of problems which ought to be solved, hence there are several possibilities and approaches.

Management of these systems should be implemented along with other agro-technical measures (fertilization, crop protection), since this way only provides the complex implementation of production technology by particular crops, as well as achieving the maximum of economic results.

Management process realization requires previously developed models, along with the forming of a data base with which these models will show acceptable results. Making the management decisions cannot be done without the use of computers.

Testing of the suggested methodology was initiated on an actual irrigation system which belongs to the Danube region. During the following irrigation season, the data base will be supplemented, along with the improvements in the irrigation system management model.

Once the testing is fully performed, the developed model could also be applied on other agricultural holdings as well.

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DROUGHT RISK REDUCING IN CORN PRODUCTION USING WEATHER FORWARD*

Todor Marković¹, Sanjin Ivanović²

Abstract

Relatively new tools for risk management in plant production are weather forwards. By using weather forwards mostly the crops with significant participation in the sowing structure are being insured. Mercantile corn is the most important field crop in Serbia, and on family farms in Vojvodina participation of corn in sowing structure is approximately 50%. Climatic conditions have very big influence on corn production and insurance is one of possibilities for minimization of drought risk. However, such type of corn insurance is very rarely used in the world, while in Serbia it is recently introduced. In this paper we quantify the drought risk reducing effect with or without weather forwards. The results show that the hedging efficiency with weather forward is substantial (34,87%), but basis and geographical risk significantly reduces the protection effect. If the field of production is close to the meteorological station, the effect of risk reduction is significant.

Key words: *corn, drought, geographical basis risk, production related basis risk, risk management, weather forwards*

Introduction

It has been long known that the weather conditions are the main factor of uncertainty in the plant production. It is assumed that, as a result of global climate change, there will come to increased fluctuations of weather conditions. For this reason, an integrated system of risk management in

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plant production is necessary, in order to somewhat compensate for the loss caused by weather risks. Beside the traditional insurance, some authors suggest the need for an expansion of other crop insurance systems, especially of the multi-risk crop insurance, revenue insurance, income insurance and index insurance (weather derivatives) which is mainly present in the developed countries of the North America and is gradually being introduced to Europe (Berg, 2002, Weber et al., 2008, Marković, 2010).

Weather derivatives are relatively new tools for risk management that occurred during the mid-nineties and their payoff depends on a certain weather parameter. Although weather derivatives show many advantages over traditional insurance, the market for these products is still relatively limited. If there is a tendency to develop the market of the liquid weather derivatives in the future, then first of all it will be necessary to ensure crops that have a significant share in the sowing structure or a higher level of yield per hectare.

Mercantile corn is the most important field crop in Serbia. It is produced in average in each year on the area of 1,200,000 ha. On family farms in Vojvodina (which are at the same time the most important corn producers) participation of corn in sowing structure is approximately 50%.

Having in mind that corn is used as mercantile corn for concentrated feed, as well as for production of various kinds of silage, it could be concluded that corn is the most important fodder. Besides, corn is used in food processing industry and chemical industry as well. Corn is very important export commodity. Therefore corn has a significant economic influence on entire agriculture of Serbia.

If corn production is observed by regions than it is possible to conclude that larger areas under corn are situated in Vojvodina comparing to Central Serbia. Average yields per hectare and total volume of corn production are higher in Vojvodina than in Central Serbia region.

The aim of this paper is to provide the basic theoretical assumptions about the weather futures and forwards as new financial instruments in crop insurance and in the case of an individual household in Vojvodina to indicate the hedging-effectiveness of weather forward in corn production.

Material and methods

The basic source of data is the documentation of the Statistical Office of Serbia about the harvested areas, yields and production of corn in Serbia in the period from 2000 to 2011, data about corn prices, as well the documentation about corn exporting from Serbia in the same period of the time.

Also the source of data is the documentation of average yields and selling prices of corn provided by the selected farm in Ruma, as well as the information on the monthly amounts of rainfall from the meteorological stations „Rimski Šančevi“ Novi Sad, for the period from 2000 to 2011.

Weather forward is used as a risk management instrument to indicate an agreement between the two parties about the exchange of risk of inadequate rainfall. During the construction of the weather forward the key issue is the calculation of the forward payment.

The payoff of the weather forward (I_{FO}) is calculated as the difference of the strike level (G) and the realized the weather index (i) multiplied by the tick-size (N). Forwards do not distinguish between buyer and seller, but between the party, which has taken the long position and the party, which has taken the short position.

The payoff of weather forward for both sides can be represented as follows (Schmitz, 2007):

$$I_{FO}^{DP} = N \cdot (G - i) \quad (1)$$

$$I_{FO}^{KP} = N \cdot (i - G) \quad (2)$$

If the weather index is lower than the strike level, the party, which has taken a long position (buyer), pays a sum of money to the party, which has taken a short position (seller). On the other hand, if the weather index is higher than the strike level is, the short position pays to the long position.

The realization of the corn revenue, as an indicator of success, cannot be fully predicted due to uncertainty. Measures of dispersion are highly expressed (e.g. standard deviation) and the economic survival is permanently threatened. For this purpose, different methods are used to assess the risk.

This paper puts emphasis on the concept of stochastic dominance, where the different distribution functions (probability distribution) of revenue (with or without forward) are compared with each other. The starting point to examine the dominance is the cumulative probability distribution of the two alternatives.

Based on the previous statements the cumulative probability of corn revenue with and without weather forward is compared. Consequently, the value-at-risk method (with percentiles) is applied to determine the possibility of a reduction of the risk. The software (@ Risk) has performed all the necessary calculations.

Also, in this paper are used trend line method, as well as graphs, tables and percentages.

Results and discussion

Corn is very significant export item of Serbia. It is in accordance with fact mentioned by Gajić, M. and Zekić, S. (2013). According to these authors export structure of agricultural products is dominated by plant products characterized by low level of processing, which means products with low added value.

On the other hand, share of animal products and final products in total value of export is very small. Importance of corn as an export article is presented in table 1. In this table it is possible to notice that quantity of exported corn during period 2009 – 2011 is stabilized at level of approximately 1,600,000 t.

Analysis of the most important countries where corn is exported can be done regarding quantity and value of corn. The largest quantities of corn (table 2) are exported to Romania (approximately 63% to 70% of exported quantity, depending on year). Second important country (considering quantities of exported corn) is Bosnia and Herzegovina. In this country is exported somewhere around 9% of corn from Serbia.

Table 1. *Export of corn from Serbia in period 2004 – 2011*

Year	Quantity (t)	Value (000 USD)
2004	190,514	34,244
2005	813,139	103,267
2006	1,350,512	179,712
2007	415,740	85,099
2008	551,059	129,577
2009	1,602,073	288,129
2010	1,662,151	334,923
2011	1,630,893	455,544

Source: *RZS and authors' calculation*

Table 2. *Quantity of exported corn according to countries where the corn was exported (t)*

Countries	2009	2010	2011
Romania	1,111,857	1,046,759	1,062,187
Bosnia and Herzegovina	132,521	151,728	159,149
Italy	50,528	69,676	122,820
Other countries	307,167	393,988	286,737
Total	1,602,073	1,662,151	1,630,893

Source: *RZS and authors' calculation*

Regarding value of exported corn it is possible to see that Romania and Bosnia and Herzegovina dominate, as well (table 3). In contrast to quantity of exported corn, which is relatively stable, value of exported corn increases significantly year after year, due to rise of prices in the world market. Having in mind that in the world corn is increasingly used for various purposes (for example for biodiesel production) it is possible to expect that corn price will continue to rise in future.

Such rise of corn price could cause very unfavorable economic position of livestock production (primarily swine and poultry production) because corn significantly participates in structure of feed for animals. Corn price increase may generate high growth of milk and meat prices. This phenomenon can lead to certain social consequences which have to be kept in mind. It is also important that increase of milk and meat price should be appropriate to increase of corn price. Otherwise economic efficiency of livestock production may be questioned. Therefore it could

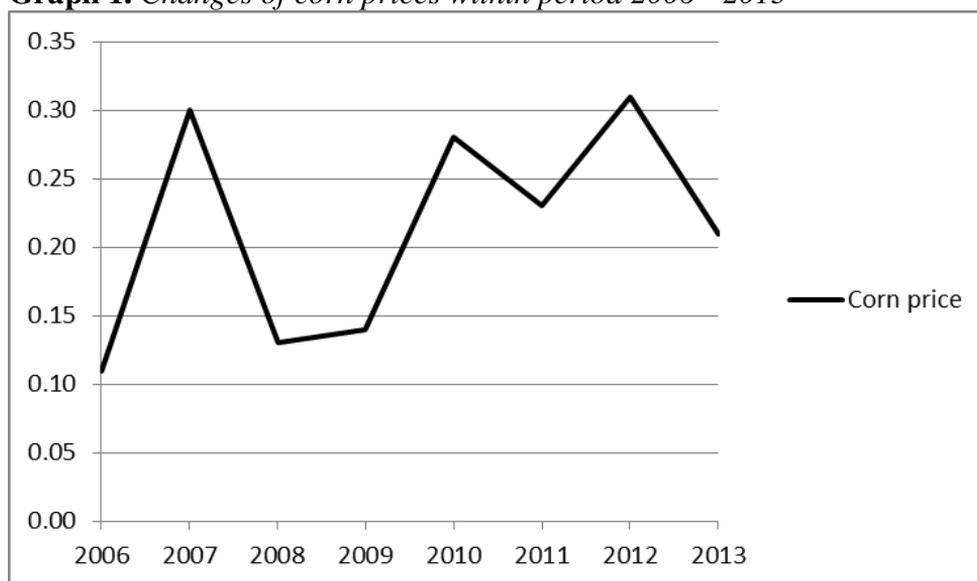
be expected that certain number of producers change production type from combination of field crop production and livestock production to specialized field crop production.

Table 3. Value of exported corn according to countries where the corn was exported (000 USD)

Countries	2009	2010	2011
Romania	184,839	198,594	284,341
Bosnia and Herzegovina	24,679	32,699	45,527
Italy	9,613	12,298	31,962
Other countries	68,998	91,332	93,714
Total	288,129	334,923	455,544

Source: RZS and authors' calculation

Graph 1. Changes of corn prices within period 2006 - 2013

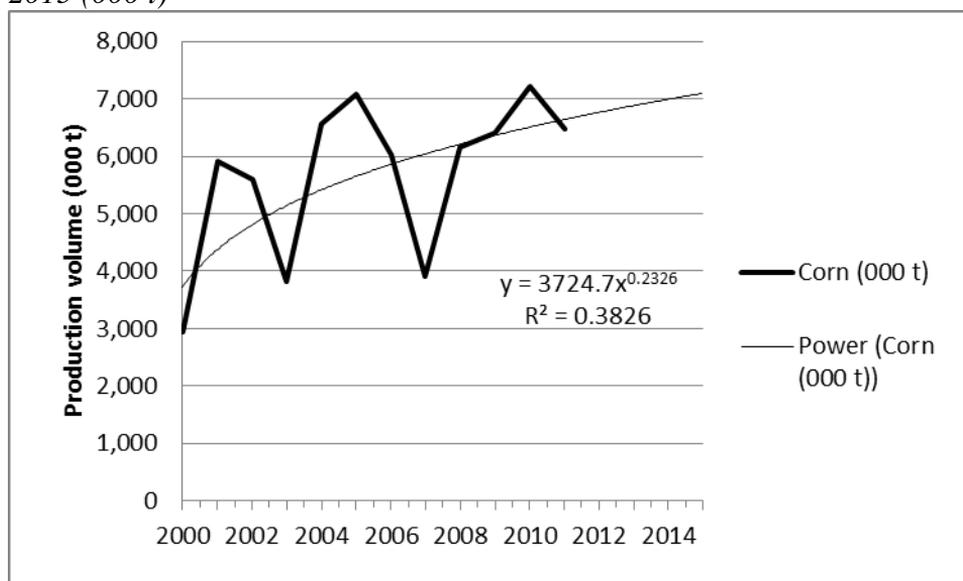


Source: STIPS and authors' calculation

Thus, it is obvious that changes in corn price could significantly influence not only economic effectiveness of field crops production but also of livestock production and economic effects of some industry branches. On graph 1 is presented development of corn price within period 2006 – 2013. Prices used in this analysis are taken from STIPS database. Prices are related to naturally dried corn sold in bulk, which means that on the graph are presented wholesale corn prices. To provide comparability of

corn prices they are presented in USD. Besides, the same period is used (beginning of October of each year), as well as the same area (Vojvodina). It could be seen that corn price varies significantly from 0.11 USD/kg in 2006 to 0.31 USD/kg in 2012.

Graph 2. *Trend line of total production volume of mercantile corn by 2015 (000 t)*



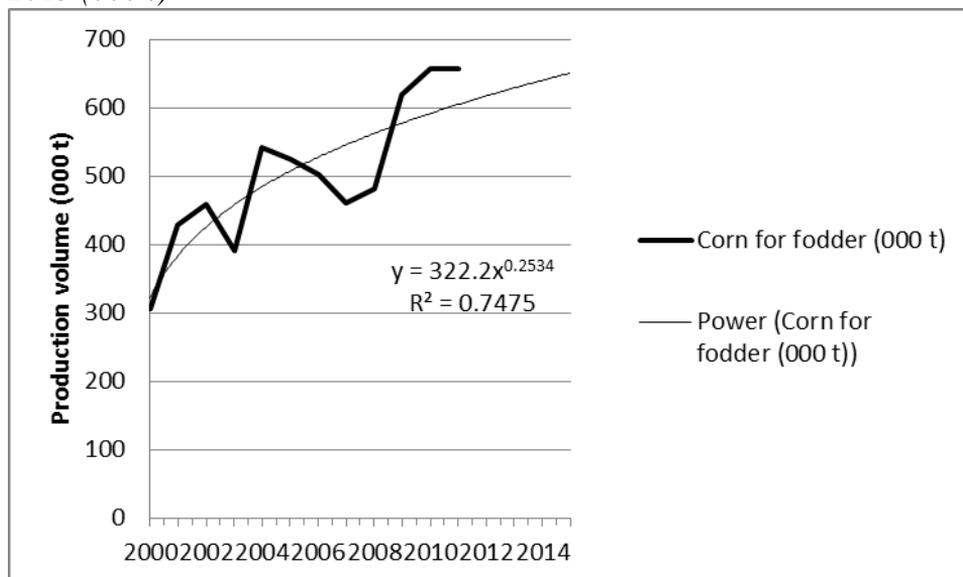
Source: *RZS and authors' calculation*

Average corn yield significantly varies from year to year and depends on climate changes and applied agricultural practice. It is necessary to emphasize dependence of corn yield from application of the proper technology in the cultivation of corn, because corn is an enterprise which requires relatively high input levels. On the other hand, under conditions of constant growth of prices (of fertilizers, pesticides, diesel fuel and other materials) agricultural producers because of lack of working assets very often do not use complete agricultural practice.

That leads to decrease of average yield in corn production. Munćan, P. and Božić, D. (2013) stated that yields of corn on family farms studied by authors (family farms specialized in field crop production in AP Vojvodina which possess more than 20 ha of arable land) are lower than average yields in developed EU countries by 13% to 32% (due to use of insufficient quantities of fertilizers).

Total production volume of mercantile corn and corn for fodder in Serbia varies considerably over the observed period (graph 2 and graph 3). However, it could be noted that there is trend of growth of observed indicators. Harvested area of corn for fodder in Serbia is approximately 25,000 ha. Total production volume of corn for fodder is still low, which indicates its small participation in cattle feeding. Therefore, cattle feeding (cattle are the most important consumers of silage corn) in practice is often based on alfalfa hay. Such type of feeding is too expensive and therefore reduces competitiveness of agricultural producers. Yield of corn for fodder is low, as well. It varies in average from 11 t/ha to 23 t/ha, while yield of mercantile corn is somewhere between 2.4 t/ha and 5.9 t/ha (table 4).

Graph 3. Trend line of total production volume of corn for fodder by 2015 (000 t)



Source: RZS and authors' calculation

Having in mind high production costs of corn per hectare caused by high input prices, it is possible to conclude that corn production costs per kilogram are additionally increased as consequence of low yields per hectare. On the other side, climatic conditions have very big influence on corn production, especially having in mind the fact that in Serbia irrigation is not applied in corn production. According to Stevanović, S. (2009) volume of corn production primarily depends on natural conditions during the growing season.

Insurance of corn is one of possibilities for minimization of drought risk. However, such type of corn insurance is very rarely used in the world, while in Serbia it is recently introduced (Vasiljević et al. 2013). On the other hand above mentioned authors state specifics of insurance of agricultural crops in Serbia: “The standard ones and the most present coverage in the case of Serbia are the ones of the prevailing risk: the hailstorm, fire and thunderstorm, with the most emphasis on the protection of the hailstorm. There could be also added the risks of storms, floods, frost and insurance against loss of seed quality, loss of quantity and quality of fruit and table grapes, etc.”

Table 4. *Yield of mercantile corn and corn for fodder within period 2000 - 2011 (t/ha)*

Year	Yield of mercantile corn (t/ha)	Yield of corn for fodder (t/ha)
2000	2.40	10.90
2001	4.80	19.20
2002	4.70	18.10
2003	3.20	15.10
2004	5.50	20.90
2005	5.80	21.10
2006	5.10	19.80
2007	3.20	16.20
2008	4.80	18.10
2009	5.30	21.90
2010	5.90	22.90
2011	5.10	21.10

Source: RZS

Weather derivatives are contracts (futures or options on futures), which are based on weather indexes (temperature, rain, snow, wind, frost, etc.). Based on these indexes the deviation of the actual weather parameter and the selected strike level is calculated. The deviation is calculated based on actual weather conditions, monitored by the reference meteorological station and the selected strike. Any deviation value is multiplied by a tick size and the contract becomes applicable if the level of the selected weather variable falls below or exceeds the strike level. In this way the weather parameter is converted into a product that can be traded.

Weather derivatives and other financial instruments may be traded on organized financial markets, respectively stock exchanges or they can be traded "over the counter" by specialized retailers (mostly banks and insurance companies). If the derivatives are traded on the *OTC* market, they are called forwards, if they are traded on the stock market, we talk about futures. The first and largest organized market for weather derivatives is the Chicago Mercantile Exchange (*CME*).

In Europe the largest market is the London Stock Exchange (London International Financial Future and Exchange - *LIFFE*). On the other hand, the *OTC* market is less regulated and it allows the creation of contracts, which are fully adapted to the needs and requirements of users (buyers and sellers). The selection of appropriate contracts largely depends on buyers and seller's aversion to risk, as well as their expectations for the future.

Basic types of weather derivatives are (Marković, 2010):

- Weather futures (standardized contracts, traded on the stock exchange);
- Weather forwards (privately negotiated contracts that are traded on the *OTC* market);
- Weather options (which can be traded on the stock market, but also on the *OTC* market).

On the market of weather derivatives the option trading is dominant. 75% of all the contracts are options (can be traded on organized financial markets or *OTC* market), while only 25% are futures and forwards (Becker and Bracht, 1999).

Futures and forwards are mandatory contracts, because the buyer and the seller are obligated to buy or sell a specific product in the future (Lazibat et al., 2009). Futures indicate the sale of a standard amount of financial instruments in the future at a set price and with are traded on stock exchanges. Weather futures contracts are products, which are index based on climatic variables and they are not very different from the commodity contract. Weather future contracts on a regulated market have standardized index value (tick size), whereas, on the *OTC* market cash value of the index is arranged according to user needs.

From the perspective of the buyer (long position) the payoff structure of futures (I_{FU}), is computed as the difference of the weather index at maturity (X_N) and at the time of assessment (X_0) multiplied by the tick size (N) (Mußhoff et al., 2005):

$$I_{FU} = N \cdot (X_N - X_0) \quad (3)$$

Based on the previous conclusions the difference between the futures and options are the following (Marković, 2010):

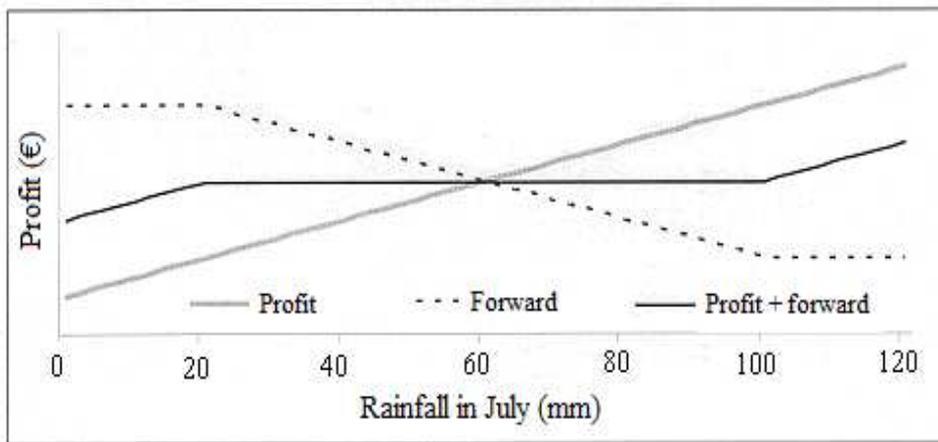
- Futures are traded on a regulated market, whereas options are traded on stock exchanges and *OTC* market;
- As the owner of futures obligated to buy or sell an instrument at maturity at a specified price, an option offers the buyer the right to buy or sell an instrument on a certain point of time (or the day maturity) at a specified price;
- An option comprises an obligation to trade if the buyer chooses to do;
- The right to do so must be purchased (option premium), while the futures are not bought, however, a fee has to be paid in the form of margins. The seller pays the margin of an option, because he can lose money (the buyer can only lose the option premium that has been already paid).

Forwards indicate the privately negotiated contracts, which are mainly traded on the *OTC* market. The main drawback is their low market liquidity. Weather forwards are private arrangements between two parties on the replacement of future cash flows according to a predetermined formula (Schmitz, 2007). Weather forward is an agreement between the two parties about the exchange of weather risk. A successful implementation of these instruments involves that the weather risk has the opposite impact on the participants in the transaction. Depend on the strike level and the weather index at the end of the weather contract both sides can be better off (Lazibat et al., 2009).

The agreement on weather forward between a farmer and an insurance company is taken as an example. The farmer wants to protect himself from insufficient rainfall in July by taking with corn insurance and thus ensuring his income. Based on the analysis of the relationship between sales (revenues) and the average climatic conditions, it was found that any deviation from the normal annual precipitation affects the farmer's income.

Unable to find hedgers willing to take the risk of the same size, but opposite in direction, the farmer decides to enter into weather forward with an insurance company that is acting as a speculator or it knowingly takes the risk with the intention to make a profit. The strike level is determined by the amount of rainfall and lies between the minimum amount of 20 mm and the maximum amount of 100 mm at exact 60 mm. The tick-size is 100 RSD/mm (1 EUR = 100 RSD). In this scenario the farmer wants to hedge insufficient precipitation, as he takes a long position.

Graph 4. *Payoff structure of weather forward*



Source: *Authors' calculation*

In the case that the actual rainfall ranges between 20 mm and 60 mm at the maturity of the forward, then the insurance company has to pay to the farmer the difference between the strike level and the actual amount of rainfall multiplied by the tick-size (100 RSD/mm).

$$I_{FO}^{DP}(N, G, i) = 100 \cdot (60 - x) \quad (4)$$

On the other side, if the actual rainfall ranges between 60 and 100 mm, the farmer has to pay to the insurance company difference between the strike level and the actual amount of rainfall multiplied by the tick-size (graph 4).

$$I_{FO}^{KP}(N, i, G) = 100 \cdot (x - 60) \quad (5)$$

The risk reduction by using weather forward is usually quantified by comparing the revenue with and without the forward. If no forward is involved the corn revenue ($P_{without,forward}$) corresponds to the product of corn yield (q) and its price (c) and can be represented by the following formula:

$$P_{without,forward} = q \cdot c \quad (6)$$

In the case with a forward is involved the corn revenue ($P_{with,forward}$) is calculated by increasing the corn revenue without weather forward ($P_{without,forward}$) with payoff of the forward (I_{FO}):

$$P_{with,forward} = P_{without,forward} + N \cdot (G - i) \quad (7)$$

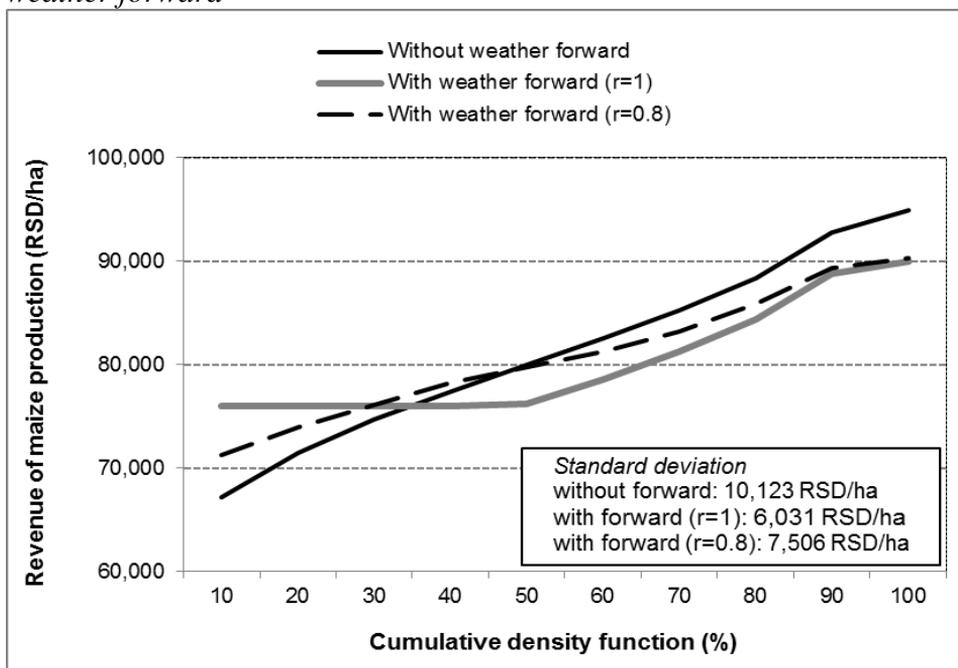
By signing a forward agreement the farmer gets a certain payoff from the weather forward, which depends on the corn production (yield) and on the weather index. Further, he also receives the actually realized revenue from selling the corn (Marković and Husemann, 2012).

Between the weather index and the yield, which are stochastic values, there might be a stronger or a weaker as well as a positive or a negative correlation. The farm is 40 km away from a reference meteorological station, and analysis revealed a moderate positive correlation (+0.8) between precipitation and yield of corn (Marković and Jovanović, 2011).

It is certain that the farmer takes a significant geographical risk (different amounts of rainfall at these two locations) and significant production related basis-risk (weaker correlation between precipitation and yield of corn).

On the basis of the correlation coefficient it is possible to determine the probability distribution of the revenue of corn production (Graph 5). If the correlation coefficient +0.8 is, it reduces the down-side risk (34.87%). This is reflected in the reduction of the standard deviation from 10,123 RSD/ha (without forward) to 7,506 RSD/ha (with forward).

Graph 5. Revenue distribution of corn production with or without weather forward



Source: Authors' calculation

Considering the 10% percentile revenue with the forward (71,283 RSD/ha) increased by 6.10% of the revenue without the forward (Graph 5). On the other hand, if the place of production is not located far away from a reference meteorological station is and, if achieved higher correlation is ($r=1$), it increases the positive effect of weather derivatives or there is the greater risk reduction (Marković et al., 2012).

Conclusion

The presented example of the use of weather forwards clearly shows that they still indicate the useful tools for weather risk reducing. Special emphasis is placed on reducing the oscillation of revenue, caused by the weather factor.

By using weather forwards mostly the crops that are distinguished by the amount of yield or that have a significant participation in the sowing structure are being insured. Mercantile corn is the most important field crop in Serbia (each year in average it is produced on the area of 1,200,000 ha), and also very significant export item. Having in mind that

corn is used as mercantile corn for concentrated feed, as well as for production of various kinds of silage, it could be concluded that corn is the most important fodder. Average corn yield significantly varies from year to year and depends on climate changes and applied agricultural practice.

Weather forwards play a minor role on the weather derivatives market than weather options do. This is because it is very difficult to find a partner who wants to engage into forward agreement, considering the risk should have an adverse impact on the participants in the transaction. Since there is a greater distance between the farm and the meteorological station (40 km) and correlation between precipitation and yield of corn is also only moderate, the hedging efficiency of the weather forward is relatively high (34,87%).

If the place of production is close to the meteorological station, and there is a strong correlation between weather index and yield of corn, the effectiveness of risk reduction is significant. Therefore, it is necessary to combine different forms of weather derivatives (options, futures and forwards), with a dense network of meteorological stations, in order to reduce significantly the geographical basis risk, and also production related basis risk. This refers primarily to the weather contracts design, with special emphasis on determination of strike level and tick size, and it is also important to select the appropriate weather index and to study the correlation between yield and weather index. However, preliminary calculations show significant potential of weather forwards in reduction of production risks, and therefore they can be a supplement to existing instruments for risk management in plant production.

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THE CHAOTIC WHEAT PRODUCER PRICE GROWTH MODEL: THE DANUBE COUNTRIES

Vesna D. Jablanović¹

Abstract

The important role of the Danube countries in the production and export of wheat is sufficient reason for attentive analysis of producer price of wheat in this region. The basic aim of this paper is to construct a relatively simple chaotic producer price of wheat growth model that is capable of generating stable equilibria, cycles, or chaos, and secondly, to analyze the stability of wheat producer price growth in the Danube countries in the period 1991-2010. A key hypothesis of this work is based on the idea that the coefficient $\pi = [1 + \alpha (\beta - \mu)]$ plays a crucial role in explaining local growth stability of the producer price of wheat growth, where, α - the adjustment coefficient; β - the coefficient of wheat demand function; μ - the coefficient of wheat supply function. This paper confirms that during the period 1991-2010, wheat producer prices increased because the coefficient $\pi > 1$ in the Danube countries.

Keywords: *producer price of wheat, growth, chaos*

Introduction

Wheat is the most important food grain in the world. It is a commodity input that goes into many food products. Approximately two-thirds of the wheat produced in the world is used for human food . Wheat is planted for livestock feed, industrial uses, seed requirements... A growing proportion of wheat production is used for the manufacturing of biofuels (bioethanol).

Wheat is one of the world's oldest cereal crops. It is now cultivated worldwide. In 2012, world production of wheat was 674.9 million tons

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(FAOSTAT , www.fao.org), making it the third most-produced cereal after maize (875.1 million tons) (FAOSTAT , www.fao.org) and rice (485.9 million tons) (FAO, 2012).

Current prices in 2012 are higher than a year ago . Decline in world wheat production has pushed up international wheat prices . For example, the US wheat (No.2 Hard Red Winter, f.o.b. Gulf) values averaged USD 373 per tonne in October 2012. By late October 2012, wheat futures for December delivery on the Chicago Board of Trade (CBOT) were priced at around USD 318 per tonne. (FAO , 2012)

The European Union, China, India, United States and Commonwealth of Independent States (CIS) are the biggest producers of wheat in the world. USA, EU, Australia and Canada are the biggest exporter in the world.

World wheat production has increased since the 1960s because of yield increases. World wheat production has constantly increased over the last fifty years, even though there have been minor fluctuations in trends. After a peak at the beginning of the 1980s, there was a strong decrease in surface areas. The reason for the increase in world production is mainly yield increase, as a result of technical progress.

The world wheat market is a concentrated, imperfect market. Since the beginning of the 1960s, a group of five countries (China, India, USA, Russia and EU) are the biggest producers of wheat in the world. Canada, Australia, Pakistan, Turkey and Argentina are included in the second group. On the other hand, there are three wheat production model in the world : (i) Intensive capitalistic production (EU) ; (ii) Extensive capitalistic production (USA) and (iii) Small farm sizes inhibit mechanization (India and China).

Global food consumption of wheat is likely to reach 479 million tonnes, up 1.1 percent from the previous season. World per capita consumption of wheat is expected to remain steady at around 67.7 kg per annum, with the per capita consumption remaining at 60.4 kg in the developing countries and at 97.4 kg in the developed countries. (FAO, 2012).

World wheat consumption continues to grow at the expense of world reserves. There is an increase in demand in emerging countries (BRIC countries) and in non-food demand (bioethanol).

World wheat production is insufficient to meet the demands of rapidly growing food and non-food requirements. Because of this, world wheat stocks continue to decline .

Wheat prices are highly volatile. Since 2000 there has been a steady increase of wheat prices . This increase can be explained by a combination of four factors : (i) the drop in world wheat production since 1998; (ii) the increase in world demand; (iii) the important decline in world stock levels since 2000; (iv) world financial crises.

There are endogenous factors that explain the permanent imbalance between supply and demand, and therefore price volatility: (i) the climatic factor ; (ii) a strong aversion to risk of farmers; (iii) low world stock levels of wheat; (iv) the imperfections of the world wheat market structure. Also, the causes of wheat price volatility are : (i) state export monopolies; (ii) substantial government aid systems (food aid, marketing loans and export credits, subsidy).

Globalization of the wheat market and liberalization of international exchange should lead to the stabilizing of wheat world prices.

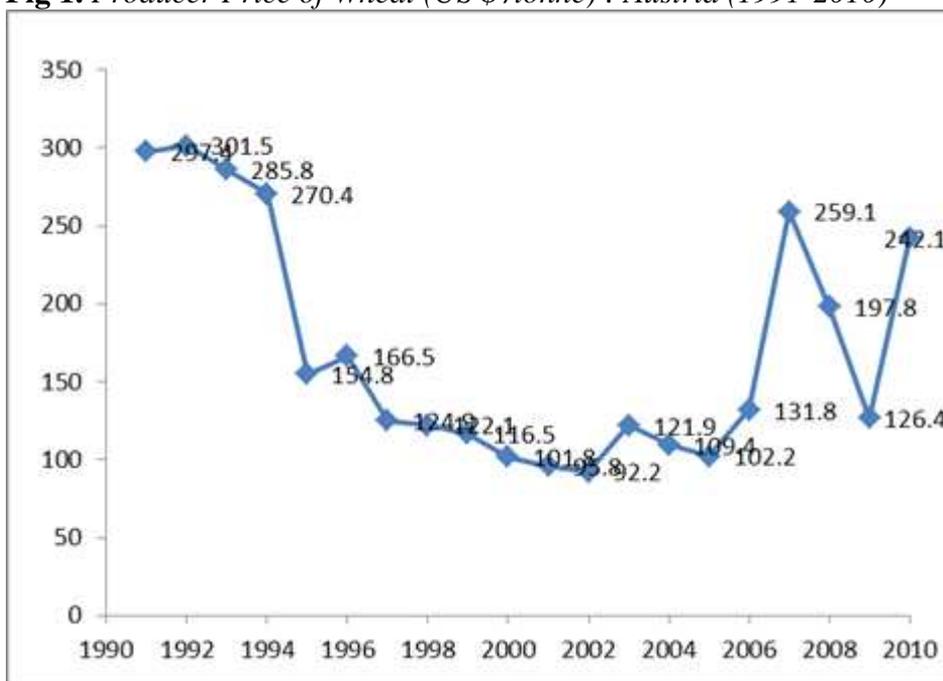
The basic aims of this paper are: firstly, to set up a chaotic wheat producer price growth model , that is capable of generating stable equilibria, cycles, or chaos, and secondly, to analyze the stability of wheat producer price growth in the Danube countries in the period 1991-2010.

The Danube, as Europe's second longest river, originates in the Black Forest in Germany and flows southeastward for a distance of some 2,872 km, before emptying into the Black Sea. The ten Danube countries are: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Moldova, Ukraine and Romania.

The Danube countries are facing several challenges: environmental threats, insufficient transport and energy connections, uncoordinated economy, education, research. Also, it is important to improve security system in the Danube countries.

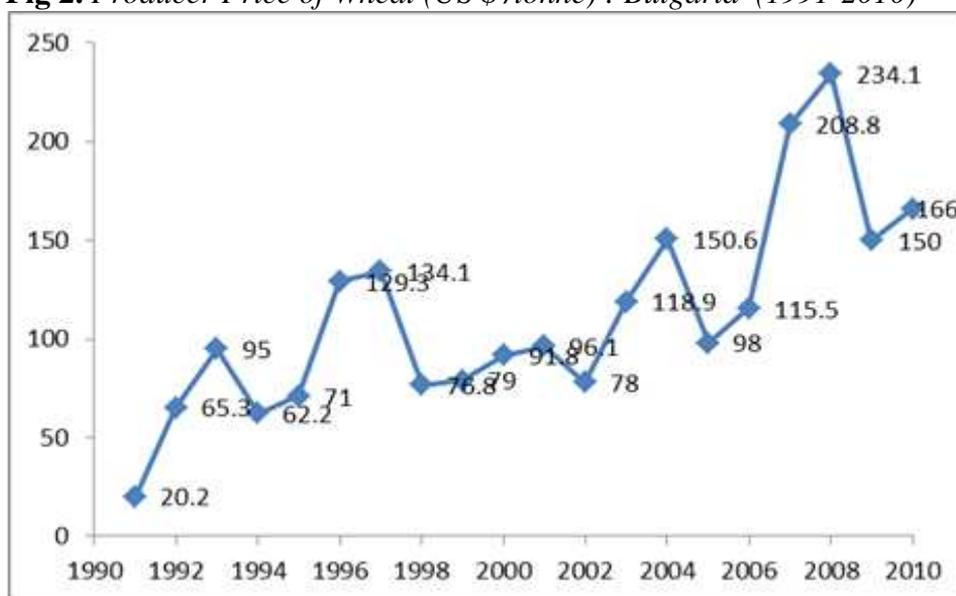
Wheat producer price volatility in the Danube countries in the period 1991-2010 is presented (see Fig 1-10.)

Fig 1. *Producer Price of Wheat (US \$ /tonne) : Austria (1991-2010)*



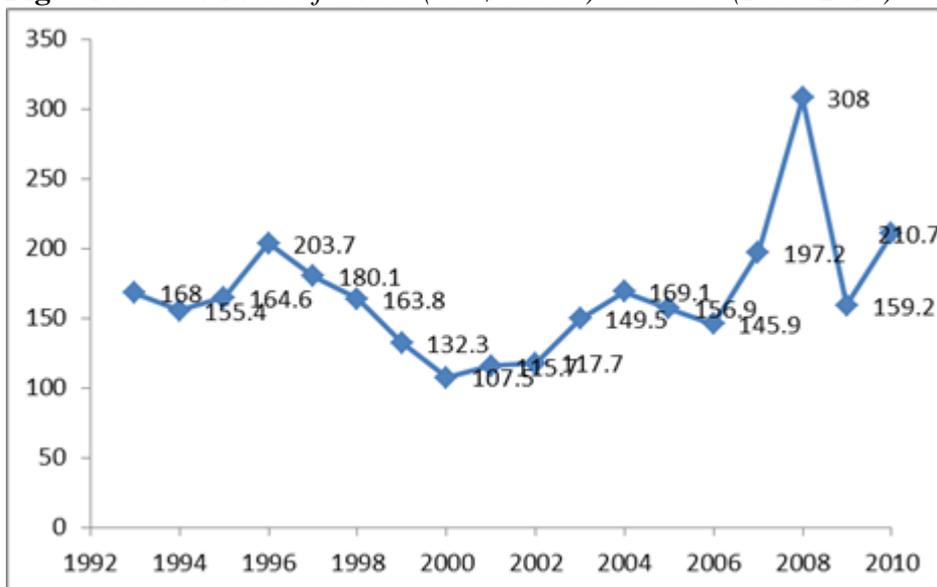
Source: www.fao.org

Fig 2. *Producer Price of Wheat (US \$ /tonne) : Bulgaria (1991-2010)*



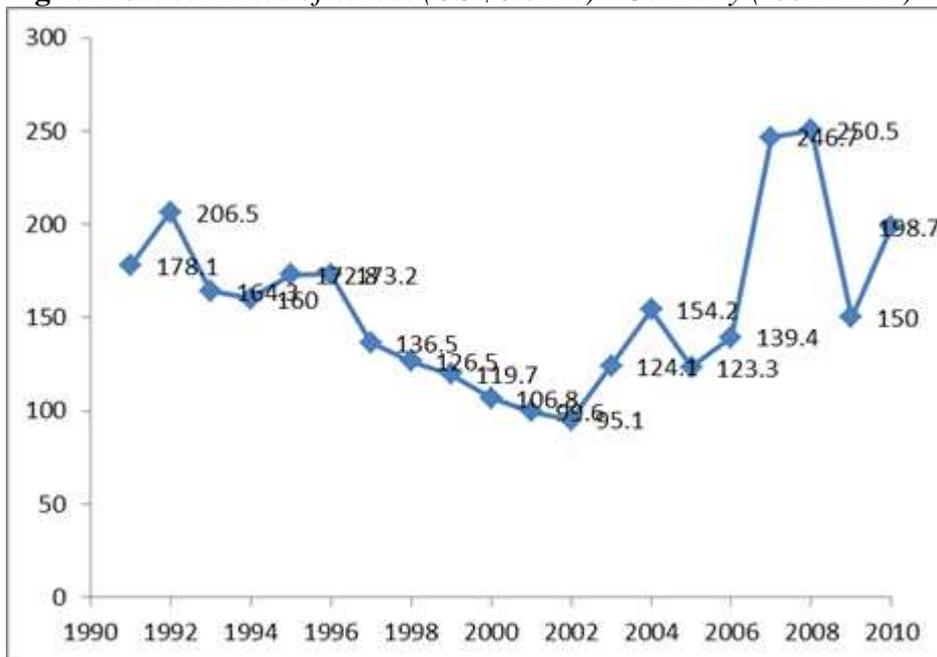
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Fig 3. Producer Price of Wheat (US \$ /tonne) : Croatia (1993-2010)



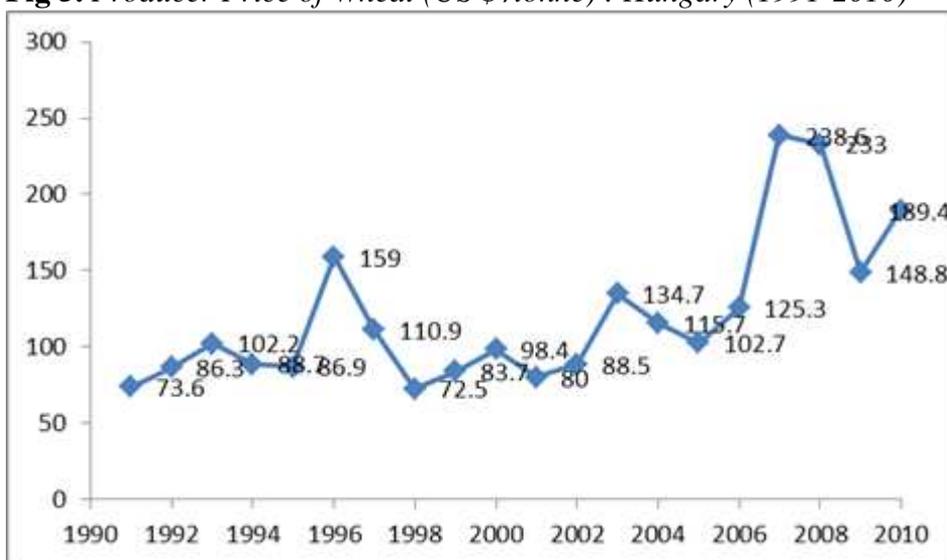
Source: www.fao.org

Fig 4. Producer Price of Wheat (US \$ /tonne) : Germany (1991-2010)



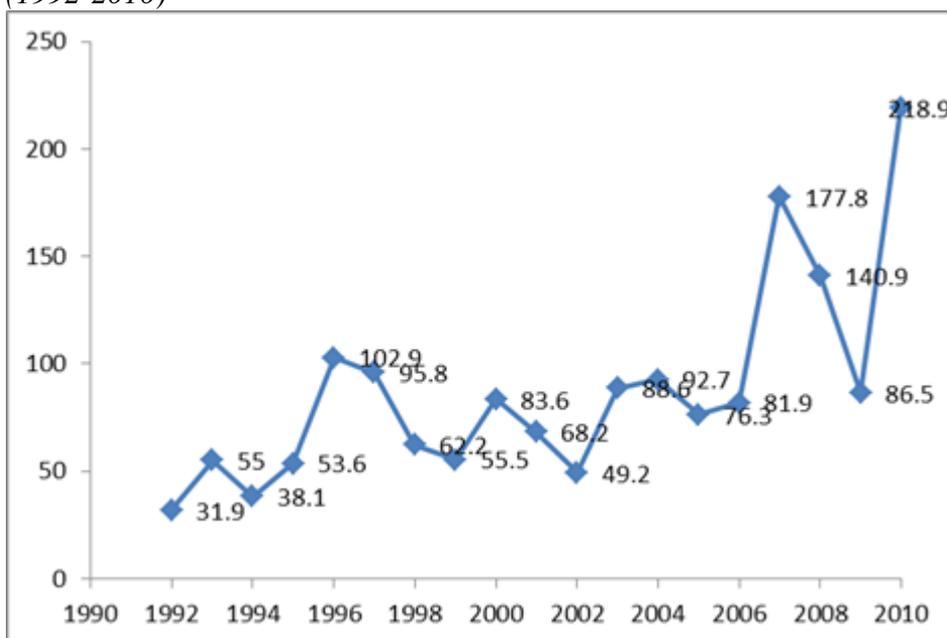
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Fig 5. *Producer Price of Wheat (US \$ /tonne) : Hungary (1991-2010)*



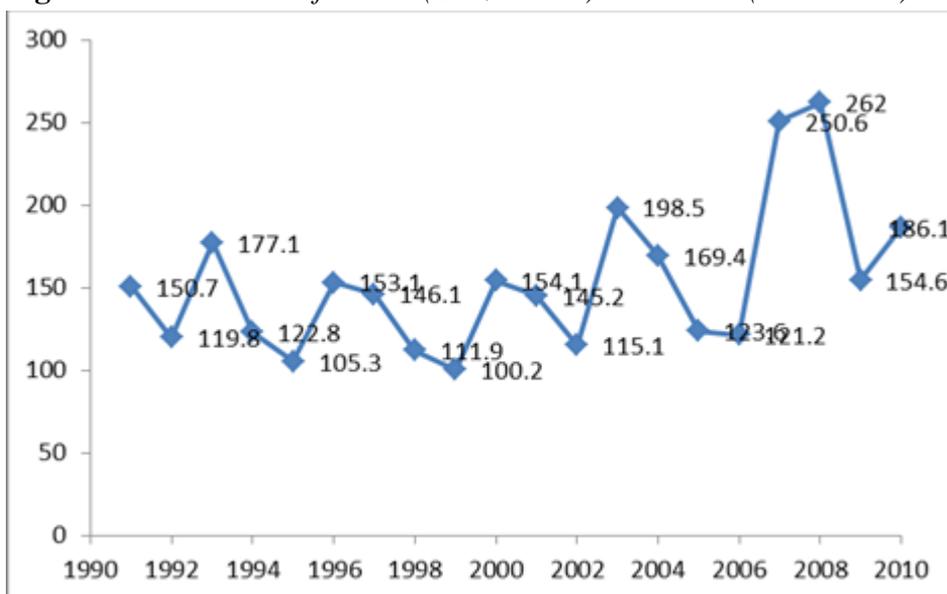
Source: www.fao.org

Fig 6. *Producer Price of Wheat (US \$ /tonne) : Republic of Moldova (1992-2010)*



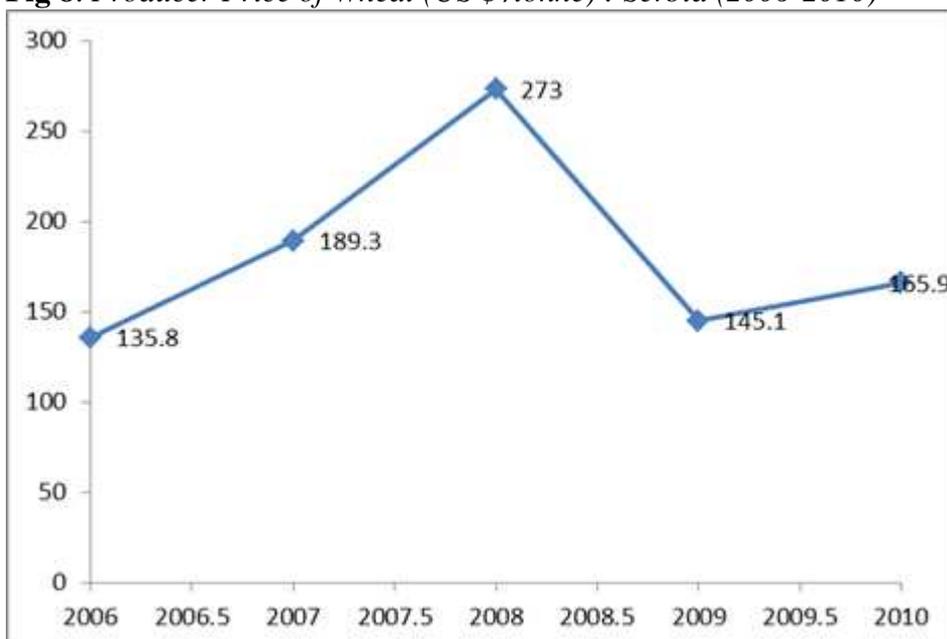
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Fig 7. Producer Price of Wheat (US \$ /tonne) : Romania (1991-2010)



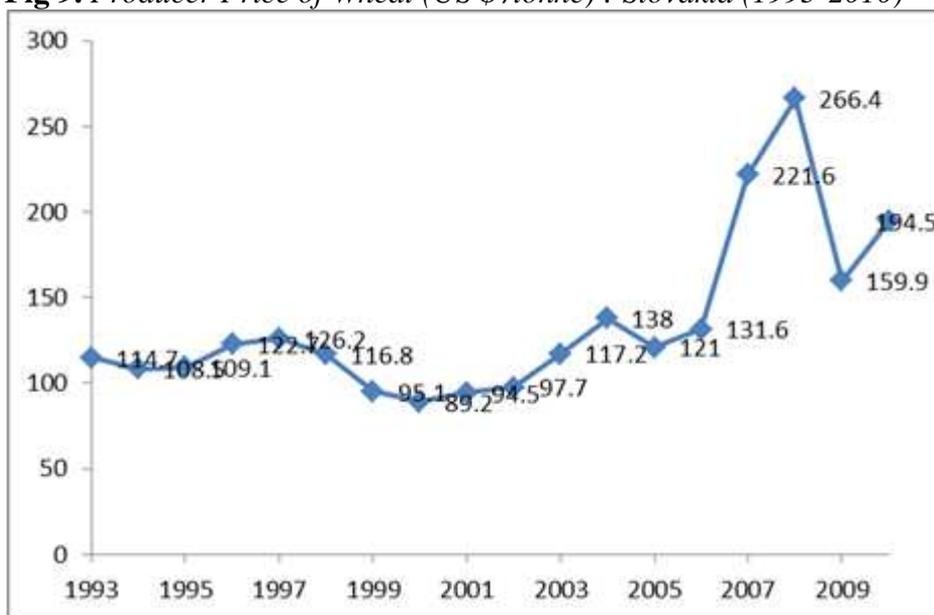
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Fig 8. Producer Price of Wheat (US \$ /tonne) : Serbia (2006-2010)



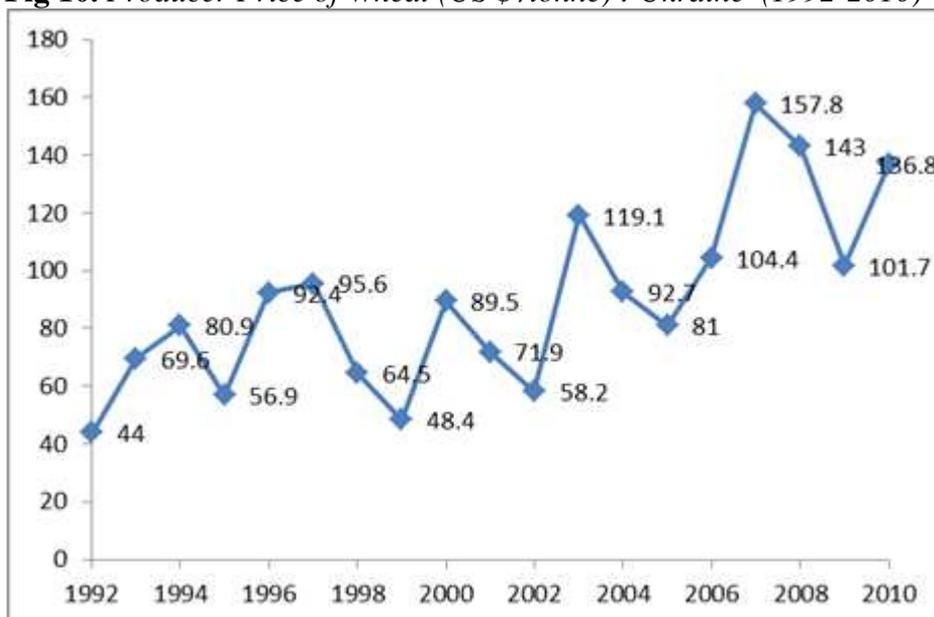
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Fig 9. *Producer Price of Wheat (US \$ /tonne) : Slovakia (1993-2010)*



Source: www.fao.org

Fig 10. *Producer Price of Wheat (US \$ /tonne) : Ukraine (1992-2010)*



Source : www.fao.org

A Simple Chaotic Wheat Producer Price Growth Model

Chaos theory started with Lorenz's (1963) discovery of complex dynamics arising from three nonlinear differential equations leading to turbulence in the weather system. Li and Yorke (1975) discovered that the simple logistic curve can exhibit very complex behaviour. Further, May (1976) described chaos in population biology. Chaos theory has been applied in economics by Benhabib and Day (1981,1982), Day (1982,1983,1997), Grandmont (1985), Goodwin (1990), Medio (1993,1996), Lorenz (1993), Jablanovic (2011, 2013).

Deterministic chaos refers to irregular or chaotic motion that is generated by nonlinear systems. Chaos embodies three important principles: (i) extreme sensitivity to initial conditions ; (ii) cause and effect are not proportional; and (iii) nonlinearity. The chaotic wheat producer price growth model is presented by the following equations:

$$D_t = \beta - \gamma P_t \tag{1}$$

$$S_t = \mu + \delta P_{t-1} \tag{2}$$

$$\frac{P_t - P_{t-1}}{P_{t-1}} = \alpha (D_t - S_t) \tag{3}$$

$$P_t = \theta P_{t-1} \tag{4}$$

Where P_t – wheat producer price; S_t – supply function of wheat ; D_t – demand function for wheat ; α - the adjustment coefficient ; β , γ - the coefficients of wheat demand function ; δ , μ , - the coefficients of wheat supply function; θ – the growth coefficient of wheat producer price.

(1) defines demand function for wheat; (2) defines supply function of wheat; (3) determines the relation between wheat producer price growth rate and surplus of demand for wheat and (4) defines growth of wheat producer price.

By substitution one derives:

$$P_t = [1 + \alpha(\beta - \mu)] P_{t-1} - \alpha[\gamma\theta + \delta] P_{t-1}^2 \quad (5)$$

Further, it is assumed that the current value of the wheat producer price is restricted by its maximal value in its time series. This premise requires a modification of the growth law. Now, the wheat producer price growth rate depends on the current size of the wheat producer price, P , relative to its maximal size in its time series P^m . We introduce p as $p = P/P^m$. Thus p range between 0 and 1. Again we index p by t , i.e., write p_t to refer to the size at time steps $t = 0, 1, 2, 3, \dots$. Now growth rate of the wheat producer price is measured as

$$p_t = [1 + \alpha(\beta - \mu)] p_{t-1} - \alpha[\gamma\theta + \delta] p_{t-1}^2 \quad (6)$$

This model given by equation (6) is called the logistic model. For most choices of $\alpha, \beta, \gamma, \delta, \theta$, and μ there is no explicit solution for (6). This is at the heart of the presence of chaos in deterministic feedback processes. Lorenz (1963) discovered this effect - the lack of predictability in deterministic systems. Sensitive dependence on initial conditions is one of the central ingredients of what is called deterministic chaos.

The Logistic Equation

The logistic map is often cited as an example of how complex, chaotic behaviour can arise from very simple non-linear dynamical equations. The map was popularized in a seminal 1976 paper by the biologist Robert May. The logistic model was originally introduced as a demographic model by Pierre Franois Verhulst. Chaotic dynamics was made popular by the logistic map. The most interesting characteristic of the logistic map is in the simplicity of its form (quadratic) and the complexity of its dynamics. It is the simplest model that shows chaos.

It is possible to show that iteration process for the logistic equation

$$z_{t+1} = \pi z_t (1 - z_t), \quad \pi \in [0, 4] \quad , \quad z_t \in [0, 1] \quad (7)$$

is equivalent to the iteration of growth model (6) when we use the identification

$$z_t = \frac{\alpha [\gamma \theta + \delta]}{[1 + \alpha (\beta - \mu)]} p_t \quad \text{and} \quad \pi = [1 + \alpha (\beta - \mu)] \quad (8)$$

Using (6) and (8) we obtain:

$$\begin{aligned} z_t &= \frac{\alpha [\gamma \theta + \delta]}{[1 + \alpha (\beta - \mu)]} p_t = \frac{\alpha [\gamma \theta + \delta]}{[1 + \alpha (\beta - \mu)]} \{ [1 + \alpha (\beta - \mu)] p_{t-1} - \alpha [\gamma \theta + \delta] p_{t-1}^2 \} = \\ &= \alpha [\gamma \theta + \delta] p_{t-1} - \frac{\alpha^2 [\gamma \theta + \delta]^2}{[1 + \alpha (\beta - \mu)]} p_{t-1}^2 \end{aligned}$$

On the other hand, using (7) and (8) we obtain:

$$\begin{aligned} z_t &= \pi z_{t-1} (1 - z_{t-1}) = \\ &= [1 + \alpha (\beta - \mu)] \frac{\alpha [\gamma \theta + \delta]}{[1 + \alpha (\beta - \mu)]} p_{t-1} \left\{ 1 - \frac{\alpha [\gamma \theta + \delta]}{[1 + \alpha (\beta - \mu)]} p_{t-1} \right\} = \\ &= \alpha [\gamma \theta + \delta] p_{t-1} - \frac{\alpha^2 [\gamma \theta + \delta]^2}{[1 + \alpha (\beta - \mu)]} p_{t-1}^2 \end{aligned}$$

Thus we have that iterating (6) is really the same as iterating (7) using (8). It is important because the dynamic properties of the logistic equation (6) have been widely analyzed (Li and Yorke (1975), May (1976)).

It is obtained that :

- (i) For parameter values $0 < \pi < 1$ all solutions will converge to $z = 0$;
- (ii) For $1 < \pi < 3,57$ there exist fixed points the number of which depends on π ;
- (iii) For $1 < \pi < 2$ all solutions monotonically increase to $z = (\pi - 1) / \pi$;
- (iv) For $2 < \pi < 3$ fluctuations will converge to $z = (\pi - 1) / \pi$;
- (v) For $3 < \pi < 4$ all solutions will continuously fluctuate;
- (vi) For $3,57 < \pi < 4$ the solution become "chaotic" which means that there exist totally aperiodic solution or periodic solutions with a very large, complicated period. This means that the path of z_t fluctuates in an apparently random fashion over time, not settling down into any regular pattern whatsoever.

Empirical Evidence

The main aim of this paper is to analyze the wheat producer price growth stability in the period 1991-2010 , in the Danube countries , by using the presented non-linear, logistic the wheat producer price growth model (6) or ,

$$p_t = \omega p_{t-1} - \vartheta p_{t-1}^2 \quad (9)$$

where p – producer price of wheat (US \$ /tonne) , $\omega = \pi = [1 + \alpha (\beta - \mu)]$ and $\vartheta = \alpha [\gamma (1+\theta) + \delta]$

Firstly, we transform data on producer price of wheat (US \$ /tonne) (Faostat, www.fao.org) from 0 to 1, according to our supposition that actual value of producer price of wheat (US \$ /tonne) , P , is restricted by its highest value in the time-series, P^m . Further, we obtain time-series of $p = P / P^m$. Now, we estimate the model (9) . The results are presented in Table 1.

Table 1. *The estimated model (9)*

Austria (1991-2010)	<p>R=.69598 Variance explained: 48.439%</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">ω</th> <th style="text-align: center;">υ</th> </tr> </thead> <tbody> <tr> <td>Estimate</td> <td style="text-align: center;">1.242958</td> <td style="text-align: center;">.405244</td> </tr> <tr> <td>Std.Err.</td> <td style="text-align: center;">.217704</td> <td style="text-align: center;">.270324</td> </tr> <tr> <td>t(17)</td> <td style="text-align: center;">5.709389</td> <td style="text-align: center;">1.499104</td> </tr> <tr> <td>p-level</td> <td style="text-align: center;">.000026</td> <td style="text-align: center;">.152187</td> </tr> </tbody> </table>		ω	υ	Estimate	1.242958	.405244	Std.Err.	.217704	.270324	t(17)	5.709389	1.499104	p-level	.000026	.152187
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Bulgaria (1992-2010)	<p>R=.60418 Variance explained: 36.503%</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">ω</th> <th style="text-align: center;">υ</th> </tr> </thead> <tbody> <tr> <td>Estimate</td> <td style="text-align: center;">1.434409</td> <td style="text-align: center;">.676820</td> </tr> <tr> <td>Std.Err.</td> <td style="text-align: center;">.218692</td> <td style="text-align: center;">.311340</td> </tr> <tr> <td>t(16)</td> <td style="text-align: center;">6.559047</td> <td style="text-align: center;">2.173896</td> </tr> <tr> <td>p-level</td> <td style="text-align: center;">.000005</td> <td style="text-align: center;">.044129</td> </tr> </tbody> </table>		ω	υ	Estimate	1.434409	.676820	Std.Err.	.218692	.311340	t(16)	6.559047	2.173896	p-level	.000005	.044129
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Croatia (1993-2010)	R=.53203 Variance explained: 28.305% <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">ω</th> <th style="text-align: center;">υ</th> </tr> </thead> <tbody> <tr> <td>Estimate</td> <td style="text-align: center;">1.603712</td> <td style="text-align: center;">1.017612</td> </tr> <tr> <td>Std.Err.</td> <td style="text-align: center;">.192403</td> <td style="text-align: center;">.294439</td> </tr> <tr> <td>t(15)</td> <td style="text-align: center;">8.335170</td> <td style="text-align: center;">3.456099</td> </tr> <tr> <td>p-level</td> <td style="text-align: center;">.00000</td> <td style="text-align: center;">.003527</td> </tr> </tbody> </table>		ω	υ	Estimate	1.603712	1.017612	Std.Err.	.192403	.294439	t(15)	8.335170	3.456099	p-level	.00000	.003527
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Republic of Moldova (1992-2010)	R=.38981 Variance explained: 15.195% <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">ω</th> <th style="text-align: center;">υ</th> </tr> </thead> <tbody> <tr> <td>Estimate</td> <td style="text-align: center;">1.639131</td> <td style="text-align: center;">1.192285</td> </tr> <tr> <td>Std.Err.</td> <td style="text-align: center;">.329072</td> <td style="text-align: center;">.539097</td> </tr> <tr> <td>t(16)</td> <td style="text-align: center;">4.981079</td> <td style="text-align: center;">1.990136</td> </tr> <tr> <td>p-level</td> <td style="text-align: center;">.000136</td> <td style="text-align: center;">.063944</td> </tr> </tbody> </table>		ω	υ	Estimate	1.639131	1.192285	Std.Err.	.329072	.539097	t(16)	4.981079	1.990136	p-level	.000136	.063944
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Serbia (2006-2010)	R=.65250 Variance explained: 42.576% <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">ω</th> <th style="text-align: center;">υ</th> </tr> </thead> <tbody> <tr> <td>Estimate</td> <td style="text-align: center;">2.357757</td> <td style="text-align: center;">1.772674</td> </tr> <tr> <td>Std.Err.</td> <td style="text-align: center;">.529681</td> <td style="text-align: center;">.641185</td> </tr> <tr> <td>t(2)</td> <td style="text-align: center;">4.451275</td> <td style="text-align: center;">2.764687</td> </tr> <tr> <td>p-level</td> <td style="text-align: center;">.46944</td> <td style="text-align: center;">.109716</td> </tr> </tbody> </table>		ω	υ	Estimate	2.357757	1.772674	Std.Err.	.529681	.641185	t(2)	4.451275	2.764687	p-level	.46944	.109716
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Source: www.fao.org

Conclusion

This paper suggests conclusion for the use of the chaotic wheat producer price growth model in analyzing the fluctuations of the producer price of wheat (US \$ /tonne). The model (6) has to rely on specified parameters α , β , γ , δ , μ , θ and initial value of the wheat producer price, p_0 . But even slight deviations from the values of parameters α , β , γ , δ , μ , θ , and initial value of the wheat producer price, p_0 , show the difficulty of predicting a long-term movement of the wheat producer price movement.

A key hypothesis of this work is based on the idea that the coefficient $\pi = [1 + \alpha (\beta - \mu)]$ plays a crucial role in explaining local growth stability of the producer price of wheat growth, where, α - the adjustment coefficient; β - the coefficient of wheat demand function; μ - the coefficient of wheat supply function.

The evolution in Danube countries wheat producer prices since the beginning of the 1990s highlights high price volatility. This paper confirm that during the period 1991-2010, wheat producer prices increased because the coefficient $\pi > 1$ in the observed countries.

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POSSIBILITY OF INTEGRATED RURAL MUNICIPALITY OF REKOVAC

Vladimir M. Nikolić¹, Marko Ivaniš²

Abstract

Specify the objectives and policies of the rural development of underdeveloped municipalities should take into account the conditions of the economic environment. Contemporary moment (not only of the Serbian economy) reflecting the decline in economic activity and the high cost of hiring funds. Policy to attract investors implies continuity in improving the conditions and benefits of investment. It is understood that the solutions can be found in the growth of primary agricultural production, i.e., exploitation of forests and forest products. Simultaneously, it reaffirms the need to access rural industrialization (building mini - industrial plants).

Keywords: *Rural development, PEST analysis, rural industrialization*

Introduction

Possibilities of integrated rural development of least developed municipalities directly depend on the achieved level of development in the Republic of Serbia. All the more important to determine the possibilities and directions of development rely on the objectives and policy of the Government of the Republic of Serbia.

Rekovac municipality is distinctly rural area with population structure and aims for agricultural production. It may be noted that the municipality Rekovac characterized by extremely negative demographic trends, with a negative rate of population growth and the relatively old population structure.

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Some towns or regions can be designated as “rural” if they meet the requirements set by different criteria. According to demographic criteria, these are the areas or villages with a population density of less than 150 inhabitants per km². Economic and spatial criteria imply that the regions with small and low-income, that is, agriculture is the dominant activity of the population. Element of the development policy of the state, i.e., the local government is an integral rural development. Includes economic, social, and environmental, cultural and social aspects, and overall factors of development, and represents a new paradigm of rural development.

Determine the feasibility of development of the municipality Rekovac necessarily rely on available resources, given its characteristics as an extremely rural area. In addition to pointing out the results of the economic analysis, PEST analysis is applied to evaluate development opportunities. The goals and policies of the rural development of the municipality Rekovac determined in accordance with the possibility of launching and implementation of individual projects.

Current Problems of Rural Development in Serbia

Rural development is important for the overall economic development of the economy in the Republic of Serbia (hereinafter: RS). The key elements of integrated rural development interest and need for reallocation of resources (redundancy) from agriculture to non-agriculture sector, the increase in export demand associated programs and instruments to promote exports, increase domestic demand and ultimately increasing the efficiency of resource use, and on that basis per capita income. Institutional solutions are based on the strategy of regulated market economy: the autonomy of the undertakings that bear the economic responsibility for business decisions, the corporate form of governance, the protection of competition, and the regulatory measures that are basically aimed at encouraging efficient use of factors of production.

Sustainable development is defined as a complex, long-term, continuous, comprehensive and synergetic process. It involves the development of models that align social and economic needs and interests of citizens, taking into account the environment and natural resources. However, the establishment of sustainable development means to establish processes and continuous decrease in unemployment. Sustainable development

implies the harmonization of various aspects of development and conflicting motives contained in the programs of individual sectors.

The organization of economic activity is basically a mixed economy in which the market and the state (government regulation) are the two complement and a complementary system of economic management. Therefore, RS applies a wide variety of regulatory measures in the field of fiscal and monetary policy instruments and mechanisms to promote exports, import protection, subsidies and other mechanisms. Way for the implementation of these measures is the adoption of a number of strategic documents, which provide a consistent and comprehensive development of the Serbian economy. It is these long-term and strategic documents by their contents are the benchmark and starting point for the formulation of integrated development of rural areas of the municipality Rekovac.

More legal and other documents indicate efforts to RS stimulate economic development of rural areas. The most important legislative acts are the Law on Agriculture and Rural Development, Law and the Organic Farming Act incentives in agriculture and rural development.

It should be noted that the integrated rural development in the RS and other governing documents: the National Programme for Agricultural Development, Poverty Reduction Strategy (Government of the Republic of Serbia, 2003), and the Sustainable Development Strategy 2011-2022 region of Sumadija and Pomoravlje.

Establishing institutional development and performance of rural areas and agriculture of a municipality or region in Serbia is based on the current situation, which is characterized by (1):

- "Big and far-reaching changes;
- Unfavorable growth performance;
- Completely changed , it is still extremely unfavorable general economic conditions , at least from the point of view of development (high level of indebtedness of the economy , no savings and no accumulation);
- A lot of various obstacles and constraints (technical and technological inferiority) to slow down , hinder and even prevent the development of (non-consolidated basis of institutional management in agriculture);
- A high degree of uncertainty seems to agricultural development."

Growth performance of the economy and development goals is crucial for the selection of lines of integrated rural development for several reasons. They indicate the desirable and the possible path of development and growth: **the tempo** (rate of growth of wealth), **quality** (based on the efficient use of factors of production, or quantity of production factors) and **structural changes** (e.g., production orientation. It is understood that the determination of the projections for the area affected by the level of demand in the domestic and foreign markets. A separate issue is the problem of the labor supply (i.e., the impact of demographic aspect), or you can have more or less labor mobility.

Both elements: and the knowledge of a surplus or deficit in agro-food production, and knowledge of the efficiency of production factors, of course, is the starting point for the establishment of various scenarios of integrated rural development. Low accumulation of Serbian economy reflects the low level of investment activity, which in turn leads to stagnation and decline of production, employment and living standards. Unfavorable growth performance reflects the current level of production, inefficient use of factors of production and low accumulation.

The current development of the Serbian economy is characterized by a moment insufficient and unstable domestic product growth, high unemployment, high trade deficit, high public debt and ongoing budget deficits. In the previous 2012 year, was even negative GDP growth rate produces that reaches close to two percent, and public debt, however, about 60 % of gross domestic product. The largest reduction in GDP was recorded in the sector of Agriculture, Forestry and Fisheries. The physical volume of agricultural production, as estimated by the 2012th were reduced by 17.5%. Turnover in retail trade fell by 2.5%. Earnings before taxes and fees, expressed in nominal terms, increased by 9.3%, while the assessment of the annual rate of inflation is 13%.

Short-term economic policy for the 2013th one has a stabilizing character, so he's discontinuity with the policy in the past. Projection of the main macroeconomic indicators of the Republic of Serbia Ministry of Finance and Economy for the period (2013-2015.) is given in Table 1. Current economic policy is aimed at establishing macroeconomic stability. Therefore, the focus on stimulating economic growth: the measures and instruments for lowering the cost of capital and labor costs, as well as measures to preserve stability dinars.

Table 1. *The main macroeconomic indicators Republic of Serbia for the period 2013-2015*

	2013	2014	2015
GDP, million dinars (current prices)	3679015	3979131	4316243
GDP per capita in euro's	4295,5	4545,3	4846,8
Components of GDP, real growth in%			
Personal consumption	- 1,3	0,7	1,0
Government spending	- 4,4	0,8	1,7
Investments	8,7	7,8	8,3
Exports of goods and services	9,2	10,6	11,1
Imports of goods and services	2,5	5,6	6,6
The balance of goods and services in euro's, as a percentage of GDP	-16,2	-14,4	-12,8
Inflation, end of period, %	5,5	5,0	4,5
Number of employees 000	1721,6	1742,2	1782,3
Investment ratio,% of GDP	15,2	16,0	16,8
External debt as% of GDP, end of period	87,5	85,4	85,2
Real GDP growth	2,0	3,5	4,0
The growth of per capita GDP	...	5,8	6,6

Source: *Ministry of Finance and Economy of the Republic of Serbia*

Regional development policy essentially assumes a certain redistribution of economic activities in less developed rural areas. For the design of agricultural development programs in rural areas are determined by regional programs and specific investment projects that will promote greater economic efficiency and rationality of the spatial allocation of investments by providing adequate infrastructure. Our villages we must respect traditional values and to respect the demands of the market. Choice of objectives and policies should encourage the process of growing a family farm in an economically and technologically strong, entrepreneurial motivated and efficient farm.

Incentives such form and approach to rural development is assumed business and ownership linkages between economic, organizational and developed enterprises and economic entities, businesses and farms. Connectivity is based on the construction of production facilities: (storage, processing and treatment) primary products of agriculture (livestock, vegetables and fruit) and other complementary activities that

in performance of comparative advantage (cottage industry, handicrafts, tourism , etc.). It is believed that it should be emphasized that the policy of integrated rural development cannot be based solely on market criteria.

Characteristics of Municipal Rekovac

The intersection point of imaginary centerline Serbia, in a north - south and east - west and the center of gravity of Serbia, located on the municipalities Rekovac, which occupies much of the region known as the Levach. Rekovac municipality in central Serbia, in the heart Sumadija, the group of the least developed municipalities in Serbia.

In the municipality of Rekovac alternately take turns highland and lowland fields. That territory in appearance has a funnel shape, which makes this area by some assumptions named Levach. On the west side of slopes the mountain Gledick's while the southeast beyond the hilly terrains belonging town lets Juhor mountains. The territory of the municipality Rekovac extends to nearly 37 000 ha. Levach valley situated between mountains Juhor and Gledick mountains. In Gledick mountains there are numerous scenic gorges which eventually formed the River: Kalenic, Zupanjevacka and Dulenka. Watercourses Rekovac municipalities have a relatively small amount of water, and in the summer many of them often run dry.

Soil has a favorable regime of soil and air humidity, and diversity of soil cover. Gradual process of decay and decomposition of geological substrate, rocks and minerals were favorable for the formation of fertile alluvial soil types.

In the municipality of Rekovac most widespread non-metallic minerals such as: sand, quartz, quartz sand, graphite, pegmatite, marl, and technical-building stone. The site was found in the diabase quarry "Drach" in the village of translation. Total mineral resources are not yet sufficiently investigated.

Probably, the most important feature of the municipality Rekovac fact that the total population, in all areas, is constantly decreasing. Finding and successful implementation of sustainable solutions of the municipality Rekovac is directly correlated to stem the flow of negative demographic. Along with the continuous decline in population (since 1970) is growing number of people aged 55 - 59 years. However, it is precisely this

category of population is the human resources required for the implementation of development programs.

Rekovac are typical agricultural municipality. The structure of the land surface of about 60% is arable land. In a four Rekovac production areas, namely:

- Field crop and vegetable production (,in river valleys),
- Field crop and fruit and wine (on the slopes),
- Fruit - and meadow – livestock,
- Pasture - forest area (on the surface at 700-900 n/m).

Crops - wheat and corn have a dominant position, and then forage and other crops on the remaining area of arable land. Animal husbandry in the agricultural municipality Rekovac is a traditional and economically significant area of business. The annual milk collection over 4 000 000 liters.

Vegetable production is present and recently experienced a slight expansion, particularly in the area of greenhouse sweet pepper, tomatoes, cucumbers and other vegetables. Also, there is a predisposition for the production of healthy seed potatoes in the fields of higher altitudes. **Fruit production** - plum has traditionally been the most important place. Neglected to dry fruits and vegetables. **Grape production** is traditionally present in Levach. Current production takes place at around 700 hectares and is 60% before production. The farmers have planted more present where successfully grown other fruits - cherry, apple, pear, cherry, apricot, peach, quince, walnut. Berries, especially raspberries, blackberries and strawberries, in recent decades the increased production of records. The volume of production is the potential for significant income to farmers.

Plant life in the municipality Rekovac makes vegetation temperate continental type. The forests are predominantly deciduous. Statistical data are given in Table 2.

Table 2. REKOVAC - forested areas - ha

TOTAL	11440
In the state-owned	3042
Private ownership	8398

Source: Republic Statistical Office (RSO) (6)

The potentials of the municipality Rekovac as rural areas

The issue of (in)sufficient development of the rural areas of the Municipality Rekovac is primarily a structural problem of long-term development. Structural (economic) analysis includes primarily the economic dimension of growth and development as one key, which determines the direction and opportunities, and other aspects (social, environmental) n-dimensional development of economy and society. Therefore, the analysis requires numerous and varied material and credible indicators that represent multi-dimensional development.

Development potential, subject to analysis and one of the aspects to assess the possibilities and limitations of development, including: basic demographics, population movements and the working potential of renewable and non-renewable natural resources, by institutional factors forming the economic structure, level of development of the municipality as a whole, the structural changes in economy , the efficient use of resources, infrastructure and economic position of the economy and agriculture as the main activity of the rural areas.

The key demographic characteristics of the Municipality Rekovac an overall process of natural depopulation and extremely demographic aging. Rekovac municipality in the census conducted 2011th a total of 11 055 inhabitants. The population of the 2002 census. declined by 19.90% and compared to in 1971 year. even for 57.94%. Population statistics by municipality Rekovac lists of in 1971 year and ending with the final list is presented in Table 11th.

Table 3. *The total population of the municipality Rekovac*

Year	Population
1971	22710
1981	19871
1991	17011
2002	13551
2011	11055
2017*	9553

* projections by authors

Source: RSO (6)

Average annual growth rates (reduction) of the population by decades witnessed the very rapid reduction in population on the grounds of population outflow from the region and reduce population growth. Active population Rekovac municipality covers 47.5% of the total population of the municipality, and 53.5% of contingent labor standpoint. The share of active population (the performance of the activity) is very high, reaching 60%. The key issue is how to minimize, or entirely close the gap between actual and potential GDP and thus increase employment. Educated population is a key factor for its level of economic efficiency. The educational structure of the population in the municipality Rekovac unfavorable, which is a large and serious constraint to growth and economic development.

From the standpoint of the development of rural areas of crucial importance are the scope and structure of agricultural land. The level of availability of agricultural land is one factor of production, which is essential for the development of rural areas of the municipality Rekovac. The level of equipment of agriculture land is not only a factor features or limitations of rural development, but one factor which determines the structure of agricultural production and direction of technological development, given the mechanism of diffusion of technological progress in agriculture. Agricultural land covers about 60% of the municipality, which is mostly located in the hilly area above sea level to 600 m. Agricultural land covers 22,927 ha, of which 86.87% is arable land and 13.34% is pastures. The structure of farmland fields and gardens are represented by 67.39% , 16.49% orchards, vineyards with 3.89% and 12.23% meadows. Area of certain categories of land use are given in Table 4.

Table 4. *Land Use by Category*

Agricultural land	in ha – 2012
Farmland	20,589
Arable land	14,011
Grains	6,623
Industrial Crops	-
Vegetables	1,524
Ordder crops	4,331
Orchards	3,174
Vineyards	794
Meadows	2,610
Ggrasslands	2,580
Ponds, swamps and marshes	6

Source: RSO (6)

The structure of arable land, grain accounted for 47.27%, fodder crops with 30.91%, and vegetable plants with 10.88% . Comparative overview of the structure using arable land in the municipality Rekovac and Morava region shows that the municipality Rekovac to any greater extent labor intensive production such as horticulture, viticulture, truck farming and livestock forage production . Structure of the use of arable land in the labor-intensive culture is an expression of a relatively low level of equipment of agriculture Rekovac municipalities with land as the main factor of agricultural production.

The level of equipment of agriculture land resources in the municipality Rekovac measured and arable land per capita is 1.46 ha per agricultural capita and 4.08 ha per active citizen 5.69 ha. Efficient use of land mines it depends on the ownership structure (size of farms), which is in Serbia as a whole, due to institutional reasons, from the rationality of production, unfavorable. The average size of farms in Serbia, measured by acreage per farm was in 1960 year. 4.37 ha in 1981 year 3.78 ha and 1991 3.47 ha. According to the preliminary report of the census of 2012th (and 2013). overall number is 630 000 households with an average size of 4.5 ha (without plant). Average farm in Serbia has one tractor, one cow, four pigs, three sheep, 27 poultry. Based on estimates, the average farm size in the municipality Rekovac corresponding average Serbia.

But from the standpoint of development projections of rural municipalities, the paramount importance of permanent and significant increase in households with a status of registered agricultural households. Number of registered households in the municipality has increased from 125 as it stood 2005th even the farm in 2821 2009th registering farms in the municipality established the conditions to support agriculture regulatory measures of agrarian policy.

Application of PEST analysis to evaluate the possibilities of integrated rural development of the Rekovac

PEST analysis allows us to :

- More comprehensive look at the current situation in the municipality Rekovac,
- Carry out a critical analysis of the economic analysis performed,
- Express the situation in key areas , critical for accelerating rural development and access to rural industrialization .

Consideration of the political, economic, social and technological environment is done from the perspective of the impact on the objectives and policies of the municipality Rekovac.

Political environment. The municipality Rekovac directly influence economic policy in RS as well as economic and political developments in its immediate surroundings. Also great importance to the development of rural areas is the process of joining the European Union, relations with the countries of BRICS group (Brazil, Russia, India , China and South Africa) and non-aligned countries, with which we have in the past had a very good economic relations and economic cooperation.

The current orientation of the exclusive cooperation with the European Union on a way to adjust the opening of Russia, China and non-aligned countries. Upcoming opening reflected in financial cooperation, investment attraction and export of products with the announcement of the defense industry. At present, the municipality Rekovac, may be the closest and perhaps most important, the possibility of cooperation with the European Union.

Serbia has successful cooperation with the countries of South Eastern Europe, especially in the export of their products. Cooperation with the countries of the former Yugoslavia is performed with varying degrees of success. With some successful and the balance of exports and imports in favor of the Republic of Serbia. Some countries have been successful and significant investors in Serbia, but also refused to establish an appropriate reciprocal economic exchange of goods and services.

National Rural Development defines very precisely the situation in the Republic of Serbia. It is noted that the economic structure of rural areas depends on the primary sector , especially in agriculture, food industry. The economic structure is not sufficiently diversified. Lacking growth service sector, the capital market is virtually inaccessible. This situation affects the lack of orientation towards entrepreneurship.

Human resources in rural areas in Serbia are not educated enough. Product placement is difficult and accompanied by long terms of payment, which affects the illiquidity. At the same time, the placement of products on the EU market follows the fierce competition, supported by strong interventions in agriculture and food industry.

Even 45 - 50 % of the rural population of the Republic of Serbia is employed in agriculture. Chipped farm can have high economic efficiency, and thus revenue. Low income does not provide adequate accumulation. Low accumulation locally prevents investment in industrial production and services. Small choice of better-paying jobs for young people and women to the negative demographic trends.

Economic environment. We see that the RS economy more than twenty years of going through a difficult period. Last 2012th, Serbia ended in recession, instead of the announced growth privrenog development. These facts sufficiently indicate the difficulties in the economic environment faced by the municipality Rekovac.

In the municipality of Rekovac no businesses that may support its economic development. At the same time, agricultural holdings are fragmented, under- connected and without proper logistical and marketing support. Existing associations, for example, breeders of sheep and goats, it is difficult or impossible to deal with bureaucratic hurdles and provide appropriate support to invest in their own development.

Social/demographic environment. Rekovac municipality belongs to the group of underdeveloped municipalities in Serbia. This speaks to the number of dimensions of social development, with a negative sign. But the necessity of securing long-term sustainable development of the basic characteristics of the municipality Rekovac.

Serbia has a very unfavorable demographic trends, including the municipalities Rekovac no exception. Although it can be said that the problem in this community even stronger there. Along with the decline in population Rekovac municipality has a substantial population of over sixty years. At the same time, the status of underdeveloped municipalities indicates that there is no possibility for solving problems of vulnerable groups, especially women and youth .

Application of the principle of synergy, when the strength of a community is directed to a common resolution of existing problems, highlights the importance of gathering residents of the municipality. Such features provide an active approach to cultural and sporting events, and the establishment of institutions and culture and sports, and other forms of association with different activities.

The creation of such associations, as well as the improvement of existing ones, and actively organize cultural, sporting, and other events, will create the conditions for a sense of achievement skills, and connect people in the municipality Rekovac. This small strokes and a relatively small financial investment, to improve the quality of life.

But more important is the fact that in this way emphasizes the politics of identity, politics of identification and pride in his hometown. When you accept this way of thinking and in business, then the principle of synergy, strive to achieve a higher level of quality to lead people set goal: ensuring sustainable development of the municipality Rekovac.

Technological environment. Start 21 century is characterized by business, relying on the use of modern technology. Modern technology relies on increased application of information technologies and the introduction of shorter daily life of scientific studies. Therefore, the survival of the market, followed by rural development is increasingly dependent on recognition of two facts.

We know that the farms in Serbia, and in the municipality Rekovac fragmented. With them in proportion to the economic power of such a farm. Then, there is a large number of elderly households, as well as unfavorable, the relatively low level of education. It was founded in the assumption that the current situation is not conducive climate for investment and accelerated business development, relying on modern technology. Because it is considered to have permanently Education (willingness to learn throughout life) and the application of information technology – extremely important for technological development and hence rural development and rural industrialization. For the municipality Rekovac significant existence of the Agricultural School. Recently, more open consultative agricultural department of High Agricultural School Applied Sciences of Prokuplje. Human resources of the two educational institutions can be used as an important driving force of technological development and Rekovac and Šumadije and Morava region.

Possibilities of Serbia are limited, and the interest of investors to invest in Serbian economy is certainly not in line with their needs. It follows, that the Rural Development of Rekovac, and the whole of Serbia, but must seek support in professional and scientific resources and social wealth of which they are available.

This means that the orientation of the municipality Rekovac to independently make efforts towards rapid rural development and rural industrialization correctly. It appears to be a well-thought strategy of rural development and rural industrialization can provide a higher quality of life.

The goals and policies of the integral rural development of Rekovac

Growth performance of the economy of the municipality Rekovac, which determine the level of economic development, a necessary benchmark for the assessment of the possibilities for the area. Criteria grade level of development of the economic unit (the product of average gross wages and number of employees) percapita, which is an indicator of the standard of living (see Table 5).

Table 5. *Level of development of the municipality Rekovac measured by economic indicators percapita (RSD)*

	2008.	2009.	2010.
municipalities Rekovac	33119	31960	30417
The Republic of Serbia	45674	44147	47450
Rekovac municipality in respect of Serbia	72,51	72,39	64,10

Source: RSO (6)

Markedly lagging municipalities Rekovac (down 8.8%) for the RS requires setting development that would decrease the growing gap. Obviously, the qualitative and structural changes in production, employment growth, increasing the level of technical equipment, can achieve economic growth based on the use of natural resources.

Achievement of objectives based on the continuity of the rural development of the municipality Rekovac on three pillars:

1. Active approach to securing funding.
2. Sustainable development based on knowledge.
3. Identity politics in the municipality Rekovac.

Set up rural development policy takes into account changes in production and consumption of food and food products that are taking place at the international level.

Continuity of policy development involves implementation of the targets set in the previous period. Target point in the past were placed on infrastructure development: spatial plans, project documentation for individual local roads, water supply systems, development of waterways, and the establishment of industrial zones. Efforts to build a sports hall, educational building modernization .

Activities to attract investment, the supply of available resources are the subject of continuous efforts of the municipal management Rekovac. However, the lack of positive response of potential investors, indicating that more efforts should be done. These efforts should be directed in different directions.

One possibility is the activation of existing production facilities that are not used for various reasons. Taking ownership of the productive resources, the state of RS and Rekovac municipality, has the opportunity to establish specific public-private partnerships with potential investors. Securing financial structure (attracting EU funds and/or RS) and investments in municipal infrastructure is becoming an important partner and the holder ownership of the project, proportionate to its share of the material. This Municipality shall be entitled to the immediate control of the project, as well as participation in the realized profit. Accumulation can be achieved so that a material basis for future investment.

The second direction is the development of knowledge-based. This approach involves directing efforts to:

- Increasing yields in agricultural production,
- The introduction of higher levels of processing of raw materials,
- Introduction services (storage, transport, trade , and others) with establishment of horizontal and vertical integration in the international market.

It is considered that the development of knowledge-based path to a higher level of competitiveness, and thus to create much needed storage for their own future, rapid development Rekovac. Yield increase in agricultural production involves taking a series of measures (land consolidation, crop structure, renewal of vineyards and orchards, racial composition of cattle) based on the use of cropping knowledge. The aim of these measures is to create commodity surpluses to ensure the cost-effective production of small production units for processing of agricultural products. Mini industrial plants can be established with a wide range of activities:

- Wine and Brandy Distillery,
- Fruit and vegetable products,
- Production of cream and cheese,
- Production of organic feed from secondary raw materials,
- Production of meat products,
- Extraction of herbs.

The main characteristic of these production facilities is the backbone of the identity politics of food. It is known that the realization of identity politics can be implemented with the introduction of various forms, such as:

- Brand,
- Protected designation of origin,
- Geographical indications,
- Guaranteed traditional specialty, and
- Organic farming.

Marketing of food and beverages is certified identity provides the required level of accumulation necessary for future investments in and out of the circle underdeveloped. These products achieve better prices and have access to the markets of industrialized countries. Renewable energy sources are the next area of multidisciplinary projects that achieve positive effects on several grounds. Solar power or the use of geothermal energy are renewable sources of energy. This technology to develop very fast and it is widely used and economic justification. It is good for the environment in which the needs of the increasing need for electricity or heat occurs periodically, such as in tourism. Such projects do not require large investment projects and usually resolve within investment in tourism facilities.

Finally, it must be stressed the economic potential of forest resources for the Rural Development of Rekovac. Timber harvesting provides a basis for the development of entrepreneurship at the local level, but with the advent of the international market. Options range from timber exploitation (for intermediate products, finished products, fuel mass), the collection of forest products, the development of hunting tourism and so on. In addition to manufacturing plants dedicated to processing of food products is considered to be necessary to point to the possibility of forming a mini-production plant for the processing of wood.

One of the aspects of fire safety in forests and cutting of forest roads. Proper selection of the route, you can create the forest roads that would allow tourists walk, but also create the conditions for a specific tourist offer – „bike mount.“ This kind of tourism product does not require significant financial resources for implementation, and the effects are multiple.

Conclusion

Getting out of the circle of developed and elimination of negative demographic trends are interrelated and conditioned processes. Environmental conditions (economic slowdown in world-wide, including in Serbia, security and cost of capital...) indicate the approach to integrated rural development based on available natural resources in the municipality Rekovac and creating conditions for the expression of human synergy potencijala (residents Municipalities, the region of Sumadija-Morava, or the Republic of Serbia).

Good land and a favorable climate provide a basis for increasing yield in agricultural structure. Along with the consolidation measures, structural change in the direction of growing medicinal crops can be expected to increase accumulation.

Forests in the municipality Rekovac extends over 11 000 ha and is a very important natural resource. The importance of forests in a sustainable, rural development is outstanding . Organized long-term protection and exploitation of forests is one of the priorities in the implementation of strategic goals. One of the most important reason is environmental protection: protection from soil erosion, water flow and water sources, biodiversity, and climate conditions in the territory. Conservation of forests is one of the contribution to the politics of identity.

Growth in primary agriculture and forest exploitation would create the necessary basis for the implementation of measures of rural industrialization - the formation of mini-industrial plants. Construction and establishment of mini-industrial plant is one of the means of encouraging rural industrialization in the municipality Rekovac. Structure – activity and production facilities can rely on all the activities of primary agricultural production. This approach involves pooling rural industrialization in the vertical and horizontal level (creation of cooperatives, associations) and connect to the cluster in order to perform on the international market .

It is suggested that rural development policy, relying on identity politics can contribute to the elimination of one of the key problems in the municipality Rekovac: while rural development will also be effected on improving demographics.

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ECONOMICS CHARACTERISTICS OF PRODUCTION OF LIGHTWEIGHT AGGREGATES FROM WASTE MATERIALS

Vladislav Zekić, Zoran Bačkalić¹

Abstract

The best way to deal with disposal of fly ash is to use it as a raw material. As a primary solution, it is necessary to analyze their use in the construction materials industry. Application in construction industry is particularly significant in terms of environmental protection and opportunities for improvement of certain properties of cement mortar and concrete. The calculated cost of production of small aggregates was 70.52 €/m³. The biggest costs are the costs of energy with amount of 85% of total production costs. In the case when costs of production, without calculating the price of the raw materials, are compared to the price of an equivalent material, or of gravel, estimation of economic effectiveness gives a negative result. This result is primarily caused by the high cost of energy in the production process.

Keywords: *lightweight aggregates, waste materials, recycling.*

Introduction

The optimism of technological development and social progress during the past century is almost lost to the problems caused by degradation of the biosphere and the destruction of ecosystems. As the main limiting factor for the development occurs intensive reduction of reserves of non-renewable mineral resources and energy. Due to this comes the development of environmental awareness on a global level, but it is not yet enough to achieve a significant impact on the development objectives, which are still determined by the need for constant growth in consumption. Better understanding of changes in living environment,

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with climate change as the most significant, leads to a concern over the issue of humanity's own survival. The modern way of life requires a large amount of easily available and inexpensive energy. According to estimates, about 50% of the total energy produced is consumed in residential and commercial buildings. Of which 69% of the energy is spent on the temperature and ventilation, 15% on water heating, 11% on lights electricity and electric devices and 5% on food preparation. The largest emitters of greenhouse gases are the United States and China. Whereas the U.S. comprises 5% of the world population, but currently spend about 26% of all energy. China's growth explains its high percentage of emissions through its recent industrial development, and while other countries developed and polluted, they were not large emitters. China and whole Asia are today in economic expansion, but also turning to the production of system for the renewable energy sources use, in order to competitive and participate in the global market (<http://esttp.org/cms>).

On the other hand, it is known that the construction of buildings, directly or indirectly, uses a lot of energy and causes a significant part of the annual environmental damage. Accordingly, the appropriate use of recycled and waste materials can contribute significantly to sustainable development. Achieving this objective is possible through finding environmentally friendly materials and construction. One of the directions of the solution is in the recycling and reuse of materials, which directly affects the sustainable production.

Therefore, a significant part of the environmental problems is related to the construction, maintenance and use of buildings. This means that the solution for environmental problems can only come from integrated access, with transportation and construction industry at central position. It is necessary to point out that modern transportation is not possible without the use of massive civil engineering structures.

Performing construction work in addition to the method involves the transport and production of materials. As a result, the development of sustainable technologies within the construction materials industry is of great importance since it uses 60% of raw materials extracted from the lithosphere (Wadel G, 2009). Of this amount on the construction goes 24% of the total extraction. In Europe, the building consumes 4.8 tons of mineral resources per capita per year. Despite the fact that the great part of the burden of the environment comes from the materials produced by

the demolition of structures (Van den Dobbelsteen, 2002), other materials have also a significant impact on the environment deterioration. Previous research shows that the construction industry must always take into account sustainability and the impact on the environment (JG Speth, 1990; Ehrlich P, 1990).

One of the ways to ensure the preservation of the environment is to use materials that are by-products of energy production, as aggregates for mortars and concretes to be used in conservation cultural heritage. Use of waste affects not only the reduction of environmental pollution, but also has an impact on conservation of society resource by reducing the exploitation of raw materials and provides a replacement for materials such as cement, whose production requires a significant amounts of raw materials, energy and resources to produce.

As a result, research of the possibility of processing and utilization of waste materials are subject to a number of studies, with a substantial portion of them addresses the issues related to the problem of storage and utilization of fly ash.

Quantities of fly ash from the burning of coal in thermal power plants are, both in the world and in Serbia, serious economic, but primarily an environmental issue. Amount of ash annually deposited is measured in millions of tones. In Serbia annually appears between 6 and 7 million tons of fly ash. Waste area of fly ashes is near power plants and cover large areas of arable land, nearly 1800 acres (<http://www.eps.rs/ekologija/zastita.html>). Currently in Serbia and in the world, only a part of the produced fly ash is used as a pozzolanic additive in cement and concrete (Ilic, 2003).

Exploitation of this waste as secondary raw material in the production process is the only sustainable solution. Large amounts of fly ash can only be used in the construction and building materials industry (Baščarević, Z., 2006). Thanks to pozzolanic properties precipitator ash firstly found its application in the cement industry, as pozzolanic addition of portland cement. In the future, it can be expected to increase the use of fly ash in the construction industry, for the production of lightweight aggregate (Ainet, 2005) or as material for land consolidation in road construction (Mulder, 1996). It is also investigated the possibility of using fly ash in the production of ceramics (Baščarević, Z., 2005).

Materials and Methods

Analysis of the economic characteristics of plants for the production of lightweight aggregate proceeds from the investment accounts. It was done on the basis of preliminary technical - technological project. Since it is not currently possible to determine the cost of materials for the production, the calculation is limited to the cost of production. Costing is based on determining the total cost (Jakovčević, Klara 2008). Material cost is derived. Depreciation is calculated in accordance with the estimated investment and assumed lifetime of certain assets. Wages were calculated according to the average wage in the Republic of Serbia, in accordance with the required professional qualifications. Cost of energy consumption is determined in accordance with the pending charges and market prices. Building and equipment maintenance costs are accounted by empirical standards. The opportunity cost of financing and land use and insurance costs are not calculated.

Research results and discussion

Today, in the world is actual problem of waste, which is directly manifested through the issue of solid waste landfills. As one of the solutions of this problem is consideration of its use. One of the potentially reusable wastes is fly ash from power plants. During the combustion of ground coal in thermal power plant boilers, ash particles, which come along with the flue gases, are collected in electrostatic. This is called the fly-ash and represents approximately 85% of the total amount of ash in thermal power plants. Particles of fly ash are mostly glassy spherical shapes, ranging in size from 1 μm to about 150 microns, and the typical size of the particles can be taken less than 20 μm . Fly ash has specific characteristics that are significantly different from other industrial by-products used as additives in the cement industry. In addition, variations of these characteristics are much higher than, for example, of high furnace or filter or SiO_2 dust, because they depend on the type and quality of used coal burning and technological conditions (temperature) and cooling mode particles of fly ash (Baščarević, Z., 2006). World production of fly ash is about 700 million tons per year, while is only 6% of the waste materials in cement production exploit (D. Jozić, 2007, A. Wong, 2004).

The chemical composition of fly ash is similar to the clay material to be used in cement plants as one of the raw material components for the production of portland-cement clinker. The results of research indicate

that the replacement of fly ash clay component in the production process of the portland-cement clinker obtains in better hydraulic properties of this type of cement. In some countries, large amounts of ash are used for roads, as a fraction of the supporting layer. There are data on the development of building bricks based on fly ash. The ash could also be used as a raw material component for the synthesis of different silicate materials, such as ceramics, glass ceramics and ceramic tiles. Also interesting data is one on the use of fly ash for stabilization and solidification of industrial waste (Natasa Jovanovic, 2006). Amounts of ash in this way consumed are insufficient for permanent solution of ash landfills. It is necessary to look for a new way of efficient use of fly ash, as of a construction material should be regarded as the primary purpose.

The selection of construction materials for certain purposes is performed on the functional, technical and financial size. However, by introducing the concept of sustainability and sustainable development as a decision criterion in the last few decades, changes classical approach to the evaluation of construction materials. The use of fly ash as a raw material for the production of construction materials has a number of advantages: 1) permanently solves the problem of waste, 2) reduces the depletion of natural resources, 3) provides the basis for energy efficiency through substitution of cement, 3) the recycling process is flexible since it is possible to easily store waste and use for multiple purposes. Thus, the use of fly ash in construction materials and concrete technology solved the problems of industrial waste, environmental degradation and destruction of thousands of acres of land. It also offers the ability to create new, cost-effective construction materials.

Wide application of fly ash as a raw material for production of construction materials, in addition to the above advantages, to some extent could result in the reduction of unemployment in rural areas and fly ash landfills. The problem of unemployment in the previous period was latent and concealed within social enterprises and family farms. Today, changes in the social system and ownership structure of the economy make unemployment a prominent problem in our society. It is clear that the answer to the problem of unemployment in the rural areas can be found in the specific forms of rural development. Of particular importance for the development of a new concept of rural areas is the inclusion of a wider range of activities in the preparation of development plans in rural areas. Rural areas are not the driving economic force, but

they are of great importance because: 1) they are the primary sources of income for a significant part of the population, especially in the part of the population that does not have the conditions to be included in the formal economy, 2) the rural areas constitute the diet basis for the population, 3) they are the basis for a wide range of environmental resources such as water, air, biodiversification, bioenergy and tourist attractions, and 4) they are of particular importance for the use of bioenergy resources. Although rural resources are not a safety factor by themselves, in terms of meeting the basic needs on a sustainable basis, they are an important part of a diversified rural household budget (Rauch et al., 2001).

This is particularly important having in mind that the unemployment rate in rural areas is high and amounts to 21% (Draft Rural Development Strategy, 2010 - 2013) and clearly indicates the lack of employment opportunities. Of great importance is the fact that youth have especially poor position in the labor market in rural areas. The unemployment rate of youth to 25 year is three times higher compared to the average. This situation can be changed only by investing in the development of rural regions. Of great interest is to seen investment in rural regions not only in its literal form, i.e. invest in production facilities. In fact, these specific investment activities typically precede investment in the development of technologies that are suitable for use in such a small capacity plants which are normally raised in the rural regions.

In addition, the past two decades, the growth of interest in problems of global sustainability has led to the need for increasing the sustainability of the methods and techniques used for building construction. For developing countries, the emergence of this market represents an opportunity to connect sustainability with a better performance in projecting, construction and operation of facilities. The logic needs to be set against global trends related to the steady production growth, consumption and markets (E. Papargyropoulou, 2012). Accordingly, it is necessary to find new ways for sustainable growth of production and employment. Of great importance is the development of other technologies where the dominant place could have technology that is based on renewable energy sources (Jovanovic, 2004).

It should be noted that the construction of buildings is one of the indispensable and fundamental human activity. The volume of construction has increased with the development of human civilization

and today construction, directly or indirectly, causes a significant part of environmental damage. The appropriate use of recycled and waste materials can contribute significantly to sustainable development. This is possible through the use of environmentally friendly materials and construction. The development of ecologically friendly technologies is of great importance since the construction industry consumes 60% of raw materials extracted from the lithosphere (Wadel, 2009). On the other hand, the appropriate use of recycled and waste materials can contribute significantly to sustainable development. Achieving this objective is possible only through finding environmentally friendly materials and construction.

One of the directions of the solution is in the recycling and reuse of materials given, which directly affects the sustainable production and use of renewable sources. Of this amount for the construction goes 24% of the total extraction. In Europe, the building consumes 4.8 tons of mineral resources per capita per year. No matter that the most important part of the burden of the environment comes from the materials produced by the demolition of structures (Van den Dobbelsteen et al., 2002) and other materials have a very significant impact on the deterioration of the natural environment. Previous research shows that the construction industry has to greatly appreciate sustainability and to always take into account the impact on the environment (JG Speth, Ehrlich, P., Ehrlich, A., 1990).

Materials of construction are selected only at the end of building process or during the preparation of project documentation, which is the wrong methodological approach. The choice of materials used in the construction is the basis for both, for the quality of the recovered objects and for the development of industry's own building materials and society as a whole. Different materials are through the current development of society used in the construction of buildings. Builders are always seeking to use materials that were present in the environment and readily available. In line with that materials used in the construction have their application today. A large number of innovations in terms of technology, mechanical and other properties had big influence on use of materials in appropriate way and to do detailed analysis. In addition, the behavior of materials in service, in modern micro-and macro-climate change, for the protection of the environment and ecology, requires their strict control and continuous testing. Only with the help of appropriate technology set can create a real basis for the development of entrepreneurship.

In the development of materials and manufacturing technology, and later in implementation of the same models for the development of entrepreneurship, it is needed to properly interpret the European model of agriculture. European direction of agricultural development is based on a competitive, multifunctional and sustainable model of agriculture.

The idea of multifunctionality of agriculture acknowledges the fact that there are a lot of different roles, because, besides the production of agricultural and food products, farmers ensure the quality and safety of food produced using good agricultural practices, which environment protect, cares about the appearance of the environment and contribute to economic and social development of villages, providing at the same time valuable public goods to society at large (The draft plan of rural development strategy, 2009-2013).

In this way seen multifunctional model of agriculture we should seek for the sector's ability to contribute to the sustainable development of the rural economy through the production and development of traditional technologies. Most of the traditional technology refers to technology in regional production and processing agricultural product and creating food products with authentic characteristics and geographical origin.

On the other hand, rural development shouldn't be limited to the agricultural sector and food production, but to be extended to other sectors. Accordingly, the production of traditional building materials can be a valuable source of new jobs and for their maintenance in rural areas in Serbia. This is particularly important in rural areas where there are no other sources of employment available. This is the way to protect the environment and it is another element in the creation of wealth.

In this way it is possible to achieve the goals defined in the Rural Development Strategy. Expansion of activities of the population in undeveloped rural areas could significantly reduction unemployment and also affects on the sustainability of family income. Development of technologies that do not require high qualification structure would result in the reduction of poverty and social exclusion. In addition, this method has direct and indirect impact on the protection of the environment and it is a prerequisite for the future development of the rural economy as a whole. Increase of income of population would create a basis for the improvement of economic and social infrastructure in rural areas of Serbia.

The process of rural development may not necessarily be linked to the development of industry and high technology, but in the first place, to create the basis for the dynamic enterprise.

Possible area for this type of development provides use of waste materials and technologies adapted to the market model of the economy. To create an enabling environment it's necessary to overcome a number of limiting factors:

- 1) lack of socio-economic motivation for innovative behavior and production enterprise,
- 2) low availability of qualified and internationally competent workforce,
- 3) poor quality of regional, sub-regional and local infrastructure,
- 4) orientation of regional financial infrastructure for financing imports and population, and
- 5) low efficiency of regional, sub-regional and local authorities and public services in eliminating these problems (Adzic Sofija, 2006).

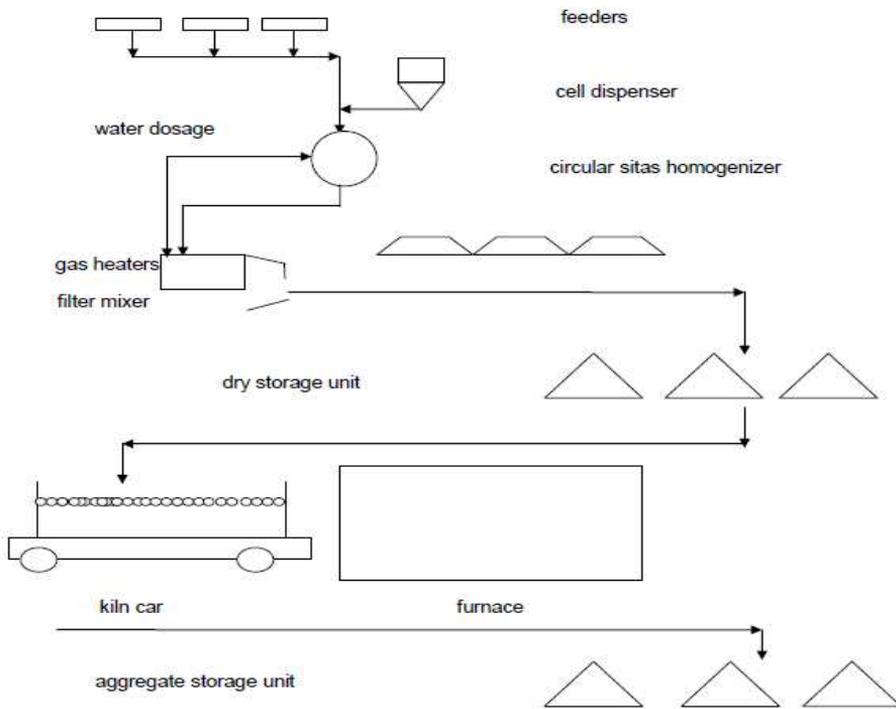
In light of these findings, it is clear that today's development of the rural sector activity cannot be rely on the development of the high technology. The solution to their problems must be found in other affordable activities.

Resources of rural regions are usually very dispersed which makes their character of exploitation very local. This fact gives the opportunity for greater involvement of traditional technologies and recycling in the expected growth of the sector.

Total investments in the observed plant were approximately € 980,000.00. Investment in land and infrastructure are not subject to screening.

Economic analysis within this work deals with the production of small aggregates obtained by baking the mixture mass formed by the four materials. As a finished product is a unit that is used for making concrete with improved thermal insulation properties. Overview of production plant for light aggregates is given in the following scheme.

Scheme 1. Display facilities



For the production of the said light unit it is used raw mixture which has the following composition (where the mass fraction is given in %): Component 1 - 62%, Component 2 - 23%, component 3 - 10% Component 4 - 5%. No matter that fly ash occupies a significant portion of the mixture at this point it is not possible to publish the names and exact composition of the individual components.

In accordance with the purpose of research the previous displayed lightweight aggregate manufacturing facility is projected with daily capacity of 200 tons of finished products per day. Planned production stages are: 1) Transport and storage of raw components, 2) Preparation of the raw material mixture, 3) Format, 4) Drying, 5) Baking and 6) Storage of finished product.

Transport and storage of raw material components: Component 1, 2 and 4 are delivered by truck transport, the loader is unloaded and stored in special boxes. Component 3 is delivered in bags and stored on pallets.

Preparation of raw material mixture is based on adding component 1, 2 and 4 through three quarterbacks who have the ability to control the dosing amount of each raw material separately. Thus, the measured raw materials are delivered by conveyor belt to a circular sieve homogenizer in which water is added and homogenization of raw material mixture is done. Component 3 is dosed through cellular dispenser with silos for storage, just before the entrance of raw material mixture in the circular strainer homogenizer which has a raw composite wetting system.

When homogenized raw mixture is molded goes to filter mixers through rubber conveyor belt, on which end is grating with standard diameter for forming granules defined radius. Correction of wet raw composition is done with this process. In the next stage, the molded aggregate is transported for draying with steel plate conveyor to high power gas heater. The dried aggregates are transported with conveyor to the place of storage and placed in boxes for each cross-section unit separately.

Baking is done in the oven chamber. The dried aggregate in specially designed containers is put on the wagon furnace. Baking is done on the selected mode, with a maximum temperature of 1020°C. After baking and cooling the aggregate is removed from the wagon furnace in containers by hand and delivered to the storage of finished or baked aggregates by forklift.

Previous researches (Nunes KRA et al., 2007, Symonds Group Report 1999) indicate that the structure and capacity of plant for recycling and production of construction materials are to the greatest extent determined by capital costs and the possibility of securing sufficient quantities of waste processing. Thus, the cost of use of this plant is largely determined by economies of scale and transport costs. Since this case does not include big transport distance, analysis of economic characteristics of the observed plant use is much simpler.

An estimation of the observed technology can be made only through a complete investment analysis. Only in this way it is possible to get the value of investments that an investor can invest in listed plants and costs of production that can be covered by the incomes. Methods of investment analysis must be based on the market value of the product and actual income. Because the world still has no market applications of analyzed products as raw materials, it is not possible to give a complete investment

analysis, but it has to be limited to the analysis of investment and employment.

In the analysis of investment in the plant for light aggregates production, based on waste materials with supplements, it is not considered the possibility of building a new plant. Possibility of production is analyzed using existing plant for the production of bricks and blocks. The plan is to adjust the plant with additional new equipment, to perform the necessary modifications to existing equipment and to carry out small-scale electro-mechanical and civil works.

The estimation is based on the economic characteristics of the following assumptions: 1) the basic raw material is close to the plant, 2) the use of existing facilities for the production of clay products (bricks, blocks) with the purchase of used equipment, 3) the plant is supplied by energy: electricity, gas and water supply, and 4) there is infrastructure, water supply, sanitation, access roads and administrative buildings.

The working plan of facilities is based on the duration of the shift of 7.30 hours, seven days a week, three production shifts per day. Also, one shift a week of overhaul is planned. In accordance with this, twenty production shifts per week or fifty working weeks is planned per a year. Planned number of employees is shown in the following table.

Table 1. *Number of employees*

Description	Number
Director	1
Head of sales	1
Production Manager	1
Manager	3
The operator of processing and design	4
The operator of thermal processes	5
Automation operator	4
Stockman	2
Total	21

Consumptions of raw materials and energy are calculated based on the daily production of 200 tons of aggregate. Planned specific gas consumption is 40 m³/t, while the specific energy consumption is 50 kWh/t. Water consumption is 0,3 m³/t. The calculation of production costs is shown in the table below.

Table 2. *The calculation of production costs*

Costs	Value (€)	Structure (%)
Material	0	0%
Amortization	117.600	7%
Salaries	89.100	5%
Maintenance	29.400	2%
Cost of natural gas	1.066.667	64%
Electricity costs	362.319	22%
Other materials	13.900	1%
Total	1.678.986	100%

* calculation of the cost of materials is not carried out

The total planned production was 66,667 tons or 23.810 m³. Based on the planned production and calculated expenses basic economic indicators can be derived. The calculated cost of production was 70.52 €/m³. The big part of these costs is the costs of energy, which summary amount is 85% of total costs. Up to two-thirds of the costs of energy are costs of natural gas resulting in the baking process of aggregate. In the case when costs of production, without calculating the price of the raw materials, are compared to the price of an equivalent material, or of gravel, estimation of economic effectiveness gives a negative result. This result is caused by the high cost of energy in the production process.

Conclusion

The use of fly ash in construction materials industry and the building industry is particularly important in terms of protecting and preserving the environment. As preliminary research concluded (Zekić at all, 2011, 2012), it is clear that today's development of the rural sector activity cannot be rely on the development of the high technology. The solution to their problems must be found in other affordable activities. On the other hand, Resources of rural regions are usually very dispersed which makes their character of exploitation very local. In other hand, by introducing the concept of sustainability and sustainable development as a decision criterion in the last few decades, changes classical approach to the evaluation of construction materials. Regarding to this, in traditional building techniques materials that are obtained by the process of recycling found their place. As the opportunity for entrepreneurship development in

rural areas is in agriculture, tourism and small capacity light industrial, construction materials are possible and logical course of development.

In order to achieve the development of these areas, it is necessary to invest and to renew technology and infrastructure. In addition, it is necessary to provide education and training and to create the conditions for a change of lifestyle in a rural area. The concept of integrated rural development as part of regional development policy is an alternative to the classical industrialization and is applicable in countries with large rural regions such as Serbia. A range of problems could be solved and harmonious development of the whole country could be achieved by integration of the concept of rural development in the state planning.

In order to reduce the investment risk for investors, economic and political instruments must provide financial support in advance for the observed technology and regulation of market of building materials in general. This could be achieved through the consistent application of standards in the use of recycled materials and financial support through the indirect effect of taxes on landfill and production facilities, as well as through direct influence by subsidizing production facilities and recycling centers themselves or recycled raw materials and materials produced by recycling.

Accordingly, a special action plan to stimulate the development of the above sectors must be made: 1) the development of appropriate technologies and technical solutions, 2) study of the supply and sales markets, 3) exploration of the potential users of the technology solutions, 4) the establishment of funds and institutions favorable crediting of new and development of existing facilities, 5) incentives for use of alternative materials in construction of buildings, 6) the development of tax and other incentives, 7) construction zone with the allocation of land under favorable conditions with regulated their infrastructure for specified purposes, 8) start the process of establishment of technology parks.

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PRODUCTION AND CERTIFICATION OF FRESH ORGANIC VEGETABLES- PROSPECTS OF COMPETITIVENESS

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Abstract

Organic food production, especially organic vegetables is a very promising long-term sustainable agricultural production. In the Republic of Srpska/BiH is currently developing several major projects primary production downtime organic vegetables, which is properly certified and that seems entirely export - oriented production. There are significant projects implemented with concrete , successful and measurable results, which represent a model of good practice for the long-term development of the sector of organic food production and increasing the share of primary organic farmers. Republic of Srpska/BiH has great potential and opportunities for a successful development of organic food production, so that the direct affirmation of the sector, through the introduction of new technology to ensure long-term sustainable development and the establishment of good practices of producers in the agri-food sector to achieve the appropriate level of competitiveness at the regional level.

Key words: *organic production, certification, development, competitiveness, export.*

Introduction

Production and certification of organic vegetables is one of the most promising sub-sectors of agricultural production in the region , including the Republic of Srpska / Bosnia and Herzegovina and Serbia. Significant untapped agricultural areas are a good basis for the development of organic farming, which in order to be successful must be planned and implemented in the medium and long term. The technology that is used in organic production can provide high-quality fruit good yield and a significant share of the fruits of the first class , if the production is based

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on the expertise and experience of the manufacturer. Certification procedures are also the segment that is very important for manufacturers and is part of the activities that the farm should be performed by persons (graduate agricultural engineers, food technologists and food safety inspectors). Requirements for organic food are growing. Because of the awareness of the increasing demand of quality products, consumers have expressed an increased willingness to buy local and seasonal organic produce. The mainstays of the market determine the price of organic products, which is controlled to be more expensive than the conventional minimum of 30 % to 100% per unit. If prices farmers can not cover the cost of production, a possible consequence of the disappearance of small family farms, which are the basis of organic food and traditionally speaking our farmers represent this type of farmer. Organization of production, monitoring, certification and marketing of organic products facilitate placement and increased trade with foreign countries, which in economic terms makes the organic food sector is significant. Benefits of organic production are numerous, and especially the export-oriented manufacturing, professionally organized, which includes established procedures and documentation of production and product stewardship, sustainable management of the farm, eco- conscious farmers. Organic production in Bosnia and Herzegovina and Serbia, should be seen as an objective development opportunity, and the experience of the authors suggests that a number of geographic areas in which there was considerable interest in the professional development of primary food production can certainly be prosperous and to develop appropriate projects in this sector. Production affirming apply new technological solutions will provide for an organic product our position in demanding markets of the EU and beyond. Transfer of technology to be more prevalent in primary practice, especially when you consider that an important place in all strategic and planning documents, which are made at the local level, as well as government development strategies. Due to current trends in the global economy, prices of organic products have increased dramatically in the past few years. A small number of companies providing a complete organic system that includes supply raw materials, equipment, plant materials and production technology, training, monitoring, certification, and most foreign sales to the European Union. The authors have developed just such a system, which is fully functional and conducive, and can be applied to the regional framework. Demand for organic products was consistently low until a few years ago, when there was a significant increase in requests by customers from European Union countries.

The aim

The primary aim of the authors is to present a model of applied good agricultural practices, which gave the results and meet the demanding criteria of the EU market of organic products. The development of organic vegetable production project in Bosnia and Herzegovina authors have achieved the following results: an organized, standardized production of fresh organic vegetables (peppers, tomatoes of different varieties), established an export-oriented production, with the fulfillment of requirements regarding quality, quantity and continuity; certified authentic marketing of agricultural and food products from Bosnia and Herzegovina, development and promotion of local products; training farmers in organic primary production of food, employment, agricultural producers in the sector of organic food production, increasing the interest of local communities and institutions to support projects development of organic food production and rural development in the municipality, joining, strengthening, commercial organization of farmers. Thus established a complete chain of production and supply with adequate access to all inputs and outputs in the production, in order to achieve uniform quality of products and technologies applied at all production sites.

Methods of work

Analysis of the sector

Food market is generally well researched and marketing of products is provided, and food production is a field that constantly gaining in importance. The demand for healthy safe food is increasing. Detailed analysis of the agricultural sector of the Republic of Srpska, conducted by the authors identified the following main problems: disorganized total agro- processing industry; failure to provide the required amount of product with uniform quality standards and food safety; absence of a functioning supply chain organic raw materials and adequate institutional support in the organization and marketing of finished organic products; lack of continuity of supply serious buyers adequate quantities of products, and therefore a more serious appearance in foreign markets. From the overall analysis it was found that there is a need for coherent regional organization of agricultural production throughout the Republic of Srpska /BiH, with the utilization of the natural advantages of each region, which would make our manufacturers get serious space in the markets of Europe and beyond. The author has successfully implemented

an organic vegetable production are in several different locations , in open fields and greenhouses, which gave excellent results that will be presented in this paper.

Modern technology growing organic vegetables on principles

Organic production in any case should not be neglected either, and certainly not extensive agriculture. Proper cultivation technology in all aspects of planting material to sales, can achieve a highly professional production, with good yields, high in fruits and first-class fully financially sustainable. Today, the Republic of Srpska / Bosnia and Herzegovina due to the low knowledge of organic production and certification of agricultural and food products, one of the most significant development for lack of primary organic production evident lack of certified organic plant material. The technology is also growing segment which must be paid enormous attention from the quality of soil preparation, planting dates to care for now. Supplemental feeding program and care that the authors used in the sample, and the organization of production in the market 2013th year included a combination of the application of effective microorganisms, minerals, and products based on herbal preparations. The combination of organic fertilization and protection of resources with proper technology growing, it is possible to get the fruits that are delicious and healthy, vivid and attractive appearance. The share of first-class fruit is extremely high, ranging between 80-90 %. The above results have been achieved in the professional greenhouses, which have fully automated systems (weather stations, roof and side opening, regulating the flow of air system inflates foil), and the results of the open field system (drip irrigation and mulching, soil) have also very good results. All of the above materials used are available on the local market, and the prices are compared to the high cost of conventional means dressing and protecting brand is acceptable. As the authors in 2013th the organized professional organic produce for the market of Germany in greenhouses and in the open field in 6 different climatic and production sites, all production is organized in a uniform technology, performed a set of analyzes (water, soil, fruit and other plant parts), and the production certified according to the rules of organic production and Global Gap, a standard that includes the placement goods in major retail chains. These measures and activities, and a large proportion of the engagement, which replaces the use of chemicals costly production about 30% or more depending on the conditions Production downtime, which is the reason

for significantly higher prices of organic products on the market, compared to the conventional agri- food products.

Establishment of pilot production of organic vegetables

The authors have over many years of working in the sector of organic production to meet the benefits and problems that are most important in this area. One reason for slower expansion of organic production in the Republic of Srpska / Bosnia and Herzegovina is that farmers do not have enough knowledge about organic production and underdeveloped market of raw materials necessary for the organization of successful organic farming. Production downtime equals "neglecte" the production of which is carried out without adequate technology and without a professional approach. This is exactly the reason why the authors are working on a long-term development of organic production in Bosnia and Hercegovni access the medium term, the establishment and affirmation of the organic production of fresh vegetables. In previous years, the market analysis of Western European countries for organic products, as well as to communicate with the wholesalers of organic products as the main problem is detected insufficient organization of primary production and the lack of first-class quality fruits and adequate due cultivars. During the period 2009/2012, the authors have implemented a number of experiments on different locations. Municipalities in which the experiments were organized: Laktaši Gradiska, Srbac, Kotor Varos, Doboj in northwestern Bosnia and Herzegovina in the experiments in the municipalities of Trebinje and Vares. As well as in central Bosnia in an irrigation area in the municipality Kreševo. The trials were organized in two ways: as an open field trials , the sample plots of 100-200 m², which was the first phase of the experiment. The second phase of the experiment conducted during the 2011/2012 year , and only in protected areas-reenhouses, a different level of equipment, of base tunnel greenhouses, to highly professional green house with completely automated function. In 2013, organized and carried out in an open field production, and production under the large area of protected areas for organized professional production for the market. Cultures were grown peppers and tomatoes of different varieties. Selected crops are good adaptability, medium to large fruit, intense color and good qualities of preservation, storage and transportation. The results of these experiments showed that organic farming can be successfully organized throughout the territory of Bosnia and Herzegovina, in different climatic and production conditions. The results in terms of fruit quality, and organoleptic qualities were very

good, which in terms of market system allows for a good position of local organic products. Experimental production in the education of producers, and the formation of farms specializing in organic production also certified, verified by international bodies of Austria Bio Garantie, which is one of the leading certification bodies in Europe. Manufacturers are accepted during the experimental process technology for organic growing principles, and adequate safeguards and fertilizer products, packaging, storage and labeling. As expected due to the implementation of experiments on a regional basis, has developed a number of farms that specialize in organic vegetable production, and are implemented in the same market for the 2013th year with the corresponding results.

Establishing a professional production of vegetables in greenhouses and in the open field

Professional production is organized in different locations and in different climates and growing in professional greenhouses and in the open field. The yields achieved in greenhouses during the growing season in professional greenhouses organic peppers amounted depending on objects 8-12 tons of peppers, bell peppers, block type. The share of first-class fruit is extremely high at around 80-85 %. Outdoor production is organized on an area of 5 hectares, pepper peak, with an expected yield of a maximum of 150-200 tons, of which the fruits of the first class are also represented about 80%. The results that the authors have achieved very high yields for organic farming, which is caused by a combination of his crop (mulching, watering, hoeing, biological pest control measures, monitoring of production in all stages from seedlings to obtain the release of fresh produce at the market). The technology of effective microorganisms is fully applicable to organic production, and has multiple effects: strengthen plant resistance, better adaptability to stress, and larger tastier fruits additional effects of beneficial microorganisms in the enrichment of the soil, which has a long term effect repairs characteristics of the soil, improving the properties of humus and repair structural properties of the soil. Biological protection measures relating to the use of beneficial insects in pest management (mainly aphids) . Used biological products are available in the local market, but were entered and natural populations ladybug and bumblebee. The effects of these measures are indoors very good, if a timely application. It was observed that in Bosnia and Herzegovina has represented a significant preparation for the biological control of pests, and the little vendor that deals with the protection of this segment. Disinfection of land, which is acceptable

vapor, or withdrawal without means suitable for organic production. In addition to effective microorganisms, were entered and preparations based on zeolites, and products based on plant extracts and active materials of natural origin who quickly gave positive results in the preparation of the land, especially in vegetation. Bearing in mind that these are preparations of natural origin response of plants is expected positive. Also, during the vegetation period and the experiments were conducted with the use of new resources for organic production as a regional perspective, in addition to primates that conventional production reserves, evident steady growth of the market of organic products and raw materials. These markets are more developed in the Republic of Serbia and Croatia to BiH, but there is a significant positive trend with an expected increase in the number of organic producers, which will lead to the development of the market related products. The consequence of this is the availability of a large number of resources and protection of the dressing and increasing interest in their application. In this way, organized organic farming is defined by high technology and complete professional, what is to keep appropriate documentation procedures, which is the basis of certified food production. It is important to note that the manufacturer of the primary production of a bias to the organic production is equated with extensive agriculture, with no care for the time being and with very little scientific farming technology and prime minister. From the alleged reasons, education of farmers are very important and necessary for long-term planning and development of the organic sector in a given area. Organic farming in the open field is somewhat more complex, because of the larger influences of adjacent land and less able to control the production process. Proper siting organic production is essential and necessary for a number of reasons: the previous generation, pesticide residues from previous conventional production, type of production neighboring land, distance from potential sources of contamination.

Chain supply adequate raw materials for organic vegetable production

Buy materials for organic production in Bosnia and Herzegovina is significantly lower proportion compared to the market of raw materials for conventional production. The main reason is that the organic production in the Republic of Srpska / BiH very little represented. In the Republic of Slovenia for example, the number of organic producers is about 3% of the total number of farmers (Source : Institute for the control

and certification of Con- cert Maribor). In Bosnia and Herzegovina, where the organic production in its infancy, a number of manufacturers appropriated for organic production is much smaller, although the experience of countries with developed organic farming confirms that organic production of agricultural producers spend in total do not exceed 5%. Stated directly affects the development of the materials, related products and services in the sector of organic production. In Bosnia and Hercegovina is a range of resources available to smaller dressing and care that is appropriate for organic production. A particular problem in the BiH market as there is virtually no possibility of purchasing organic seedlings, or seeds that have been certified and appropriate for the establishment of production. Import of planting material for organic production is very expensive and compromise the overall profitability and sustainability of production. Nursery production in the Republic of Srpska / BiH relatively little present and a small number of entities engaged in the production segment. Organic production of vegetables is practically non-existent and it is a significant problem for the expansion of organic farming on a large scale. The authors are in the process of establishing organic seedling production, which would be sufficient scope for gradual and safe increase in the share of organic production in the total primary production in BiH. Lack of certified planting material suitable for organic production affects the achievement status organic producers, extend the period of conversion and jeopardizes producers who want to change their orientation from conventional to organic production downtime. Given the significant competitive advantage and the ability to organize organic production, which may be a regional brand, one of the critical points and the problem to be overcome is available to certified quality planting material. In fact, development of competitiveness at the regional level is to act as a prerequisite to have a significant effect on the development of organic markets and related products, and a faster flow and cooperation can significantly affect the revenue in the market of organic products. A special advantage of organic farming is that it is mainly export-oriented, and can be an important source of income, and to be long term look at one of the most profitable sub-sectors in agriculture.

Certification by the rules of organic production of vegetables

The legal basis for the implementation of organic certification is the regulation number 889/2008, which defines the rules and procedures to be followed by the manufacturer for organic rules. Certification bodies assessments are conducted in accordance with this Regulation, which

contains technical and technological details of production , measures that can be implemented, timelines and procedures in organic production. Organic farming is fully controlled production. Conditions of production are based on rules of IFOAM (World Association of organic producers) have adapted to the specific conditions of each country in which production takes place and regulated by law. So that would be the one area of established organic production, it must comply with precisely defined conditions. One of the requirements is keeping documentation procedures-book production, and control of all input elements, following previous certification process and forms a complex approach that aims to manufacturer to pursue an organic production work on the farm as a whole is oriented to respect the principles of responsible behavior environment, sustainable use of resources and application of crop production with no adverse effect in any way. In addition, national legislation defines the framework of the organic production method in which production is organized, friendly operations and procedures that are required at the national level. National laws are in effect for European regulations to the extent that it is applicable up to and following the regulations in terms of requirements. Manufacturers in preparation for certification generally have a problem with the first certification procedures in the documentation, production management and control of all its segments.

This is certainly an aspect that requires significant involvement of experts and the education process. All production inputs (seedlings, various resources, substrates) should be certified and that the manufacturer has evidence , and the evidence of history of manufacturing sites. Conversion period usually lasts for 24 months, depending on the type of production, but in some cases this period may be much shorter. A significant number of parcels in the Republic of Srpska / Bosnia and Herzegovina is not cultivated for many years, and for that reason were not burdened with residues of pesticides and fertilizers from conventional production. Earlier certification, as well as documents on the non-use of land for back 3-5 years can reduce the conversion period, which is important from an economic point of view of the manufacturers themselves. The problem with local sales of certified organic products in Bosnia and Herzegovina is that the local market for organic products is very small and in the early stages of development. At the same time in the world and slower in the country and the region to develop awareness of the significance certified products, as well as interest in the origin of the product, the method of production, safety and other information products .

In Bosnia, a very small number of products certified according to the rules of organic production and are primarily of export products. Certification for the local market is hardly practiced since the local price of the product regardless of organic status, they can not cover the costs of organic production and certification. Unfortunately, to the enormous potential in Bosnia and Herzegovina products which are sold locally to certify it for marketing reasons.

Certification of fresh produce per GloablGap standard

Global GAP is prescribing chains trade market. Implies the application of good agricultural practices in primary production over the entire production process, to packaging the product for marketing to end customers. There are possibilities of group and individual certification, which is a lot simpler and faster, and is particularly suitable for smaller households. Implementation Group Global Gap certification standard includes two parts: a quality management system and Global GAP standard. Advantages of Global Gap in the production of the documents in the development, appropriate forms and records that directly promote the use of good agricultural practices. Farm after applying Global Gap standards can more effectively carry out the development process, shall control the input and output elements in production, and to document the changes and improvements implemented.

Products without Global Gap certification in principle in major retail markets are not included, because the supermarket chains themselves as members of the Global Gap Secretariat directly concerned to implement good agricultural practices, monitor the movement of products and establish clear accountability of all participants in the supply chain. Global GAP standard is equally important for both organic and conventional produce, but very often buyers of certified organic products will not require Global GAP certificate. Applying Global Gap implies that the manufacturer will perform analysis over a set of primary production and water analysis (chemical and microbiological), soil analysis, and analysis of fresh fruits on multipesticide.

These analyzes enable the control of use of supplemental feeding and care, and have a greater significance in conventional production because they have a role in preventing the excessive use of chemicals, various pesticides and fertilizers. An additional effect of the application of Global Gap is the farm can be kept professional, analytical and monitoring of all

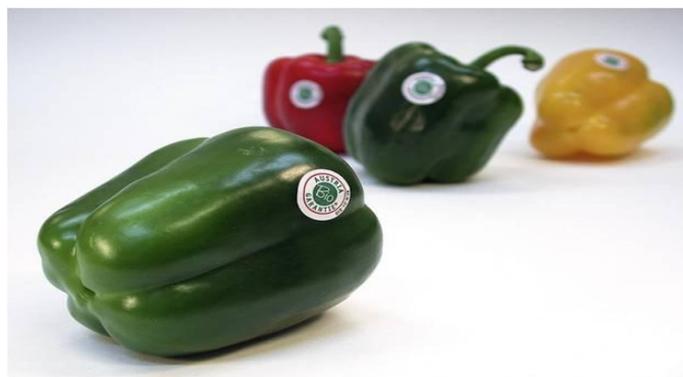
essential elements of the production. The Global GAP certificate is for business communication manufacturers, wholesalers and supermarket chains, and is not visible to end - users of the product consumers. Global GAP is essentially a commercial reference to participants in the supply chain and this effect is most striking in the certification according to this principle.

Marketing of organic products

Certified organic products in the export market have an adequate position and advantage in the standings. Wholesalers conduct sales campaigns of products, very often at the origin and the specific mode of production and assortment. The problem that the authors identify in Bosnia and Herzegovina, and a similar situation in the region, the marketing of agricultural products is often overlooked, or even more often if you do not practice. One of the few groups of products that do not just promote the agricultural products.

We believe that this is a serious deficiency, which leads to a significant loss of revenue from the sale of fresh products in retail and at competitive prices. The authors of the arranging production for the market and for the already well-known customer - contracted production, spending less local campaigns that have had a positive effect, because organic farming attractive to customers - consumers and marketers should be given due attention.

Figure 1. *Fresh organic produce for the market in 2013 model year*



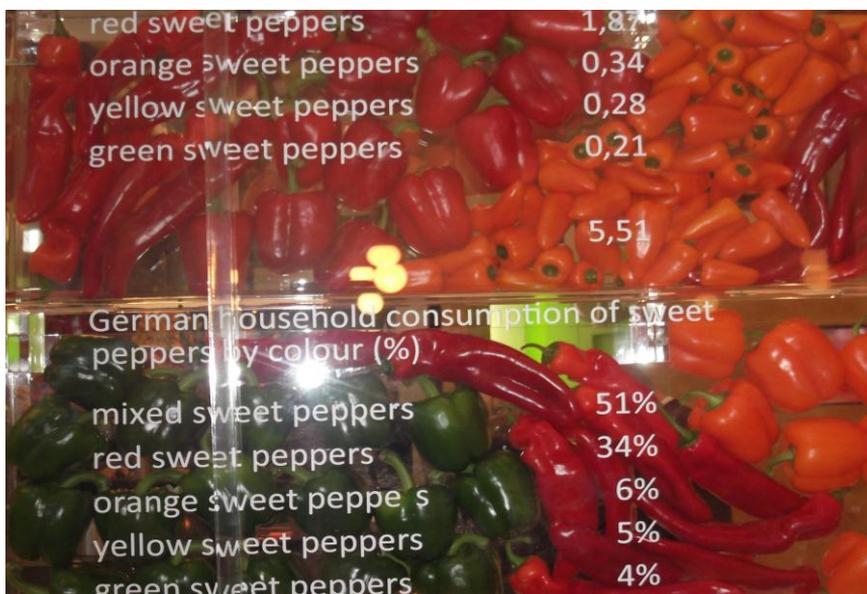
Source: *Photo archive Herba Krajina Limited*

The market for organic foods in Europe and the world – indicators

One of the conditions of food production and called sustainable agriculture. The concept of sustainability in ecology means the avoidance of pollution and environmental degradation to the provision of conditions, "Health for All".

The basis of the requirement of a sustainable agriculture is organic agriculture. In the 2010/11 global organic food market is estimated at over 15 billion pounds (45 billion). USA is the largest market for organic food. In Europe, the biggest market of organic food are achieved: Britain and France by 1 billion pounds; Germany, 2.1 billion pounds; Switzerland consumes 69 pounds/capita on organic products. The analysis shows that 70% of people want organic/local foods in schools. Economically growth in the consumption of organic food is constant.

Figure 2. Market demand for German organic vegetables - peppers (by type)



Source: Photo archive Herba Krajina Limited

2005/06 was 34 million hectares of land used for organic food production; Europe - approximately 6.6 million hectares or 4.1% of total arable land; Total organic production in the world is 24 million hectares. Sales of organic food has increased tenfold in the period 1997-2007 years. Sales rise £ 2 million a week.

Organic food production and tourism - basis of rural development and strengthening of competitiveness in the region

There is compatibility between organic food production and rural tourism development, which in an integrated approach may be the best basis for rural development. The most important results of this sectoral integration in the development of services and finalize deals in rural areas, and to link the individual bids (eg, culinary and tourist offer, indigenous and traditional products with a stay in the countryside, etc.). So there is a real possibility of putting into operation of tourism using the natural advantages and preconditions that our area has to the development of organic farming.

Our natural resources , especially land as a key factor due to the lack of exploitation of the last 15 years, unencumbered chemicals, pesticide residues and other harmful components, consequently, water and air quality are satisfactory for this type of production. Particularly interesting are the mountainous areas , due to the good spatial isolation, on the other hand, a large part of the population of these areas has a steady income, and agricultural production is organized in a relatively small area. All this points to the possibility of setting up organic farming in the vicinity of tourist centers, on the other hand the possibility of their placement in the immediate vicinity of the production. Regions, the linking of the two offers a lot to be done in promoting local production capacity, but also to achieve adequate operating results, which directly affect the improvement of the business environment in rural areas.

Results

So far in the activities of this program is implemented as follows: preparatory activities (programming, dynamic effects , etc.). Analysis of space, location, conditions for the organization of production and the real opportunities in terms of zonal distribution of certain types of production; Signing contracts with buyers of organic products in the EU - Republic of Germany. Organization of production at six different sites adapted technology growing. Certification of the production rules for organic production and Global Gap standard. Export volume from first production in 2013. Planning expansion project in 2014/2015 at the regional level (Republic of Serbia, Republic of Croatia).

Through the implementation of the certification procedures provided a standard of quality agricultural products, with the involvement of local experts in these activities. Staff education (graduate degree in agricultural engineers and technicians), and particularly education of primary producers in organic production and management of documentation procedures to ensure competence farms are manufacturers and consultants in production. Our experience shows that, on average, over 6 months of intensive monitoring production on farms and work with producers in all the segments manufacturers fully master the technology and organic production. Here, even in most cases involved persons without any previous experience in agriculture. Through the development of organizational models of primary production and with its adequate supervision is ensured traceability and maintain uniform quality and food safety at the appropriate level, all production sites, and in all conditions of production.

Discussion

All the synthesized organic agricultural products (fresh, organic vegetables) are packed and placed in the central warehouse, where all the products are coming on the final sorting and packing. On pallets and related export documents cited references such as the number of the certificate, Global gap of all export documents are sent simultaneously to the CA for verification and approval for each specific delivery of the goods. Also, it is necessary to ensure continuous supervision of all activities mentioned bodies, so that a record is kept of all lots sold. All production is provided standardisation, established a chain of food safety and certification of products manufactured according to international standards of production with corresponding periods of conversion. Given the specific production technology and processing methods of individual products, will provide the production and processing that follows and respects the chain of food safety, which will facilitate the placement and provide a better export market position through the development of each project to establish supply chain. The effect of the application of the concept of development is to build long-term competitiveness by creating a recognizable production site for organic vegetables. Initial results of applying this approach gave satisfactory were examined showed considerable human and material resources for the development of commercial and professional organic production in the Republic of Srpska/Bosnia and Herzegovina. A special advantage of the project is that it is fully applicable and sustainable in production conditions in Serbia, but in the entire region of South East Europe where agriculture is scattered and untapped resource.

Conclusion

Organic production in Bosnia and Herzegovina is one of the most promising sub-sectors in terms of development. There is a huge untapped potential for the development of organic farming in the region, and improving competitiveness through branding Danube region as a location for a professional production of organic products, especially organic vegetables. Challenges and problems that occur in the current process of development of organic farming are small and underdeveloped local market, insufficient quantities for export, under-organized training for producers in primary manufacturing, production planning approach. Certification is a priority for export-oriented production and the need to provide professional services for manufacturers in this segment. Raw materials market for organic products is in development, with the Republic of Serbia and Croatia, the market situation and supply of this product group is better than in Bosnia. Market for organic food products in Europe and the world is booming, has seen steady and continuous increase.

Despite the many challenges and problems, it is possible to successfully develop and professional produce organic agricultural food products. The project, which the authors have developed and applied in Bosnia, according to the principle of organizing demonstration, followed by a market-oriented organic production proves that it is possible to successfully develop organic production in BiH, but that is the same model production as much as possible to develop and successfully in Bosnia. Implementation of project activities has provided adequate conditions and the starting point for a permanent expansion of the production of organic agricultural and food products. This ensures the safety association of primary production to the market, and the certification of the safety of the end consumer.

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CONTRIBUTION OF AGRICULTURE TO ACHIVEMENT OF THE MDGs – THE CASE OF BOSNIA AND HERZEGOVINA

Željko Vaško,¹ Aleksandra Figurek²

Abstract

The development goals are different from country to country and from one period of time to another. To facilitate tracking and comparing the achievement of development goals, in 2000 the world list of eight unique millennium development goals was established. Agriculture primarily contributes directly to achieving the development goals of poverty and hunger alleviation by employing labour and produce food. In Bosnia and Herzegovina (BaH), the contribution of agriculture is powerful because, in a situation of high unemployment, a significant part of the workforce is employed in agriculture, and rural households produce most of the food needed for consumption of its members and excess food, which is consumed by urban population. The potential in food production in BiH is not adequately utilized and in this respect, the contribution of agriculture food production could be higher. Extensive agricultural production is correlated with the development goal of providing environmental sustainability and in case of intensifying agricultural production often do not pay enough attention to ecological principles. In terms of achieving the other MDGs (Millennium Development Goals), rural areas in BaH generally lag behind urban areas.

Key words: *development, agriculture, millennium development goals.*

Introduction

Each country sets development goals for itself, which often differ from country to country and from one period of time to another. These goals are determined in a way to be adapted to specific situation and time, but the differences between them and occasional changes, make it difficult for

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implementation and comparison between countries. Therefore, there is the idea and necessity to define a number of development goals, which would be identical for all countries of the world and would be valid for a longer period of time. In line with it the millennium development goals are defined.

The Millennium Development Goals (MDGs) are determined by the 189 UN member states, as a universal development goals for the whole world by adopting the Millennium Declaration in the year of 2000 (United Nations, 2000). It adopted eight global millennium development goals:

1. Eradicating extreme poverty and hunger,
2. Achieving universal primary education,
3. Promoting gender equality and empower women,
4. Reducing child mortality,
5. Improvement of maternal health,
6. Combat HIV/AIDS, malaria and other diseases,
7. Ensure environmental sustainability and
8. Develop a global partnership for development.

In achieving each of these goals, specific set of tasks is defined. Unique indicators, that have a quantified target size, have been defined in order to be able to track and compare achieving of the MDGs.

A number of the MDGs is directly related to agriculture, i.e. it can be achieved through development of agriculture. Other MDGs are of a general character, but their fulfilment can be seen through the prism of rural areas. Achieved agricultural development has a direct impact on the achievement of the first and seventh MDG and rural development has a direct or indirect relation with the majority of the remaining goals.

Materials and methods

The primary objective of this paper is to make a reference to the contribution of agriculture in achieving the Millennium Development Goals by analysing them in case of Bosnia and Herzegovina.

The secondary objective is to give the specific ratings of all MDGs in rural areas of Bosnia and Herzegovina, and, where possible, to compare the level of their achievement in rural and urban areas. Some results of other authors that researched this topic and other secondary resources were used for the purpose of this paper.

Achieving the MDGs is shown through 8 targets and 29 indicators, in accordance with the methodology used by the UNDP (United Nations Development Programme) in its periodic reports about the implementation of millennium development goals. Subsequently, the authors provide a review of the contribution of agriculture in achievement MDGs in BaH through their own observations and comments, arguing that from different data sources.

An additional effort is made in order to assess the achievement of MDGs from the perspective of rural areas, since available data are usually general and do not distinguish between achievement of the same development goal in urban and rural areas.

The research results

In terms of achieving the MDGs, Bosnia and Herzegovina accomplishes variable progress. As in many other cases, in evaluating the implementation of the MDGs in BaH, there is a problem of uncertainty and lack of respective data sources, so that the assessment should be given by the use of a larger number of domestic and foreign databases, sometimes even in case of the same indicator. The unemployment rate is one of the examples, because it varies significantly when measured according to the national statistical methodology, or according the methodology of the International Labour Organization (ILO).

The problem was highlighted in defining the initial status of some indicators in the year of 2000 and 2001, because many phenomena were not the subject of regular and systematic monitoring. In case of existence several sources of data for the same year, in the paper was referenced the one that was most favorable.

According to the UNDP report for the year of 2010, the following results were achieved in reaching the MDGs in relation to the year of 2000 as the base and their projections for the year of 2015.

Table 1. Status of achieving the MDGs in Bosnia and Herzegovina

	Goal/Indicator	Initial state (2000.)	Current state (≤2010.)	Goal 2015.	
1.	Eradicating extreme poverty and hunger				
1.1	Population below the poverty line	19.1%	14%	9%	
1.2	Unemployment rate	ILO	22.9%	29.9%	22%
		registered	43.4%	42.7%	30%
1.3	Unemployment rate (15-24 years)	34.8%	47.5%	12%	
2.	Achieving universal primary education				
2.1	The enrolment rate in primary	92.8%	96%	100%	
2.2	Enrolment in secondary schools	56.8%	77%	85%	
2.3	Enrolment rate in the faculty	19.8%	50%	35%	
3.	Promoting gender equality and support to women				
3.1	The proportion of women in paid work	39.2%	34.9%	45%	
3.2	The proportion of women in parliament	14.3%	10.5%	25%	
4.	Reducing child mortality				
4.1	Child mortality (under 5 years)	10.3%	15%	7%	
4.2	The infant mortality rate	14%	6.9%	5%	
5.	Improving of maternal health				
5.1	Maternal mortality	5.05%	1%	2,5%	
5.2	Percentage of births with the professional assistance	99%	99.9%	100%	
5.3	The prevalence rate of contraceptive	49%	35.7%	65%	
6.	Combat HIV/AIDS, malaria and other diseases				
6.1	Adults suffering from AIDS	51	43	50	
6.2	The prevalence and mortality from tuberculosis ³	cases	50	30	20
		mortality	4	6	2
7.	Ensure environmental sustainability				
7.1	Forested areas	44.6%	53%	60%	
7.2	Access to piped water	53%	65%	67%	
7.3	Sewerage system	33%	36%	40%	
8.	Develop a global partnership for development				
8.1	The share of development aid to GDP	11.1%	2.6%	1%	
8.2	Number of PCs per 100 inhabitants	3.9	6.4	12	
8.3	Telephone lines per 100 inhabitants	22.6	27	26	

Source: UNDP (2011), *Progress in achieving the millennium development goals in Bosnia and Herzegovina 2010.*

³ per 100,000 inhabitants.

How agriculture and rural areas make impact of reducing poverty and hunger in Bosnia and Herzegovina?

BaH has a large percentage of rural population. Although, there is no reliable source of data on the percentage of rural population in BaH, according to one of the sources it is 61% (Markaš i Demir, 2010). Most of the rural population in BaH is traditionally linked to agriculture, which contains primarily social and then development component. According to the last known data, in BaH there were 14.04% of the population in category of poverty, 17.78% of the rural population according 8.23% of the urban population. Rural poverty is still twice higher than those in urban areas and three out of four poor people live in rural areas (The World Bank, 2009). In 2004, in rural areas of BaH lived 74.5% of the total poor and in 2007, more than 77.1% (JICA and OPMAC, 2010). A similar conclusion was made by Bogdanov et al. (2010) in neighbouring Serbia, ascertaining that the dependence on rural households' income from low productivity agriculture causes high rates of poverty of rural households in general.

The rural population produces food, mainly for their own needs. One reason is the need to satisfy the nutritional needs of members of rural households, and the other is traditional orientation towards mixed farming, which results with the smaller quantities in food production and consumption on the farm. Because of expressed patriarchal attitude and economic necessity (high unemployment and low wages in towns), rural population, to some extent, still feeds poorer part of the urban population through direct food aid that is given to relatives and friends. The rural poor, with no or low-income, is forced to produce a variety of foods for own needs. Therefore, the structure of agricultural production in poorer rural households is heterogeneous, because they do not have sufficient cash income to buy deficient food products on the market. Because of the fragmented production and the fact that a significant portion of the food produced in the country is consumed to meet nutritional needs of the producers and members of their extended families, the level of marketability of agricultural products in BaH is low, and the produced foods consumed for their own use, represent the opportunity costs. In the IPARD sectoral studies for milk and meat, it is ascertained that subsistence and semi-subsistence farms, which consume majority of their product on and produce only little marketable surplus, remain the dominant form of farm structure in BaH (FAO, 2012). The same study estimated that 63% of farms in BaH which breed cows, produce milk for their own use or process

a small quantity of milk and sell their products (mainly cheese) locally. 61% of farms in BaH, which breed swines have 1-3 swine, exclusively for meat production for their own consumption. Approximately, 40% of the farms, which have up to 5 sheep and lambs, produce meat and milk for their own use. 89% of farms that keep chicken in BaH have up to 20 chicken, suggesting that they have them only for own consumption.

Quantity and quality of food in rural areas could be improved if agricultural production is more intensified and increase its productivity, which is low in Bosnia and Herzegovina. For example, according to the World Bank (2010) in 2006, vegetable yields in BaH were one-fifth of those in the EU Member States of Southern Europe (Portugal, Spain, Italy, and Greece), which have similar geographic and climate conditions. According to the same source, the yield of apples in BaH is 63%, cow's milk 33%, and tomato only 15% compared to the EU-27 average. These and other data point out that, in rural areas, greater amount of food could be produced with the same land and human resources, than it is now. The prerequisites for this are specialization and technological modernization of production, new investments and better market integration. However, raising productivity in agriculture, due to putting profitability in the foreground, carries the risk of jeopardizing its environmental sustainability, which is a common developmental contradiction indicated by Zhelizakov and Zaim (2012) in their reflection of the economic value of biodiversity.

Another importance of agriculture for achieving the first MDG is poverty reduction. For a large number of rural holdings, agriculture is the only source of income. According to the Labour Force Survey (Agencija za statistiku BiH, 2012) even 117 thousand working age people in Bosnia and Herzegovina is a full-time employed in agriculture, and another 50 thousand, part-time. According to Packard et al. (2012) in six new EU member states,⁴ rate of informal or unregistered employment in agriculture is 80.6%, and can be reasonably concluded that it is at the same level in Bosnia. Through agricultural production and sale of agricultural products, rural population earns income that meets their needs and thus indirectly affect the achievement of other development goals (better quality of life, providing education for children, better health care, etc.). In a situation of high unemployment, agricultural production is only possible way of engagement and making income for the significant number of rural population. If there were no possibility of finding "the last resort in

⁴ Bulgaria, Czech Republic, Estonia, Latvia, Poland and Slovakia.

agriculture" and survival thanks to agriculture, the percentage of poor people in BaH would have been even greater. Pejanović et al. (2013) use the term "social shock absorber" for that type of agriculture. The way, in which a significant number of rural households are engaged in agriculture in BaH, is extensive (small holdings, low yields, the structure dominated by low profit crops, etc.). Former BaH is characterized by the phenomenon of mixed rural households.

Because of the small holdings (which was restricted also with the agropolitical measures) and rapid industrialization, employment of rural labour force in industry was mutually acceptable initiative. A significant number of industrial workers lived in the countryside and worked in the nearest town. Due to the transition and the Civil War, many industrial facilities in towns have collapsed, and in addition to urban population, one part of rural population was left without previously secure additional income from employment outside of agriculture, thus, some of them were pushed below the poverty line. Thanks to the family's households in the villages, and own food production, the former industrial workers, who have lost their jobs in the transition process are not hungry, but they have become poor and dissatisfied with their current status. On the other hand, small holdings and low production base for a large number of farms in BaH, necessarily push them in the direction of diversification and achieving income in several ways. One recent research (Figurek et al, 2012) confirmed that there is a higher degree of diversification on smaller farms (till 10 ha), with a significant number of additional activities associated with further processing of agricultural products on the farm and occasional provision of certain craft services.

One of the results of mentioned research was also that in the category of rural households, whose head is older than 70 years, is recorded a high percentage of non-agricultural income. The rationale for this is that in the rural areas of Bosnia and Herzegovina live more pensioners, who are exclusively engaged in agriculture for food production for their own use. Due to low pensions, 338 BAM (Bosnia and Herzegovina Convertible Mark) or 173 EUR (Direkcija za ekonomsko planiranje, 2013), this category of population cannot meet all their basic needs, so life on farm (in vacation homes or houses inherited from parents) is a strategic way to escape from pensioner's poverty, because the cost of living is lower in rural areas and gives them opportunity for producing food for their own needs. In support of this, there are also data for the Republic of Srpska in which 8.6% of rural population has the status of pensioners (Ministarstvo

poljoprivrede, šumarstva i vodoprivrede Republike Srpske, 2009). The unemployment rate in BaH is virtual larger than it really is for the reason that a number of farmers (fictitious) were registered as unemployed in order to achieve certain benefits such as free health insurance and other social benefits. Farming in the territory of Bosnia and Herzegovina was never recognized as a profession, and current attempts to implement it, faces with resistance by farmers, because that status entails the obligation of regular payment of fees for health insurance and pension. Although farmers are full-time employed on their farms, they prefer to register as job seekers, and in that way, they disturb real picture of unemployment in the country.

How agriculture influences the provision of environmental sustainability in Bosnia and Herzegovina?

The starting point is the thesis that a stagnant agricultural sector, with low productivity and profitability, will result in unsustainable use of natural resources for agriculture (The World Bank and IFPRI, 2005). Sustainable agricultural production is based on the optimal use of natural resources for food production and such mode of production that takes into account the degree of soil degradation and control of soil contamination, groundwater and surface water, air and hazardous substances. Already noted low level of productivity in agricultural production in BaH, and a high proportion of uncultivated areas (about 50%) indicate that agricultural land, which is in other parts of the world valuable natural resource, BaH wasted and not used in a sustainable manner. BaH state has accepted and ratified number of conventions on the protection of natural resources, flora and fauna, and, at the state and other administrative levels, have adopted numerous action plans for protection of nature. However, in their implementation there are difficulties and inconsistencies.

Bosnia and Herzegovina has a high index of forest cover. According to the World Bank (2013), 42.8% of the territory of Bosnia and Herzegovina is covered by forest. The significant increase in areas under forest in Bosnia and Herzegovina is not the result of intensive afforestation in recent years, it is rather consequence of technical corrections of previous data for about 300,000 ha after providing satellite images by Corine Land Cover methodology. Due to neglect and abandonment of mountain pastures, they have been replaced by shrubs and coppice forest, so that low-quality forest spread at the expense of agricultural land.

One of the indicators of environmental sustainability is putting the areas with rare and specific plant species or natural features under the protection and special management regime. Despite of having the richest biodiversity in Europe, BaH is still the country with the lowest coverage of protected areas. According to the evaluation of second environmental performance review mission, BaH has only 0.85% of the territory which is treated as protected areas (United Nations Economic Commission for Europe, 2011). 154 protected areas in Bosnia and Herzegovina from the former SFRY officially no longer exist and they must be re-examined and re-designated in accordance with the new legislation. Protected natural areas, as well as those that do not have formal treatment, but have a certain level of attractiveness to tourists, are typically in rural areas. And the rural population themselves are sometimes against the declaration of protected areas because it limits their economic, mainly agricultural, activities. It is therefore important to develop tourism infrastructure, and to promote such destinations, in order to give opportunity to rural population to diversify income, respectively substitution of income from agriculture to the income from rural tourism. Valuation of protected areas through development of rural tourism is development direction that can reconcile the MDGs ensuring environmental sustainability, and aspirations of rural population for the realization of a satisfactory level of income. Certain useful recommendations about the direction of rural (and eco) tourism in BaH development, are contained in the analysis of USAID and author Emergin Makret Group (2006).

Area of BaH is exposed to the negative impact of climate changes. In recent years, there are significant variations in rainfall and the appearance of extreme values of air temperature. Factor of climate change is more important because of the structure of the BaH economy has a high share of agriculture and forestry, which are directly dependent on climate. Some assessment say that BaH will be more vulnerable to climate change than other countries in the region, estimates show that the average annual temperatures will increase by 3 degrees Celsius up to the year of 2060, and that the average amount of precipitation will reduce by 50-100 ml per m² (Svjetska banka, 2010). Certainly, this will drastically affect agricultural production and reduce the yields of almost all crops, and indirectly will have a negative impact on the development of animal husbandry. One way to combat climate change is to increase the irrigated areas. In Bosnia and Herzegovina, there is only 2% of agricultural land, which is irrigated (United Nations Economic Commission for Europe, 2011). At present (in collaboration with the World Bank) there is a project in the implementation

phase, which should increase the irrigated area of 50 thousand hectares (The World Bank, 2012), but the grown plants in BaH remain highly dependent on the lack of moisture.

In addition to irrigation water, for the sustainability of life in town and in rural areas the access to safe drinking water is an important. BaH is relatively rich in water, but in spite of that, a huge number of mostly rural households do not have running water (from water supply systems). According to a study conducted in the Republic of Srpska, 61% of rural households have water piping (Mirjanić et al., 2011). In this context it is necessary to mention the efforts that have been made in Bosnia and Herzegovina in the last decade to improve water supply in rural areas, both from the Ministry of Agriculture and local authorities, by co-financing the construction of water supply systems, as well as through donations from the international community in the post-war reconstruction. The problems in agriculture are also floods that in recent years have been causing significant damage to agriculture, because of underdeveloped and inadequate maintenance of systems for flood protection.

There is 1,263 km² in BaH out of use due to mined area (BH MAC, 2013), which is mainly agricultural and forest land. Suspicious agricultural areas have not been in use for a long time, and returning them into their original function, in meanwhile, is very difficult. For achieving environmental sustainability, proper treatment and disposal of waste water has an essential significance. More than 90 percent of domestic sewage is discharged without any treatment directly into local surface waters, and less than 3 percent of domestic waste water passes through the full biological treatment (United Nations Economic Commission for Europe, 2011). Houses in the towns are connected to sewerage system, generally, while rural areas are hardly connected to it.

An additional problem in the country is inadequate disposal of solid and liquid waste, which leave significant amounts of nitrogen in groundwater. Practical implementation of the Nitrates Directive is in start, and simulative measures are undertaken in order to achieve that goal, (incentives for construction of septic tanks and disposal of manure on farms), and in rare cases, sanctions. The use of organic and synthetic fertilizers in agriculture is low, but mostly uncontrolled, so that there is a potential risk of soil contamination. The use of chemicals (herbicides, pesticides, etc.) is increasing, and from this aspect, farming is potentially greater pollutant of the environment. Education of farmers about the

quantity and method of application of fertilizers and chemicals protective equipment is desirable and necessary. There is an increase in CO² emission in the world, and also the agriculture contributes to it. The main source of CO² emissions from agriculture is methane, produced during the digestion of ruminants in the use of natural fertilizers to improve the fertility of agricultural land in crop production. Currently, in BaH 13.2% of greenhouse gases come from agriculture. Although it does not seem to be much, at the same time industry in BaH spreads only 10.4% of greenhouse gases (United Nations Economic Commission for Europe, 2011). Since the low level of agricultural development, it could be expected that with the intensification of agricultural production, will also lead to increase negative impact on CO² emissions.

In the context of increasing the production of energy from renewable sources, agriculture dispose with biological waste, of which a certain amount of energy could be produced, and which can save non-renewable sources of energy. Energy production from biomass in BaH is still related to sporadic cases, although a great potential for energy production from 33,485 PJ (Husika, 2010) is in the biomass. In addition to biomass, rural areas are suitable locations for raising hydro and wind power and installing solar panels. The construction and location of generating capacity from renewable sources, temporarily or permanently employs rural population and increases their personal income, but also the local revenues on whose territory those capacities are located.

What is the relation between rural areas and the other millennium development goals?

Achieving universal primary education. One of the positive achievements of socialism in Yugoslavia, and thereby in BaH, was constantly improvement of primary schools and guaranteed (mandatory) and free primary education. Previously attained level of 100% of coverage in the primary education is partly disturbed under consequence of the influence of the civil war in BaH, during which a number of primary schools were devastated and rural population migrated. Other negative effects include low birth rates and depopulation of rural areas, which resulted in closing a number of rural schools. According to a study conducted for the preparation of the Strategic Plan for Rural Development RS (2009), 1/2 of the villages have a five-year primary school, and 1/4 of the village nine-year primary school, to which rural children cross 10 kilometres on average.

Number of secondary schools is less than the number of primary schools. Thus, in the predominantly rural areas (data relating to the Republic of Srpska), 11 municipalities from 34, do not have high school, and in most other municipalities, there is only one such school (Mirjanić et al., 2011). 4% of children do not attend primary school in BaH, and it is sure that the majority of them are located in rural areas. Continuing schooling of rural children requires significant costs, so it is certain that fewer children from rural areas continue their education in high schools and universities in relation to their peers in urban areas.

Promoting gender equality and support to women. Rural areas are traditionally patriarchal, and the role of women is often subordinated to the care of family and home. In this respect, it can be concluded that women do every day unpaid work such as childcare, cooking, cleaning, washing and physical works in agricultural production, while men are doing more paid work outside the home or farm operations using agricultural machinery. Participation in the paid labour force in rural areas is higher by men than for women. One study conducted in rural areas of the Republic of Srpska gave the following results. Over a half of men (58%) declared that men and women are equal in marriage, in comparison to only 40% of women, while 51% of women and 31% of men think that men are predominant in marriage. Over 70% of women questioned think that women are inferior to men in their position in society (Blagojevic, 2007). Although women, both in rural and urban areas, regarding declarative rights, are equal to men, in practice, it is still apparent that the role of women in rural areas is more inferior to her husband and family, especially in families with elderly members, who largely respect and cherish the tradition of patriarchal family. Rural households engaged in agriculture are more closed, its members have limited level of communication and movement, and women, living in such households, have fewer opportunities to come to the fore, and to show and prove their skills.

Reducing child mortality in BaH is still below the programmed target. According to the latest UNDP data (2013), the mortality rate of children under the age of 2 weeks is higher in rural (4.7%) than in urban areas (4.3%). Although the difference is not large, certainly it is the result of poor access to health services - a distance of place of residence from health institutions, lower quality of health care in rural areas and etc. It is interesting to notice (according to the same source) that twice more children in rural than urban areas are included in breastfeeding. Improving maternal health. In Bosnia and Herzegovina it is estimated that the

maternal mortality rate in the year of 1990 was 18 per 100,000 new-borns, and 20 years later, in the year of 2010, the maternal mortality rate was 8, which shows a positive decline of 56 percent (UNFPA, 2013). Some of another indicators, which is used to measure the level of women's health are: use of contraceptives, health control during pregnancy and giving birth in hospitals. In terms of these indicators, although there is no reliable quantitative data, women in rural areas in BaH are certainly in a worse position than women in urban areas. The reason for this is lower availability of specialised clinics and maternity hospitals, lack of systematic tests, traditional views about sexual and reproductive health, lower levels of education and others.

Combat HIV/AIDS, malaria and other diseases. At the end of the last century, HIV, malaria and tuberculosis have been declared the world's health problems and reducing patients which suffering from these diseases has been included in the global millennium development goals. In some countries, HIV/AIDS issues are rated as first class problems. The percentage of the population suffering from this disease was high in both urban and rural areas. Fortunately, the number of people infected with HIV/AIDS in BaH and the Balkans in general, is low and measured in tens compared to 4 million. Perhaps surprising data is that awareness about HIV in the female population in BaH is a higher in rural than in urban areas (UNDP, 2013). Tuberculosis, as the most common infectious disease in Bosnia and Herzegovina is present in a greater extent, and the number of recorded cases of this disease is higher in BaH than the average in the region. There is a direct correlation between poverty and the emergence of tuberculosis. Lack of access to drinking water and sewage systems, are also factors that affecting the occurrence of tuberculosis. One of the sources of tuberculosis could be cattle infected with this disease, so it is important to conduct regular vaccination against bovine tuberculosis and bacteriological control of milk. Given the aforementioned factors, rural areas and its population are exposed diseases such as tuberculosis in a greater extent . An additional problem is that a substantial number of rural population has no health insurance and therefore does not do preventive control of their health and they are not treated regularly.

Development a global partnership for development. In the context of BaH, this MDG has a specific meaning and weight, especially in the case of agriculture and rural areas. Notwithstanding the objections of certain interest groups, BaH has definitely become an open economy. By accepting the custom free regime with the countries of the region on the basis of the

CEFTA agreement, the signing the Stabilization and Association Agreement (SAA) with the EU and the forthcoming membership in the World Trade Organization, the country is permanently opted for an intensive exchange of food and other products. Currently, the exchange takes place at the expense of BaH because it has high trade deficit, but the pricing pressure of imported goods, forcing domestic manufacturers to seek solutions to increase their competitiveness. Notwithstanding the frequent objections, after joining CEFTA and SAA BaH has gradually, year after year, improved its foreign trade position. Agri-food sector in BaH, although being one of the sensitive sectors of the economy, quickly improves its trade performance of the BaH economy. The positive impact of the CEFTA agreement can be felt within the sector, but the sector does not fully exploit opportunities offered by liberalization (Nikolic et al., 2010). On the other hand, the openness of the BaH economy eliminates the potential for shortages of certain goods, it was the case in various stages of development in the socialist period. The opening of borders has resulted in a free movement of goods, but the people, also. Solid work habits and abilities, as favourable geographical position, enabled the employment of a significant number, especially rural, population, abroad. Their foreign remittances from abroad, make significant balance and improve living standards of families with members working abroad. Given the favourable acquisition opportunities in the privatization process, relatively cheap labour and proximity to Western European markets, expectations of foreign direct investment have been significantly higher than the actual benefits from them. The fact that the bulk of production funds in agriculture has been privately owned by a large number of small farms, the agriculture sector in BaH is remained outside the interests of foreign investors. A certain number of acquisitions is recorded in the food industry in BaH, but their development effects are modest. It may be noted that the agricultural complex in BaH is remained outside of the interest sphere of foreigners, apart from some commercial ambitions to sell surplus of food produced in other countries, on the BaH market. In the context of global partnership in development, donor and credit funds should be mentioned, which are invested in development of BaH agriculture and rural reconstruction by the World Bank, IFAD, FAO and other international organisations and some bilateral donors through their development agencies (USAID, SIDA, GTZ/GIZ, DFID, etc.).

Besides the role of these assets as a source of new investment, the transfer of new knowledge is not less important, which took place within the projects that have been implemented with financial support of these

funds. Due to the fact that agriculture in BaH is based on a large number of small farmers, it is necessary and inevitable to make their connections and associations, so that the world's millennium development goal of associating (partnership) in the agricultural sector is of much greater importance than in some other sectors. However, the model of organising farmers in cooperatives is not successfully overcome the transition period, so that the farmers from the cooperatives have less benefits. An alternative model of organisation, farmers' associations, shows certain results in articulating their interests and their influence on the creation of agricultural policy, but not in the case of enabling or facilitating the sale of agricultural products and procurement of necessary inputs.

From the perspective of "openness" of rural areas in BaH, and communication options, the majority of rural households have access to a fixed or mobile phones. Supply of PCs in rural areas is weaker, in RS there is about 1/3 of the households that have a computer (Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srpske, 2009), and their use for collection of information is even more rare, bearing in mind the educational structure of the rural population regarding IT literacy. Thus, in a study conducted for the purpose of the aforementioned strategic plan, it was confirmed that the main source of information for the rural population are radio and TV, and the second one is the conversation (exchange of information) with neighbours.

Conclusion

Almost all countries have agreed to define eight unique development goals which they called the millennium development goals. Adhering to the same objectives and indicators for monitoring their implementation, each country, in accordance with the current situation and opportunities, determines itself target size for the same goals. Bosnia and Herzegovina had also done that. As far as majority of development goals are concerned, BaH did not still reached a given size, although positive developments have been recorded in all areas.

Agriculture contributes directly to achieving two development goals - eradicating extreme poverty and hunger and ensuring environmental sustainability. A significant number of citizens in BaH live in rural areas and are engaged in agricultural production, which is a primary or supplementary source of income for them. In this way, agriculture, permanently or temporarily, decreases unemployment and increases

revenue, but a number of farmers is still close to the poverty line. Number of hungry people in BaH reduces, and agriculture contributes to it through the production of food for own consumption in rural farms and the production of surplus food for sale on the market. Available natural resources for agricultural production make it possible to produce more food, in which BaH has additional reserves to reduce poverty in the country and to contribute to reducing poverty and hunger in the world. Due to the high presence of extensive agricultural production in BaH, it is common opinion that it is ecological production. However, inappropriate use of manure and fertilizers and chemicals pollute the nature, so that the contribution of agriculture to ensuring environmental sustainability in BaH is questionable. The method of disposal of waste water is often not adequate, and number of rural households without access to water and sanitation is still significant. Rural areas in BaH generally lag behind urban areas in terms of the achievement of other MDGs (achieving comprehensive primary education, gender equality, reducing child mortality, improving women's health, mortality from infectious diseases, achieving global partnerships and information awareness, etc.).

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REINDUSTRIALIZATION OF SERBIAN AGRICULTURE: TOWARD A MORE BALANCED AND KNOWLEDGE BASED RURAL DEVELOPMENT¹

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Abstract

The paper deals with the role and importance of reindustrialization of Serbian agriculture due to the importance of technology and knowledge development. Those are the factors of agricultural production prosperity, especially in the rural areas where they offer possibilities for more balanced development in accordance with local natural features and regionalization of agricultural production. Following the latest international experiences, in the area of regional development and planning, in market oriented economies, the authors point out the need for reindustrialization of obsolete agriculture and implementation of new industrial policies within the Republic of Serbia. According to the authors, the special efforts have to be focused toward the development of knowledge based agriculture. The above mentioned is directing to new concepts and reorientation of Serbian agriculture based on new approaches that are standing on the new foundations. Reindustrialization, supported by the relevant policies, should enables possibilities for Serbian agriculture to achieve better results, as well as to be better structured at the new bases.

Key words: *reindustrialization, industrial policies, technological development, knowledge based agriculture, balanced development.*

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Introduction

From the point of the development theory, second half of the XIX and first half of the XX century could be characterised as a period with poor results. Instead of studies of social and economic development, the growth theory of the capitalistic i.e. market economy system has been improved. The studies on development were issued only by chance like Josef Schumpeter's' book from 1911 (*The theory of development*). But such and similar works were unmarked in that time until the mid of the XX century. So, the development that is followed by social, economic and political transformation was for a long period of time out of concern. The better situation was when the critics of capitalism are in focus. The theory of so called social reproduction and the vision of a state as a mostly system of equality of the citizens in which the obstacles of capitalism are relativized, in the very beginning was the issue raised by socialists, before all Karl Marx⁴. Based on his concept, as well as on the way how was governed the development strategy of Soviet Union, it was established a lot of today's development theories. For instance, based on so called, material balanced development strategy, Vasily Leontief - USA formulated input-output analysis, or Feldman G. A. who developed sophisticated mathematical models two decades before well-known Harrod – Domar's model, etc. (Domar, 1957).

On the other hand, slowing of the capitalism growth and rising of World economic crisis in 1929, as a consequence of monopolistic structure (concentration and centralization of capital), finally push the western economists to start to think and resolve the cumulated problems. J. M. Keynes (1956) as establisher of state capitalism suggested abundance of *laissez-faire*. It was generally accepted and helped in resolving the World economic crisis. Continuing, other economists analysed the dynamic of economic development and growth of market oriented economy. They have seen a big distortion between productivity and standards of living in developed and underdeveloped countries, but also within them (Clark, K.; Pigou, A.; Robinson, J.; Lange, O.; Kalecki, M. and others). It could be mentioned K. Galbraith (1967) as one who thought that state intervention can bring better proportion to socio-economic system and who was against prerequisites on consumers' sovereignty in market economy and promotion of price control policy.

⁴ Fundamentals of the economic development theory are based on criticism of capitalism by Preobrazhensky, Trotsky and Bukharin, what enabled a policy of USSR industrialization and its fast transformation, from the aspect of economy, from lag behind Russia into the superpower.

All previously mentioned established a large number of authors contribution after II WW, dealing with development issues, the role of industry and agriculture in the process of development, regional and rural development, etc. It was of such a volume that Jacob Oser (1967) was cynically expressed that production of literature dealing with development in underdeveloped countries became most favourable development branch in developed countries. In spite of that remark it's essential to mention few theoretical aspects of modern development. On that way, in the terms of macro approach, reindustrialization of agriculture of underdeveloped country, like Serbia is, could be recognised as important goal.

The development theories formulated in last seventy years are often cited, in spite of relatively narrow effects in theory and practice. They are often analysed from the aspect of their effects done in the overall economic development. In that sense, it is worthy to mention the Millennium goals of UN. Therefore, the analysis of economic theory development requires selection of basic analytical material and later generalization of the derived solutions. Furthermore, most often is insisted on relatively small number of cases of poverty that are caused, and after its generalization, possible solutions are provided i.e. *recipes*. In such approach, the institutional frame that is providing so called neo-colonial exploitation through local state management structure is often forgotten. That local state management structure became the instrument of neo-colonialists for obstruction of any social progress.

The historical development of countries has divided the world into two categories, one which is abundant in everything and another that is suffering. Further division goes within the countries. Therefore, such approach has vast weaknesses in its structure i.e. in existing social relations. Also, many authors are often expressing *circulus vitiosus* of poverty. That statement is argued by the fact that the industry can not be developed because of narrow local market, or that accumulation is relatively small because of low incomes, etc. Along with that, opinion of neo-maltusians, which looks at the poverty problem from the side of high birth-rates, has to be added.

In such situation the role of agriculture is seen as significant in initial phases of development. Also, it is difficult to generalize all conditions within the overall development model, which could be out of differences in natural conditions on one side, as well social relations on the other. This is due to fact that agriculture in underdeveloped countries dominates in the starting phases and as it has already existed, it does not mean introduction of new industry but modernization of existing one, in other words reindustrialization based on new approaches and

developmental levels. It is not so easy because every country has its own development history that is influencing next development steps: size of estate, literacy - education level of the farmers, their ability to accept new models of farm activities, their relation to the market, etc. Mentioned facts possess crucial value in determination of developmental model in agriculture of some country and of course, within whole economy. It could be underlined a large number of risks that follow process of agricultural production (climatic, size of farm, differences in historical development). These affect agricultural development from the very beginning phase of rethinking the possible development approach for the particular country.

Finally, there is concept of balanced development of economy branches on one side, but also the level of balanced development of particular regions on the other. First could be called as industry branch approach, while second could be named territorial approach. Both are promoting re-industrialization of agriculture. In starting phases of industrialization process of agriculture is considered introduction of industrial methods of work and step by step implementation of big scale production (corporatization). In next phase, phase of reindustrialization, through implementation of modern industrial policies, agriculture has to become (science) knowledge based. It covers implementation of hi - tech innovations and development of the branches like biotechnology, genetic engineering, etc., what could bring agriculture to the leading position especially in rural areas. Trend of permanently low productivity in agriculture could be alleviated, so labour from agriculture will stop to be transferred in industrial sector in higher percentage.

Is agriculture a priority?

The priority of agricultural development of underdeveloped countries within the overall development process has been emphasized by numerous economists, so in favour of such approach they introduce a lot of different arguments. During the mid of XX century, well known Marxist Maurice Dobb (1951) stressed that if we need to point out only one factor that fundamentally limits the speed of economy development, we can not avoid market surplus of agriculture. He particularly underlined market surplus of agriculture, not the total production or productivity of total production. The same approach has had Kindlberger (1958) who pointed out in his textbook that the base obstacle during the process of capital formation in any underdeveloped country is creation of agricultural products surplus, which has to be used for feeding of workers employed in production industries of capital goods.

Prowse and Chimhowu (2007) are giving three possible pillars that can facilitate poverty exits in rural areas. According to them only agricultural growth is not sufficient to enable farmers to escape chronic poverty, so next elements are required: establishment of solid economic and physical (communal) infrastructure; continuous education is key activity as for agriculture - based poverty exits, as well as for diversification beyond agriculture; stronger information provision through extension services and innovative delivery channels. In other words agricultural growth is particularly unlikely to be sufficient along with the lack of good infrastructure, unsatisfactory education and inefficacious information services.

Also it could be mentioned the opinions of Gustav Papanek (1954), scientist who firstly recognized the need for giving a priority to the agricultural development, where he established following arguments:

- Modernization, technical improvement and mechanization of agriculture in some countries is needed to support the need for manpower in industry;
- Agricultural production can be increased with relatively small amounts of the capital;
- It's difficult to develop industrial production in underdeveloped countries because of lack of capital and managerial and entrepreneurial ability, as well as because of some institutional limitations, inadequate social services (transport, communication or energetic). On the contrary, in agriculture it could be made a great progress with relatively small changes in technology;
- Agricultural development represents the savings of social capital because it needs minimal investments;
- Beside of domestic there is lack of foreign capital;
- Many structural changes in agriculture could be implemented before the start of technology development and industrialization;
- Due to the overall development in underdeveloped countries, higher income initiates agricultural development or import of agricultural products. So it is better to approach the developmental processes within the agriculture of certain country.

After analysis of mentioned arguments it could be concluded that they are not founded well. They are also refuted by global development practice. So, authors needed to use more sophisticated approaches. For instance, Johnston and Mellor (1961) are pointed out that higher production and productivity of work immensely contribute to: the overall economic development of certain country, because there come to huge raise of agricultural products consumption, or

expansion of export could become important factor, then additional workers for the other sectors could be created in agriculture, agriculture represents a base for creation of investments in social infrastructure, as well as growth of salaries in agriculture could provide a boost for expansion of industrial production. Additionally they are stressing the need for establishment of social and economic proportions. Besides, they thought that agriculture could become bottle neck of economic development. That creates the balanced development approach, which wasn't precisely formulated so many authors use it for describing and analysing different phenomena⁵. It's also worth to mention the dual sector model (Lewis, 1954), which was presented in theory and practice up to now, no matter that it is not connected by population density and nature of wealth any more. But, thing which is acceptable within the theory of balanced development is the need for investigation of investment complex as a whole, as well as coordination of investments with other measures of economic policy. In contemporary circumstances it could be connected with investment in development of knowledge and technology as the most important factors of faster agricultural development.

The main factors of rapid development of agricultural production

It is a fact that there are a lot of factors which affects agricultural development and its pace, but here will be mentioned only two, maybe most important one: 1) support to implementation of new technologies and their introduction into the traditional agrarian structure based on the planning of processes; and 2) impact of education and investments in human factor as a new base for the raising of agricultural productivity and systematic increase of yields per ha. Therefore, they are representing the basis for conceptualization and implementation of modern industrial policies in agriculture.

The role of agricultural new technologies

Improvement and spreading of new technologies is one of the key factors that determine the future of agriculture and agro complex. Over the past 150 years, scientists have focused on the development and refining of the selection and breeding techniques. Although considerable progress has been made, conventional selection and breeding are time-consuming and bear many technical limitations (FAO, 2002).

⁵ Concept of balanced development initiated R. Nurkse (1953).

According to FAO, modern biotechnology has the potential to accelerate the development and deployment of improved crops and animals. Marker-assisted selection, for example, boosts an efficiency of conventional plant breeding, because it allows rapid, laboratory based analysis of numerous of individuals, without the necessity for plants growing to stage of maturity in the field. The techniques of tissue culture allow the rapid multiplication of clean planting materials of vegetative propagated species for distribution to farmers. Genetic engineering or modification (manipulating an organism's genome by introducing or eliminating specific genes) helps in transfer of desired traits between plants more quickly and accurately than is possible in conventional breeding. Up-to-date techniques give significant contributions but have also trigger off wider public concerns, as like ethical doubts, solicitude about food safety and environmental protection, as well as frights related to concentration of economic power and technological dependence, which could deepen the technological gap between developed and developing countries.

Good example could be fast spreading of genetically modified (GM) crops. Area under them increased by a factor of 30 over the 5 years period up to 2001, when they were grown on more than 52 million ha (FAO, 2002). According to James, genetically modified organisms and foods produced from them are highly politicized issues that observe the health, economic and environmental aspects. Within the period 1996-2012 the worldwide area planted with GM crops increased few times and covers in 2012 little more than 170.3 million ha (James, 2012).

Significant researches, in order to develop more GM varieties are on-going in some developing countries. China, for instance, claims that follows in the footsteps USA, worldwide leader according to possession of biotechnology research capacity. However, dissemination of GM crops so far is geographically very limited and uneven. Mentioned crops can be found in 25 countries (15 developing and 10 developed countries) but only 8 countries include more than 98% of worldwide surfaces under GM crops (USA as leader with 62.5 million ha is followed by Argentina, 21 million ha, Brazil with almost 16 million ha, India and Canada with 7.6 million ha, China, 3.8, Paraguay with 2.7 and RSA with almost 2 million ha), (Pacic Brankov, Lovre, 2012). Number and type of crops and involved applications are also relatively reduced. For example $\frac{2}{3}$ of the GM area is planted to herbicide-tolerant crops, as well as commercially grown GM crops are usually either non-food crops, as cotton is, or they are quite a lot used as input in animal feeds industry (soybean and maize), (FAO, 2002).

So, in front of scientists is a tremendous work in order to focus on potential benefits and relativize the potential risks. Fast establishment and spreading of new biotechnological applications, along with the insecure public feedback, complicate the possible predictions of long-term benefits related to use of mentioned technologies, having in mind their effects on future production. However, short-term development (up to three years) is quite easier to foresee. The adoption of GM technologies in developing countries will surely to rise. For instance, GM soybean has already covered $\frac{2}{3}$ of the global area under soybean, and its share is even larger in developed countries. Together with expansion of such crops other more sophisticated biotechnology applications may gain importance (e.g. GM-based nutraceuticals or cosmetic applications). Some stances are that after new technologies start to produce a wider range of benefits, not only cheaper foods products and feeds, consumers in developed countries will possibly become fonder to accept them.

Some previous research in Serbia, related to consumers' attitudes toward the GM food, was shown extremely negative public reaction towards GMOs. For example, little less than 20% of respondents has tendency to buy GM food if it is cheaper, but if possess the same taste as traditional one. On the other hand, rejection of GM food is mostly connected to possible harmful effects on human health, along with moral and ethical issues (Papic Brankov, Lovre, 2013). It may be said that underdeveloped countries must raise their knowledge and research capacities to implement new technologies and to choose right way of governing the industrial policies that are relevant to support their further development.

The role of knowledge

It is undeniable that contemporary agricultural technology is permanently bringing hundreds of new solutions for agricultural production, and that is oriented toward the raise of agricultural productivity, so according to that it needs fast industrialization (Higgins, 1959). But on the other hand, at the global level, only a relatively small number of producers are implementing these technologies. Mentioned creates the gap between possibilities and reality (Njegovan, 1992) and actualises the old doctrine that absence of learning produces the poor results in agriculture. Finally, the work of Young (GB), Thaer and Liebig (GER) in XIX century presented agriculture no more as an empirical. That is further improved by the hypothesis that the main reason for differentiation in achieved yields are caused by use of knowledge (Varga, 1924). All that arguments provide the possibility for Theodore W. Schultz (1964) to formulate the theory of transformation of traditional agriculture. He stressed that transformation of traditional agriculture is not investment problem *per se* but

more the difficulty to choose the best way of investment, what is a problem of knowledge. It should be added that the economic problem of society is not only a problem of how to allocate *given* resources, if *given* is taken to mean given to a single mind which deliberately solves the problem set by these *data*. It is rather a problem of how to secure the best use of resources known to any of society members, for ends whose relative importance only these individuals know (Richman, 2012). Or, to put it briefly, it is a problem of the utilization of knowledge not given to anyone in its totality. So it is not difficult to conclude that the quality of the human factor is underestimated and that neomaltusians are not right.

Today we are witnesses of negligence of the role and importance of the constantly increasing man capabilities, as relevant element of progress that is able to compensate and substitute decreased physical capacities of the natural production factors. In this regard, it is particularly important (especially in developing countries like Serbia) to make significant investments in creation and strengthening of human capital. That way it will be avoided a vicious circle of poverty. Investment in quality of population (in increase of the level of their knowledge) could largely determine future outlook of the national agriculture, or complete economy (Njegovan et al., 2012).

It means that investment in education and research in agriculture can be definitely considered justified. Starting from the beginning, it could be said that firstly, permanent care for children, gaining of home and work experience, adequate approach to information, skills overmastering and specialization through training, investment in the health care system, etc. can improve the general quality of the population. Also the criticism to higher education comes into direction that it does not meet expectations in terms of social needs. Elitism is underlined, or even that it causes an outflow of population from rural areas.

In that course there are believes that the quality of education, not politics, is the biggest cause of unemployment among large number of graduates, as education and organized university research are obsolete in many parameters. On the other hand, Zubović et al. (2009) were noticed that unfortunately there is no clear institutional strategy which would define curricula and bring closer formal education with the real market needs in agriculture. Curricula in secondary and tertiary educational institutions oriented to agriculture has to change toward the introduction of subjects like management, trade and marketing, as well as to integrates environmental courses with contemporary knowledge in IT and social sciences.

That way the expectations of producers in agriculture could be formed through new opportunities and incentives on which they want, or are able to respond. It means that from the aspect of agriculture, establishment of competitive and innovative agro-sector can not be done without tight cooperation between public and private institutions, as well as without good communication between government, system of higher education and science, agricultural extension services, primary agricultural producers and processing industry. For example, according to Cvijanović (2009) in Serbia is a lack of relevant functional connection between respective scientific potentials on faculties and institutes as emitters of specific services, and individual farmers, cooperatives and agricultural enterprises as their users.

Good example can be a Knowledge Economy Indicators (KEI), which have been determined by World Bank (WB) for many years. They synthesize a set of indicators and sub indicators for all countries and certain regions, and include: 1) economic relieves and institutional regime⁶; 2) education; 3) efficient innovation system⁷; and 4) structure of information system. WB reported in 2006 that among 30 countries of Central and East Europe and Middle Asia with fairly low KEI scores, according to KEI value Serbia and Montenegro was ranked as 22nd. In relation to value of individual KEI parameters Serbia was the worst in the segment of economic relieves and institutional regime (25th), and the best within the segment of information infrastructure (20th), (World Bank, 2006). Values of KEI for 2012 ranked Serbia on 49th place among 145 worldwide countries. Related to individual KEI parameters, picture is almost the same, the best rank is achieved for the segment of information infrastructure (39th) and the worst within the first defined segment (81st), (World Bank).

As current global economic growth is dominantly based on technical-technological development and knowledge economy, that leads to conclusion that only with full application of achieved knowledge and its prompt transfer through new industrial policies, within the whole reproduction chain in agriculture, could be created high quality, safe and worldwide competitive agricultural and food products.

⁶ It synthesize next parameters: support to investments in information and communication technologies, strength of business environment in order to provide free flow of knowledge, satisfactory and effective legislative, protection of intellectual property, existence and functioning of anti-corruption mechanisms, etc.

⁷ Level of functioning of research institutions, universities and private enterprises network.

Industrial policies in agriculture - reindustrialization paradigm

Industrial policy (IP) of developed countries is directed, before all, to creating of environment for achieving goals and tasks of industrialization, as well as on promoting agricultural growth and efficiency. The main goals of such policies are compatible with other goals of economic development. They must contribute to the general economic growth, financial stability, improvement of positions within the balance of payments, full employment and improvement of prosperity. Towards economic policy they can have positive and negative approach⁸. Reindustrialization is procuring new equipment and implementing new knowledge based techniques for better employment, so in this situation, IP in agricultural practice is oriented toward many segments.

Investigation of Kilkenny and Schluter (1993) can be also interesting. How public support to agriculture in the USA includes many different approaches (from spending on agricultural research and extension to direct income transfers), they wanted to prove what can be the better rural and agricultural development policy, public spending for agricultural research and extension, or equal amount spent for direct income transfers to rural households. Starting from the facts that greater economic activity implies expanded consumption and higher national income, as well as investment and less unemployment, by appliance of *computable general equilibrium (CGE) model*⁹ they concluded that investment in agricultural research and extension will result higher productivity, what will be more effective way to stimulate the rural economy.

Realization of IP issues mainly depend on whether the instruments actually work in practice. Furthermore, it is important that IP instruments and procedures are not too complicated, that they are easy to manage and that their implementation does not make high additional costs. So, establishment and carrying out the goals of IPs are highly complex issue which implies numerous actions taken in many segments. Coordination and integration among institutions and organizations are highly important. The IPs of developed countries can be observed as paradigm, above all those from the EU and certain countries of Eastern Asia (Njegovan, 2012).

⁸ Positive approach pertains to stimulation of new industries or new products and processes, while negative approach fosters abandoning of outdated resources and technologies in individual productions.

⁹ Inter - American Development Bank defines CGE model as one of the most precise quantitative methods for evaluation of the impact of policy reforms on the whole economy (irreplaceable tool for policy establishment). Model realistically reflects economy structure, as well as all ongoing economic transactions among different economic agents, underlining the broader set of economic impacts derived from the implementation of certain policy reform. It is peculiarly valuable when the expected effects of policy implementation are complex.

Industrial policies in EU after Lisbon strategy

The IP of the EU can be presented as a set of certain activities in countries that have established a goal recognized in achieving of industrial changes by incentives that promote production of specific industries, or stimulate entering and exiting a market with specific industrial products. It was developed through many phases, from sector protectionism to horizontal support and clearer promotion of competitiveness, i.e. from passive to active IP.

While the European Economic Community was switching from the passive to active IP integration, the importance of supranational IP was constantly growing. After all, along with worldwide globalization, economic and political domination of USA, highly competitive Japanese industry, as well as China's transformation into a new economic power, EU recognized need for the new and improved approach to establishment of IP, what began as a product of the Lisbon Summit of the European Council in 2000 (Njegovan, 2012).

Strengthening of EU competitiveness and its potential for the industrial growth is based on next goals: 1) broader and more efficient use of new information technologies and creation of European area for research and innovations; 2) finalization of establishment of common EU market; 3) establishment of efficient and reliable financial market; 4) strengthening of entrepreneurship, particularly SMEs and promotion of employment; 5) skills and social protection system improvement; 6) sustainable development that ensures better quality of living. The established IP includes a set of proposals that can affect rise of IPs efficiency, as are: 1) Improvement of regulatory environment that will directed sector of industry towards security, health, environment and consumer protection; 2) Strengthening of innovative role of SMEs; 3) Financing of Community projects, before all industrial projects that include trans-European networking and projects whose aim is public interest harmonized with industry; 4) Use of structural funds to provide industrial competitiveness within the economically marginalized regions; 5) Establishment of expert groups that will try to interconnect all industrial branches; 6) Financial prospects. So, creation of a common IP was the key element for successful economic development that includes achievement of high level of industrial products and services competitiveness, as on internal market, as well as main foreign trade markets (Njegovan, 2012).

State of IP in agriculture of Serbia and prospects for its reindustrialization

Development of national agro-complex was strongly influenced by the implementation of respective IPs. Their lack or inappropriate implementation in previous period has driven agro-complex from the level of average developed to undeveloped sector of economy. General limitations in IPs development are recognized in (Njegovan, 2012): a) Formerly, agriculture was mostly leaned on imported technological solutions, that affects strong economic dependence on some countries; b) Import of food processing technologies was usually non-selective, so it pushed agro-complex into a growing instability; c) Licensing, utilization of trademarks, rapid transfer of know-how, technical assistance and common investments were generally harmful to the domestic producers; d) Weak cooperation between domestic companies within the agro-sector leads to situation that for a couple of decades the competitive struggle has been happened usually between foreign companies present in our market; e) Most of companies were based their economic power on transferred/foreign IPs; and f) For a long time different treatment of private and social sector of agro-complex caused sometimes diametric approach to the research and technological development.

In a favour of previously mentioned, being that the industrial policies are related to the comprehensive economic policy, there is also a need to present a certain limitations concerning rural development and agriculture in Serbia, which can represent a possible basis for future priorities setup (Njegovan, 2012): 1) Overstated role of agriculture in rural development; 2) Extrication of agricultural policies from macroeconomic policies; 3) Keeping of strong state position within the food chain (throughout monopoly storage enterprises, state marketing channels, state regulation of foreign trade and prices and use of resources), (Njegovan, Bošković, 2006); 5) Slowness of land reform hinders normal functioning of the land market and land tenure; 6) Privatization without setting right of market imperfections; 7) Lack of stable and continuous policy approach - often unclear, changeable and confused policy measures caused much uncertainty in agricultural production; 8) Lack of greater experience with market economy - need for establishment of functional market institutions and elements of market infrastructure, larger support for R&D activities, as well as further development of food safety and security system. According to mentioned, the agriculture is still using extensive industrial policies. The initial framework of the reindustrialization can make a space for the efficient industrial policy.

As state Stevanović et al. (2013) within the last two decades was marked the absence of investments in national economy (industry in particular) followed by rapid deindustrialization. Currently, share of industry in the Serbian GDP is at

the level of sixties of previous century, or the level of industrial production is on the level of 40% of the one in the 1990s. Further deindustrialization will lead to more pronounced structural disturbances, so reindustrialization is absolutely necessary in current phase of economic development, what is also confirmed by experiences of many East European countries (Czech Republic, Slovakia, Hungary, etc.) that have already passed the same way.

Recently, National council for economic recovery initiates an establishment of *Reindustrialization strategy of Serbia*. In mentioned document is expressed that reindustrialization is seen as a critical project not only from an economic, but also from a political perspective. Previous experience showed that sustainable economic development and political stability, at this level of economic development, are based on tradable goods and services, i.e. on the real economy (industry and agriculture). So this activity requires the creation of new economic environment and change in the way of conducting the policies within the sectors with comparative advantage, or sectors which potential for growth lies in available resources (mineral resources, fertile land and skilled labour force), accessible and favourable sources of financing and position rent, what together may drive the output growth. For Serbia this sectors are recognized in energy sector, agriculture, food processing industry strongly linked with agriculture and metallurgy. According to proposed Strategy, the first step in the elimination of output gap through expanding production in mentioned sectors will be finding of strategic partners that would be interested to buy equity in state companies from energy sector, agriculture, food processing, logistics and infrastructure. Also, industrial development and boosting of aforementioned sectors will highly depend on the Serbian accession to the European Union and EU technology platforms.

Along with creation of functional relations among entrepreneurial, research, educational and public sector, goals of national IPs in next period should be turned to (Njegovan, 2012): sustainable industrial growth and development; proactive role of the government and unemployment reduction; better balancing among stabilization, developmental and social function of the state; strengthening of entrepreneurial initiatives, primarily SMEs; diversification and boosting of export activities; advancement of investment conditions and initiation of stronger competitiveness; harmonization of educational system with the real market needs; proactive cooperation between the sector of science and industry, along with greater innovation activity supported by all economic and social stakeholders; further improvement of economic regionalization; better respond to energy efficiency and ecological issues; etc.

During the process of national agro-complex modernization, beneficiary of high tech achievements should be deeper involved into the developmental processes, so they have to possess certain background and adequate technological skills. Their proactive approach needs constant focus toward contemporary achievements and practical validation of achieved results. So, one of the most important factors of development of agriculture, and indirectly of complete economy and society, has to be development of advanced technologies by domestic scientific potentials and transfer/import of know-how (information about unpatented findings, procedures and methods, along with skills and experience that possess staff of licensor firms which transfer will enable competitive advantage of our products and production cycles). Reindustrialization and IPs establishment and implementation have to arise into the mutually coordinated process between public and private sectors, as well as between production-services and scientific-research sectors. That will accelerate reaching of more effective development of complete agro-complex.

Conclusion

Today, the role of science and technology considers before all knowledge and capability of individuals, as well as whole countries to implement the right concept for their faster and more efficient agricultural development. This means more balanced development based on reindustrialization and implementation of new industrial policies. Synergetic effects that reindustrialization mutually requires and produces, impose the importance of knowledge, what was the reality within the last few centuries. Agriculture is not only empirical economy branch. Modern society is a priority for Serbia, as well as expressing of needs for human innovativeness. In that sense, balanced sustainable development of agriculture and human wellbeing needs some prerequisites, as like:

- enabling long term relations between research activities and organizations, based on strengthening of potentials and competences of science and research system;
- increasing of investment in education and technology development and implementation;
- improving the quality of research results by the strengthening of educational and scientific contribution to the competitiveness of agricultural enterprises;
- development and strengthening of scientific-research infrastructure;
- encouraging the networking with globally recognised partners (scientific and technology centres); etc.

In any economically and socially advanced system cooperation within the area of ideas, people and existing capacities has to be crucial. That could initiate overcoming of the gap between the critical science and technology resources. Way to go ahead is turned to new industrial policies, which have to be established and implemented along with further programs of knowledge strengthening what require quite long period to show certain trace of progress.

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FARM.SOFT S.20.10-AGROMIX - SOFTWARE FOR RECORDING AGRICULTURAL FARM BUSINESS OPERATIONS: AN EXAMPLE OF GOOD PRACTICE IN SERBIA

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Abstract

Application software FarmSoft S.20.10-Agromix is a software solution for keeping records of farm business operations. The program was created by a team of experts from the consulting firm Mojsijev from Vrsac. It has been installed at over 300 farms in Serbia and 30 farms in Montenegro. For the purpose of simplicity and easier use by our farmers, the program menu is made in Serbian. The methodology of the program is aligned with the FADN methodology of keeping accounting records in the EU countries. Use of the software includes: data entry, data updating and report reviews. The program enables the monitoring of: farm assets - land, buildings and machinery; income and expenditure, with records of suppliers and customers; inventories of materials and finished products, crop production records on work operations and spent material per plot and products; central register of livestock, monitoring of livestock production with the records of all the events and costs for individual animals; calculations for each farm product; as well as writing reports for each of these records. Empirical data from our practice and the results of the survey carried with the owners of farms who use the FarmSoft S.20.10 show that by its proper use business can be managed successfully and the farm's competitiveness is encouraged.

Key words: *farm, business, records, software, competitiveness.*

Introduction

In developing the concept of bookkeeping, we should take into consideration the objectives to be achieved by keeping these types of records on one hand, and the objective conditions in which a farm operates (Krstic *et al.*, 2005), on the

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other hand. Compared to a company, a farm as a production unit is closely associated with the household as the main consumer unit. Agricultural producers in our country, often perform a number of activities on the farm single-handedly, and accounting should not be their additional burden.

Developed countries apply strategy of respecting the producer's time, therefore generally, the majority of economic activities take place in the producer's economic backyard. The necessary production materials are delivered to the farm according to the agreed time and delivery dynamics, range, quantity, quality, etc. On the other hand, the final products produced on the farm, customers usually take from the farm's economic yard or from the place of production, according to the agreed terms of delivery - the quantity, price, quality and the like. This approach which implies compliance with the obligations and leaving time to the manufacturer to perform the production, is the first step of the opportunities for better organizing, keeping accounting records and effective management of the farm. Farm management must be based on real and up to date data so that the business decisions can be made on time (*Zoranović and Vukoje, 2008*). In the countries of developed agriculture the procedure of software monitoring and farm business performance analysis is already well known. The countries of European Union are attaching more and more importance to the introduction of this information system, justifying it by the importance of up-to-date information, due to the quick changes in technical conditions, the market and economic regulations in today's global world (*Dékán & Orban, 2008*).

Accounting system should be simple, acceptable to producers, simultaneously developing learning and awareness that such evidence does not serve as the basis for taxes or any other liabilities of the farm. At all stages of use of such information, manufacturers need to have assurance of confidentiality and that all analyzes are published under a code (*Sredojević et al., 2009*). So, the developed and implemented software FarmSoft S.20.10-Agromix proved to be an example of good practice in agriculture in our conditions as a basis for improving the farm and the competitiveness of agriculture. Therefore, the main task of this paper is to analyze the above mentioned software package for recording farm business operations, the effectiveness of its applications so far and the possibility of its wider use in our practice.

Material and Methods

During the period from 2007 to 2010, a team of experts in the field of agronomy, agricultural economics, computer science and programming, from the consulting

firm Mojsijev from Vrsac, in collaboration with farmers and consulting the scientific literature, in phases prepared elements of a program for recording farm business operations. Respecting the technical and technological rules and norms of primary agricultural production, applying various economic methods, the software program FarmSoft S.20.10-Agromix was designed. The successful testing was followed by the promotion and application at a number of farms.

In the period from 2011 to 2013, the software was installed at more than 300 farms in Serbia and 30 farms in Montenegro. The software is composed of the latest generation of Microsoft tools in client-server technology and relies on bases VisualFox PRO8 or MS SQL Server 2000 made in VB 6.0. For operation, from the hardware and software aspects, it requires PC Pentium II, 128 MB RAM HD 2G minimum, but PC III with 512 RAM and HD 2G is a better solution. The program works in all Windows operating systems. For more efficient use by our farmers, the menu is made in Serbian language. During the summer of 2013, the authors of this paper conducted interviews and surveys including 45 manufacturers who have been using this program more than two years.

Results and Discussion

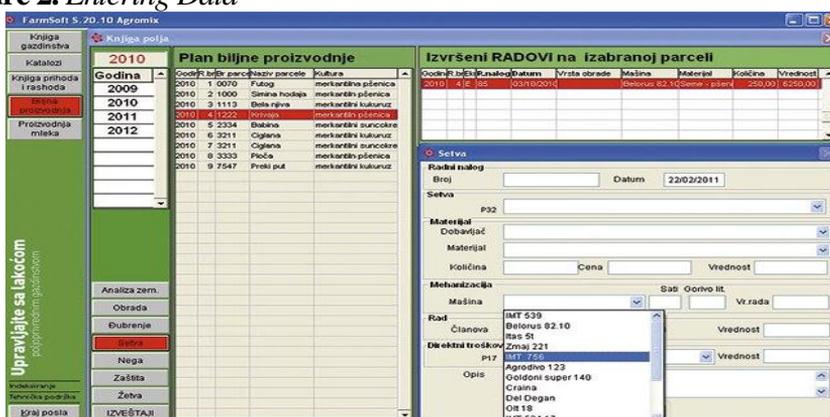
When you start **FarmSoft S.20.10-Agromix** you will first see on the screen the control numbers and fields for entering the user code. After the successful registration, the user enters basic data of the farm - the name, registration number and the year of record keeping commencement (Figure 1).

Figure 1. Farm Registration/signing in

The screenshot displays the 'Licenciranje i inicijalna prijava GAZDINSTVA' (Licensing and initial registration of the farm) window. The window title is 'Licenciranje i inicijalna prijava GAZDINSTVA'. Below the title bar, there is a red button labeled 'BRIŠANJE danih PODATAKA'. The main content area is titled 'Prijavite osnovne podatke o gazdinstvu' (Enter basic data about the farm). It contains several input fields: 'Naziv' (Name) with the value 'GAZDINSTVO GAJ', 'BPG' (Registration Number) with the value '3455744221467', and 'Godina' (Year) with the value '2011'. There is also a field for 'Brog POLJOPRIVREDNOG GAZDINSTVA'. Below these fields, there is a section for 'Za licenciranje programa nazovite distributera telefonom da biste dobili aktivacione BROJEVE' (For program licensing, call the distributor by phone to get activation numbers). This section contains three input fields for activation numbers: '8514', '4452', and '9088', each with a '0' below it. To the right of these fields is the label 'Vaši brojevi' (Your numbers) and 'Dobijeni brojevi od DISTRIBUTERA' (Numbers received from the distributor). A 'POTVRDI' (Confirm) button is located at the bottom right of this section. At the bottom of the window, there is a yellow warning box that says 'Posle obavljenih aktivnosti MORATE pokrenuti ponovo program' (After the performed activities, you must restart the program). The background of the software interface shows a sidebar with menu items like 'Knjiga gazdinstva', 'Katalozi', 'Knjiga prihoda i rashoda', 'Bilina proizvednja', and 'Proizvednja mleka'. The top right corner of the software interface has the 'FarmSoft S.20.10' logo. The bottom left corner of the software interface has the 'Agromix' logo and the text 'Upravljaite sa lakocim' and 'Upravljanje poljoprivrednim gazdinstvom'. The bottom right corner of the software interface has a small image of a field with crops.

The program consists of modules - subprograms that are used for data entry and processing and review of reports. Operating windows in FarmSoft program are all the windows that are used for input, review and deleting data. They all have the following in common: they are opened from the menu on the module home screen, showing data which were marked in the navigation table before their opening, the operations with data can be performed only on them and there can not be several operating windows open at the same time. To enter data, first chose the appropriate module from the main menu and then open an operating window to enter the planned data (Figure 2). Selecting the window is done in the menu on the lower left side of the module, and by its activation the previously entered data are shown.

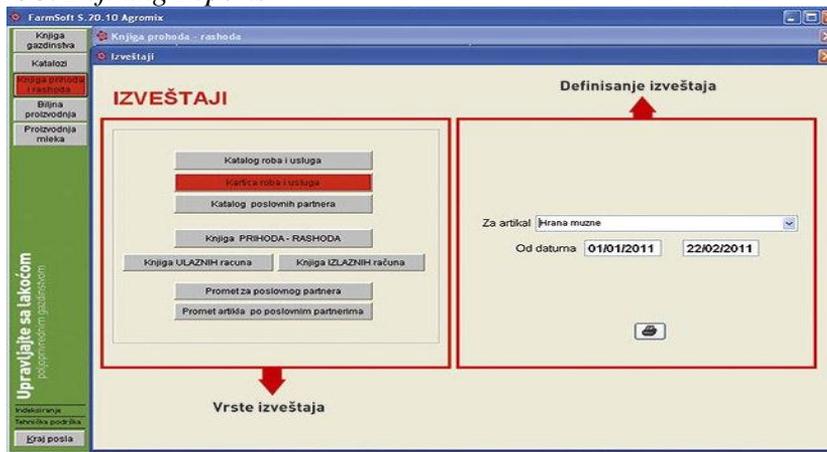
Figure 2. Entering Data



All modules contain a working window under the title **reports**. They have their own form. On the report there is the basic information about the farm (name, FN, name and surname of the holder, address, telephone number and e-mail), date of printing and the name of the report (Figure 3).

Data are always stored in rows and their descriptions are given in columns. For most reports you need to define the period for which it is required. At the beginning of each year the farm production plan is made and entered into this program. It defines the production fields and sowing crops for each field. Production plan for crop production is the basis for recording all operations. Use of the program requires completion of work orders, their record in electronic form, and filing in writing. Timely and accurate information is a necessary prerequisite for the successful management of the farm. Recording of data on production and operations is a basic requirement for each subsequent procedure of decision-making aimed at farm promotion. The procedure of keeping records includes: collection, storage and use of data.

Figure 3. Defining Reports



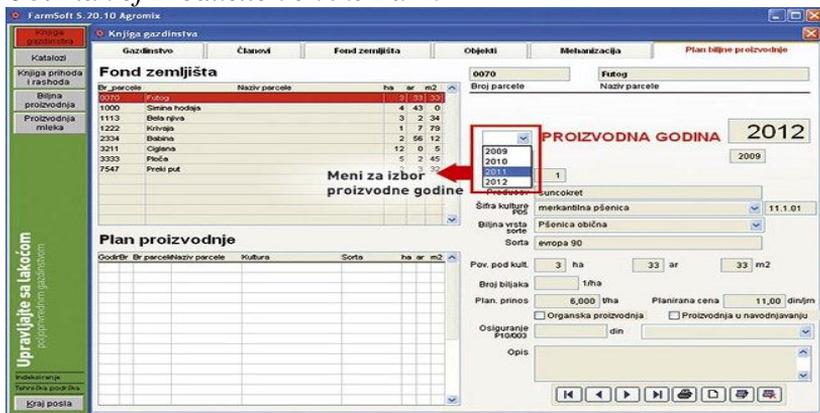
Data collection - involves recording of all the operations and good organization of the maturity of documents. It is necessary to establish the system of data collection appropriate to the size and functioning of the farm on the farm itself. It is essential for collecting the data that they are available to everyone on the farm and that they are easy to use and complete. *Storing data* - represents their disposal in a manner that is clear to everyone involved in this process. It is organized in such a way that it does not take much time, and at the same time ensures quick availability of all the required documents. Data of the farm are entered on the working window *Farm Books*. On the working part of the window there are the following elements: data that are defined at the registration of the program (previously entered), the fields to be filled each year when registering the farm, the menu with icons for data management and the table for the year selection. Data of the active working household members are entered here as well as those referring to the plots, buildings and machinery (Figure 4).

Figure 4. Farm Data



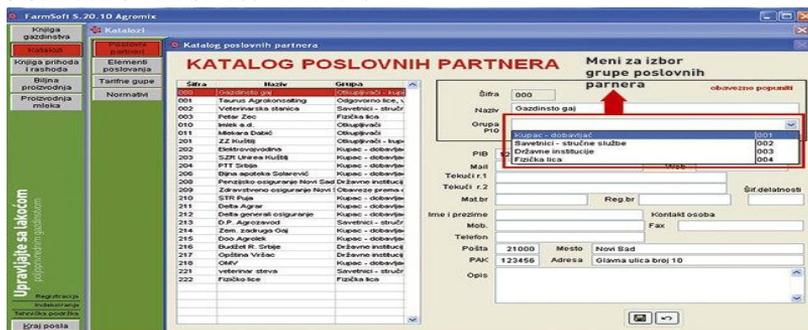
When you open the working window, it is necessary to choose the production year for which the plan is made. The plan is entered for the manufacturing fields, which may be smaller than or equal to the plots. If the plot is planned for single-culture sowing after the completion of entries, the next plot is chosen in the table for land fund and the corresponding data are entered. However, if a plot contains more different cultures, a new field for the same plot will be entered. This process can be repeated until the sum of the entered fields equals the total area of the plot. The display of manufacturing fields (in the table Production Plan) for a plot is obtained by its marking in the table Land Fund (Figure 5).

Figure 5. Plan of Production on the Farm



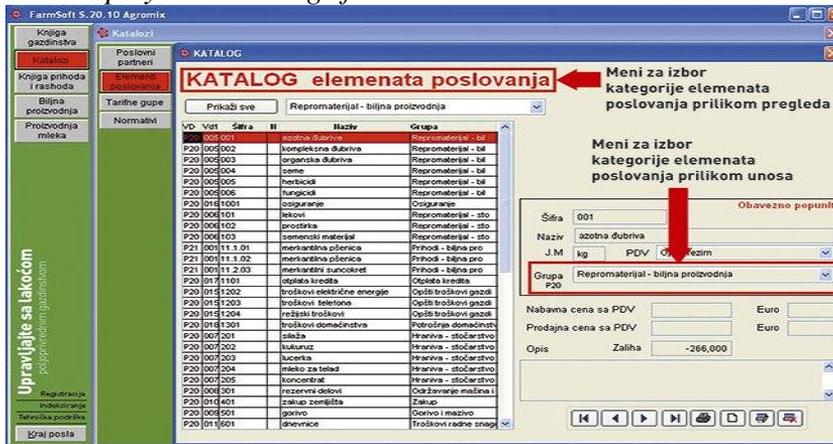
In the module DIRECTORIES there are data which constitute farm data bases. These data form the drop-down menus, which are used in recording the events on the farm. **Directory of business partners** - It is used for entering all the business partners of the farm, which can be natural persons, legal entities, as well as government institutions, with which the farm gets into contact. Business partners can be classified into one of the following groups: customers / suppliers, consultants - professional services, government institutions etc. (Figure 6).

Figure 6. Data on Business Partners



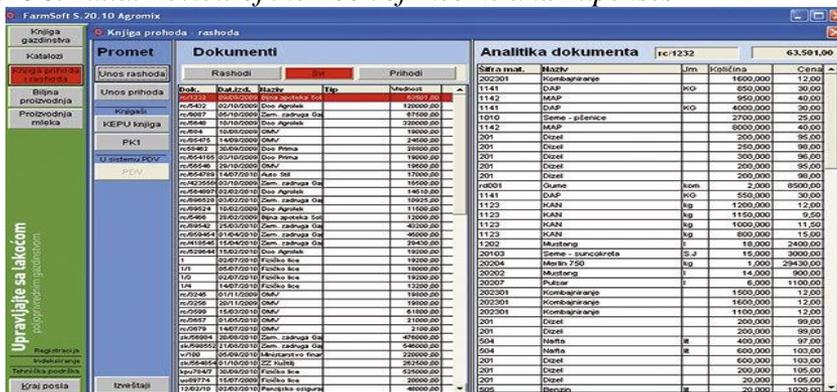
Business Elements Directory - When entering the business elements, in addition to codes, descriptions, units of measure and tax rates it is necessary to select the element of business in the drop-down menu. Categories of business elements are adapted to farm operations (Figure 7).

Figure 7. Display and Entering of Business Elements



Such recording system allows users to choose how thoroughly they want to monitor their business (there is no need to enter each item individually, because they have the possibility of grouping elements of business operations according to their requirements). Thus, they get quality reports while using the program is not complicated. Operating income, expenses and reviews of the inventories-stocks, raw materials, payments and sales are recorded in the module **Book of Income and Expenses**. After starting the module from the main menu, it opens a window where you can see an overview of all revenues and expenditures entered (Figure 8).

Figure 8. Initial Review of the Book of Income and Expenses



Operating window for entering expenses opens when you click on ***Enter Expenses***. The first step in booking expenses will be choosing the type of expenditures in the drop-down menu at the top of the screen. Then the overview table shows all expenses entered for the selected category. The entry of new expenses is done in two steps.

The first part of the input is done on the upper half of the window. Clicking on the **"new"** you will open the field for entering account/invoice information (number of account/invoice, purchase date, payment date, supplier and VAT).

The second part of the input is done in the lower part of the window and you will enter the items that are purchased according to the given invoice. When the item is selected from the drop-down menu, the remaining entries to be done are the price and quantity of goods purchased or services. This procedure is repeated until you have entered all the items from the invoice.

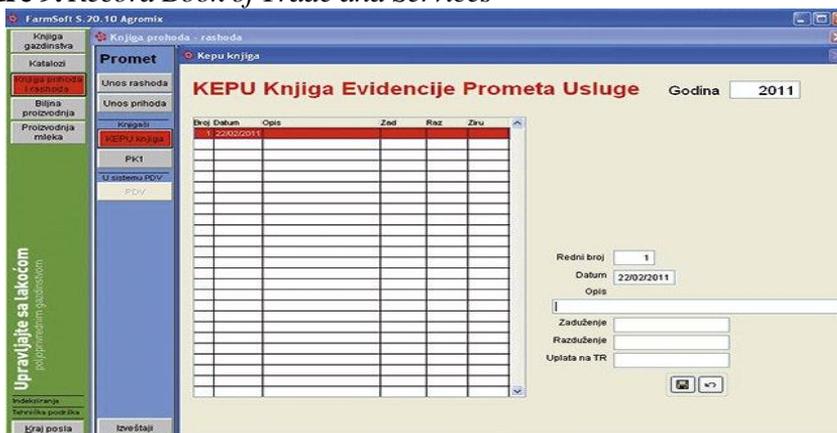
Entry of income begins by choosing the type of income in the drop-down menu at the top of the window ***Book of Income and Expenses***. Then clicking on the **"new"** enables entry of: the number of documents, the choice of a business partner from the drop-down menu, the date of sale and the date of payment. After entering this information, you can proceed by entering of items of income, applying similar procedure as the one for expenses.

The books ***KEPU (Record Book of Trade and Services)*** and ***PKI (Business Book of Income and Expenditures)*** are used for records on farms which have the obligation to keep books on the single-entry bookkeeping principle. This obligation may occur in two cases:

- 1) In the event that the farmer, in accordance with the provisions of the Law on Personal Income Tax, opts to pay tax on income from agriculture and forestry according to the actual revenue;
- 2) In the event that the farmer, in accordance with the provisions of the Law on Value Added Tax, at the beginning of the year, determines to pay VAT and on basis that, under the provisions of the Income Tax Act, becomes the taxpayer for income from self-employment.

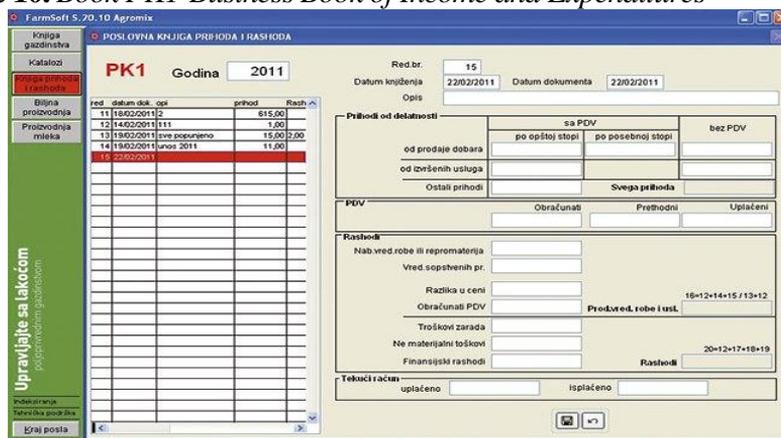
The ***Record Book of Trade and Services - KEPU*** - keeps the records of the farm's received and sold or delivered goods and services performed (Figure 9).

Figure 9. Record Book of Trade and Services



The **Business Book of Income and Expenditures** records income from the sales of goods and services, income from financing, extraordinary income, business expenditure referring to the realized income and other data of significance for the monitoring of income and expenses (Figure 10).

Figure 10. Book PK1-Business Book of Income and Expenditures



The operating window containing reports of the Record Book of Income and Expenditures is opened by clicking on the **“Reports”** button found in the lower left corner of the first window in this module. Opening, reviewing and printing of these reports is done according to general rules described in the chapter. This module consists of the following reports: *Directory of Business Elements*, *Business Elements Ledger*, *Directory of Business Clients*, *Book of Income and Expenses*, *Book of Received Invoices*, *Book of Issued Invoices*, *Turnover for a Specific Business Partner*, *Turnover of Goods per Business Partner*.

The module PLANT PRODUCTION records all work operations during the plant production cycle and produces reports concerning production and production costs. The initial operating window of this module contains the following elements: *Production Year List*, *Menu for the Choice of Work Operation*, *Plant Production Plan*, *Farm Ledger*, *Input Table for Detailed Description of Completed Work Operations*, *Field for Information Input and Review*. Results of *soil analysis* are entered by clicking on “Plot” in the table *Land Fund*. When the desired plot is selected, the data entry can be started by clicking on “new”. If one document contains results for different types of soil analysis, the entering procedure has to be repeated for each analysis type (Figure 11).

Figure 11. *Initial View of the Plot Ledger*

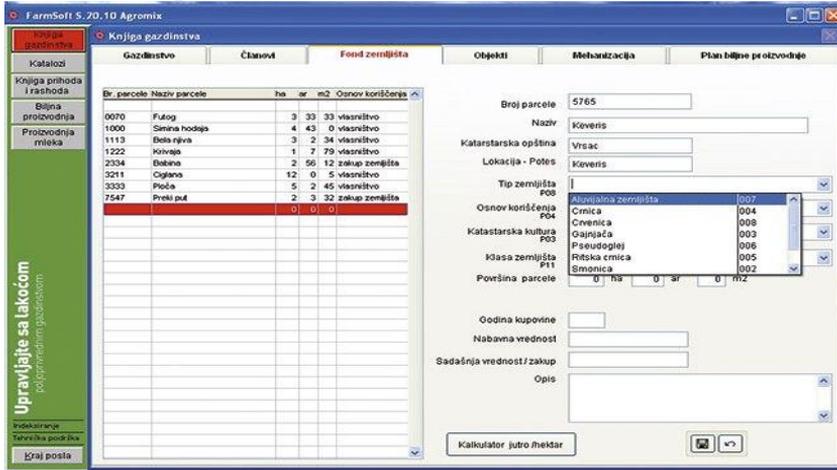


Work operations within plant production are entered in the same manner. Fields for data entry on all operating windows (except the sowing window) are divided into 6 parts (as well as the work order) and the following is entered: work order number and date of work operation, materials-supplier, quantity and price, machines and workforce. This procedure is repeated until all data from the work order has been entered (Figure 12).

The report on plant production plan contains data on planned production per plot(s). The report of the *plot ledger* follows the layout of the traditional plot ledger often used by agricultural producers. It consists of the front page, plot data and soil analysis data, work done on the plot with overview of the value of used materials. *Machinery costs* in the program are calculated on the basis of time spent using specific machinery. The user has the option to add fuel consumption.

This report presents work hours and fuel consumption per machine for the selected production year.

Figure 12. *Work Operations Record*



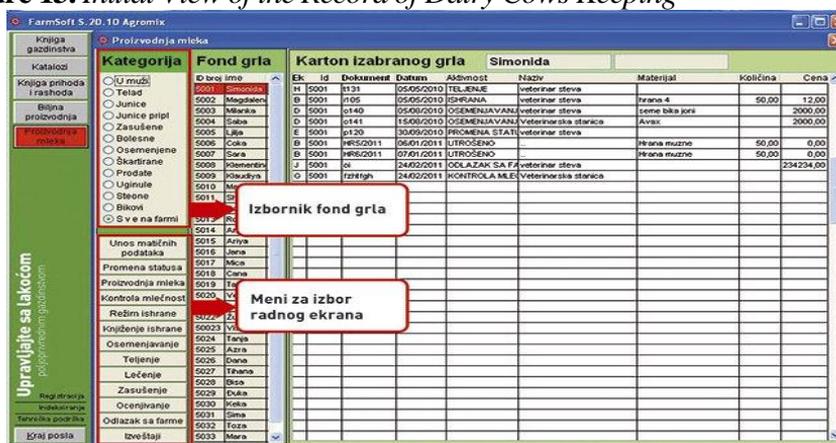
The Production Calculation contains: general information on the production, data on plots on which the product was grown (one for which the calculation is made), data on all income realized for the given product (income from sales of the primary and secondary products, subsidies, etc.); data on incurred expenses (costs of the material, machinery, other direct costs, workforce costs and general expenses). The calculations establish the following indicators: *gross margin, gross margin rate, profits before depreciation and financing, profits rate, total unpayed work and other*. *The analytical production calculation* is one of the primary methods in the analysis of the business of a farm and as such is necessary during production planning. *The summary calculation* is the summarised review of calculations on all products produced on the farm during a given production year. This report contains data on plots used in the production process, data on income per plot, total expenses and success indicators. The way of defining expenses, as well as the method of obtaining the success indicators is identical to the previously described reports/calculations. *The gross margin* of a farm presents total income less variable costs (including fuel). This indicator is used within the FADN, a European Union farm classification system. The program contains report groups where the user can review the work orders by different criteria, depending on the user's needs.

The annual work order – is a report containing all work orders which refer to the selected production year. The data is listed in chronological order by work order numbers. This report enables fast comparison of data on paper with the data

entered into the program and may help identify possible errors. *Production field work order* – contains all entered work orders for a specific production field in the selected production year. *Crop work order* – contains all work orders for the selected crop regardless of the plot. *Operation work order* – this report contains data on material costs needed for the work operations done on all plots of the farm, e.g. fertilizer application, sowing, plant protection etc.

The initial operating window of the MILK PRODUCTION module consists of several elements. *Animal category menu* – which is located in the upper left corner of the window, the user chooses to select the needed animal category. *Animal list spreadsheet* – contains animal ID numbers of the selected animal category in the animal fund menu. *The selected animal record card spreadsheet* – shows all entered data on events related to the selected animal. *Menu for the Choice of Operating Window* – is found in the lower left corner of the panel and used for opening work windows for entering data, corrections and deleting data on completed work operations and all events recorded on the farm (Figure 13).

Figure 13. *Initial View of the Record of Dairy Cows Keeping*



Main records (animal entry) – The initial entry of all animals is done on implementation of the software, while the animal history is recorded in other operating windows. The software enables entry or correction of data irrelevant of date of occurrence of the event, if there is relevant data on insemination, calving, lactation, medical treatment and other. *Data on Calving* is entered in the operating window *Calving*, while the basic data are entered in the *Animal Sign-in*, as soon as the farmer gets them. The purchase agreement is entered in the module *Record Book of Income and Expenditures*. The history of the animal (if available) is entered as in software implementation. *Registration of Acquired Animals* is done for the main herd. Click on *Animal Registration* button in the

Entry Window menu to enter data on a new animal. Entering, correcting and deleting data is done according to the described rules. The software enables editing all data except the ID number. *Animal Status* – is defined at the registry and the animal has to be put in one of the main categories: *milking, dried, calves, young bulls, breeding heifers, and bulls*. Apart from this main categories, an animal can also be categorized in some of the auxiliary categories: *ill, inseminated, in-calf, sold, died, rejected*.

Changing the status of an animal can be done in the window for status change. After this, the animal can be found in the selected category in the *Animal Fund* menu. The change of status resulting from an event registered in the software is done automatically.

Figure 14. *Main Records*

The screenshot shows the 'Unos podataka o prihvaćenom prlu' window in FarmSoft 5.20.10 Agremix. The window has a sidebar on the left with various menu options like 'Knjiga gazdinstva', 'Kategorija', and 'Upravljanje sa lakocim'. The main area contains a table of animal records and several input fields.

	ID broj	Ime	REGISTRARSKI broj	HB broj	Tetovir broj
	5001	Simonida			123456
Majka	5999	Bosa			658584
Baba	5998	Cana			23565
Deda	5997	Cane			12345
Otac	5996	Ayax			

Below the table, there are fields for:

Dat.rođenja: 02/03/2007

1-u zapatu: 1

2- nabavljeno: 1

Dat.nabavke: 02/03/2007

Dana: 1450

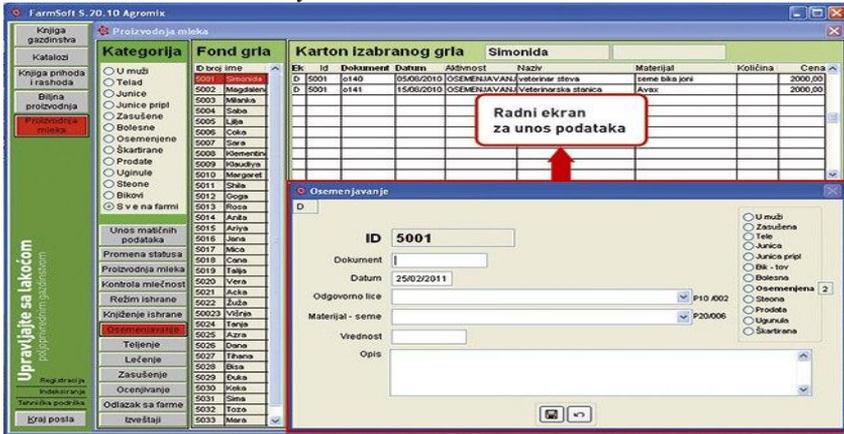
Rasa: Simentalska

Objekat: štala

Trenutni status: U muži, Zasušenje, Tele, June, Priplod June, Bik - tovl

Entering data on single animals consists of: *insemination, medical treatment, calving, drying out, leaving the farm and evaluation*. Before entering these data the user needs to select the animal concerned from the *Animal Fund* list and then open the corresponding operating window from the operating windows menu. At this point all entries, changes and data deletions can be made (Figure 15).

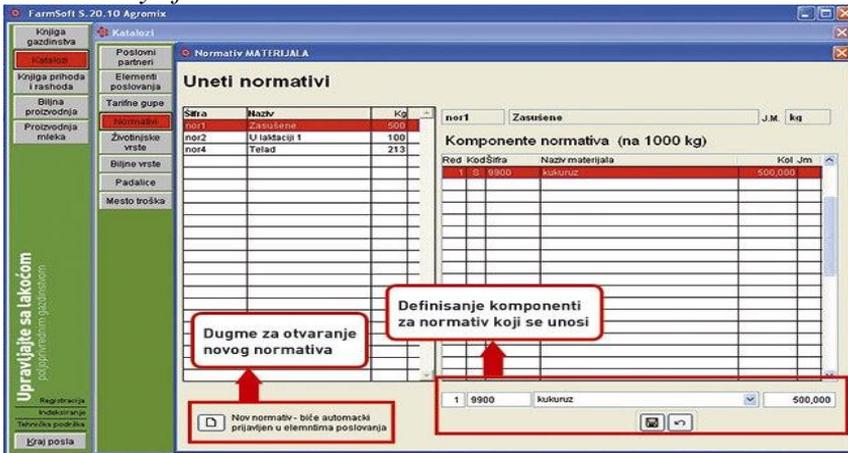
Figure 15. Animal Data Entry



Data on milk production and distribution is entered in the *Milk Production window*. It is important to enter data regularly and accurately for the software to work properly and for achieving best farm business analysis results. The user enters the data on income from milk sales in the module *Record Book of Income and Expenditure*. The information on the quality of milk the farm can enter if it has it and needs to monitor it. If the farm sells the milk to a number of different buyers on the same day, or distributes it between big buyers and direct retail buyers, the entry must be repeated for that day for the number of different buyers. The milk sold at the farm must be entered summed up and the buyer is specified as a natural person. In this way the sales of cheese at the farm is also entered (shown as amount of milk used for the cheese production). *Milk Yield Results* entry – represents monthly milk production analyses done by the Main Selection Agencies. The results of these controls refer to the quantity and quality of milk from animals in lactation at that moment.

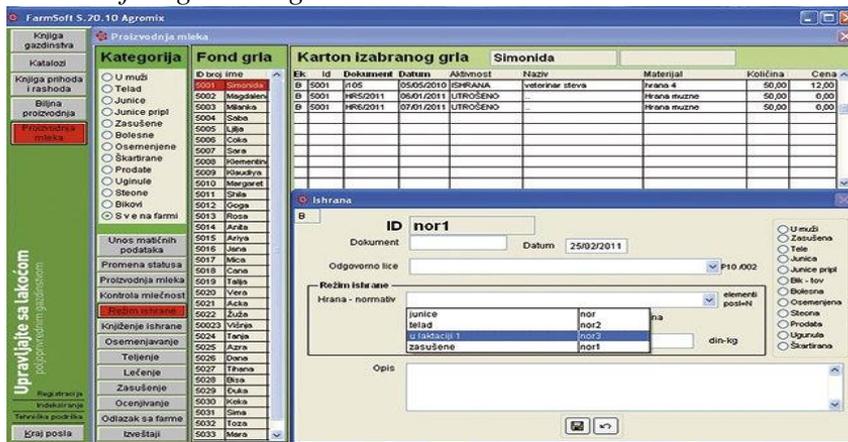
Unlike the milk production which is entered as a sum of the whole farm, Milk Yield Results are entered individually per animal and therefore require selecting the animal the data refers to. If the user is entering summarized results on milk production and monthly milk yield results, the program will, based on this data, automatically calculate the daily milk production per animal. The user can manually enter daily milk production per animal. *Dietary Intake Data* entry – includes types and cost of food, dietary norms (diet composition) and food consumption. Records kept on diet can be periodical or daily, depending on frequency of entry. Periodical records include: *entry of components, dietary norms and defining diet regime for all animals*. This is entered once, after implementing the software and can be corrected later if necessary. The quantity of food intake is entered daily (Figure16).

Figure 16. Entry of Norms



The second step is defining diet regimes per animal (Figure 17). This is done by selecting the appropriate diet regime from the drop-down menu and defining the daily food intake in the *Milk Production/Diet Regime* window. By entering the diet for all animals, the software now has all the necessary information for food booking. It should be noted that the user should enter in this window all changes in a diet regime and food intake for each animal (after drying out, calving, category change, etc.)

Figure 17. Defining Diet Regime



Food/diet entry – daily diet entry is done in the operating window *Milk Production/Food entry* (Fig 18). This window also includes spreadsheets on animals on the currently selected diet regime as well as the daily intake needs for the regime. It is necessary to enter the daily intakes of all foods daily for the software to function properly.

Figure 18. Food Entry



MILK PRODUCTION module enables reviewing and printing of several different reports. *Animal Registry* - contains data on all animals or a specific category. *Animal Record Card* – enables viewing entered data for a specific animal. The user may view milk production parallel to the costs, and therefore have a clear view on the profitability, or validity of keeping a specific animal. *Farm Journal* – is a report that gives the survey of all entered data on the events on the farm. It contains all the general information on all needed events for the defined time period.

Milk Production – contains data entered for the total production of milk on the farm. It is viewed per day and divided into: 1) Delivered quantities, 2) Quantities sold on the farm, 3) Quantities used by the calves, 4) Destroyed quantities.

Milk Yield – this report shows us data on milk production per animal. These may be data based on the user’s own measurements, or data given by the Main Selection Agency. It is printed for the defined time period. *Snapshot* – this report contains business results of the farm for the defined time period. The snapshot consists of three parts: 1) Overview of the number of animals by category; 2) Production calculations; 3) Milk production indicators. *Lactation Reports* – is a spreadsheet view of lactations for the selected animal: start and end dates, number of days, total and average milk production.

To avoid data loss risks due to “system failure”, regular back-up procedures are required. Another way of saving data is done by correct filling-in of work orders and proper filing of documents.

User interviews and survey results show that *FarmSoft S.20.10-Agromix* is reasonably simple and user friendly, not only for professionals, but farmers as well. It provides all relevant information for which it has been designed. The methodology and the menu are adapted to our farms. The software enables automatic generation of a number of important reports (individual and summarised calculations, Record Book of Income and Expenditures, various analytical success indexes, overviews of stock, receivables, liabilities, main herd movements and other) The software methodology is in line with the FADN methodology of bookkeeping in the EU. It may be said, based on all above, that this type of gathering, recording and storing data offers consistency and comparability to other farms. A reliable business record keeping software enables the farm to be effectively managed.

Conclusion

Recording data on running a farm and its production is a prerequisite for any further steps for developing individual farms as well as for the development of whole rural regions. The business recording software implementation process must be based on the farm owner's good will and gradual spreading to other farms.

The experts at the consultant firm Mojsijev have by developing the *FarmSoft S.20.10-Agromix* software, contributed to solving this problem. The system is user-friendly and acceptable to producers. In all phases of using the software, the producer gains the sense of safety of data and all published analyses are password protected. This record also contributes to ecology. The user can have a clearer view on the usage of synthetic-chemical agents in agriculture, therefore initiating new projects and ideas on preserving the environment.

The results on using this software are positive in our practice. Analyzing results of the surveys and interviews we may conclude that users mainly emphasize the simplicity of use, the possibility of having real information on their business as well as making calculations for any production. The general expenses of a farm and individual branches of the production are assorted by bookkeeping/accounting rules as cost allocations and the production results are easily accessed. Reviewing the business results of farms is a good foundation for designing the social politics of revitalization and development of rural areas in Serbia.

Note: *The paper is part of the research projects number: 46009 - Promotion and development of hygienic and technological processes in the production of foods of animal origin in order to obtain high-quality and safe products competitive on the world market and the 179028 - Rural labor markets and rural economy of Serbia - the diversification of income and poverty reduction; funded by the Ministry of Education and Science of the Republic of Serbia, in period 2011-2014.*

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KNOWLEDGE AS A SOURCE OF COMPETITIVE ADVANTAGE OF THE AGRICULTURAL ENTERPRISES¹

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Abstract

In contemporary and dynamic business conditions the knowledge is a critical resource for successful business in the long run. Hence, there is a need for companies to create and execute the knowledge transfer in order to build, maintain and strengthen the competitive advantages. The aim of this paper is to explore the role of knowledge in modern economy and to point out the need to adopt the concept of "learning organization" by domicile agricultural enterprises. Implementation of the Stabilization and Association Agreement has predicted liberalization of trade between Republic of Serbia and European Union. That means facing of domestic enterprises (including the agricultural ones) with relentless competition of economically developed countries. The domicile producers will have the opportunity to successfully meet the challenges only if they have adequate knowledge. They need knowledge in order to successfully protect themselves from foreign competitors, but also to find a way toward foreign consumers.

Key words: *knowledge management, competitive advantage, innovation, learning organization, agriculture, globalization.*

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Introduction

Trends of business globalization and trade liberalization have repercussions on the national economies in the sense that it has been significantly increased the involvement and interaction level of individual national economies and the world economy. This is due to the free flow of information, people, goods and capital all over the world. Involvement in the global economy means at the same time the reflections of global trends on the national economies, and thus on the companies within them. The changes that are rapidly taking place in the modern economy require also appropriate adjustments within the companies.

According to the past experience, an exposure to the global competition leads to increased productivity, both directly and indirectly. In those branches that are directly affected by the process of globalization, the productivity growth occurs as an effort of the enterprises to face successfully with the global competition. On the other side, the achieved (increased) level of productivity in branches that are directly affected by the mentioned process is regarded as the standard in a particular national economy, which is also expected from other branches to achieve such standards. As it is well known, the productivity and growth of productivity are important sources of competitive advantage and the existing average level of productivity in the Serbian agriculture is quite modest.

The market is undoubtedly one of the main drivers of the business globalization process (other factors include technology, the growth of international trade, foreign direct investment, etc.). The global economy becomes more important when the markets of particular countries are not large enough to encourage the creation of companies of optimal size. This is because the size of the company gives an opportunity to be provided the market share in a greater number of national markets. In order to take place in foreign markets, it is necessary for some company firstly to develop a certain advantage in its own country, which will then be used in the global market.

The Stabilization and Association Agreement represents a document that was signed in April 2008 between the Republic of Serbia and European Union. The two most important obligations that the Republic of Serbia has undertaken with this Agreement are establishment of a free trade zone and harmonization of Serbian legislative with the EU one. Serbia's

obligation consists in the gradual abolition of the import customs duties for the goods originated from European Union. On the other side, by this Agreement the EU confirmed free access for the goods coming from Serbia to the EU market. At the same time, implementation of the Agreement from the perspective of farmers and agro-economy means dealing with ruthless competition coming from the economically developed countries. In addition, it should be borne in mind that the EU member countries give far more funds from the budget than Republic of Serbia to support agricultural production. In such an environment, with other unchanged conditions, domestic farmers could be able to successfully meet the challenge only if they have adequate knowledge. It has to be stressed it is important the gained knowledge should be used in productive purposes.

Previously outlined facts emphasize the importance of creating and improving knowledge as a source of superior competitive position. The results of some researches suggest that the competitiveness of Serbian agriculture is based on the fact that the production factors are relatively cheap compared to other countries (land, labor, and various inputs) and that it consequently provides a lower selling price, i.e. price competitiveness. However, the current situation with the factors' prices is rather the result of an underdeveloped and inefficient domestic market, as well as an inadequate economic environment. In other words, the permanent sources of competitive advantage have to be found in other areas, primarily in the area of knowledge and innovation.

In order to be achieved the advantage for the local farmers, it needs to be carried out the process of continuous learning, and that is in fact what constitutes the essence of human capital. Namely, knowledge represents the key factor of competitiveness in modern global economy. Consequently, the domestic agribusiness companies and other stakeholders in agrarian economy should explore the environment, not just one in which they currently operate, but also in the markets in which they intend to act, and to react timely on the observed changes. In other words, it is extremely important that the company should be compatible concerning resources and capabilities with the environment in which it operates.

It is well known today that knowledge is not a mere addition to the other factors of production, but frequently it can serve as their replacement. In other words, the acquisition and application of knowledge and innovative

thinking can compensate the limitations of other resources and enable that with "less (input) can be achieved more."

An important incentive for knowledge creation and innovation of agriculture provide numerous international institutions such as Food and Agriculture Organization of the United Nations (FAO), European Commission (EC), World Bank (WB) etc. Their efforts are focused on education, research and dissemination of knowledge, as well as their integration in order to work out on the solving of poverty through shared ideas and principles. From the above it follows that knowledge can be created on a micro and macro level. In this paper, attention will be paid to the creation of knowledge within the company as the bearer of agricultural activity.

The leading companies in the era of globalization are the ones which initiate actions based on the knowledge created in the company itself. Although the knowledge and productivity of knowledge are not the only factors of competitiveness, there is no doubt they have a major importance in many branches, including agriculture. Only in this way it will be possible to increase the yields, more efficiently produce a high quality product, to face the challenging business conditions and foreign competition, to develop a brand and reputation, and finally, to attract and retain increasingly demanding customers in the global market.

Preconditions for the successful participation of agricultural companies in the global market

In terms of the new economy, knowledge as a product of intellectual capital has the key importance. This is because due to business globalization the market requirements are changing, and thus the competitiveness of enterprises. Hence, significant efforts of companies have been directed towards finding out the sources of competitive advantages. In this regard, it is considered that the main sources of competitiveness are just knowledge, creativity and innovation. The economy of knowledge imposes new rules of business and behavior, which requires that the value is understood in a different way compared to the traditional understanding of value. In other words, the success of company depends on what it knows (i.e. the level of knowledge the company has at disposal), the way in which this knowledge is applied, and the speed with which the new knowledge is adopted. The traditional factors of production in agriculture (fixed assets, land as an operating

mean and labor) are of secondary importance. Hence it is increasingly talking about the skill based competition.

In an environment of continuous changes, it is necessary to continually test the abilities of the company and to adapt them to internal and external environment. It is believed that the greatest weakness of the company is an immobility, i.e. inability to perform the changes, in other words to change the existing state of affairs. The reactive changes are occurring as a result of pressure from external forces onto the company. The proactive changes occur when a company has the will, the strength and the knowledge to change the things. The companies that manage on an ongoing basis to redesign their strategies and structures become "the learning organizations". The goal is that through the created expertise, *know-how* and other intangible assets it should be added the value to the overall business in a way that is difficult to be copied by the competing companies.

From the above mentioned, it follows that successful performance of agricultural companies in the global market requires strategies based on knowledge, while the practice should enable the creation and transfer of knowledge. For example, if the companies want to compete on a cost basis (the cost leadership strategy), it is necessary to adapt their value chain in order to ensure the cost structure (the lowest amount of costs) which competitors can not achieve without difficulty. If the companies decide to use the supply differentiation strategy, then it is important to be provided the added value for consumers as well as the product recognizability. However, the exceptional dynamics of competition in the market causes an erosion of the competitive advantages in a relatively short period of time as a result of the competing companies' activities, but also due to changes in consumers' preferences. In other words, the companies mutually compete by knowledge and not by products, which means that the progress could be achieved only by continuous learning.

The essence of competence is the basis for creation of the company competitive advantage. It can be contained in the functionality, an access to a particular market and product integrity (Milisavljević, 2000). As such, the competitive advantage opens up new opportunities for the company. After the company defines the essence of its competence, it is necessary to identify individual expertise and technologies that determine the specified competence. Based on the above, the companies will be able to determine which activities should be vertically integrated in the value

chain, and which ones should be left to the other companies (*outsourcing*). The essence of the competence is important for achievement of sustainable competitive advantage.

Knowledge as a source of competitive advantage of agricultural companies

In the 21st century an accumulation and application of knowledge is a key factor in the process of development. As it has been previously stated, the knowledge is a resource through which the company could obtain a competitive advantage. This is because it is a resource that is valuable, irreplaceable and one that is difficult to be copied by the competitors.

The learning process in the company is carried out in several ways. Suitable opportunity for learning represents a situation when the company does not achieve the planned goals. Then, learning occurs through the effort to bridge this gap, which is considered as the one-sided learning, which is a satisfactory solution for routine tasks. However, the problem is related to the fact that in the modern business environment a small amount of decisions made by the management are of a routine character. Hence, for a successful business in a dynamic and complex environment, the crucial importance has the two-way learning. It starts at the individual level and extends to the level of the organization.

The development of modern agriculture requires knowledge and innovation in the following areas (Asenso-Okyere, Davis, 2009):

- *technology* (the climate changes require new researches in order to be developed the varieties resistant to drought, floods, and in order to be shortened the cycle from the sowing to the harvest);
- *institutions* (system of rules that constitute the environment in which innovations occur, then the regulations, tradition, norms, beliefs);
- *policies* (the adequate, relevant and timely public interventions necessary to promote and enhance the creation, dissemination and application of knowledge and innovation). In order to be accelerated innovations in agriculture, it is necessary that the holders of political authorities increase investments into the agricultural science and technology, research and dissemination of achieved results, education and training;

- *organization* (the public and private groups and companies who have to innovate in order to become more efficient and effective in the services they are providing).

As it was mentioned earlier, innovation can occur in the form of a new idea, procedure or product that have been successfully introduced into economic or social processes and which can include technology, organization, institutions and policies.

The new system of knowledge in agriculture must be based on the adaptation of the existing economic and scientific realities. This means that it is necessary that in the company it should be continuously present the process of learning, how it could be successfully adapted to the changing environment. The path from the laboratory table to the table of consumer is significantly shortened. At the same time, the process of knowledge transfer has become more transparent. In the economy of knowledge, the science and technology have to a greater degree the character of social and economic activities rather than the technical ones. Hence, it is of crucial importance an open communication with the wider public on a continuous basis, both on the flows of new knowledge and its application as well as the potential socio-economic implications. This is because the future results of knowledge can not be fully anticipated.

The basic supposition for acquisition of innovation is that the knowledge is being created, accumulated, adopted and used. This requires appropriate knowledge management strategy, which is discussed in the following parts of the paper.

Knowledge management in agriculture

It is necessary to manage the knowledge in order it would be useful. The key factors that are behind knowledge management are contained in an effort to be improved the company competence and competitiveness. What is particularly characteristic for agriculture is a significant portion of knowledge is not of explicit nature. Hence the crucial importance has development of information systems and decision support systems (Rafea, 2008).

The goal of knowledge management is that information and intellectual property will be transformed into the sustainable value. In other words, the basic idea is to strengthen, improve and encourage the company to use

the wealth of information and knowledge that the company and its employees possess.

The knowledge management process includes the following phases: creation, transfer and diffusion of knowledge, as well as its application. Adequate knowledge management minimizes the risks and uncertainties of farmers that may arise in the process from the products' production up to their marketing. The effective knowledge management requires appropriate mechanisms, processes and institutions. Sources of knowledge include both existing (indigenous) knowledge and the results of new scientific researches. After accumulation of knowledge it is necessary to carry out its expansion and application in the form of innovative solutions.

An effective knowledge management system in agriculture provides outputs in the form of technology, software, expert systems, skilled professionals, information, i.e. the essential elements for innovations and continuous development of agriculture. All participants are at the same time the potential sources and users of knowledge and information. The farmers can not rely only on their experience and available technical knowledge. For example, knowledge of marketing is of increasing importance for business success (Engel, 1990).

The functions of the system of knowledge and innovation include the following (Standing Committee on Agricultural Research, 2012):

1. development and diffusion of knowledge;
2. research and identification of opportunities;
3. entrepreneurial experimentation and management of risk and uncertainty;
4. establishment of the market;
5. mobilization of resources;
6. gaining of legitimacy;
7. development of positive externalities.

Finally, in recent years it is more and more talking about so-called "multidirectional learning", which takes place through a reconsideration of existing methods, techniques and feedback information. That represents a kind of "learning about learning", which will be more elaborated in the following discussion.

An importance of applying the concept of "learning organization" in Serbian agriculture

Agriculture is an important component of economic development of the Republic of Serbia and it significantly participates in the national GDP. Although in the last decade the share of agriculture in GDP ranged between 15.5% and 11.8%, the overall contribution of agriculture through contributions to other sectors (the food processing industry and the producers and processors of agricultural inputs) exceeds 40% (Gulan, 2013). However, the current situation and current developments in the agricultural sector for the majority of agricultural subjects generate significant limitations, particularly in terms of access to modern technology, volatility in input prices, low accumulative and reproductive ability of family farms and other subjects, a distinct lack of raw materials, modest exports of agricultural and food products. The knowledge of the vital role of agriculture in the process of economic development is increasingly widespread among economic policy makers, primarily due to the global price crisis and rising food prices.

An awareness of the importance and application of knowledge in agriculture has long been present in many developed countries. This is witnessed by different knowledge support systems for promotion and support of knowledge as an important element of rural development and promotion of agriculture, then the agricultural innovation systems etc. In the Republic of Serbia there are provided different incentives for development of professional knowledge of farmers, which are the responsibility of the Directorate for Agrarian Payments. These funds are intended to promote the acquisition of knowledge necessary for the management of the farm, rural development, improvement of small farms and sales. However, it should be noted that the current level of agricultural development as well as the structure of agricultural products' export clearly indicate that this approach to the knowledge topic is insufficient, and that the problem can not be solved by partial and sporadic decisions, but it is necessary systematic approach to the problem.

The concept of "learning organization" has its roots in various scientific disciplines such as management, psychology, organization, sociology, management of innovation. Development of the concept came to the fore after it became clear that knowledge and learning create a sustainable competitive advantage. Although there are many definitions of the "learning organization" concept in the literature, for the purposes of this

paper it has been adopted the approach according to which that is an instrument for changing past experience and adaptation of companies to the changing environment, thus increasing the ability for taking over an effective action and achieving the goals in an innovative way (Asenso-Okyere, Davis, 2009).

Innovation is seen as a method of improving labor productivity and competitive position in the world of rapid changes. This includes agriculture and food production as well. According to some forecasts, by 2050 it will be nine billion people on the earth, which suggests that it will be necessary to produce much more food with limited natural resources, i.e. such increased production must be achieved in a way that is sustainable in terms of environment and population. This requires more investments, system of innovations and transition. The network and co-operation between researches as well as dissemination of knowledge to farmers and agricultural enterprises in those circumstances is crucial.

As it was already mentioned, innovations are new ideas, processes or products that have been successfully introduced into economic and social processes. Innovations could take the form of technology, organization, institution or policy that was introduced in order to be derived from the knowledge an economic, social and ecologic values. In other words, the innovation should apply an idea, knowledge and technology in a manner that will significantly improve the performances of the company. In the domain of agriculture innovations are created through dynamic interactions among numerous participants involved in production, processing, packaging, distribution and consumption or utilization of agricultural products (The World Bank, 2012).

The experience of many countries shows positive examples of creating and applying innovation, both organizational as well as technological and institutional ones, which have transformed agriculture. Their importance lies in the fact that they were able to initiate the growth and development of some national economies. The World Development Report for 2008 highlighted the importance of knowledge in achievement of innovations. The Report states that the series of innovations enables enterprises to move towards the value chain in the global agricultural market. The strategy refers to the acquisition of knowledge and creation of innovations in order to increase productivity (The World Bank, 2008).

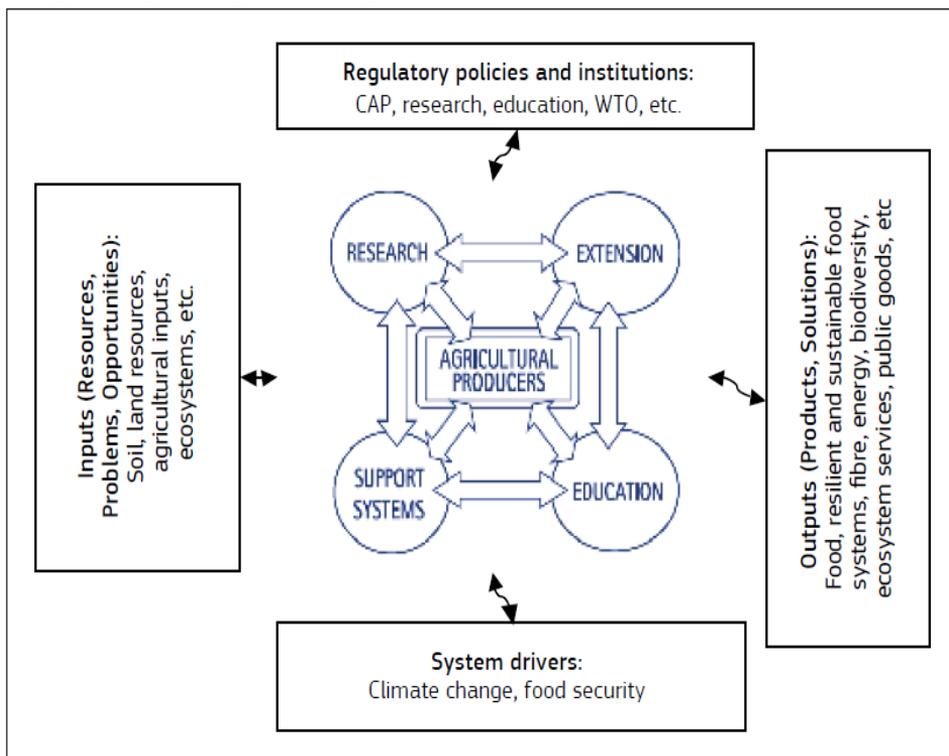
Mobilization of existing knowledge is a necessary prerequisite for the initiation of innovations. Although they are primarily the responsibility of the companies, it has not be overlooked the role of the state in a given process. Namely, the innovations often have a "spillover effect", which means that in addition to innovators even other subjects could have benefits from the innovations (Standing Committee on Agricultural Research, 2012). The cited effects are considered to be positive externalities. However, there might be some negative effects and the role of government is to minimize the negative ecological effects that occur in agriculture and food production through the innovations' supporting activities (those are the areas with intensive fossil fuels, pesticides and other substances which beside the pollution lead to the greenhouse effect as well as the global warming problem).

The previously exposed conclusions point to the necessity of introducing a broader approach to the creation and accumulation of knowledge, which must be multidisciplinary and has to include a variety of perspectives and skills such as meteorology, the safety standards, molecular genetics, intellectual property, food analysis, land rights, logistics, etc. Innovations include new knowledge and technologies that are associated with primary production, processing industries and commercialization, which ultimately results in higher productivity, competitiveness and economic growth.

The instruments that support innovation are numerous. At the state level they may appear in the form of various tax incentives, then by establishment of the field visits and scientific parks, in support of the farmers' associations and the like. In developed countries, as part of the Economic Action Plans it is included a significant allocation of budgetary resources for the program of innovations in agriculture. It also can not be overlooked a role of research projects in the field of applied research, advisory systems and universities. Such co-operation will have positive effects for all parties involved: for the farmers it will mean an increased competition and business success in the long term, while for the community in which the activity is carried out it will ensure the preservation of biodiversity, the sources of clean water, the protection of environment and other elements of social welfare. The innovation and commercialization of products, technologies, processes and services are the key factors for growth and global competitiveness of agriculture, which at the same time influence the creation of new jobs and encourage the GDP growth. From the standpoint of buyers (consumers), the benefit

is seen in a favorable quality-price relation and safety of agricultural and food products, and finally in the higher quality of life.

Image 1. *Square of knowledge*



Source: *Food and Agriculture Organization of the United Nations, World Bank, (2000) Agricultural knowledge and information systems for rural development (AKIS/RS): Strategic vision and guiding principles.*

If we bear in mind the importance of knowledge and innovations, it is necessary to perceive the way in which knowledge can be created and transferred. The linear model of the knowledge and technology transfer from the scientists toward the users is today considered as the obsolete one, which needs an introduction of an interactive model or network system that integrates production knowledge, necessary adaptations, supplementary guidelines and education. It is important to note that agricultural producers (agricultural enterprises) are not mere recipients of knowledge, but they actively participate in its creation. In other words, in the mentioned process they have a role of a partner who actively participates in the system of knowledge, passing on their own experiences and ideas.

As it can be seen in Image 1, agricultural producers (i.e. the agricultural enterprises) represent the core of „square of knowledge“. The number of participants in this process ensures synergy between practical knowledge and scientific base, contributing at the same time to a more efficient creation and transfer of knowledge in agriculture (Kalaitzandonakes, 1999). This means that education, implemented researches, the diffusion of knowledge are aiming to meet the growing needs for knowledge of farmers and other stakeholders in agriculture, which will provide them a significant support to improve productivity, to increase sales and revenue, along with the optimal management of natural resources as a key prerequisite for sustainable business.

As for the participants participating in the "square of knowledge," it is necessary to pay attention to the particular component of knowledge diffusion ("*agricultural extension*"), as this concept is now enough present in domestic literature. Namely, *agricultural extension* means the application of the scientific research and new knowledge results in agricultural practices through education of farmers. The area of "*extension*" covers a wider range of communication and learning activities organized for the farmers which is related to education in various disciplines such as agricultural production, marketing, health and safety, business etc.

The diffusion of knowledge is based on four paradigms (Swanson, Rajalahti, 2010), including:

1. Transfer of technology (this paradigm has dominated in the colonial era and re-emerged during the 1970s and 1980s). It is characterized by the "top-down" approach, which consists in providing specific recommendations to the farmers concerning the ways how certain procedures should be adopted.
2. Extension work (there is still present today, and a core paradigm is to support farmers in the field of technical regulations and other issues). It appears even in the form of project management by NGOs and donors.
3. Human resource development, which represents a paradigm focused on rural population who are poor and can not finance the consultants. Its essence makes use of the "top-down" approach in

the teaching, where it is expected from the participants to make their own decisions how they will use the acquired knowledge.

4. Incentives for improvement, which represent a paradigm based on experimental learning and exchange of experiences among farmers themselves. Knowledge is gained through an interactive process, while the participants are encouraged to make their own decisions. The problem however is related to the fact that farmers are increasingly resistant to the idea of sharing knowledge and experience with their competitors, since each of them is trying to maintain a competitive advantage.

As a result of the process of knowledge management process, there appear new opportunities identified in the entrepreneurial combining of agricultural production and tourism, the food production on farms, direct marketing, energy production (so-called "*the energy farming*"). To maintain and improve the existing level of knowledge, they are necessary the programs of continual professional development, the culture of innovations and a willingness and readiness of all participants in the agri-complex to learn. This is the only correct way for successful business in a sustainable way, in the present situation of increasingly complex economic conditions.

Conclusion

Observation of agriculture as a conservative activity, in which there is no space for new knowledge and innovations, is wrong. Innovations and agriculture are closely linked. Although agriculture arose more than ten millennia ago, the farmers have to be innovative in order to face the challenges of their current business. The Stabilization and Association Agreement signed between the Republic of Serbia and European Union means for domestic producers the changed business conditions. They are on the one hand reflected in substantially increased competition in the domestic market, but also in the possibilities for domestic producers to supply sophisticated EU market. Competitiveness of Serbian agriculture can not be based only on low-cost inputs. In order to be fully competitive in this field, the producers need to have the necessary knowledge and innovations. The knowledge is not a mere supplement to the other factors of production, but it is not rare situation that it could serve as their replacement.

Successful appearance of agricultural companies in the global market requires strategies that are based on knowledge. Hence, it is of particular importance to manage effectively with the knowledge. This process includes the creation, dissemination and application of superior knowledge.

The learning process in the company can be accomplished in several ways. If the company does not realize what it has planned, then learning occurs in an effort to bridge this gap. For a successful business in a dynamic and complex environment it is of a crucial importance the multidirectional learning. The new system of knowledge in agriculture must be based on the adaptation of the existing economic and scientific realities.

The key factors that are standing behind the knowledge management are contained in an effort to improve the competence and competitiveness of the companies. Adequate knowledge management minimizes the risks and uncertainties of farmers that may arise in all processes from the production up to the marketing of products.

An effective knowledge management system in agriculture provides outputs in the form of technology, software, expert systems, skilled professionals, information, i.e. the essential elements for innovations and continuous development of agriculture. All participants are at the same time a potential source and users of knowledge and information.

The linear model of technology transfer from the scientists toward the users is obsolete due to which it is necessary to introduce a network, interactive model that integrates the production knowledge, adaptation, advices and education. As the creators of knowledge they appear not only the researchers and the education system, but also the farmers with their experience and private companies in the field of agriculture.

Mobilization of existing knowledge is a necessary prerequisite for the initiation of innovation. Instruments that support innovation are numerous. At the state level they may appear in the form of various tax incentives, then by establishment of the field visits, in support of the farmers' associations and the like. In that process also an important role has the system of research projects in the field of basic and applied research, then the agricultural extension service and universities.

Such co-operation will have positive and synergistic effects for all involved parties: for the farmers it will enable an increase of competition and business success in the long term, while for the community in which the activity is carried out it will ensure the preservation of biodiversity, the sources of clean water, the protection of environment and natural resources, as well as the other elements of social welfare.

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II SECTION

BIOREGIONALISM AND PERMACULTURE AS A CONCEPTS OF CONSERVATION OF ECOLOGICAL SPECIFICITIES OF RURAL AREAS

SUSTAINABLE DEVELOPMENT OF RURAL AREAS: CHALLENGES FOR THE REPUBLIC OF MOLDOVA

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Abstract

The aim of the paper is to identify the main challenges of the sustainable development of rural areas. In order to achieve this, there were used the following research methods such as: analysis of the economic indicators, methods of comparative analysis, analysis of the public policies' impact on the agri-food sector and rural area. The agri-food sector in the Republic of Moldova is based on extensive farming and is insufficiently adapted to market economy conditions. There is a growing understanding in the country that the rural economy is not confined to the agricultural sector, but embraces the broad spectrum of needs of all rural people including living standards, economic activities and natural resources. The paper contains conclusions and proposals on diversification of agriculture and non-farm activities in rural areas.

Key words: *Agricultural sector, sustainable development, rural areas, diversification*

Introduction

There are several works in literature which examine the structural changes in the economic environment, starting from the least developed countries, where the predominant economic activity is based on agriculture and ending with highly developed countries, where the agrarian sector has a share on average, for 5% of GDP. Dominant paradigm of structural transformations, since the 70s of last century marks agriculture as an "engine of growth" in the countries with early stages of development, because agriculture occupies a large share in the economic activity of the state. In the context of this paradigm, economic growth is seen as

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pro-poor if it is based on a dominance of small farms in the agricultural sector. [1, 3, 12]

In the Republic of Moldova, land reform was based on the fragmentation of land into parcels for all the eligible households (basically the full present and past farm employee cadre at the time of the reform). Land was divided into three categories: arable, vineyards and orchards, with the majority of farms undergoing privatisation holding all three categories of land. Under the land distribution process each eligible household received their share of each of the three categories of land type. This led to an extreme fragmentation of land, especially in the case of the vineyards and orchards where it was common for a family to receive a few fruit trees and part of a line of vines. At the same time a few thousands of large farms specialised on extensive crop production have appeared. These farms are renting in land plots of rural population and have limited number of jobs available. Evidences from post-socialist transition countries suggest that economic diversity in rural areas has the potential to stimulate the local economic growth and mitigate the rural-urban income gap and poverty in rural areas. In the Republic of Moldova, the number of poor people from rural areas exceeds the capacity of agriculture to provide sustainable livelihood opportunities.

Country background

Geography: The area of the country is 33,843 km². Chisinau is the capital city with an estimated number of populations of 663,400 persons.

Terrain: Moldova is a country with rather uniform topography, with the Central and North regions having slightly higher hills and receiving more precipitation. In the South the landscape is going more to a rolling steppe that gradually slopes south to Black Sea. With only small rivers traversing the country and limited irrigation infrastructure, the bulk of agriculture is rainfed.

Climate: Moldova's proximity to the Black Sea gives it a mild and sunny climate. Moldova's climate is moderately continental: the summers are warm and long, with temperatures averaging about 20°C, and the winters are relatively mild and dry, with January temperatures averaging -4°C. Annual rainfall, which ranges from around 600 millimeters in the north to 400 millimeters in the south, can vary greatly.

People: Moldova has a population of 3,6 mln (2009) consisting of the following ethnic groups: 75.8 % Moldovans, Ukrainians (8.4%), Russians (5.9%), Gagauzi (4.4%), Bulgarian (1.9%) and other. The population is fairly divided between

urban and rural areas, at 41.4% and 58.6%. Many Moldovans, especially in urban areas, speak excellent Russian. The official religion is Eastern Orthodox (93.34%), but there are some other confessions, too: Protestant (1.98%), Old-rite Christian (0.15%), Catholic (0.14%), etc.

Moldova is a relatively small country, with a high-density population (111 pers./km²). The demographic tendencies show a decrease in the number of population and its ageing as a consequence of the decrease of the birth rate and massive migration abroad. The country is divided into 32 districts and 5 municipalities, UTA Gagauzia and administrative-territorial units from the left of the Dniester.

Economy: Moldova enjoys a favorable climate and good farmland, but has no major mineral deposits. As a result, the economy depends heavily on agriculture, featuring fruits, vegetables, wine, and tobacco. Moldova must import all of its supplies of oil, coal, and natural gas, largely from Russia. It is divided by sectors as follows: agriculture (9.0%), industry (14.5%, of which manufacturing 11.6%) net taxes on products (16%) and services (62.6%). The economy still remains vulnerable to higher fuel prices, poor agricultural weather, and the skepticism of foreign investors.

The main industrial activity is agricultural processing, in particular wine production and the processing of fruits and vegetables. Other industries include food processing, agricultural machinery, foundry equipment, refrigerators products: vegetables, fruits, wine, grain, sugar beets, sunflower seed, tobacco, beef and milk. Export commodities are: foodstuffs, wine, tobacco, textiles and footwear, machinery. The major exports partners are Russia, Romania, Germany, Ukraine, Italy and Belarus. Import commodities are mineral products and fuel, machinery and equipment, chemicals, textiles. The country's population has access to a network of roads, telecommunications, gas and electricity. However, the degree of depreciation of this infrastructure is rather advanced, especially in the rural areas, which increases its vulnerability to natural calamities and other risks. An adequately developed health care system exists and functions in Moldova. Still, the morbidity and death rate remain at high levels, and the longevity is way under the European average level.

Framework for the sustainable development

Agriculture is a predominant activity in most developing countries. As economic growth and development take place, importance of agriculture tends to decline according to the famous hypothesis. The declining share of agriculture is,

however, a slow phenomenon and is felt only over a relatively long time horizon. The implication is that growth of total income exceeds that of agricultural income over a long time.

Sustainable development has three principal dimensions: economic growth, social equity and protection of the environment. Underlying the economic dimension is the principle that society's well-being would have to be maximized and poverty eradicated through the optimal and efficient use of natural resources. The social aspect refers to the relationship between nature and human beings, uplifting the welfare of people, improving access to basic health and education services, fulfill food security needs and respect for human rights. The environmental dimension, on the other hand, is concerned with the conservation and enhancement of the physical and biological resource base and ecosystems. [8]

Global transformation and modernization of the agro-food sector faced many challenges over time. Countries with economies in transition faced with complex processes of transformation of political and economic systems. In these countries, the liberalization of exchange rates and prices, and privatization of farms and enterprises caused a collapse of the system of vertical coordination and significant disturbances in the agricultural branch. Disruption in relations between farmers, input suppliers and food companies also resulted in severe constraints faced by many farms in accessing essential inputs such as feed, fertilizer, seed, capital, etc. Also, in many countries with economies in transition, privatization and market liberalization led to a decline in the supply of inputs and credit to farms and disrupted agricultural activity of several state-controlled institutions, agricultural and consumer cooperatives and processing enterprises. In the case of the Republic of Moldova, the results of the reforms have still not reached the initial expectations. The agricultural sector in the Republic of Moldova has not yet been recovered from the decline in production and productivity, which occurred during the '90s. Currently, the Republic of Moldova remains dependent on agriculture, which has a contribution with about 12% to GDP.

More than 30% of the country's working population is employed in agriculture and food sector, which reflects the situation characteristic for the countries with an insufficient regional development, when the major territory of the country is characterized by a predominance of unproductive and low-paid agriculture occupation.

Within the structure of the natural resources of the Republic of Moldova the climate, soil and some deposits are outnumbered by the regenerative biological resources, particularly the agricultural ones, followed by water resources (surface

or underground), forest, hunting and fish farming resources. The spontaneous biological and agricultural resources are also the most vulnerable ones to natural risks and climate change.

The most important natural resource for the country's economy is the soil layer. The chernozem types account for about 2/3 of the approximate 10 soil types encountered in the country. These soil types are some of the most fertile soils, but they are also among the most receptive, and thus vulnerable to certain risk phenomena (rain showers, droughts, etc.), as well as to the technogenic impact. The forecasts on the evolution of the soil quality in climate change conditions imply the reduction and limitation of achieving their productive potential, including the acceleration of the erosion, degradation and desertification processes. The main anthropogenic causes for the degradation and thus reduction of the soil's fertility, which amplify the consequences of the natural risks, are the following: excessively high quota (65%) of cultivated lands and insufficient activities to combat the natural and technogenic erosion of the soils. In the same time the way the soil is used and managed influences to a great extent the vulnerability of the hydrographical network, of the micro-ecosystems, which are part of the agro-ecosystems, as well as the risk level towards different pests of the agricultural crops.

The geographical space of the Republic of Moldova is characterized by a lack of humidity. The main sources of water are trans-border Rivers Nistru and Prut. Small rivers, that in the past decades have lost a great part of their debit and water quality, diversity and biological productivity, are particularly exposed to natural risks, especially torrential rains, which cause floods, and droughts. The internal hydrographical network is in an increased process of degradation. In the same time, over 600 communities are under the risk of flooding because of poorly developed or deteriorated protection infrastructure. [6]

The forest resources in the Republic of Moldova occupy 450.9 thousand hectares or 13.3% of the country's surface. About 89% of the total area of the forest fund is managed by state forest authorities, the rest is managed by town halls and other land holders, including 0.4 thousand hectares of forest in private property. Forests' capacity to mitigate the natural risks impact and the consequences of climate change are weakened by the reduced share of forest areas, by their excessive segmentation (the forest fund is divided in over 800 forest bodies), by the anthropogenic pressure on the forests (illegal forest cutting, cow grazing, poaching, etc.), and by the recovery and enlargement of the forest areas on the basis of a reduced number of species. In the same time the forest's role to stabilize the water table and maintain the aquatic resources is being reduced, as well as the

role to diminish the soil erosion processes and landslides. The share of agriculture in GDP and the employed workforce is continuously decreasing in relative terms, and the last one even in absolute terms. Meanwhile agriculture continues to grow in absolute terms and provides growth for the entire economy. Structural changes thus involve a net transfer of resources from agriculture to other sectors of the economy in the long term.

There is a common view on many of the mechanisms leading to agricultural and economic development. The first is the ability of agriculture to create jobs and enhance the welfare of the rural population by increasing agricultural productivity. These relationships are seen through input-output relations that link the industry sector with the agricultural one through the production of raw materials used by the industry, ensuring access to food, delivery of job places on one side and on the other side, the agricultural sector capacity development to serve as a market for sale of industrial products. The agricultural sector in the Republic of Moldova is based on extensive farming and is insufficiently adapted to market economy conditions. There is a growing understanding in the country that the rural economy is not confined to the agricultural sector, but embraces the broad spectrum of needs of all rural people including living standards, economic activities and natural resources. The situation is associated with the major risks related to the structural changes that may affect the countryside and the economy as a whole such as:

- a) migration and uncontrolled urbanization,
- b) lack of professional qualifications and adaptability of the population in the rural areas,
- c) inadequate use of the natural resources.

Agriculture by its nature is a risky activity. For this reason it can have negative effects on agricultural income, food security, capacity of development and attracting investment, and competitiveness of the sector.

Food security

Food security represents an important part of the national security, ensuring in such a manner the maintenance of the required level of health and quality of people's life from the Republic of Moldova.

The nowadays food security challenges in the Republic of Moldova have two major dimensions. The first dimension seeks to maintain and increase the country's ability to face the national food demands through assurance of the internal food production, import of the food products that can not be produced

efficiently in the country, and exports of products that have a comparative advantage.

The second aspect is related to the reduction of inequality and the decrease of poverty among the majority of the population of the Republic of Moldova, which is particularly evident through the low purchasing power and high unemployment rates in rural areas.

At the national level Republic of Moldova is food secure. It produces its main food products, exports its surplus food, and imports what it needs to meet its food requirements. Food security indicators prove that in the Republic of Moldova the level of per capita food consumption have stabilized during the last years. However, the consumption level is much lower than in the neighbor countries or other countries in the region. [10]

In addition to natural risks, commercial risks largely influence the level of food security in the Republic of Moldova. The evolution of prices in Moldova follows the trends of international food prices, agricultural products and resources for agricultural production in relative terms. Like other small countries with low income, Republic of Moldova faces additional challenges when making an effort to refocus and rebuild the destroyed sector of primary production and processing industry.

Agriculture is the sector of national economy with the highest exposure and vulnerability to natural risks and climate change. The main factor that determines the amount, the quality and stability of the agricultural production in the Republic of Moldova are the agricultural and climate conditions of the territory, particularly the lack or surplus of humidity, largely conditioned by the current climate changes.

Short-term droughts have transformed in some places in a dangerous phenomenon and became almost chronic. At the same time, every 2-3 years, agriculture becomes a subject of intense droughts, which cover almost the entire territory of the Republic of Moldova. In such a way, the damage of the drought from 2007 that affected agriculture can be estimated, according to some sources, between 600 million USD to 1 billion USD. The negative effect of the drought from 2012 has been recorded during the whole vegetation period. The fact is that the drought in the Republic of Moldova started in autumn 2011, creating in such a way an unfavorable environment for the sowing and growth of winter crops. In terms of values, the damage was estimated between 160-200 million USD.

Also, assessing the level of preparedness of country's economy to the droughts from 2007 and 2012, it is worth to mention the increasing potential of agriculture in coping with problems. Creation of the national crop fund system, strengthening of the technical and material base of agriculture, use of low till technologies had a great impact on agriculture's sustainability.

In order to reduce the dependence of agriculture of natural and economic hazards, there is a need to introduce some legal, economic, ecologic and social measures in the main Government Programs.

In the Republic of Moldova, the Government has limited possibilities to support agriculture. In such a way, farmers receive support only in facing the catastrophic hazards. Farmers carry the main management burdens of the current and catastrophic hazards. In such conditions, the systems of measures for assuring the sustainable development, adaptation of the management systems of agriculture to the changing weather conditions receive a special meaning.

Food safety and quality is the essential part of existence, welfare and quality of life. Consumers from the Republic of Moldova reasonably expect from the Government that it will create the conditions for providing the population with food in accordance with international safety standards. Moldova's goal is to ensure the delivery of safe and quality food, as for its own population, and for the export. The prerequisites for the food safety provision exist and the Minister of Agriculture and Food Industry continues working in this direction. The Republic of Moldova has made a significant effort for harmonization of technical regulations with the international standards for food, fact that would ensure the consumer's and human health protection, the conditions for loyal competition, elimination of commercial falsifications and technical barriers. [11]

The strategic goal of the Government is to reform the system of quality control of food. For achieving these goals it is necessary to accomplish the following strategic objectives:

- The improvement of legislation that will ensure a greater harmonization with the international legal norms and standards that reflect all aspects of food productions from the farm to the table of the consumer, including the production of animal feed;
- Development of the National Agency of Food Safety, which is charged with the responsibility of the implementation of several key objectives for managing all aspects of the food quality from the farm to the table of the consumer, including

those of the rapid alert systems, dialogue and communication with consumers, as well as with the national agencies and scientific organizations;

- Control of food quality, which will provide a uniform procedure for the activities of the national system and inspection through the appropriate distribution of authority and responsibility among all government agencies involved in the food safety issue.

All marked problems should be solved on the basis of the need to improve the quality of management system of food, ensuring compliance with technical requirements, both for export and for domestic market.

Modernization of agricultural sector

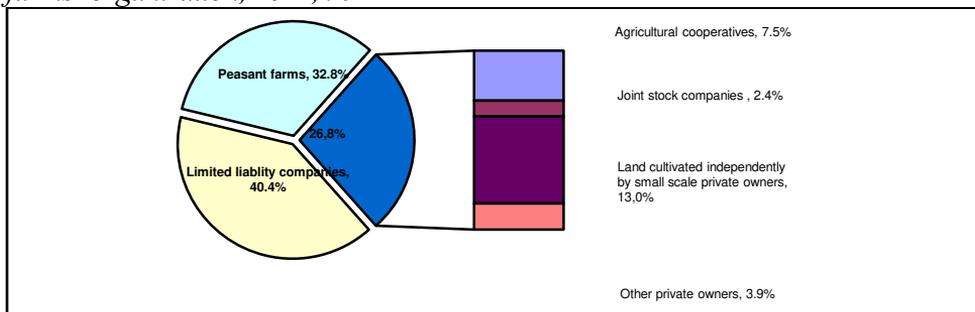
The history of classical modernization theory can be tracked back to the 1960s. In his book, *Transforming Traditional Agriculture*, American economist Schultz proposed the transition from traditional to modern agriculture. A spate of works on agricultural modernization were published in the 1970s and 1980s. The modernization theory assumes a total change of policies intended to raise the standard of living of the poor often consist of disseminating knowledge and information about more efficient techniques of production. For instance, the agriculture modernization process involves encouraging farmers to try new crops, new production methods and new marketing skills. Since prosperous agriculture is considered to be the most crucial base for economic development particularly in the less developed countries, the only viable option for them is to continue to enhance the productivity of land and labor in agriculture. Increased productivity in agriculture has been achieved in several parts of the world mainly by modernizing agriculture. Modernization consists largely of using improved seeds, modern farm machinery such as tractors, harvesters, threshers, etc., chemical fertilizers and pesticides in an optimal combination with water. [1]

As the most of the East- European countries the Republic of Moldova has passed through a process of land reform after the political changes around 1990. The first attempts of land privatization have been made after adoption of the Land Code in 1991. However the massive land privatization has started after the implementation the program „Pământ” (Land) in 1998-2001, when over $\frac{3}{4}$ of agricultural land were privatized. During the land privatization process the land was distributed to workers of the former collective and state farms in order to assure the social equity among the rural population. Based on privatized land new forms of agricultural holdings and farms, limited liability companies, joint stock companies and production cooperatives had been created. Currently about 74 percent of

agricultural land (1,834,600 ha) is privately owned and about 26% of agricultural land (654,700 ha) are public property.

According to the national land cadaster on January 1, 2011 most of private agricultural land (40.4%) is owned by limited liability companies. In the possession of peasant farms are about 33 percent of the land. About 13% of agricultural land are cultivated independently by private owners, while cooperatives and joint stock companies own 7.5% and 2.4% of private land, respectively (see figure 1). According to preliminary data of the General Agricultural Census in 2011 were working 903 000 farms, including 391,646 peasant farms, 232 agricultural cooperatives, 161 joint stock companies and 3624 limited liability companies. Average size of an agricultural holding is 2.2 ha, including agricultural holdings with legal entity - 247.9 ha, and those with physical entity - 0.8 ha.

Figure 1. Structure of the private agricultural land according to the form of farms' organization, 2011, %



Source: Developed by the author according to the data provided by the National Bureau of Statistics [9]

According to the General Agricultural Census of 2011 lands of agricultural holdings are divided into 2.65 million plots. Each farm holds on average 2.9 plots of land. At national level the average size of parcels is 0.8 ha, including farms with legal entity - 25.8 ha, and those with physical entity - 0.4 ha. In many cases these parcels are located at a distance of 9-20 km from each other. This fragmentation of agricultural land is largely a consequence of the imperfection of the legal framework and insufficient law enforcement.

Of the total number of 903 000 agricultural holdings registered within the General Agricultural Census of 2011, only 4800 (0.5% of the total) are farms with legal entity (limited liability companies, agricultural production cooperatives, joint stock companies, state enterprises, research institutes and agricultural schools, local councils

/ municipalities owning agricultural land, religious establishments, NGOs and other agricultural enterprises) and about 898 000 (99.5%) are agricultural holdings with physical entity (peasant farms, individual and family households, etc.).

The corporate type of farms in particular such as Limited Liability Companies and Joint stock Companies in recent years have shown decreasing trends of the number of households and respectively the reduction of the areas held by them as a result of adjustment to market conditions. Simultaneously, family peasant farms shows increasing trends of the number of households with areas larger than 5 hectares in recent years, keeping at the same level the number of households with 1-5 ha and reducing the number of households that have less than 1 ha of land (see table 1).

Table 1. *The number of agricultural holdings, 2007-2011*

Agricultural holdings	2007	2008	2009	2010	2011
Agricultural cooperatives	239	259	283	233	232
Joint stock companies	116	109	108	170	161
Limited liability companies	1342	1344	1513	2038	3624
Peasant farms (thousand)	390	386	381	400	392
<i>Including with area</i>					
Larger than 100 ha	186	209	203	276	559
From 50 up to 100 ha	105	113	143	524	780
From 10 up to 50 ha	746	904	1126	1794	2729
From 5 up to 10 ha	3307	4156	4320	3958	4175
From 1 up to la 5 ha (thousands)	2405	216	224	241	240
Less than 1 ha (thousands)	147	165	152	146	144

Source: *Elaborated by authors based on data from the National Land Cadastre*

Currently about 98% of the total number of peasant farms have areas less than 5 ha, including about 37% of them that have less than 1 ha, and 61% that holds areas from 1 to 5 ha. Together these agricultural holdings have worked about 42% of total agricultural land in Moldova in 2011. [5]

Peasant farms have a significant share in total agricultural production. Together with population households they deliver essential quantities of agricultural products. Thus the major part of the production of corn, potatoes, vegetables, fruits and grapes are concentrated in the community of small-scale farmers (see table 2).

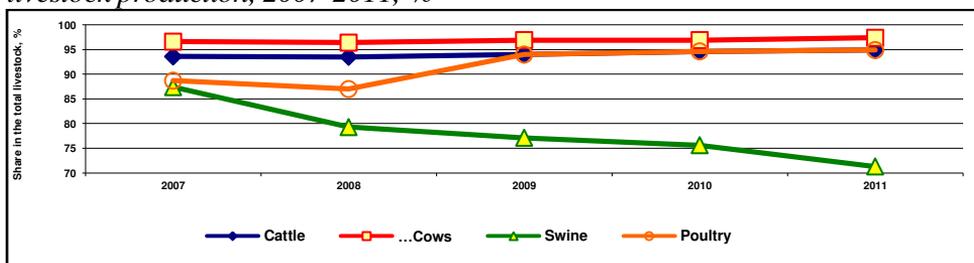
Table 2. Share of population households and peasant farms in the total volume of vegetal agricultural production, 2007-2011, %

Crops	2007	2008	2009	2010	2011
Winter wheat	23,6	29,7	33,0	28,7	28,3
Barley	26,3	26,8	30,5	36,0	37,7
Corn	91,3	83,8	89,9	84,5	80,9
Leguminous vegetables	53,9	56,9	51,4	58,9	69,5
Sun flower	33,4	31,7	33,2	30,2	31,9
Soya	32,9	26,0	31,3	22,3	21,6
Sugar beet	14,8	9,6	12,1	13,5	8,5
Tobacco	19,4	17,9	13,6	19,7	22,2
Potatoes	88,6	90,7	88,9	83,4	84,6
Field vegetables	80,2	78,9	84,5	83,9	84,0
Pumpkins	96,6	96,7	97,5	97,8	98,0
Fruits and berries	52,1	50,5	57,9	59,8	62,2
Grape	80,0	77,8	79,7	85,7	78,6

Source: elaborated by authors based on data provided by the National Bureau of Statistics

The share of small farmers in the livestock sector is even more impressive. Thus, most of the herd of cattle, swine, sheep, goats, horses and poultry are concentrated in small farms.

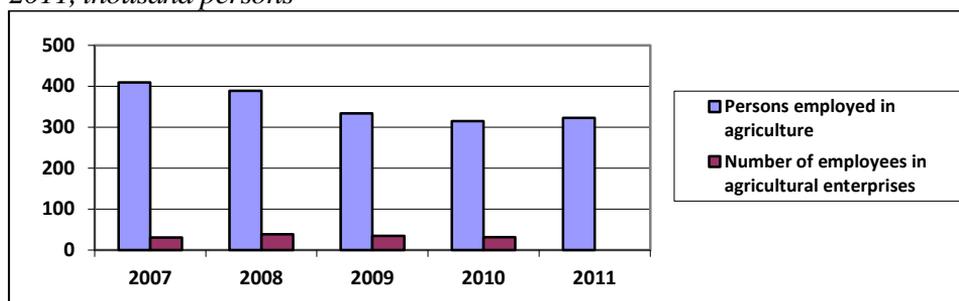
Figure 1. Share of population households and peasant farms in the total livestock production, 2007-2011, %



Source: elaborated by authors based on data provided by the National Bureau of Statistics [9]

The small size of farming units and the difficulties they faced in adopting standards of hygiene, environment, plant protection and animal health, accompanied by lack of vocational education in agriculture can be identified as major obstacles in developing the individual farming sector of the Republic of Moldova. An alternative to individual farming in order to increase their bargaining power in relation to the processing industry is creating associative structures such as marketing and production cooperatives. An important factor for sustainable rural development is the availability of qualified labor force. In the last five years, rapid changes are highlighted in employment in the agricultural sector as whole and agricultural enterprises in particular. Reducing the number of people involved in agriculture in all farming systems demonstrates inability of agriculture to absorb surplus of labor. This creates an uncertain situation in rural economic development planning. Taking into account the increasing complexity and uncertainty of agricultural systems of different sizes that compete with each other, it is necessary to form a modern vision of agricultural development.

Figure 2. *Use of labor force in agriculture of the Republic of Moldova, 2007-2011, thousand persons*



Source: *elaborated by authors based on data provided by the National Bureau of Statistics [9]*

The efficiency and competitiveness of the rural sector is dependent on a coherent approach regarding land tenure. Land fragmentation is an important factor affecting the Republic of Moldova as many other countries and its resolution through land consolidation would give to agricultural producers an incentive to invest in their farms and to remain in rural areas.

Taking into account the risk of land abandonment and depopulation, due to the high level of migration from rural areas, there are several opportunities for intervention in order to assure a sustainable development of the rural sector. Thus the demographic development can be influenced to a limited extent, while socio-economic factors and institutional frameworks can be addressed by

appropriate policies. Today, in majority of the European countries, land consolidation is an essential tool amongst other instruments in the land management tool-box and it is an integrated part of a broader rural development “package” [4].

Consolidation processes in the Republic of Moldova shows a slow but steady growth trend. Thus, in 2005 the share of agricultural land cultivated by farms larger than 100 ha was of 48.7%, of those with size from 5 to 100 ha was about 1.6%, and of those with areas less than 5 ha - 49.7%. Respectively in 2011 the share of agricultural land cultivated by farms larger than 100 ha was 52.4 (+3.7%), of those with size from 5-100 ha was 5.3% (+3.7 %) and of those with areas less than 5 ha - 42.3 (-7.4%).

Diversification of rural economy

Income and non-agricultural diversification hypothesis assume that diversifications are maximizes of the profit, while the second, non-agricultural activity and diversification indicates comparative advantages of different households underlying the incentives for non-agricultural diversification. The two types of non-agricultural diversification can be defined as follows: first, diversification due to income coincided with a period of capital accumulation (including financial and social capital, and information), while the second type of diversification led by activity often occurs later when the capital accumulation has already occurred.

Diversification of income does not necessarily exclude activity diversification, it is a dynamic and mixed process with activities and income diversification (by household) that often overlap or occur simultaneously. Thus, for many poor rural households, capital accumulation is a consequence of diversifying income and is not the objective of income diversification. [11]

When considering the type of activities in which an active population is involved, there may be three different models of diversification: (i) interior, (ii) decline and (iii) the direction. Interior diversificators are those who opt for a second job in the same field (either agricultural or non-agricultural sector) as a main activity. This would be most common in case of small facilities with insufficient capital (financial or human).

Decline diversificators are those whose main activity is in the non-agricultural sector and choose a second activity in the agricultural sector. A predominance of diversificators of decline indicates a situation where non-agricultural income

does not cover subsistence needs, forcing people to return to agriculture, or where agricultural prices are distorted (either high because low levels of agricultural productivity and efficiency, or low due to state policies to protect low-income consumers in urban areas, but with a concomitant impact of disinvestment in agricultural communities).

Direction diversificators are those with a primary agricultural activity and secondary activity in non-agricultural economy. They are diversificators of risk-taking, of demand, having often a better endowment with financial and / or human capital therefore better equipped to take advantage of market opportunities, and thus being able to be diversified. It may also be the case that these direction diversificators cannot find opportunities for diversification in agriculture and therefore try to reorient their activities (and / or sources of income) to non-agricultural activities.

Agrarian and non-agrarian economy can be directly linked through production activities, or indirectly through income or investments. Production linkages can be either ascending or descending: ascending links either occur when agricultural sector grows and there is induced a growth upstream in the supply of inputs and services, or when the increase of local manufacturing and services reduces the price and increases the availability of increase in inputs; decreasing connections can occur when activities such as manufacturing and distribution, based on the means of agricultural production are increased and thus increase the demand for agricultural products. Links with revenues arise when a sector income is spent on results elsewhere, and investment linkages occur when a sector profit are invested elsewhere. All these links are important in the development of non-agricultural enterprises in developing countries and economies in transition. However, the links may be weak and the power of different linkages is specific in a context and depends on a number of factors. In agro-food systems, many international companies have organized their production in developing and transition countries in order to be more competitive on the global market.

This process is accompanied by positive and negative effects which can influence the welfare of the local population and the sustainability of the national agro-food sector.

At the same time, local production systems are competing on the external and internal markets by producing specific quality goods, through a more efficient use of local resources and rapid adjustment to changing market requirements. [2]

As a result, a wide range of local agro-food systems has occurred, ranging from simple local food suppliers to more export oriented food industries. These systems are developing according to availability of local resources such as land, water, climate conditions, production costs, labor force, and the localization of internal and external markets.

In this perspective, local agro-food systems become the focus of the analysis in order to evaluate the level of sustainability and necessary policy requirements.

In the Republic of Moldova vertical coordination among primary agricultural production, food processing and trade, had undergone dramatic changes in the midst of 90th. Rapid liberalization of prices and external trade, privatization of farms and enterprises without relevant institutional framework, caused the collapse of vertical coordination within the existing food value chains. [7]

In a short time, the new system of vertical integration had started to develop in the agro-food sector. The process was led mostly by food business operators and traders. At the first stage the pace of new structure's development was very slow.. The process was enhanced by the creation of local agro -food systems in rural areas of the Republic of Moldova. [7]

The challenge for the Moldovan agro-food sector is to identify specific agricultural and rural development needs and opportunities across the local agro-food systems, and to focus investment on those where the greatest impact will be achieved. This identification and resource allocation process can be facilitated by analyzing the main unresolved issues concerning the factors influencing their dynamics and effects, at both local and international level.

Conclusions

Rural area from the Republic of Moldova is involved in an on-going process of socio-economic transformation. Agriculture loses its role as the main source of income. Employment places in agriculture are reduced. Meanwhile, non-agricultural sector development is insufficient and does not have a significant impact on employment and household income.

The agricultural sector of the Republic of Moldova after the process of land privatization is characterized by a clear dichotomy between large scale corporate farms and many very small and fragmented family farms.

The critical situation of the agriculture within the rural transformation and national economy, with its structural features, requires substantial governmental

and financial interventions oriented at the reduction of natural risks that could affect the rural communities, as well as at generating necessary savings and investments in agriculture.

Maintaining the production capacity of agricultural land is a strategic national security concern. Implementation of environmentally friendly technologies in agriculture to increase soil fertility will help to ensure food security and increase agricultural production for export.

The concept of sustainable development requires a set of measures to improve the living standards in rural areas. The essence of this concept is to enhance farm modernization and diversification of non-agricultural activities, to improve access of Moldovan farmers to the high value agro-food systems.

In the Republic of Moldova there is no institution responsible for creating conditions for the sustainable development of rural areas and policies are dispersed. Resource mobilization for sustainable development and institutional changes need to be done at the expense of internal and external resources.

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AGRITOURISM IN THE FUNCTION OF SUSTAINABLE DEVELOPMENT OF THE MUNICIPALITY OF ŽAGUBICA

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Abstract

The consequences of decades of inadequate agricultural policies are reflected in the migrations from villages to cities, but also from villages to Western Europe countries in search of jobs that bring more money and self-assertion compared to agriculture in Serbia. This trend has especially gained momentum after the failure of cooperatives in Serbia during the nineties. All of the above has led to major degradation of the already degraded rural areas. Under the pressure of these negative tendencies, for the sake of survival and preservation of bare existence, rural regions are forced to seek alternative sources and means of obtaining financial resources. As the result, the development of tourism has come into focus as a logical choice, especially as the trends coincide with trends of changing demands, which favored orientation of rural communities towards tourism development. This paper presents the municipality of Žagubica and points to the real potential, possibilities and the importance of developing agritourism and its role in sustainable development of tourism the municipality in Žagubica.

Key words: *agritourism, tourist region, Žagubica*

Introduction

In recent decades, tourism has increasingly developed into an important factor for sustainable development. In Western Europe, tourism is one of the most important economic sectors of the economy. According to estimates of the World Tourism Organization, the number of tourist arrivals in the EU countries will have been doubled by 2020 from current 360 million to 720 million tourists.

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If we bear in mind that tourism in about 83% of countries is in the top five export categories and that in about 40% of the countries it represents the main source of income, it is clear that this kind of tourism development and exploitation of tourist regions implies a serious risk to the environment and people's welfare but also for the tourism itself as an industry. Along with the growth in the number of tourists and the pressure on the long-targeted and well-established tourist destinations, in modern tourists there is the desire to go around standard destinations, where natural environment has been compromised a long time ago, thereby largely losing its authenticity. In fact, there is the desire to experience an adventure trip to attractive untouched areas that have not lost their authenticity and natural environment is not compromised. All of the above brings rural areas to the focus of interest of tourists, primarily as destinations for relaxing activity and rest. All this increases the importance of rural areas, and also represents significant impulse to the economic growth and development of economically underdeveloped regions.

A step forward that has been made in the development of tourism in the last decade in the municipality of Žagubica additionally imposed conditions for its future development and the need to concurrently pursue the highest economic, environmental and social goals. If you want to follow modern trends, the real need of the local population and the market, there is an obligation to define the direction and strategy to be formulated on a realistic sustainable basis while bearing in mind the actual available resources on the one hand and the chances and the dangers that come from the environment on the other hand. That represents a milestone of overall development Žagubica, where tourism is to become a significant driving force in the economic development.

Compared to other economic sectors, which have or could have an impact on economic development and quality of life of the population Žagubica, tourism has a special significance. It is the role of tourism and particularly emphasized changes imposed by modern tourist market and an increasingly important impact of tourism on the local population, that have made it necessary to explore the real possibilities for future development, in order to define guidelines and appropriate model for sustainable tourism development. At the center of the development of the municipality Žagubica we need to have a profitable tourist product which integral part is the maximally preserved environment, as well as improvement of the quality of services, and quality of life in the municipality.

This is extremely important because it attracts tourists from different markets. This affects the overall economic development and welfare of the local population.

The Municipality of Žagubica - Geographical and Economic Characteristics

The territory of Homolje has the shape of an irregular rectangle set in the direction east-southeast-west-northwest, with the length of about 35 km, while the largest width of about 26 km. Before the arrival of the Turks, Homolje belonged, administratively, to the Vidin region. After the liberation from the Turks in 1833, it belonged to the district of Požarevac, and after that to the Mlavaska district.

The border with neighboring areas generally extends over the highest peaks of the mountain ranges. Homolje is separated from the rest of the world by high mountains. According to the Zvižd, the watershed boundary extends between Mlava and Pek from Omana (936 m) to Rakova bara and Veliki Štubej (940 m). The boundary to the lower Mlava goes along the ridge of Sumurovci (911 m) and Vukan (825 m), and on the south, it goes over Karaula (675 m), Veliki vrh (670 m) and the Plateau of the Bela reka.

The southern border towards Resava goes over Sokolica (1172.) and the highest points of the ridge of Beljanica (1336 m), to the top of Kap (1291 m) to the east. Further border goes over Crni vrh (1027 m) and then towards north to Oman (936 m).

In terms of administration, the territory of Homolje fully corresponds to the territory of the municipality of Žagubica. The municipality of Žagubica in turn borders with the municipalities of Bor, Despotovac, Majdanpek, Kučevo and Petrovac. The length of the border of the municipality of Žagubica is 136 km, of which 129 km is terrestrial and 7 km is aquatic.

The longest border is towards the municipality of Despotovac to the south and it is 35 km long, then the border towards Majdanpek is 30 km long, towards the municipality of Petrovac it is 29 km long, towards the municipality of Bor it is 24 km long and the shortest is the border towards the municipality Kučevo – 18 km.

Table 1. Area and number of population at the republic, district and municipality level

Municipality, District, Republic	Area in km ²	Population				Incre. or decre. of pop. no. 2011- 1991	Population density	Number of settlements
		1991	2002	2011				
Žagubica (Municipality)	762	16,755	14,823	12,737	-4,018	16	17	
Baničevski (District)	3,865	220,225	200,503	180,480	-39,745	46	189	
Serbia	88.361	7.576.837	7.498.001	7.120.666	- 456.171	80	6.168	

Source: RSZ, (2012), "Statistički godišnjak za 2012. godinu, Republic Statistical Office, Belgrade.

The territory of Homolje, or the municipality of Žagubica, is inhabited by approximately 12,737 people. Bearing in mind the space Zagubica of 760 km², the average population density is 16 inhabitants/km². The settlements that are a part of the municipality of Žagubica are of the village type, except Žagubica which is small town and also the headquarters of the municipality. The villages situated on the territory of Žagubica are Suvi Do, Laznica, Selište, Milatovac, Vukovac, Jošanica Izvarica, Ribare, Osanica, Krepoljin, Breznica, Sige, Milanovac, Krupaja, Bliznak and Medvedica. Homolje is predominantly hilly and mountainous area, with alternating landscapes on mountain meadows and pastures with areas covered in forests. Homolje forest vegetation is represented by several types depending on the quality and type of soil. So in Mlava valley and its tributaries there are willow, poplar, elm. Medium heights are characterized by oak, maple, hornbeam, hawthorn and other trees. Above this zone rises the belt of beech forests, which are mostly represented in the forest vegetation of Homolje. When you look at the hydrological map Homolja, it becomes apparent that there are two different sections, which are intersected by the northern surface flows and southern karst. It should be noted that the subterranean karst areas there are underground rivers Rečke, Busovate and Do.

The municipality of Žagubica is one of the least developed municipalities in Serbia. In the gross domestic product of the Republic of Serbia, it accounts with only 0.067% . GDP per capita in Žagubica amounts to RSD

50,000.00 which is less than 40% of the national average. Agriculture has the major role in the economy of Žagubica. The share of agriculture in the total value of the new created products is 59.33%, which clearly speaks of its dominance, while far behind are the manufacturing industry with 8.23% and trade with 6.93%. Motels, restaurants, pubs and coffee shops account for 2.84 %. In Zagubica the total number of employees is 1,476, while the number of unemployed people is 763. At 1000 inhabitants, 131 are employed, and the number of unemployed is 24. The number of employees is lower than the national average, which for Serbia is 271 employees, and the number of unemployed is also below the national average of 120 unemployed people in 1000.³ However, the data on the number of unemployed should be taken into the account carefully . Based on the analysis of employment by sectors in Žagubica, it was concluded that the largest employment is generated by ore mining with 25%, followed by manufacturing with approximately 15% of total employment.

Map 1. *Geographic orientation of the Municipality of Žagubica in the Republic of Serbia*



Source: RSZ,(2003), ''Statistički godišnjak za 2003. godinu'', Republic Statistical Office, Belgrade

³ Milenković, S.,(2007)., ''Svetski turizam u budućnosti'',PMF, Departman za geografiju, turizam i hotelijerstvo Novi Sad, Naučno-stručni časopis iz turizma''TURIZAM''no. 11, pages14-17

It is followed by agriculture, hunting, forestry, water, health and social work and education that have share of about 10%, while other activities take up much lower share of total employment in Žagubica. Unfortunately due to high economic underdevelopment and the lack of production and processing capacities, large population migrated from the area to the big cities or to the EU. The economy is still underdeveloped in Žagubica and tourism could be the engine of development with regards to the potential that the municipality has. The problem of young people staying in the area is very strong and creates the necessity for the system to solve this problem.

Table 2. *The share of economic activities in the formation of social product in the municipality of Žagubica*

Activity	2011
Agricultural hunting, forestry and water management	59.33%
Fishing	0.49%
Ore and stone mining	8.23%
Processing industry	8.26%
Products of energy, gas and water	2.13%
Construction	4.80%
Retailing	6.93%
Hotels and restaurants	2.84%
Traffic, storage and connections	5.61%
Real estate, renting	0.25%
Health and social activities	1.13%
Other utility, social and personal services	0.00%
Total	100.00%

Source: *RZS, (2012), "Opštine u Srbiji 2011", Republic Statistical Office, Belgrade*

Rural Non-Farm Economy – Alternative Direction for Development of Rural Regions

Since the beginning of the 1970s, a large number of scientific papers deal with the importance of the rural non-farm economy (RNFE) in rural development. Rural non-farm economy can be defined in many different ways. In the literature one can find a number of different definitions and taxonomies of certain elements of the concept. RNFE is most often defined as a set of economic activities in rural areas other than activities

related to the production of primary agricultural products⁴. Rural non-Farm economy includes activities related to agriculture, such as food processing, other types of small businesses, income from social transfers, interest, dividends, rents and remittances from part or full-time employment in urban areas.⁵ Increased interest in the theory and practice of non-farm economy has become present since diversification of the rural economy became an important element of state policy on agriculture and the rural population. Agriculture and food production are not the only functions of rural areas, but there can be a wide range of other activities aimed at meeting the needs of the rural population. Hence, the support to the improvement of living standards and the establishment of social and economic stability of rural households has been pursued for several decades through the development of the rural non-farm economy. In many parts of the world, there is a growing gap between the rural population and natural resources which provide sustainable living conditions. The available natural resources are reducing, especially in developing countries, and the life of the rural population and their incomes are becoming less safe or varying significantly. Despite the growing depopulation of rural areas (or the reduced rate of population growth), employment opportunities in rural areas do not increase significantly, adapting to changing circumstances. Hence, the rural population is forced to find strategies to overcome these income risks they face. As a rule, all of these strategies, to a greater or lesser extent, imply moving away from agriculture and food production as the basic functions of rural areas. In this sense, migration to the cities is a possible strategy for that part of the rural population that has a comparative advantage in their job performance or accumulated capital. Migration is not a solution, or an option for that part of the population who cannot leave their communities for socio- economic reasons. In such circumstances, the development of non-farm economy has proved to be a suitable instrument to provide adequate living conditions for those who are unable to live from agriculture or for whatever reason they do not see their future in it.⁶ RNFE as a development concept solves key problems in most rural areas:

⁴Lanjouw J., Lanjouw P. (1997): „*The rural non-farm sector: an update*“, paper presented at the XXIII International Conference of Agricultural Economists (IAAE) on Food Security, Diversification and Resource Management: Refocusing the Role of Agriculture, Sacramento, USA; pp -3.

⁵ Davis J.R., Pearce D. (2000): „*The Rural Non-farm Economy in Central and Eastern Europe*“ Discussion Paper No. 2000/04, Natural Resources Institute, Chatham, UK. pp-7

⁶ Bogdanov N. (2007), „*Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*“, Beograd. page 83-97

- absorbs surplus of rural labor force and reduces hidden unemployment
- reduces the risk for agricultural holdings involved in activities that supplement or replace agricultural income;
- ensures the survival of households where agricultural production is damaged or compromise
- contributes to the increased use of comparative advantages of rural areas (natural and physical resources, location, labor costs, etc.),
- contributes to the acceleration of economic growth in rural areas,
- improves the overall quality of life, products and services in rural areas.

In addition, the non-farm economy through a wide range of services and activities related to agriculture has a strong, direct and indirect impact on overall economic growth. The experience of developed countries provide substantiated belief that diversification of the economy of rural areas can:

- accelerate the growth of the local economy,
- reduce the gap between rural and urban areas and
- positively affect the reduction of the rural poverty.

These experiences are significant for the post-socialist transition countries with high rural population in the total population and severe rural poverty. It has been confirmed by both the science and the practice, that the development of non-farm economy is the main mechanism for providing rural employment and income. Thanks to this, the RNFE concept has become a priority for (reform) governments, donor programs, NGOs and others.

The concept of rural non-farm economy is a realistic roadmap for rural regions as well as how the use of available human, material and natural resources in order to gain additional income and employment actually existing redundancy. The concept of rural non-farm economy has great significance for the further development Žagubica and its proper implementation would certainly lead to an improvement of the economic situation in the municipality.

Agritourism in the municipality of Žagubica

Rural tourism is a term for various forms of tourism that occur outside of the cities and areas where mass tourism has developed. Rural tourism is directly conditioned by tourist attractions that are located in rural area. In addition to the agro-rural family farms in rural areas we can encounter hunting, fishing tourism, resort tourism, sports and recreation, health tourism, cultural tourism, gastronomic tourism, ethno-gastronomic tourism, eco-tourism, adventure tourism, educational tourism, religious tourism, protected parts of nature (national parks, nature parks, bird watchers) nostalgic tourism, local history and tourism alike. Rural tourism in rural areas includes activities of tourists and one-day visitors.⁷ Rural tourism is a tool for rural development. Rural tourism is the tourism of rural areas with all the activities carried out in this area. Nature is the main resource for the development of rural tourism. The introduction of new non-agricultural activities (especially rural tourism) can create additional income that will enable the improvement of quality of life and stop the demographic decline in rural areas. Planned rural tourism can be very well used for the recovery of rural areas. Agritourism is a limited concept of rural tourism, while a broader concept of rural tourism (farm). It is related to the environment and the rural villages of the immediate environment, as well as all activities in rural areas (agriculture, events, gastronomy, folklore, ethnology, crafts and other activities on the farm).

Rural family farms are, more or less justifyingly, considered the paradigm of rural tourism and agrotourism. Stay on a rural family farm is a unique guest experience, which penetrates the space, but also socio-cultural membrane of a different world, so different from the one in the city. Features of the world are clearly legible in its physical shell, composed of the traditional architecture of the house and economic courtyard garden, a traditional garden, a traditional decoration (wall, ceiling and floor coverings, furniture, curtains, tablecloths, kitchen towels, equipment, wall decoration, lamps and icons with the image of a saint, traditional stoves for heating and cooking, etc.) and is less readable in the content of intangible cultural heritage, such as traditional knowledge, skill handicrafts, customs, legends, songs, games, relationships between family

⁷ Gocić M. Lj., i sar.(2006): *''Integrirani monitoring životne sredine osnova razvoja održivog turizma''*, ECOLOGICA, Posebno tematsko izdanje broj 12 – 2006, YU ISSN 0354-3258, UDK:303.633/.634:502.45=861.page.95-103

members and the family's relationship to the village..⁸ Over time, the changes in lifestyle of the host are inevitable, particularly in the area of agricultural production that bring changes in all of these traditional content farms and rural life on it. This raises the issue of sustainability of traditional authenticity of rural households, and the whole village and as well as the entire cultivated landscapes in rural areas.

Marketing experience of neighboring Croatia from Istria in the development of so-called agritourism, show that tourists do not insist on the literal authenticity of rural households. They expect that the houses in the village, the whole village and the surrounding cultivated landscape, include as many of the traditional features of the village to the extent needed to ensure a sense of adventure and villages, "such as the one used to be," or at least that it expects average visitor from the city. Most of the lovers of rural tourism have such expectations, regardless of whether they have found accommodation on the farm, in a rented room, apartment or house, family hotel, mountain lodge or hunting lodge.⁹ Agritourism has a very important function in the development of rural areas. It provides additional income to local population along with the basic agricultural production. It restores the dignity and self-esteem in peasants, which has been lost in the last fifty years in various stocks overall "urbanization" and "mechanization" of rural areas. Regardless of the natural and cultural attractiveness of Serbian rural areas, rural tourism, especially those related to farms, develops very slowly in relation to supply and demand in Western countries (Austria, Slovenia, Italy). The main cause of this is certainly relatively small and fragmented farm estate in Serbia, where it cannot be cost-effective to organize agricultural production, much less tourism services as additional services, then undeveloped communal and social infrastructure, and finally, the lack of public interest, lack of adequate incentives by the state for a very long period of time. It was not until the last few years that Serbia has taken concrete measures to encourage the development of rural tourism approving grant funding resources and favorable credits to rural households that are interested to work in tourism.

⁸ Simonović D. i sar., (2008), '*Ruralni razvoj i ruralni turizam*', Agromreža, Beograd. Dostupno na http://www.ruralinfosrbia.rs/dokumenta/brosura_rrazvoj_i_rturizam.pdf (09.09.2013.)

⁹ Petrić, L., (2006.), '*Izazovi razvoja ruralnog turizma: Dosadašnja praksa u Evropi i reprekusije na Hrvatsku*' , Acta Turistica, 18 , 2; 134-170. Available at : <http://bib.irb.hr/lista-radova?autor=168146> (09.09.2013.)

In addition, for the development of rural tourism only rural households involved in tourism for accommodation are not enough, but we also need other facilities in rural areas, we need adequate food and infrastructure, from restaurants to wine cellars, we need tourist attractions (real, accessible tourist attractions), designed footpaths, cycle routes, pilgrimage routes, inbound travel agency, in short, we need designed and organized rural tourism destination. The new commitment of Serbia to the agricultural sector, as in other developed countries, with the concern for food production and assume liability for physical, social and domestic quality of life in rural areas, provide a realistic framework for the development of rural tourism.

The development of the rural tourism is one of the most important tools for the development of rural areas. If, during the execution of this task, we do not take into account the necessary interdisciplinary approach to the development and use of rural tourism as an instrument for the development of rural areas, its complexity and subtlety that requires dedication and professionalism in the implementation of the concept and the training of professionals who will generate, this could still remain one of the Serbian missed opportunities. When it comes to Homolje which is a predominantly rural area so characteristic of Eastern Serbia, only in the last ten years, there has been a more serious approach to the development of agritourism.

Agritourism is a form of rural tourism, which should meet the requirements of recreational and psycho-physical relaxation room visitors. Amenity and recreation stay is best achieved in the villages of highland type for stimulating influence of the position, altitude and climate. Also significant is the local position of the village. The benefits of the position are if the village on the ridge, on an elevated terrace or a gentle plateau that dominates the surrounding area and you have a vast vistas and good sun exposure.

Benefits of village are also when they are of scattered type, with separate villages, with lots of greenery - the gardens, fruit groves, pastures, meadows and crops, which together form a gentle rural landscape. In such environments, visitors relax in contact with the owner and through the activities of the country they are experiencing their psychological and physical relaxation. For a visitor who opts for a holiday in the country, they do not want peace in isolated silence, but to find themselves in a new social environment.

Table 3. *Troust Traffic in Braničevski district and the municipality of Žagubica*

	2000			2006		
	Nights	Domestic	Foreign	Nights	Domestic	Foreign
Braničevski district	100.789	98.829	1.960	76.698	68.543	1.155
Žagubica	3.167	3.145	22	1.282	1.260	22

Source: RSZ (2009.), ''Statistički godišnjak za 2009. godinu'', Republic Statistical Office, Belgrade

Viewed from the standpoint of general natural history, Homolje is an environmentally friendly, bio-geographic and climatic optimum tourist region. Therefore; it can be argued that most villages in it have good potential natural conditions for tourism. The municipality has 17 villages. Of them, 11 are with over 500 people, and 3 are with more than 1,000 inhabitants (Suvi Do, Laznica, Osanica) and 3 are with less than 500 inhabitants. Larger villages are in the valleys and along the edges of ravines a compressed and even urbanized. Tourism is suitable for small villages scattered type, and they are more and more favorable positions. When it comes to rural households engaged in rural tourism, and whose dwellings covered by the previously executed categorization can be concluded that currently exist in the municipality of twelve households where categorization was made. The aforementioned household has fifty-two beds. Currently, the categorization process included fifteen households have about seventy-five beds. The foundation of the development of agritourism in Homolje is based on the facts:

1. Homolje is a mixture of rural and fascinating natural beauty. Homolje villages with their ethnic heritage, a mixture of Serbian and Vlach cultures are unique combinations of people and nature that are unique and fascinating and also irresistibly intriguing and magical appealing to the modern tourist. Authentic and well-preserved architecture of the family house, not undermined faceless modern buildings, gives warmth and receptive look of villages in Homolje. The villages are framed by forests, green meadows, pastures and mountain streams as a special sparkle and specific coloring the entire region. Tourists are offered accommodation in rural households and the ability to acquire new knowledge about the life and work of people in the countryside. Accommodation in rural households and offers opportunities for active participation in the daily activities that take place in the homestead.

2. Ecologically preserved area rich in natural beauty. Economic underdevelopment of Homolje has resulted in the preservation of a healthy environment and in non-infringement of the natural beauty of the area. Mountain peaks, numerous springs, underground rivers, pits, caves have all become an immense natural wealth of Homolje. In addition, the flora and fauna of Homolje are particularly rich and full of numerous plants and animal species.

3. Until recently, an insufficiently known region, this more interesting compared to the competition. Homolje until recently was an area that was not included in the travel brochures, nor offered within any travel arrangements that would include Homolje. With intense activities to promote Homolje as a tourist region, we come to a phase of the intense interest for visiting tourists as Homolje has not been revealed as a tourist region in Serbia.

4. The existence of a representative event in the function of preserving the folklore and ethno-heritage of the population of Homolje and at the same time to promote them. In the area there are four representative Homolje events. First of all, it is a manifestation "Vrela Homolja" held in Žagubica, which aims to represent all the characteristics and potential of the area as the cultural, tourism and business region. The second is "Spasovdanski susreti" held in Krepoljin which aims to preserve the folk heritage. The third is "Dani bilja i gljiva" held in Krepoljin which aims to encourage the conservation of biodiversity and the propagation of a healthy way of life. The fourth is "Priveg" held in Laznica and it is an event that is based on folk traditions that date back to pagan times.

5. Continuous marketing activity based on different segments of the tourism potential shapes a positive image of Homolje as an undiscovered tourist area. Promoting Homolje is done on the basis of the presentation of the most beautiful and interesting particularities and specificities of the area. This led to the formation of a positive image of Homolje among the general public as a region of pristine nature and yet undiscovered beauty and uniqueness that must be visited.

6. Overall trends in tourism, with the evident upward trend in agritourism favor the development Homolja as a tourist area. Desire to return to nature and the domination of modern adventurous tourists support the development of the concept of agrotourism in Homolje.

Modern tourists want to decide, want new experiences, likes sports and nature, feeding on local food and accommodation which includes basic comfort.

7. The existence of the will and motivation of the local population to engage in tourist activities based on the concept of agrotourism.

Awareness of the times in which we live and opportunities we have brought to the increased desire and good will of the population to engage in tourist activity and to realize a portion of revenues through the provision of services in the field of tourism. Through systematic work by relevant bodies we can avoid the uncontrolled activity, in order to perform categorization of households and we are continuously working to educate interest to engage in activities in the field of tourism. One of the biggest problems is the insufficient number of highly qualified staff in the field of tourism that can improve intense involvement of local people in providing services in the field of tourism.

8. The existence of infrastructure that fit into the concept of agrotourism.

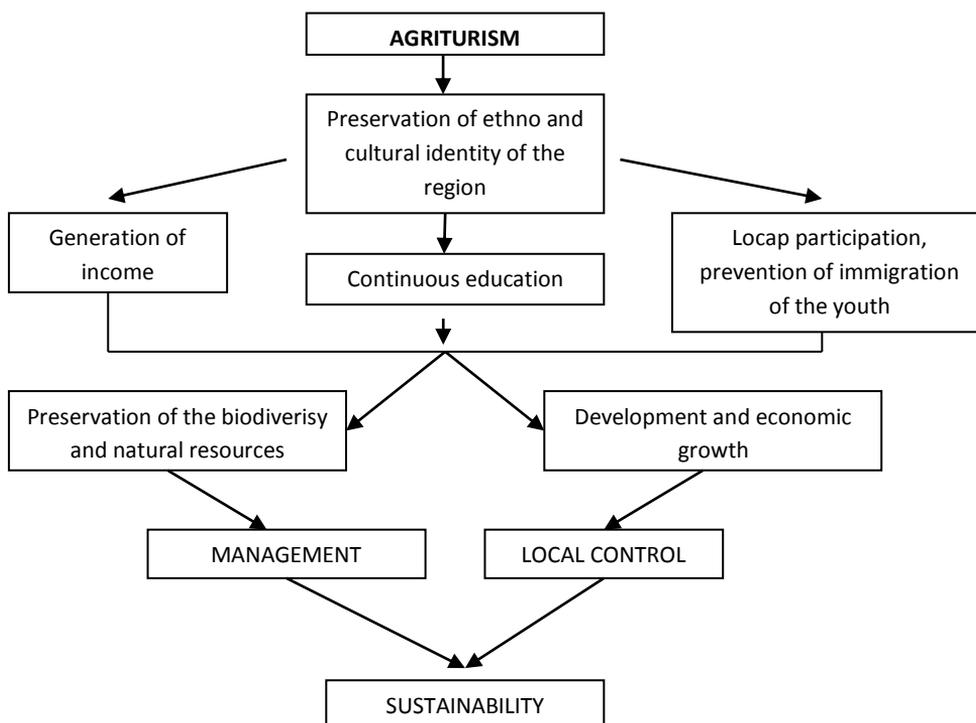
Starting from the definition of agritourism and adhering to its basic postulates, in the county of Žagubica there are households that are providing services in agro-tourism, and whose facilities are used for this purpose is fully adapted to agro-lovers. Tourists have a choice of two options; the first option is to stay in a farm located in one of the villages in the municipality. The second option is much more attractive and refers to the room i.e., the implementation of vacation at one of Homolje bachia. In both variants of other tourists are offered the opportunity to the best way of finding essential features of population lifestyles in Žagubica. At the same time they have the opportunity to acquire new knowledge about the activities performed in rural households, meet the natural beauty of Homolje, directly participate in various activities in the country (from performing farm work, preparing traditional dishes as well as the expansion of the famous cheese from Homolje, picking herbs, participating in various events in the area, etc.).

9. The existence of the local road network and the path used by the local population and may be freely used by agritourists as well, which again fits into the concept of agrotourism.

The Homolje area is intersected by gravel roads and trails that pass through the most attractive areas of the sites. Fans of extreme cycling already used all the benefits offered by Homolje. Also for riding enthusiasts there is the possibility of genuine atmosphere and unique experience visiting attractive locations on

horseback. The development of space for camping along the roads and trails that lead through Homolje for tourists - trekking lovers who can visit it during camping areas undisturbed is also in plan. It is clear that the modern concept of tourism embodied in agritourism has real opportunities to apply and take root in the area of Žagubica. By using the modern concept of agrotourism, degradation of biodiversity areas would be prevented and it would lead to optimal utilization of tourism resources. At the same time, and there would be a partial resolution of the problem of surplus labor force in the area, creating jobs. Generally speaking, this concept of tourism leads to economic prosperity of the entire region. It can be concluded that the design of tourism development on the principles of agrotourism in Homolje has led to the agritourism to be one of the factors for sustainable development of tourism in Žagubica.

Scheme 1. *Components, functions and effects of agritourism on an agritouristic destination*



For further development of agrotourism in Žagubica it is necessary to apply appropriate standardization and classification of services, in particular the adequate conditions for accommodation. Tourism law specifically regulates the provision of accommodation and food in the

household, as a specific form of service delivery. Of particular interest is the investment in infrastructure (road network, telecommunication), provision of health care and the preservation and protection of the environment in order to prevent uncontrolled urbanization. One of the most important tasks in the development of rural tourism is to educate rural hosts for engaging in this activity. This would be a great role that NGOs, Tourist organization of the municipality, and all interested parties have. Extending the principles of integrated quality management (IQM) that is so popular in the manufacturing sector, has introduced a quality management system as a tool that has the potential to help rural destinations managers to achieve their goals of higher local income and employment in tourism, while at the same time ensuring that vital environment, culture and quality of life of local residents are not destroyed by the tourism. Two key elements of the IQM approach are:

1. Focusing on the visitors, improving the quality of everything that is offered to the visitor, meeting their needs and influence their activities, to the extent that visitors return again and recommend the destination to others.
2. Involving the local community and local tourism destination management companies as participants and as consumers in the management process. It can even be argued that there is nothing new in an attempt to achieve these twin goals of improving visitor satisfaction and involvement of local communities in the process of tourism development.

Conclusion

Serious development of agritourism in Žagubica implies changing the current way of using natural, cultural, human, financial and other resources essential to the functioning of a tourist destination. Given the apparently limited resources, it is important to find such a model of sustainable development of rural tourism in žagubica that align long-term vision and development concept with the short-term interests and potential conflicts of current and potential users. Therefore, finding the optimal model of sustainable development of Žagubica must involve provision of special attention to the interests of existing and potential subjects that their business relate or intend to be related to the use of tourism potential in Žagubica (current potential users of the currently available travel funds Žagubica, local people, local government, the

Government of the Republic of Serbia with the Ministry of Economy and Regional Development, private entrepreneurs, large domestic and international investors, citizens' associations).

In order to achieve better development of agrotourism in Žagubica and hence the sustainable development of tourism in general, it is necessary to establish the formation of a coordination center for the development of tourism in the municipality of Žagubica that would employ professionals in tourism, agro-economics, management and marketing. The coordinating center is the backbone of all activities related to the development of tourism in the municipality of Žagubica. Basic actions for this center to deal: - Coordination Center would primarily work on clearly defined tourism products of Žagubica and clearly stated on the market, along with their competitive advantage; continuing to undertake marketing activities to Homolje as a tourist destination consistently in the focus of public interest by making it accessible to potential clients representing its beauty; Coordination Center would have the task of coordinating activities between more realistic variety of subjects whose economic interests in the field of tourism in the Homolje in some points are confronted; Coordination Centre also has the task of training the interested populations to practice in the rural tourism; One of the important activities would be the establishment of an integrated quality management in all subjects interested in activities in the field of tourism in the municipality of Žagubica; Undertake activities to intensify and exacerbate the entrepreneurial activities of the local population, which would be the development and improvement quality tourism in Žagubica; Promotion of activities related to the construction of infrastructure and expansion of accommodation facilities; initiation of development projects related to the development of tourism in the area of Homolje and application for incentive funds for national and international funds; organization of tourism events in the municipality, such as concerts; Coordination Center should undertake activities that would overcome the direct result of not filling the organization of tourist facilities in the villages and making sales through travel agencies. Organized way of selling will greatly contribute to better transversion of the supply and demand for the rest of the village and would certainly help rural households by the end of valorizing a significant investment in tourism. On the demand side, international experience reveals trends that speak of a greater sophistication of tourism demand and its fussiness in relation to the quality, content, price and other elements specific destination. From the above it is clear that the model of sustainable development and

sustainable agritourism in general in Žagubica is based on the formation of effective management of the organization, with flexible management structure and clearly defined schedule of duties and responsibilities, which is a clear vision of tourism development and the aim pursued the sustainable development of tourism in the area of Homolje.

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ECOLOGICAL AND ENVIRONMENTAL RESPONSIBILITY OF MINING PROJECT FROM ROSIA MONTANA

Cristian George Popescu¹, Mihaela Sandu²

Abstract

This article aims to highlight the environmental and economic responsibilities of the Romanian state mining project from Rosia Montana, starting from existing data, reports and press releases, mostly belonging to the investing firm. What is to note, that the Romanian state faced on one side with an acute need for monetary funds, mainly due to the recession, but on the other hand with obvious uncertainty on some unclear information or information not presented in the materials provided by the investor. However, it is certain that there is a minimum guaranteed return of the conducted research, as long as the pressures on the part of the population against the project, but mostly because of time pressure (after signing operation have already been 15 years), the company investor has not given up on the project. If will be a good business for Romanian state, it must be measured not only in terms of income calculated by the investor, but also in terms of long-term spending for over 50 years.

Key words: *environment, mining, gold corporation, social responsibilities, business ethic*

Introduction

Environmental responsibility is a concept derived from the current global trend of environmental degradation and exploitation of non-renewable resources concept even at the expense of profit³.

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³The Ecological Revolution, John Bellamy Foster, Monthly Review Press, New York, 2009, pp. 57

Difficult to understand even by some experts to this day, but there are all making a doomsday scenario in which we have invested more than win. Environmental responsibility can be applied in two ways:

- Once from governments and government agencies that can reach a compromise in this regard, but the pressure on capital decisions is difficult to take as long as short-term results⁴ are quantifiable;
- On the other hand taking into account the organizations responsible society that more than profitability indicators can watch and positive decisions that can be taken to improve the environment.

Environmental responsibility can be adopted and applied to microeconomic concepts of ethics are respected business organizations when organizational culture is reinforced through environmental education, either by legislative constraints. The second method is more dangerous to a government office and when adopted, due to the pressure on the private sector, which could result in blocking investments in the economy.

If until a century, until the Second World War, environmental policy at the state level was achieved given the limitation of uncontrolled exploitation of natural resources of a region, now the state bears a more important role. It is played in a global context by all countries in a conscious, responsible and disciplined (through treaties, i.e. signatories to Kyoto which obliges signatory states to significantly reduce emissions of greenhouse gases). These countries in a broader sense, they realized the "danger" appears imminent after us, it's about environmental degradation in an accelerated (inversely proportion to the degree of industrialization) . But sometimes this understanding should be extended to areas restricted degradation hazards that can bring high costs for long-term government. Therein lies a contradiction between what we think and sign and what we do. It is like when a person enters a group with positive attitudes towards the environment, express their feelings and show that these group rules apply, but in addition, when no longer with those members practice different from other behaviour towards environment.

⁴ When it comes to average period of 20-25 years, how long a holding mine, is a short time

Duplicity is that you can not only be compelled to do something or have an interest (image or moment) when it comes to the environment, but must show a constant behaviour. Unfortunately, many activities during the last century show that especially at micro and macroeconomic reasons still prevail over the green. It seems that the twenty-first century will be a time when a mentality prevailed and environmental actions or the future of humanity will be sealed in this time period. Starting from this idea, does not happen the Romanian state to play this role, about interests of the moment without seeing the future? So we could say when the legislative subterfuge is granted license to extract gold and silver mining at Rosia Montana, taking into account only economic considerations of the moment, without an environmental impact calculation on long-term environmental costs. A very important topic, which may be an example of what constitutes a nation's ecological responsibility, is exploitation at Rosia Montana. He was selected this example, on the one hand due to the importance of the topic of this period, and on the other hand to explain some economic and environmental issues for such a large project.

Organizations and business ethics in Romania

Consumers and pressure groups seem to fail to grow, requiring companies to seek new ways ethical and environmentally sound in doing business⁵. Also the media constantly manages to keep everyone's attention and highlight abuses and leaks from corporations and even companies themselves seem to recognize that being ethical can be a pretty good thing for a business. But when the company formed a pressure group on both sides for beginning of a project, then there is a normal balance weight. Civil society remains alone with the responsibility to convey messages contrary to the subject considered only having communication channels formed by the media, transpersonal communication, mass, only their channels, then create informational blockade. The action itself is known and used in many cases in history, including Romania. It acts like a battlefield where enemies implement different tactics. In our case fits best "*divide et impera*"⁶, used effectively, this strategy allows those with little real power (in our financial strength) to impose the will (the money) on those who collectively have great power (or would have, if they manage to come together).

⁵Crane, Andrew, Matten, Dirk, *Business ethics*, Ediția a 2-a, Editura Oxford University Press, 2007, p. 8

⁶Expansionist strategy used by large empires such as the Roman Empire or the British

Here is the key to the success of this strategy, unfortunately in Romania has failed lately, managed to divide some of the most important powers, leaving one side of the barricade the executive, legislative and media and society other civil side. Due to the impressive number of those who are against the Rosia Montana⁷ project (although in some circumstances referred reverse everything to distort and manipulate information), and thanks to the power of example these events⁸ project came into broad public debate. It is also important not to forget that this kind of these debates increasingly depend a legislator belonging to unilateral.

There are various ethical theories that have been developed over a long period of time, ranging from absolutist theories that focus mainly on universal ethical principles about what everyone should do in all cases; the relativistic theories focused on specific subjective concerns in particular contexts and special moments⁹. Case in Rosia Montana is part of the second category, for which the economic detriment of the party may receive the green, but that ultimately bring a higher injury because of information gaps on which can make the final decision. Ethics can be applied in many fields in order to define the level of responsibility or performance standard codes for those working in the sector¹⁰.

A proof of the vitality of ethics is the fact that, despite its short history to date, this area has experienced in the last two decades only thematic and conceptual developments noticeable, especially under the influence of the effects of globalization and the new concept of sustainability¹¹. Have a vision of sustainable development is to have regard not only economic indicators during the course of a purely economic project that naturally unfolds by exploiting resources, but over a long period of time.

⁷During September-October 2013 in the street took a lot more people protesting the project, to a small part of the miners and residents of demonstrators holding area for the project

⁸Whenever an opposing force more than ever, there is another example which due to large populations of people will manifest itself with increasing intensity

⁹Backer, Michael, J., Hart, Susan, J., *The Marketing Book*, Ediția a 6-a, Editura Elsevier , 2008, p. 551

¹⁰Snyder, John. E., Gauthier, Candace. C., *Evidence-based medical ethics, Case for practice-based Learning* , Editura Humana Press, 2008, p. 1

¹¹Craciun, Dan, Morar , V., Macovicuic, V., *Etica afacerilor*, București, Editura Paideia, 2005, p.10

Business and ethics are intrinsically linked and will remain so into the next century, and how organizations operate will continue to play an important role in society¹². We depend on the vision of leaders who will know how to make decisions now, not only for the present but for the future. We can say that there is an ethical business when economic action must be limited when faced with environmental degradation.

That here the close connection between ethics and the environment. The term ethics is often associated with environmental disasters media and financial scandals, bribes or competition in which all sorts of dirty tricks abound with high-level bribery, etc. No wonder that many people are sceptical when they hear of ethics in business because once they come to believe strongly that businesses ignore moral scruples by their nature, will not watch anything other than maximum profits at any cost¹³.

In a recent study by ProQuest¹⁴, shows how enthusiastically open Yanachoca mine in Peru, had a sustained promotion especially from locals. These, thanks to heightened poverty were very glad they had nowhere to work. But the excitement did not last long, and after a while the same people from the beginning, mine workers, were deeply disappointed due to excessive pollution and unprecedented in the area: dead fish, native plants began to suffer, rivers were polluted excessive drinking water have concentrations of heavy metals in excess, the lower layers of the lake above the dam than at acid pH balance.

Virtually all ecosystem was affected despite promises and press releases for maintaining environmental indicators under control. Only in June of 2013, 400 patients had experienced new disorders of pollution due to heavy metals and more households affected. In the U.S., Thomas P. Dunne, director of the Agency and prevention of natural disasters in the past admit that in the past haven't focused on issues that could be generated by mining, but in present they have worsened. In Guatemala and Peru, where locals were initially so happy about the promises have made by companies holding mining, in the present, the same local authorities are pressuring investors to pull out of the country.

¹² Backer, Michael, J., Hart, Susan, J., *op.cit.*, p. 552

¹³ Craciun, Dan, *op.cit.*, pp. 10-11

¹⁴ Greg Griffin, Report Information from ProQuest, September 2013

In Nevada, USA is spending huge amounts of investor¹⁵ in the region to address environmental issues. In Australia, the largest mining company in the world has sold to another company in the region after 2400 acres of rainforest destroyed and before departure saying that mine "was not compatible with our environmental values". This behaviour highlights statements and behaviour of investors who are interested in business as long as it is profitable, not caring what they leave behind and the local community.

The issue Roşia Montană

Has been much discussion lately in Romania, about the Rosia Montana Project. It was emphasized, almost every time, money gains, highlighting favourable financial advantages of Romania. Then, investment in greening the area are questionable, especially since they made several false arguments about how exploitation at Rosia Montana. In all official information from the press and specialized articles are circulated information from the laudatory to the project, but the data is not correspond perfectly.

What people are interested in information about culture as loss of all existing resources, ecological, what are the advantages and disadvantages of such economic exploitation and finally whether the benefits of all aspects (financial, environmental, and regional impact global, and so on) are the Romanian state and how it would highlight them.

As an evaluation of the most important opinions about Rosia Monatana Project we chose Romanian Academy as the most important institution in Romania that can make the most extensive evaluations of all points of view. Thus, in the opinion of specialists in this prestigious institution was an analysis of the project completed in 21 points, among which only the conclusions:

- 1. The investment is not profitable for the state a long-term period (against the concept of sustainable development)*

¹⁵ According to the Romanian Mining Taxation System: Rosia Montana Mine Financial Model, James Otto, December 2009 study presented by the investor through the official website [http://www.rmgc.ro/Content/uploads/Prof-James-Otto-RM-mine -Financial-model.pdf](http://www.rmgc.ro/Content/uploads/Prof-James-Otto-RM-mine-Financial-model.pdf)

2. *Destroying a community since 2,000 years, shouldn't be accepted in any developed country.*
3. *The exploitation is danger against unique cultural areas in the world.*
4. *Exploitation is done without a comprehensive analysis of the Geological Institute of Romania.*
5. *Extraction process is disadvantageous planned*
6. *Capitalization deposit is incomplete due to loss of valuable elements accompanying (otherwise all prior research is carried out only on the extraction of gold and silver)*
7. *There are risks that are not taken into account small earthquakes growth can cause cracks in the subsoil layers and then expanding pollution that couldn't be removed.*
8. *Natural dams unreliable in extreme situations.*
9. *Mutilation landscape for long periods of time.*
10. *Creation of concern for the use of large amounts of sodium cyanide, and disposal of waste in open basin, including heavy metals resulting from mining process.*
11. *Waste management in detail is overlooked, and site rehabilitation estimated at USD 146 million, the explanations are not detailed.*
12. *Waste management does not highlight the real issues such as separate wastewater problem TMF. Large quantities of water are in the order of millions of cubic meters containing 66 non-biodegradable chemicals, most of which are toxic.*
13. *What happens if the investment bankrupt, so millions of USD guarantees couldn't be supported creating a huge potential asset class.*
14. *The environmental guarantee is not explained, especially in the event of natural disasters.*

15. *Direct economic benefits for the Romanian state, resulting from direct incomes are not proportional to the investment rule, are not included fundamental value and disadvantages pollution and losses calculated on untapped natural and cultural resources of the area.*
16. *The investment itself could be made by the Romanian state if there is such economic potential, without mediate an investor that can't follow the local interests as it could be done by the state.*
17. *There is no guarantee that the investing company can restore the environment.*
18. *There are large gaps in relation to the implementation of the project, the important elements required for cost-benefit analysis does not exist.*
19. *The project does not comply with all conventions and European law, especially in the immediate vicinity where, there are several countries that could be directly affected to a natural disaster, countries like Hungary and Serbia.*
20. *Individual and collective protests can further amplify at the start of the project, in which case the social movements in Romania can lose very much money, and what is not taken into account.*
21. *Rosia Monatana is an important area for keeping the famous cultural and Europe being considered for funding by international financial institutions.*

Economic and financial data of the Project of Rosia Monată

In terms of economic evaluations are made by international experts¹⁶ whose calculations and estimates are correct. Forecasting cash earnings and benefits the Romanian state are evaluated in the next year after the start of holding up to its closure, is taken into account inflation. There are still some natural questions over which it could easily switch:

¹⁶ Conform Romanian Mining Taxation System: Rosia Montana Mine Financial Model, James Otto, dec 2009, studiu prezentat de investitor prin site-ul oficial <http://www.rmhc.ro/Content/uploads/Prof-James-Otto-RM-mine-financial-model.pdf>

What if the mining will result in more ore than expected?

What are other possible sources of income and you do not remember any of this?

What will happen with revenue sharing when the price of gold will increase over the estimated research experts?

Answering these questions was not given any specialized study conducted by the investor, the most important adjustments in the reports provided by the investor are the different scenarios for the inflation rate for the duration of mining, which puts a favourable light and allocated amounts originally presented by the Romanian state (all costs increase with inflation).

All financial and economic calculations from estimates of exploitation income, total revenues from the sale of gold and silver being approximately 7.5 billion USD, of which about 4 billion USD will return the Romanian state as direct and indirect costs to the economy made by investor. In a study by PriceWaterhouseCooper the existence of an output multiplier effect of about 3x that would lead to the total effect of the output (the estimates for the year 2008) to 5.88 billion USD over the life of project (multiplier applied to construction costs associated with the early years of the mine, plus operating expenses and closing all of them in total of 1.96 billion USD).

Estimated amount of revenue is the sale of 247 tonnes of gold and 905 tons silver, 7,941 thousand ounces¹⁷ gold and 29,097 ounces of silver respectively in the 2008 reference price of 900 USD per ounce of gold and 12.5 USD per ounce of silver. However, there is even contradictory information data by the investor (on the same site) so that the extracted information on the gold during the 16 years after mining with a detailed calculation shows that the actual production to be 8.63 million oz. gold¹⁸.

Instead there are scenarios based economic development of other economic and financial indicators that would ultimately lead to total income growth, such as the price of gold and silver, or increase deposits

¹⁷ 1 uncie = 31,10348 according to the international capital market that is traded gold

¹⁸ Aww the oficial site of the investor: <http://www.rmgc.ro/news-feed/cat-aur-este-la-rosia-montana.html>

in the area. However, to put more emphasis on mining period which will last 16 years, (actually being about 20 years of the license, where four years is the preparation and then closing operation), and the period of concession may be higher. License in turn may be extended for successive periods of five years.

According to the technical and economic in May 2010 on expenditure in Romania in the investment objective operation Rosia Montana gold and silver deposit made by Ipromin SA with data provided by the company that invests, we have the following centralization of revenue and expenses:

Table 1. *Main investment budget of the exploitation from Rosia Montana*

Description	Total	Romania	Extern
Incomes	7,480		
Operation expenses	2,702	1,608	1,094
Operating profit	4,778		
Royalties	299	299	0
Interest expenses	382	61	321
rental expenses and rehabilitation	128	126	2
Post-closure monitoring expenses	8	8	0
Depreciation of investment	1,627	1,045	582
Profit Margin	2,334		
Income tax	388	388	0
Net profit	1,946		
Gross dividend	1,946		
Net dividend	1,697	389	1,308
Tax withholding	249	249	0
Income distribution	7,480	4,173	3,307

Source: *technical-economic report expenditure on Romania investment objective in: Exploiting the mine gold – silver Rosia Montana, Alba Country*

According to recent negotiations with the Romanian state in the RMP investor fee would increase from 4% to 6 % and total capital state participation could increase from 19.3 % to 25 %¹⁹, which would translate into increasing

¹⁹ If the Romanian State respects some of the commitments and negotiation with the investor of the project

amounts awarded directly Romanian state²⁰ 184.75 million USD. In total about 1.8 billion USD will be direct input to the budget of state / local budget and 2.4 billion as indirect contributions, expenditures made in Romania for human resources, construction, electricity, materials, transportation, reagents, spare parts and so on²¹.

Seeking answers to the questions above, we reviewed the data highlighted by the investor and realized revenue growth scenarios taking into account forecasts of price movements of gold and silver, to extend the implementation²² and inclusion of other and unspecified probable sources of income. In the development of alternatives for predicting the results of mining have considered the data submitted by the investor is the realistic alternative of the indicators of efficiency.

Version 1, to the original will bear the following changes:

- *Implementation period of the project will be the same (16 years of actual operation) ;*
- *The Romanian state has a level of 6% royalty and equity participation of 19.3 % ;*
- *Has an ounce of gold price during operation (when it actually sold) for 1400 USD and 19 USD respectively ounces of silver.*

Version 2, compared to the original version will support the following changes:

- *Implementation period of the project will be higher by 5 years (extended for another 5 years to 16 years initial holding related only);*
- *The Romanian state has a level of 6% royalty and equity participation of 22.98%;*
- *Has an ounce of gold price during operation (when it actually sold) for 1400 USD and 19 USD respectively ounces of silver.*

²⁰ Given the investor's calculations presented in FS and already presented during item

²¹ According to the official website of investment and investor data presented by experts and presented in the article

²² According with estimates of Piraeus Bank – AUR. Defining elements and recent developments, June of 2013, http://www.piraeusbank.ro/Documents/Download.aspx?Cod=Facts_gold

Results expected after revaluation calculations (billion USD):

Table 2. *The alternatives of incomes from Rosia Montana Project (in terms of value, billion USD)*

Initial version	Intern	Extern	Total
incomes total	4,173	3,307	7,480
%	0.53	0.47	
version 1			
incomes total	5,725	5,955	11,680
	0.49	0.51	
version 2			
incomes total	7,165	7,107	14,272
	0.50	0.50	

Source: *author's own calculations.*

Seeing these versions behind which are important calculations, we wonder how such a business ethics is one of the investors is the Romanian state with significant financial strength and other investor is a private company which wants only the deposits of Romania after leaving.

Variants 1 and 2 are very likely to achieve, so we see a direct gain of about 50%, but the net loss can't be quantifiable value, is difficult to estimate, especially after a period of 20 years of land resource exploitation. Other possible sources of revenue (not considered).

Tourism revenues are especially important in the long term for the Romanian state in the economy²³ due to the multiplication factor which is higher during that area is promoted (already achieved by promoting intense premise of the Rosia Montana area) and developed economic.

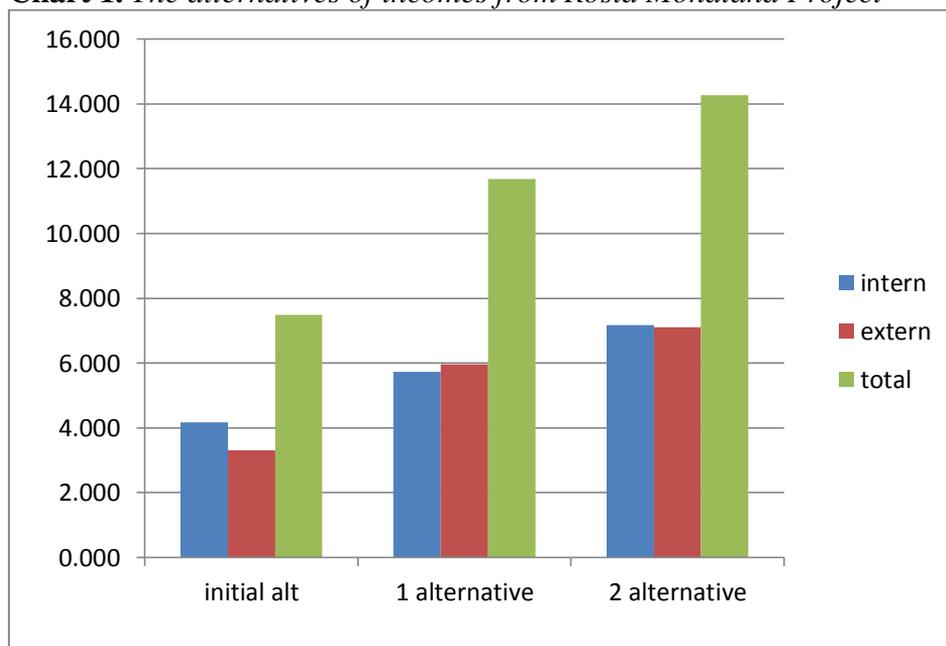
Quarry, where dynamiting and grind during the 16 years of operation more than 400 million tons of stone recovered even if half of it at a price of 2 euros/tonne then all remains an additional profit of 4 million euros, of course if this stones are recoverable.

²³ The multiplier effect of tourism, lect. univ. PhD. Carmen Maria Iordache, Assist. Univ. PhD. Răzvan Decuseară, lect. univ. PhD. Nina Hanciuc, *University Constantin Brâncoveanu, Faculty of Management and Marketing in Affair Economics and Bussines*

Other rare metals that have been declared as non-existent, but just because they did research to find them there, but some of them can be even more expensive than gold (platinum, molybdenum, etc.).

The chart of the alternatives of incomes from Rosia Montana Project (intern represent the incomes that remain in Romania) is shown below:

Chart 1. *The alternatives of incomes from Rosia Montana Project*



Source: *author's own calculations.*

Is observed that in the initial version Romanian State earn more than the investor and in the all other variants investor earn more than the Romanian state.

Conclusions

- ✓ This project will take a very well defined as 20-25 years, but thereafter the area will be recovered from the touristic point of view. Therefore, great emphasis right from the start of operation on cultural heritage.
- ✓ Option no. 1 is considered the initial version updated 2013 average price of 1400 USD per ounce of gold and 19 USD per ounce of silver variant that has already been done. There is an increase in total

income, assuming the Romanian state share lower than the initial variant of 0.49%. This is explained by the existence of significant fixed costs in total costs incurred for carrying out mining. The question how ethical is this earnings report.

- ✓ The focus is on the cultural area of the mine, which, thanks to a major promotion will bring significant additional revenues from tourism, but which, unfortunately, will not benefit the state budget during operations. Thus what apparently seems a win, it is diminished by losses cultural, tourist, i.e. it is the opportunity cost of an alternative difficult to quantify. Conservation tourist areas, the Roman galleries, archaeological sites, etc., must be a priority in negotiations Romanian State and should be a condition without which there would be entrusted location, income generated by these long-term travel is undoubtedly greater than those resulting from the operation area. Thus, within a year of the establishment of the mining museum there were already over 10 thousand visitors, according to the report investor in Rosia Montana Project.

- ✓ What is most interested in the sustainable development of the area, this mean, not only during the 20 years of operation, and what follows it. Just this time missing the investor paid expert reports. You should know very clearly that the total will be brought to the state of nature, if restored and while the ecological balance and biodiversity, all of which will allow to be exploited tourist area after project completion mining and sustainable development will be ensured. Otherwise, instead of the mountains and the city from now there will be only a rocky landscape, barren and no future. Funds allocated 128 million dollars for renewed zone, closing the exploitation, are insufficient, because it is a law of action and reaction physics tells us that what ruin an effort can't restore only through an investment roughly equivalent effort initially. Thus, if the only training area costs more than 500 million USD has no way of restoring it only cost 128 million USD. Should be investigated more in detail the environmental costs that are difficult to fundamental value in the design:
 - If you created a new artificial lake representing dump will remain after the operation it will be dry and sterile on the bottom of the lake will bring a desolate sunlight (tailings decant the order of hundreds of tons does not allow the

development of vegetation only after enormous investment recovery, the fertile soil layer);

- environmental liability guarantee is only 25 million dollars, which is very small to cover a possible environmental disaster.
-
- ✓ What will happen if they find out possible other rare metal more expensive than gold for the investor declares that there is in that area? Normally very thorough assessment should be made.
 - ✓ The Romanian State will be able to access the experts paid by them to represent their interests in the production and will oversee the process undisturbed, permanently or temporarily, anywhere, anytime?
 - ✓ There was an excessive public pressure on working conditions in the mine which is an important error in the operation of modern communication since gold is by detonation, and then taking and processing the stones in the controlled process of production from career. Under this form simply taken piecemeal hills area of operation, ground and then separated with cyanide ore gravel acids²⁴.
 - ✓ New jobs created will be insignificant compared with the scale of the project, as a contribution to the state budget, this is because only the construction period of 2 years shall be employed 2,300 workers, then operational during the approximately 16 years longer only need 880 workers, of which a large proportion are foreign specialists.

Considering all the arguments given above it is clear that it remains a tough decision that may prove important in the next years, but can be risky in the long term because the environment is one factor that reacts unpredictably impossible to estimate costs.

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ANALYSIS REGARDING THE ROMANIAN AGRICULTURE CONTRIBUTION TO THE TOTAL GREEN HOUSE GAS EMISSIONS

Cristian Teodor, Irina Elena Petrescu¹

Abstract

This paper represents a detailed analysis of the influences of the agro-food sector of Romania within the total amount of greenhouse gas emissions in the period 1990-2009. In addition, the effects of diminishing the forestry real estate in Romania have been analysed and pointed out. A dynamic system has been proposed, a dynamic modeling programme Stella, having as a purpose the correlation of the gas emissions from atmosphere to the degree of their absorption and to the way in which the forestry real estate influences the evolution of these ones. At the end, the greenhouse gas emissions forecast was made until the end of 2015.

Key words: *agriculture, greenhouse gas, forestry real estate*

Introduction

Currently, the production of food produces 19% of the greenhouse gas emissions and 60% from the pollution with phosphorus and nitrogen, and 30% from the toxic pollution in Europe². The first carbon fluxes assessment from European Union shows that the greenhouse gas emissions from agriculture go beyond the ecosystems absorption capacity. This is a fact which, according to LeFigaro, overruns even more the intensive agriculture³. Two weeks before the summit on climate from Copenhagen, for the first time the global balance of greenhouse carbonic gas emissions in European Union⁴ was presented within a study.

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² UNEP (2010) Energy and Agriculture Top Resource Panel's Priority List for Sustainable 21st Century Fossil fuel use and feeding world cause greatest environmental impacts

³ LE FIGARO (2009) A too Polluted Agriculture in Europe, PARIS

⁴E. D. Schulze, S. Luyssaert (2009), Importance of methane and nitrous oxide for Europe's terrestrial greenhouse-gas balance, <http://www.nature.com/ngeo/journal/v2/n12/pdf/ngeo686.pdf>

This balance takes in consideration not only the greenhouse gas emissions related to industrial activities, transportation, residential sector, but as well the carbon exchange between soils, vegetation and atmosphere which mainly passes in the terrestrial environment by photosynthesis and breathing. This flux is important because the forests, preeries and turbaries are capable, as the ocean, to stock a part of CO₂ that is accumulated in the atmosphere and contributes to the global warming.

While these exchanges come out in the major areas of the world by sequestrating a part of the CO₂ released in the atmosphere by human being, the balance shows that in Europe, the emissions of nitrogen bioxide (N₂O, protoxide of nitrogen or NeO) and methane (CH₄), other two gases with a strong greenhouse effect – produced by cultures and animals - exceed the CO₂ capturing made by forests and preeries.

Emissions categories and sources coming from the agriculture sector

CH₄ (methane) emissions coming from *enteric fermentation* – the natural part of the digestive process for the ruminant animals. Because this digestion process is not hundred percent efficient, a part of the food energy is lost in the form of methane. Domestic animals are the main source of CH₄ emissions.

N₂O (nitrogen protoxide) emissions coming from the *soils dedicated to agriculture* by chemical fertilizers degradation made by bacterias. In this way, the nitrogen protoxide is produced within soils, by nitrification and denitrification processes. Nitrification is the aerobic microbial nitrates oxidation and denitrification is anaerobic microbial azotate reduction of gas nitrogen(N₂).

Emission categories:

- direct emissions from the *soils dedicated to agriculture* (sources: synthetic fertilizers, natural fertilizers, fixing the biological nitrogen, wastes resulted from the harvest);
- direct emissions from soil of animal origin (as a result of grazing);
- indirect emissions from soil (atmospheric deposits, leaching).

In the total of the emissions, N₂O GHG emissions have the greatest contribution (in 2009, the contribution of N₂O emissions is 67.51%).

Other sources of emissions for **CH₄** and **N₂O**:

- management of farmyard manure;
- rice cultivation; anaerobic decomposing of materials in the flooded rice field, especially for **CH₄**

For **CH₄**, **N₂O**, **NO_x**, **CO**:

- burning agricultural wastes in the field (Burning the agricultural wastes is a net source of CH₄, CO₂, N₂O and of NO_x emissions)

Analisis of the forecasts of total emissions of GHG

The evolution of the total emissions of GHG [CO₂ in Gg] was analyzed within Figure 6.1. It can be noticed that this evolution can be aproximated using the graph of a polynomial function of degree 3. After the aproximation it came out that the polynomial function describes the best the evolution of the total emissions of GHG:

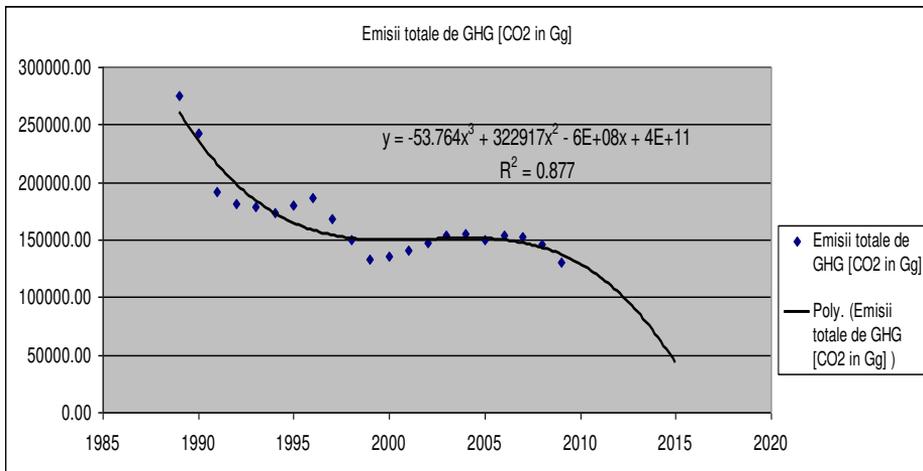
$$y = -53.764x^3 + 322917x^2 - 6E+08x + 4E+11 \Leftrightarrow$$

$$y = -53.764x^3 + 322917x^2 - 6 \cdot 10^8 x + 4 \cdot 10^{11}$$

$$R^2 = 0.877$$

It can be remarked that the value R^2 is 0.877, which represents a good suitability of the line beside the data. Using the obtained trend line it can be seen that in 2015, the total GHG emission [CO₂ in Gg] may decrease a little bit under the value of 50000 Gg.

Figure 1. *Evolution and forecast of the total GHG emissions [CO₂ in Gg]*



Note: Total GHG emissions [CO₂ in Gg], Total GHG emissions [CO₂ in Gg], Poly (Total GHG emissions [CO₂ in Gg])

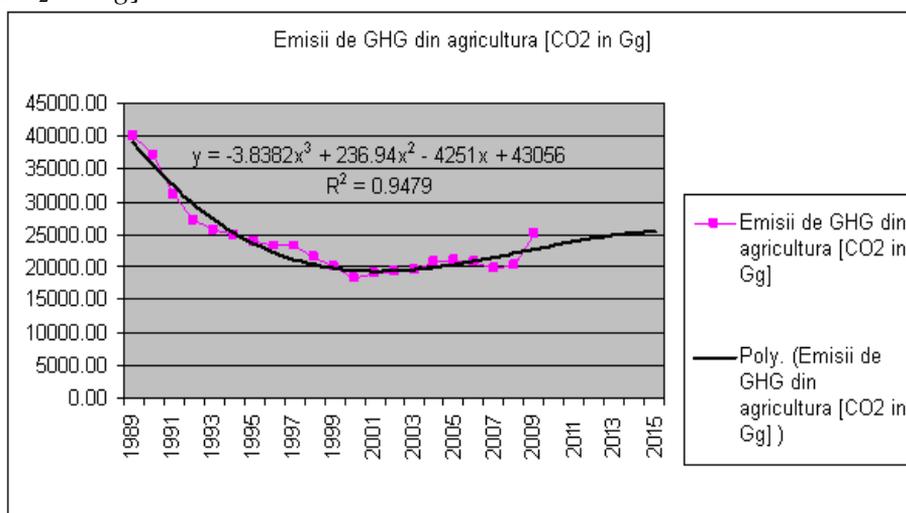
Analysis of the forecast of the total GHG emissions in agriculture

The evolution of the total GHG emissions [CO₂ in Gg] was analyzed in Figure 1. It can be noticed that this evolution can be approximated using the graph of a polynomial function of grade 3. As a result of the approximation, it came out that the polynomial function approximates the best the total GHG emissions coming from agriculture:

$$y = -3.8382x^3 + 236.94x^2 - 4251x + 43056$$
$$R^2 = 0.9479$$

The value of R² equal with 0.9479 indicates that the trend line obtained on the basis of the analysed data suits well with this one. Using the obtained trend line it can be noticed that in 2015, the GHG emission in agriculture [CO₂ in Gg] is estimated to increase up to the value of 25200 Gg.

Figure 2. *Evolution of the prevision of the GHG emissions in agriculture [CO₂ in Gg]*



Note: *GHG Emissions from agriculture[CO₂ in Gg], GHG Emissions from agriculture[CO₂ in Gg], Poly. (GHG Emissions from agriculture [CO₂ in Gg])*

It is known that a hectare (Ha) of forest absorbs on average 3.7 tones of CO (the equivalent of 0.037 Gg) from atmosphere and gives back to this one 2 million tones of Oxygen (the equivalent of 2000 Gg).

Dynamic modeling

It is proposed below a dynamic model which has the purpose to correlate the gas emissions from the atmosphere to the absorption degree and to the way in which the forestry real estate influences the evolution of these ones. Within this model it was considered that one *hectar (Ha) of forest absorbs 0.0037Gg of gas emissions*. There were considered the gas emissions of CH₄ and N₂O and as well the existent forestry real estate per years. On the basis of the analysed data (Table 1) the following rates were obtained:

- *average absorption rate by the forestry real estate (for the analyzed interval 1990-2009): 243.5 Gg*
- *average rate of modification of forestry real estate: 4.15 Ha*

Table 1. *Analysed data of CH₄ and N₂O gas emission in agriculture and forestry real estate*

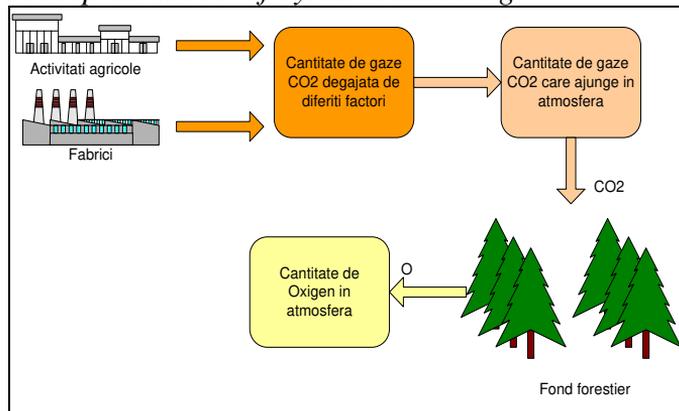
Year	Methane emissions CH ₄ in agriculture [Gg]	N ₂ O total emissions coming from agriculture [Gg]	Total forestry real estate_[thousands of hectares]	Sum of CH ₄ and N ₂ O emissions
1990	14280.54	22718.11	6252	36998.7
1991	12906.56	18231.44	6253	31138.0
1992	11205.08	16029.22	6253	27234.3
1993	9909.93	15811.72	6249	25721.7
1994	9791.70	15187.54	6246	24979.2
1995	9403.07	14571.35	6245	23974.4
1996	9393.94	13868.79	6240	23262.7
1997	9280.32	14082.08	6236	23362.4
1998	8643.04	12814.61	6227	21457.7
1999	8048.10	12036.69	6226	20084.8
2000	7523.95	10769.61	6223	18293.6
2001	7391.34	11566.92	6225	18958.3
2002	7585.21	11601.78	6239	19187.0
2003	7712.08	11838.70	6221	19550.8
2004	7814.03	13035.10	6222	20849.1
2005	7936.14	12999.07	6233	20935.2
2006	8147.18	12568.18	6272	20715.4
2007	7982.05	11718.62	6315	19700.7
2008	7700.20	12586.56	6309	20286.8
2009	8188.33	17017.37	6334	25205.7

Conceptual model design

The following types of factors were used to design the model (Figure 2.):

- *factors which represents sources of gas emissions.* Within this category the total emissions of methane (CH_4) from agriculture were included, emissions which are formed by the main sources, respectively: enteric fermentation, managing the farmyard manure, rice cultivation and burning agricultural wastes in the field.
- *factors which reduce the gas emissions mass.* Within this category the forestry real estate was included, real estate for which evergreens, beeches, oaks, resinous and deciduous plants were considered.

Figure 3. *Conceptual model of dynamic modeling*



Note: *Agricultural activities / Plants -> CO₂ gas quantity released by different factors -> CO₂ gas quantity which gets into atmosphere -> CO₂/Forestry Real Estate -> Oxygen quantity in the atmosphere*

Building the model by using Stella software for dynamic modeling

The models created by the aid of the dynamic modeling programme Stella offers opportunities to explore the environment and the processes that take place within it using the phrase (what if...?)” and then offer the possibility to simulate the designated phenomena **using real data**. Stella programme is used by professors and researchers from all over the world to study different fields, from economy and environment to physics and chemistry. The questions to which the Programme tries to find an answer sounds like: **which are the inflows, what impact do they have on the analysed system, and which are the outflows?**

The dynamic modeling Programme STELLA supports different learning styles with a wide range of characteristics. Diagrams, tables and animation facilitate in a visual manner a better and faster understanding of the existent relations between variables from the equations which describe the system. The Programme can be used:

- *to simulate a system working in the course of time;*
- *to cover the gap between theory and real life;*
- *allows the users to creatively optimize the systems;*
- *in order to highlight the relations which already exist or can be created between the system's components;*
- *to communicate clearly the system's inflows and outflows and to demonstrate in an friendly way how the results could be reached.*

Here are the offered modeling facilities:

- *Intuitive interface based on graphic ideograms which simplify the model building;*
- *Stocks and flux diagrams together with a common language for the Systems Thinking systems (systems created by ISEE Systems), offering at the same time a perspective on the way in which the systems work.*

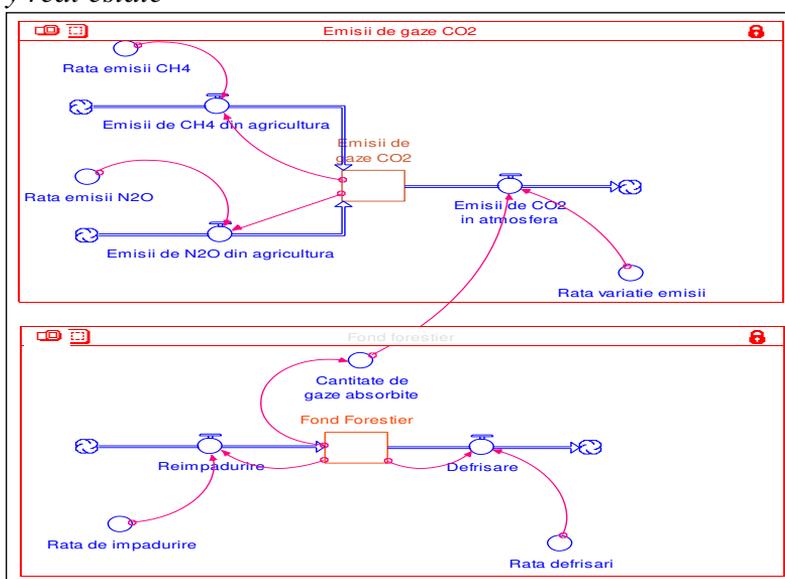
As for the simulation and analysis the Programme has got the following facilities:

- *allows the simulation of the way system works according to the ,time' variable;*
- *sensitivity analysis reveals the key points and the optimal conditions of the system's functioning;*
- *partial simulations of the model focus the analysis on specific sectors or on models belonging to the model;*
- *the results are presented as charts, tables, animations, QuickTime films and files;*
- *dynamic data import and export, links to Microsoft[®] Excel for a better data and results processing.*

The program offers as well some security facilities, as the created models can be secured by setting an access password which is going to be required when opening the file. The Programme is used by a series of research and education institutions in the world, amongst which we nominate: American University, Columbia University, Environmental

Protection Agency, London Business School, Los Alamos National Laboratory, NASA Philips Exeter Academy, Queen's University, Sustainability Institute, Tokyo University, University of Amsterdam, University of Chicago, University of Colorado, University of Illinois, American Department of Agriculture, etc. By using the dynamic modeling Programme Stella it was obtained a dynamic model which allows the corelation of the existent gas emissions in the atmosphere to the absortion capacity of the forestry real estate. Within Figure 3, using specific elements of Stella programme, there have been represented the essential components of capturing the mentioned process. The proposed model is presented in Figure 4.

Figure 4. *Dynamic model to corelate the emissions of CH₄ and N₂O and forestry real estate*



Note: *CO₂ gas missions, CH₄ emissions rate, CH₄ emissions from agriculture, CO₂ gas missions, N₂O emissions rate, N₂O emissions from agriculture, CO₂ emissions in the atmosphere, Variation emissions rate, Forestry real estate, Quantity of absorbed gas, Forestry real estate, Reforestation, Deforestation, Reforestation rate, Deforestation rate*

Model explanation

A reservoir called ,CO₂ gas emissions' was simulated within the area 1 - CO₂ gas missions and it has as inflows CH₄ and N₂O emissions from agriculture, and the outflow is represented by the flux of CO₂ emissions in the atmosphere

which represents the quantity of CO₂ emissions from which is subtracted the quantity absorbed by the forestry real estate. The absorbed quantity of emissions is in its turn dependent on the variation of the forestry real estate area, which in its turn depends on the reforestation rate (forest regeneration) and deforestation rate. The analysis within the model was calculated from 2009 to 2016. The following values were calculated on the basis of the data from the interval 1990-2009:

- average rate of CH₄ emissions modification,
- average rate of N₂O modification,
- average rate of deforestation (related to the variation of the forestry real estate area),
- rate of total emissions variation.

Scenario no. 1 (S1)

- **S1. a) Setting the parameters:**

After building the model, the following parameters were set:

- CH₄ emission rate = 5.9 (exemplification of the parameter setting is rendered in Figure 5)
- N₂O emission rate = 35.5
- total emission rate = 11.02
- reforestation rate = 0.3
- deforestation rate = 0.8
- CO₂ gas emissions = 25205.7 Gg, value afferent to 2009 (exemplification of the parameter setting is rendered in Figure 5.)
- forestry real estate = 6334 Ha

Figure 5. CH₄ Emission rate parameter setting

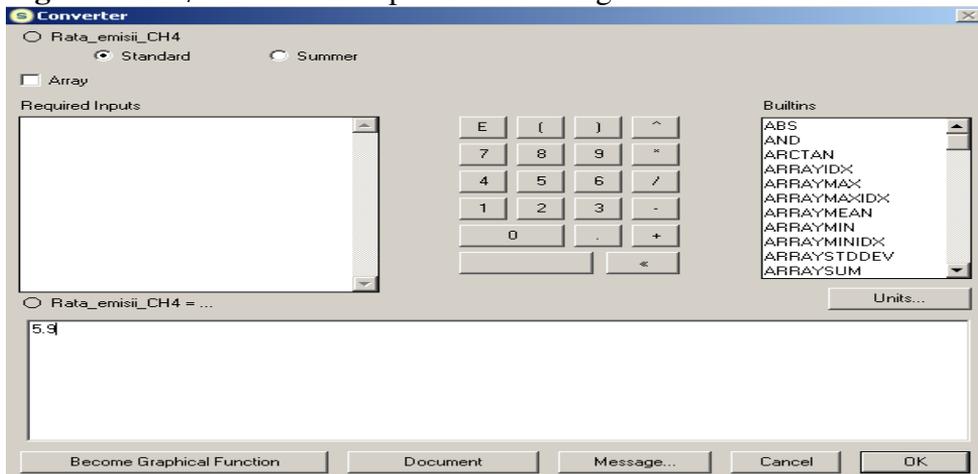


Figure 6. *CO₂ Gas emissions parameter setting*

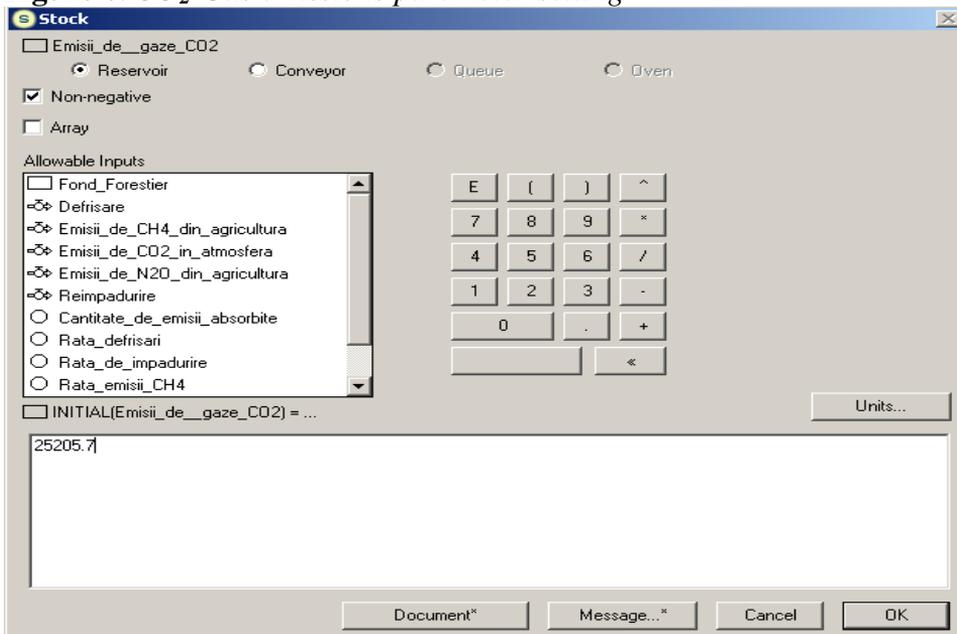


Figure 6

Forestry_Real_Estate

Deforestation

CH₄ emissions_from_agriculture

CO₂ emissions_in_atmosphere

N₂O Emissions from agriculture

Reforestation

Quantity_of_absorbed_emissions

Deforestation_rate

Reforestation_rate

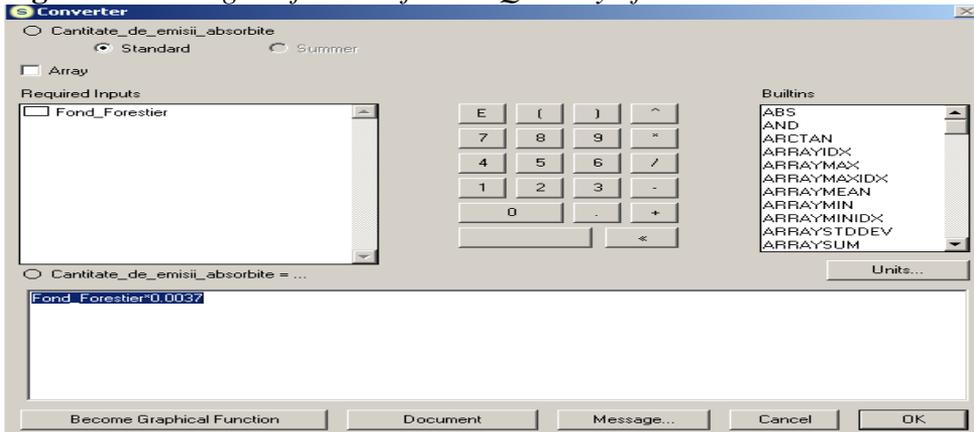
CH₄ emissions_rate

The following formula was used in order to identify the quantity of the emissions absorbed by the forestry real estate:

*Quantity of absorbed emissions = Forestry_Real_Estate*0.0037* (Figure 6.)

This formula indicates that for 2009, for a forestry real estate value of 6334 Ha, 234.35 Gg/10 of emissions were absorbed from the total of 25205.7 Gg.

Figure 7. *Editing the formula for the Quantity of absorbed emissions*



Quantity_of_absorbed_emissions

*Forestry_Real_Estate Forestry_Real_Estate*0.0037*

Similarly, the following calculus formulas can be completed:

- for *CH₄ Emissions from agriculture = CO₂_Gas _ Emissions *Emissions _rate _CH₄*0.4* (at the end it is multiplied with 0.4 as the CH₄ quantity for the used data represents approximately 40% from the total of CO₂ gas emissions);
- for *N₂O Emissions from agriculture = CO₂_gas_emissions * N₂O _emissions _rate*0.6* (at the end it is multiplied with 0.6 as the N₂O quantity for the used data represents approximately 60% from the total of CO₂ gas emissions);
- for *CO₂ emissions in atmosphere + 25205.7*Total_emissions_rate - Quantity_of_absorbed_emissions*
- and represents the fact that the quantity of the absorbed emissions by the forestry real estate is subtracted from the emissions value (related to the modification rate of the emission quantity and of the current value);
- for *Deforestation = 25+1/(Forestry_Real_Estate*Deforestation_rate)* and represents the fact that, a term based on the forestry real estate and deforestation rate is added to 25 Ha which represented the difference between 2008 and 2009;
- for *Reforestation = (Forestry_Real_Estate*Reforestation_rate)*.

- **S1. b)** *mathematical relations (differentiating equations afferent to the model)*

The mathematical relations described in Figure 7 are established among the elements used for the previous point.

For CO₂ Gas emissions area: a reservoir (named CO₂ gas emissions) was used, the value of the CO₂ gas emissions for 2009 was initiated, the fluxes for CH₄ emissions from agriculture, N₂O emissions from agriculture and CO₂ emissions in atmosphere were calculated.

For Forestry real estate area: a reservoir (named Forestry real estate) was used and its value for 2009 was initiated, the fluxes Deforestation and Reforestation were calculated., the rate for deforestation and the rate for reforestation were initiated.

Figure 8. *Mathematical Relations between the model components*

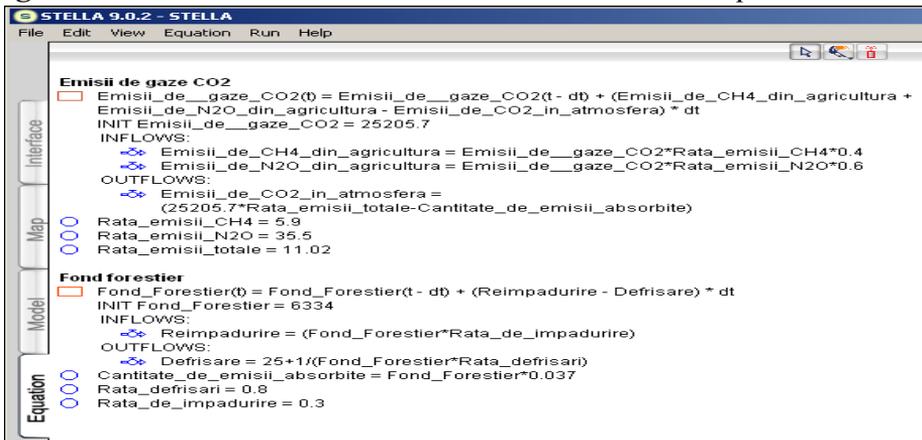


Figure 8

CO₂_gas_emissions

$$\text{CO}_2\text{_gas_emissions}(t) = \text{CO}_2\text{_gas_emissions}(t-dt) + (\text{CH}_4\text{_emissions_from_agriculture} + \text{N}_2\text{O_emissions_from_agriculture} - \text{CO}_2\text{_emissions_in_atmosfera}) * dt$$

$$\text{INIT CO}_2\text{_gas_emissions} = 25205.7$$

INFLOWS:

$$\text{CH}_4\text{_emissions_from_agriculture} = \text{CO}_2\text{_gas_emissions} * \text{CH}_4\text{_emissions_rate} * 0.4$$

$$\text{N}_2\text{O_emissions_from_agriculture} = \text{CO}_2_ \text{ gas_ emissions*} \\ \text{N}_2\text{O_emissions_rate*0.6}$$

OUTFLOWS

$$\text{CO}_2_ \text{ emissions_in_atmosphere} = 25205.7*\text{Total_emissions_rate} - \\ \text{Quantity_of_absorbed_emissions}$$

$$\text{CH}_4_ \text{ emissions_rate} = 5.9$$

$$\text{N}_2\text{O_emissions_rate} = 35.5$$

$$\text{Total_emissions_rate} = 11.02$$

Forestry Real Estate

$$\text{Forestry_Real_Estate (t)} = \text{Forestry_Real_Estate (t-td)} + (\text{Reforestation} - \\ \text{Deforestation})*\text{dt}$$

$$\text{INIT Forestry Real Estate} = 6334$$

$$\text{INFLOWS Reforestation} = \text{Forestry Real Estate*Reforestation_rate}$$

$$\text{OUTFLOWS Deforestation} = 25+1/(\text{Forestry Real Estate*Deforestation_} \\ \text{rate})$$

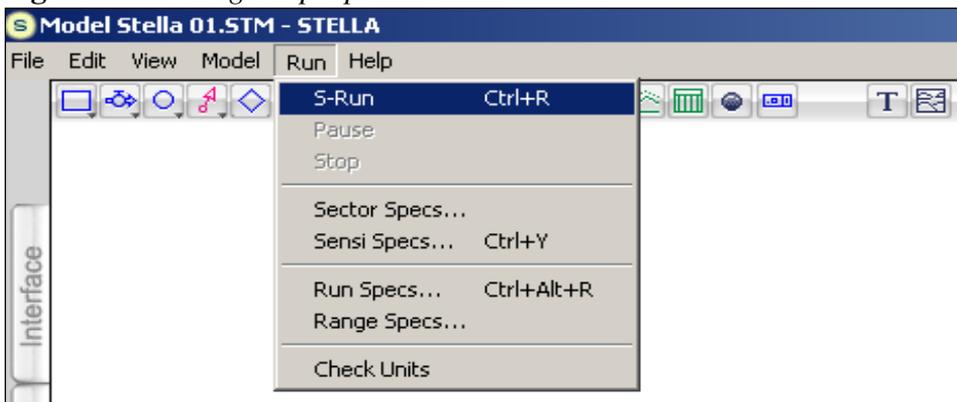
$$\text{Quantity_of_absorbed_emissions} = \text{Forestry Real Estate*0.037}$$

$$\text{Deforestation_rate} = 0.8, \text{Reforestation_rate} = 0.3$$

- **S1. c)** *obtained results and their commentaries*

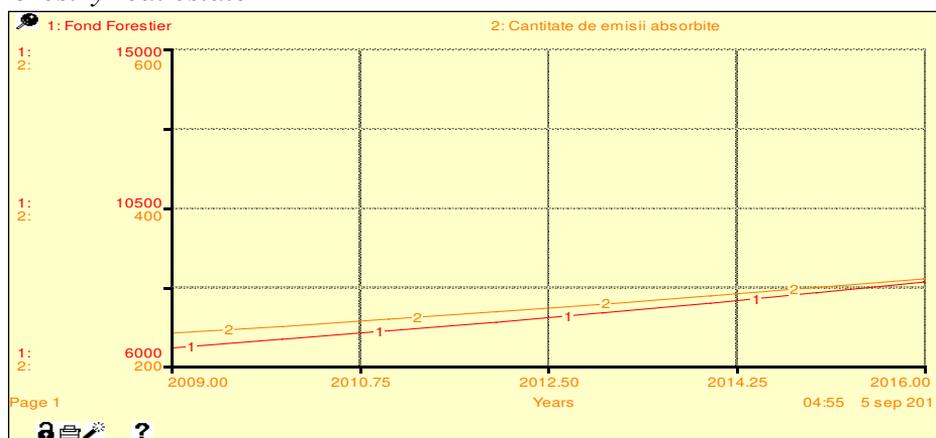
In order to run the programme (Figure 8), the period 2009-2015, the variations of the values for the period 1990-2009 and as well the existent connection between 2008 and 2009 were considered (the model is built on the basis of the requirements of the dynamic modeling programme and it has as a starting point the values afferent to 2009).

Figure 9. *Running the proposed model*



Comentary 1. For 2009, the value of the quantity of absorbed emissions is around 240 Gg/10 for the forestry real estate with an area of approximately 6400 Ha (Figure 9). For 2013, using the created model, it is estimated that, on the basis of the increase of the forestry real estate (with an area estimated with a value around 7200 Ha) the quantity of absorbed gas emissions will increase to approximately 270 Gg/10. For 2015 as well, the value of the forestry real estate is estimated to be about the value of 8000 ha, this representing an absorption of a quantity of emissions of approximately 300 Gg/10.

Figure 10. *Correlation between the Absorbed emissions quantity and Forestry real estate*

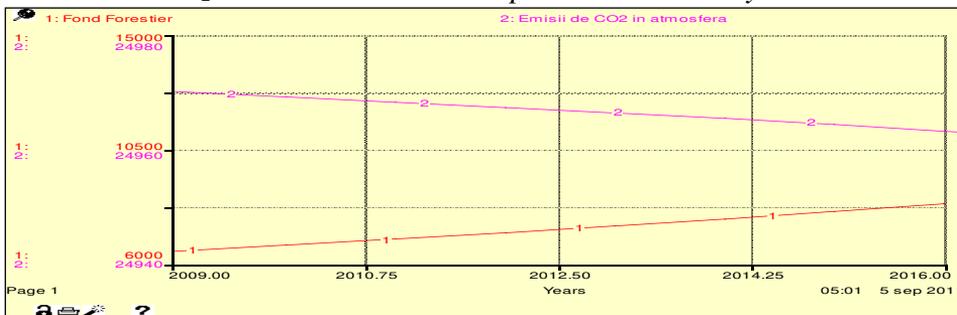


*Figure 10
Forestry real estate
Absorbed emissions quantity*

Comentary 2. The correlation obtained between the forestry real estate and the quantity of CO₂ emissions from the atmosphere is reproduced in Figure 10.

For 2009, as it can be seen as well in the table from the table 1., forestry real estate has a value of approximately 6400 Ha and the emissions from the atmosphere (after eliminating the quantity absorbed by forestry real estate) is of approximately $25205.35 - 234.35 = 24971.35$ Gg. Based on the created model, it can be noticed that for 2013 the value of forestry real estate is estimated to get to 7200 Ha, while the value of the emissions is slightly decreasing around the value of 24970 Gg, and for 2015 the value of forestry real estate will be approximately 8000 Ha and the value of the emissions is going to be over 24960 Gg.

Figure 11. *The Evolution of the interdependency between the Quantity of the existent CO₂ emissions in the atmosphere and Forestry real estate*

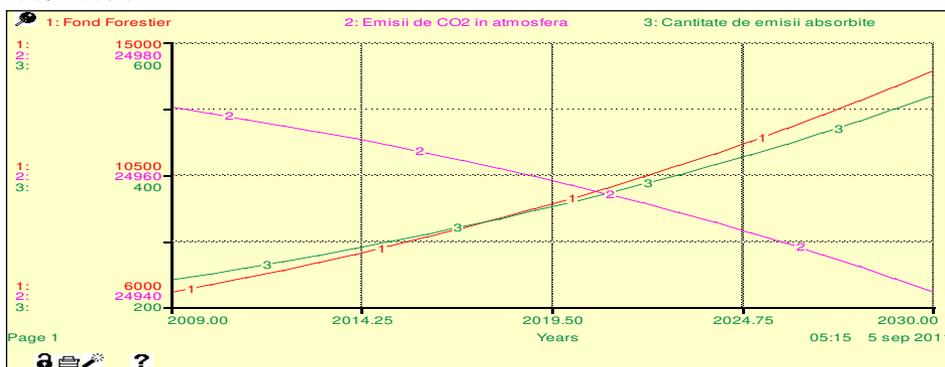


*Figure 11
Forestry real estate
CO₂ emissions in the atmosphere*

Scenario S2

In order to notice an evolution for all the components, a scenario for the interval 2009-2030 was run. the variation of each of the analysed parameter can be seen in Figure 11. For the parameter *CO₂ emissions in the atmosphere* a slight decrease can be observed, although the ascending of the the right afferent to forestry real estate is quite big. This decrease is made for the scenario in which forestry real estate keeps its current increasing rhythm.

Figure 12. *The evolution of the forestry real estate, CO₂ emissions from atmosphere and of the quantity of the emissions absorbed for the interval 2009-2030*



*Figure 12
Forestry real estate
CO₂ emissions from atmosphere
Absorbed emissions quantity for the interval 2009-2030*

Conclusions

Within the present work it was achieved a dynamic model which has had as aim to analyze the process of correlation between the variation of the quantity of absorbed CO₂ emissions and CO₂ gas emissions from atmosphere beside the forestry real estate. In order to achieve the purpose of the model, it was designed a conceptual model which captured the essential elements which were comprised within modeling; a model was created using the program dedicated to the dynamic modelling Stella; the used elements and as well the initiating model of the constants and the way of building the mathematical equation were explained; more programme runnings were done using two time intervals. As a result of the executed analysis, for the interval 2013-2015, the quantities of the absorbed gas emissions according to the variation of the forestry real estate were estimated as it follows:

- *For 2013 it is estimated, that, on the basis of the increase of the forestry real estate (with an area estimated to a value of about 7200 Ha), the quantity of the absorbed gas emissions will increase to approximately 270 Gg/10.*
- *For 2015, the value of the forestry real estate is estimated to have the value of about 8000 Ha, this one representing an absorption of a quantity of emissions of approximately 300 Gg/10.*

The European agriculture can contribute to the objectives of diminishing the global warming in three ways: offering solutions to limit and reduce its own GHG emissions, promoting carbon stocking in the soil and developing the sustainable renewable energy production. With this respect, it is necessary to develop a different type of agriculture which can reconcile better the economical, social and environmental imperatives with the natural potential of each ecosystem (eg. Agriculture practices which permit this).

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DEVELOPMENT OF THE ANIMAL HUSBANDRY AS CONCEPT OF PRESERVATION OF THE SJENICA MUNICIPALITY RURAL AREA

Cvijan Mekić¹, Zorica Novaković²

Abstract

In this paper the potential of Sjenica municipality and ecological conditions for development of different areas of animal husbandry production from conventional to organic. Sjenica municipality covers the area of 1059 km². From the total municipality area agricultural land is 80.297 ha, arable land covers 7.917 ha, orchards 30 ha, meadows 25.703 ha and pastures 45.581 ha. Even though there are good conditions for development of animal husbandry production, at the moment the number of cattle and sheep present at the area is significantly below the real possibilities of the area. Natural potential and climate are very favourable for animal husbandry production. The programme for improvement of the cattle and sheep production was suggested. Rural areas with terrain such is at Sjenica municipality represent significant (still unused) resources for not just food production but development of sustainable agricultural production especially organic production with the goal of facilitating the sustainable social economical rural development, protection of natural resources from pollution, increasing of the land fertility and maintenance of the biodiversity.

Key words: *Sjenica municipality, agricultural resources, animal husbandry development, sustainable agriculture, organic production.*

Introduction

Agriculture development is influenced by large number of factors; they are usually systematized in three basic groups: natural, demographic and economical. It is very hard to determine the influence of specific group of quoted factors as their roles and significance changes in certain periods of social economic development of the country. (Tomić i Ševarlić, 2010).

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Basic characteristic of agriculture in Serbia is decades of economic devastation and constant decrease of farmers income. It manifests in different intensity through extraction of surpluses from agriculture in favour of three main sectors: industry, trade and banking.

Therefore because of above described condition animal husbandry in Serbia is in very bad shape. Livestock fund in Serbia is especially weakened, since the beginning of the nineties of the last century it was gradually decreased from two to three percent and now it has reached historical minimum.

According to Statistical Office of Republic of Serbia data on 1st December 2012 compared to 2011, total number of cattle is less by 1.7%, cows and heifers by 0.8%, swines by 4.5%, sows and gilts by 5.7%, horses by 1.7% while the number of sheep has increased by 12% and number of sheep ready for reproduction has increased by 11.2%.

Meat production has fallen from 600.000 tons (in 90s) to 479.000 tons in 2011. In year 2011 81.000 tons of beef has been produced, 271.000 of pork, 24.000 tons of sheep and 103.000 tons of chicken has been produced. Compared to 2009 year production of beef has decreased by 19.000 tons. Serbia has preference quote for export of beef on EU market which is 8.700 tons and in the last year not even 10% of allowed quote has been exported.

Reasons for this condition are many: reduced domestic market and low buying power are one of the reasons, while other side is the fact that we have lost place in the world market, that country is in transition, that there is privatisation of the agricultural sector, that there is no long term strategy of development of the animal husbandry.

Moreover, there is widely present unorganised primary production and low cooperation between farmers and processing industries, technological and technical inability to meet the world requirements for processing industry, inadequate and slow rejuvenation of livestock. In the terms of export of agricultural products animal husbandry role is completely marginalized and it is absolutely certain that Serbia has to increase export if there is desire to increase the production.

Existing livestock fund even in its non-satisfying state considering the available farm land represents significant resource for development. However in order to develop from present state it is needed to systematically and intensively improve the genetic traits of the farm animals, technology and production organisation.

According to natural and demographic resources Serbian agriculture has potential for export, that should be strategic point in creating the path for agricultural development of our country (Ševarlić i sar., 2008).

Aim of this paper is to point out the condition, problems and development perspective as well as improvements of animal husbandry production at the Sjenica municipality territory.

Natural wealth such as healthy environment (unpolluted ground), rich water resources, forests, traditional agriculture, potential for organic production, branding, possibility of patenting of geographically protected products and possibility of development of rural tourism are the chance for survival of the analysed municipality.

General information about Sjenica municipality

Geographical location: Sjenica municipality is located on Pester plate in south western Serbia. It covers 1059 km² and it is largest municipality in mountain Zlatibor area. According to last 2011 census at the Sjenica municipality territory 25.248 people live in 101 settlements. Settlements have 6.818 households. Average elevation is 1150-1200m. Especially beautiful is pester highland plate with vast pastures. High altitude, harsh climate are not good for development of agronomy, however they are excellent for development of animal husbandry especially cattle, sheep and goat breeding.

Climate of Sjenica area: Physical and geographic position, altitude, differentiated relief, and other orographic conditions affect the specificity of the Sjenica climate (Šabić i Pavlović, 2004). Authors cite that because of the altitude and temperature inversion, average monthly temperatures are not high during summers and are 14,2-16,4°C , as well that the warmest month is July with average monthly air temperature of 16,4°C. Relative humidity is medium and constant during the entire year, it is highest in January 87%, December 86% and in February 84%. Yearly flow of cloudiness in Sjenica area matches the yearly flow of humidity and it's reversely related to air temperature. Average yearly cloudiness is 6. It's highest in January 7.2, lowest in July 4.4 and in August 4.6. Western and northwest winds blow throughout the year and they bring rain while at winters they bring slurry and snow.

Influence of climate on agriculture of Sjenica area: Based on analysed basic climatic elements in Sjenica area, conclusion can be bade that at that area climate has crucial influence on activity and scope of production of the people

living there. Limiting factor for development of crop farming in Sjenica area is climate. Extremely low winter temperatures, early autumn frost appearance and late spring frost lowers the total thermal sum needed for growing certain crops. Vegetation period in Sjenica area is only 151 days. Its beginning is at the end of April and ends in the last week of September (*Pavlović M., 2004*).

Therefore, the climate determines that animal husbandry is the most perspective agricultural production that can be developed in Sjenica area. Pluviometric regime, air temperature, geologic base and other natural factors have conditioned the Sjenica area in such way that pastures and meadows are the dominant in its structure. In those climatic conditions and on that base, population of Sjenica area lives of animal husbandry.

Natural resources of Sjenica municipality

From main area of Sjenica municipality which is 1059 km² agricultural area covers 80.297 ha out of which arable land is 7.917 ha, orchards 30 ha, meadows 25.703 ha and pastures 45.581 ha. Agriculture production is mainly conditioned by climate, relief, quality and structure of the land. Dominant land type is of lower quality (IV up to VIII class).

In its structure natural pastures are dominant, meadows (32,0% of agricultural land) and pastures (56,76%). Arable land covers 7,917 ha (9,86%). Crops that are usually grown on arable land are barley, wheat, oats, rye and fodder crops.

Main limiting factor for corn production is climate, which forces farmers to grow corn on small surfaces. In crop production of this area there are no surpluses as all crops are used for feeding the animals kept at farms. Fruit and vegetable production is organised in small areas where there are favourable climatic conditions, usually at lower terrains, valleys, around rivers, where there is land of higher quality. Small number of farmers produces surpluses and they are being sold at local markets.

Condition of animal husbandry production

In the region where municipality of Novi Pazar, Sjenica, and Tutin belong animal husbandry term mainly points out at cattle and sheep production. In that region 10.821 farms are registered, this is 2.4% of all registered farms in Serbia. These farms are dominant part of Sjenica municipality 68.50% of total households, table 1.

Table 1. *Number of registered farms*

Municipality	Individual famrs	Companies	Entrepreneurs	Cooperatives	Total	% total number of households in the municipality
Sjenica	4.662	7	1	1	4.671	68,50
Novi Pazar	3.518	8	1	2	3.529	14,96
Tutin	2.641	17	0	0	2.658	38,09
Total	10.821	32	2	3	10.858	-

Source: *Ministry of finances, Treasury department, 2011.*

There is a significant number of farmers in that region which are not registered. At the Sjenica municipality in the year 1991 28.547 cattle were bread, 42.104 sheep and 54.576 poultry were bread.

Since 1991 which was taken as zero year till today there is decrease in numbers of all farm animals, therefore in 2002 number of cattle was 27.682, decrease of 3.03% was marked, moreover the number of sheep has been significantly decreased in that period, 21.963 sheep were counted in 2002 which is decrease by 47.84%. In table 2 data about farm animal count for registered farms is shown.

Table 2. *Farm animal count for registered farmers in the region*

Municipality	Species of domestic and cultivated animals							
	Cattle	Sheep and goats	Swines	Horses, mules, donkeys	Poultry	Bee hives	Fish in fish ponds	Other animals
Sjenica	21.084	6.854	120	52	613	758	20.000	83
Novi Pazar	7.770	11.617	469	64	6.626	5.374	20.070	-
Tutin	9.934	14.188	128	160	6.617	4.655	60	5
Total	38.788	32.659	717	276	13.856	10.787	40.130	88

Source: *Ministry of finances, Treasury department, 2011.*

It is necessary to stress out that in observed municipalities significantly higher number of farm animals are bread, which is not registered. In Sjenica municipality only 6.854 sheep is registered. According to Rural development centre an estimated number of specific significant breeds of farm animals are shown in table 3.

Table 3. *Estimated number of cattle, sheep and buffalos*

Municipality	Cattle	Sheep (winter)	Buffalos
Sjenica	22.500	20.000	-
Novi Pazar	6.500	11.000	500
Tutin	6.800	10.000	400
Total	35.800	41.000	900

Source: *Veterinary stations: Tutin, Novi Pazar, Rural development center, Sjenica, 2012.*

Based on data from table 3 regarding the number of cattle Sjenica municipality is at fourth place in Serbia, just behind large centres which are Belgrade, Sabac and Kragujevac. The farm animal count, especially when it comes to sheep count, in Sjenica and Tutin increases in period of pastures and it decreases before winter time, when animals are being taken in to sheds. Main reason for existing of seasonal fluctuation in numbers is lack of animal feed during winters and small capacities for keeping the animals. It can be said that trend of decreasing of livestock fund in Sjenica municipality is same as trend of decrease of entire Serbian livestock fund. It is the result of position loss at big markets during the nineties, and unregulated market trends (price disparities, no secure markets, late payoffs etc.).

Farm and breed structure

Cattle breeding – Largest number of farmers bread 1-3 cows. Larger farms have approximately 10 milking cows, and these farms are mainly located at Pester region, while in Sjenica there is small number of frms that have approximately 20 milking cows.

Dominant breed which makes 90% of total cattle fund is Domestic Spotted in the type of Simmental. Productivity of Domestic Spotted in Simmental type is significantly decreased, especially where there breeding without any control is present. However, at larger cattle farms which enlisted and started the process of milk production specialisation, the genetic material of Red Holstein cattle is being brought in in amount of 25-50%.

Sheep breeding – is mainly present at villages of upper Pester. In this villages there is a large number of farms that have over 100 sheep. In sheep production dominant breed is Sjenica Pramenka and Württemberg mix. The mixed breed is different in size and production than its autochthonous relative Sjenica Pramenka, however it is not recognised as new breed and is being noted as improved Sjenica Pramenka.

Livestock facilities – For maximal production next to proper diet, domestic animals require optimal microclimate conditions in stables. Rarely any facility for cow keeping fulfils needed conditions. Stables are usually next to the house, old make, low ceiling with small or no windows, and without vertical ventilation canals. In such facilities it is not possible to use any type of mechanisation. Certain number of new facilities has same faults that are present in the old stables, built long ago. Newly built objects are being created following the old knowledge and traditions and not based on technological normative.

When it comes to sheep keeping objects mostly they are improvised with only aim to protect animals during winter time from snow and frost. Feeding system depends on the size and degree of farm specialisation. It varies from very extensive which is based on pastures (summer) and hay (winters) without any concentrated feeds being added to the diet, to feeding systems that have significant amount of grain and high quality concentrated feeds.

In practice it means that cattle diet is not based on technological normative for category, but is based on personal experience and traditional knowledge. Lack of food during winter time is one of the limiting factors for increasing of the production. Diet is usually not balanced when it comes to energy and proteins, they have low amount of specific protein fractions, micro and macro elements and vitamins. All this has very negative influence on productivity, milk yield, health, reproductive performances and length of exploitation of the animals that are in production. All this has negative influence on production economy and gain.

Traffic

Sjenica municipality is between two big railway nodes (Belgrade-Bar and Belgrade-Kraljevo-Skoplje) as well as between two major roads (Ibarska magistrala and Beograd-Montenegro). Condition of the road network in Sjenica municipality is described in table 4.

Table 4. Road network at Sjenica Municipality

Total km	Modern roads km	Highways, km		Regional roads, km		Local roads, km	
		Total	Asphalt roads	Total	Asphalt roads	Total	Asphalt roads
545	124	88	47	161	58	296	20

Source: Yearbook, Serbian municipalities, 2012.

Most significant traffic route that goes through municipality is Raška-Novi Pazar-Sjenica-Prijepolje road. Highways make small part of total roads length.

Regional traffic network makes approximately 40% of total roads length, whereas only 36% of regional roads have asphalt layer.

Local road network makes approximately 58% of total roads length of all Sjenica – Pester highland; they are mainly in very bad condition and are not covered with asphalt.

Total roads length and quality of the traffic network at Sjenica municipality territory is not at satisfying level. Over the Sjenica municipality territory part of railroad track Belgrade – Bar goes through, but municipality does not have good roads connectivity with the railroad, moreover there is no railroad station at the municipality.

Therefore, by building and modernising the traffic network, village would gain higher possibilities for revitalisation and urbanisation, which would lead to decrease in outflow of young people from the village, who would be doing animal husbandry at their farms as natural conditions are favourable only for that type of production.

Animal husbandry development concept

The specific natural resources of Sjenica municipality, such as natural meadows 32,0% of agricultural lands, and pastures which make 56,76%, clean water, forests, favourable geo morphological characteristics of the terrain and preserved nature enable the production animal products that are of very high quality.

Cattle breeding improvement – The main problem regarding the cattle breeding is the strategy for the improvement of the genetic potential. A study is needed in order to apply modern methods and to create the cattle population which will be appropriate for intensive breeding and higher production. This should be the priority as very unfavourable state of cattle breeding in Serbia manifests through decrease of the cattle number and low milk and meat production per cattle. Now there is a question: Can we in Serbia stop the unfavourable trends in cattle breeding and start the recovery and development of this strategically most significant branch of animal husbandry, using natural and other existing resources?

In order to develop and improve animal husbandry it is needed to create programmes which will round the improvement of arable lands its better usage, and increase in quality of animal food. By giving the adequate breeding conditions, pre-conditions for improvement of the breeds, application of modern bio tech methods in reproduction would have been fulfilled.

For all that to work properly, it is important to properly organise the professional services, to allow good loan rates, to educate the farmers, as well as for government to give bonuses and subsidies to the farmers, the protection, to develop and apply scientific achievements. Moreover it is very needed to improve the industry, to increase its efficiency and to develop home and international markets. Cattle breeding programmes are usually very complex and there are no short term programmes.

Genetic improvement of the cattle breeding: Dominant breed in cattle breeding is Domestic Spotted in the type of Simmental which makes around 90% of total cattle number in the municipality and region. Therefore cattle should be bred for combined production milk-meat, meat-milk. In extensive and semi intensive conditions production direction would be meat-milk, and in intensive conditions production direction should be milk-meat.

Domestic Spotted would have been improved by selection and crossing. Farmers who are breeding Domestic Spotted with production direction meat-milk would be also producers of good quality calves. Farmers with better breeding conditions would be instructed towards intensive milk-meat production, and they would be the main suppliers for milking stations. They would be rearing higher numbers of cattle where selection would be made with goal to achieve higher milk yield.

Base for improvement should be controlled reproduction. Therefore it is needed, that in the field of artificial insemination of the cows, all needed measures to be taken in order to improve the work of this service. Without resolving the issues which are present in the artificial insemination service the improvement of the production cannot happen, therefore realisation of improved production goals should be implemented in the services.

Besides the effort to solve the problem of cow and heifers insemination it is very much needed to import the high quality pregnant heifers in order to make quicker change of breed composition and rise of the production level. There is an interest for good quality genetic material of higher productivity, but due to lack of financial help farmers buying power is very limited.

Special factor for intensive cattle production is that specific environmental conditions are to be met, that proper healthcare is taken, that food (production of silage) production is well developed and that there is enough food for entire year.

Production in cattle breeding requires support from the state in longer time frame in order for above mentioned measures to be felt in the production.

Improvement of Sheep production: Main goal in intensive sheep production today in the world is production of large amounts of good quality lamb per sheep in one year and in prolonging the usage period, production of higher amounts of milk and at the last place improvement of wool yield and its quality.

In future it is necessary to take specific measures in order to improve sheep production:

- Increasing the number of sheep,
- Genetic improvement of productive traits,
- Increasing of fertility,
- Lambing interval reduction,
- Securing the good quality animal feed availability.

Intensive sheep production should be based on genetic potential of the animals and their life cycle, primarily increasing the biologic base for animal reproduction.

With consideration that sheep production is mainly based on individual farms, the farms should be formed with 100-300 reproductive sheep, (making the specialised farms for meat, milk and wool). Professional services were to give special attention to these farms.

Reproduction programme and genetic improvement of Sheep: According to breeding and selection program (Breeding goal and strategy of genetic improvement) improvement and change in genetic composition of sheep in Republic of Serbia should be realized primarily by: 1) breeding of domestic strains of Pramenka sheep in pure breed, in order to preserve its genetic potential; 2) by changing the heritable base of certain numbers of Pramenka sheep thus creating the new populations and types; 3) Building on wanted traits and selecting on them in existing groups of mixes within the defined frame of breeding programme.

Therefore genetic improvement concept at Sjenica municipality territory (in short) would be following: It is needed to create new (more productive) population of sheep lighter dual production type, meat-wool, and keeping the milk production at the level of superior maternal groups.

Therefore, in genetic concept the combinative crossing should be performed. For maternal base selected Sjenica pramenka breed would be used and as paternal base rams of lighter merino type would be used such as Württemberg breed.

Main goal of this research is to create programmed population with specific genetic combination, specific production and traits: body weight of grown sheep should be 50-55 kg; rams 70-90 kg; unwashed wool yield per sheep should be 3,0-3,5 kg; per ram 4,0-5,0 kg; thread diameter 25-29 micrometers; wool lock length 10-12 cm; fertility 120%; milk yield in lactation period 80-90 kg; sturdy constitution and good health. Breeding conditions in any case should be improved compared to traditional conditions that are at the moment present on farms (inadequate housing, bad and inadequate diet).

Genetic improvement programme can be realised and it is proven by the production results of Pirot improved sheep which was created and accepted as new cross breed, therefore same programme is suggested for Sjenica pramenka.

Production results of Pirot improved sheep are: body weight of the sheep 60-65 kg; rams 100-120 kg; wool yield 4,0 kg (sheep) 8,0 kg (rams); wool fell depth 7 cm, wool thread diameter 23-26 micrometres; milk production 60-90 kg; fertility 115-140%, body weight of lambs at birth 4-5 kg, which is significantly better than with autochthonous Pirot pramenka breed.

Basic conditions for realisation of proposed development plan

Animal husbandry development should be given high attention by the state and it should be directed in such way to maximally utilise the natural resources of specific parts of Republic of Serbia, such is Sjenica municipality. Household income should be increased, villages should be revived and there is a complex of measures that can significantly bring to that goal. Most significant measures could be: *firstly* – Constant and organised reminders at economic significance of this type of production; *secondly*: Higher investments (buying of reproductive animals, building proper housings, melioration of the meadows and pastures); *thirdly*: Economic politic measures

– monetary subsidies because of the slow turn of capital in agriculture; *fourthly*: Price politics and reproductive material placement; *fifth*: Joining of individual farmers in to groups; *sixth*: Organisation of professional services; *seventh*: Production system and traffic.

In order to overcome unfavourable state of animal husbandry, agricultural politics measures will have main influence on future development, especially price and marketing politics regarding the reproductive material of fattening animals, meat, milk, wool and their products.

Sustainable agriculture and rural development concept

Success in agricultural projects or in rural communities cannot be measured just by economic indicators. Successful projects are those which are sustainable even after stopping all outside interventions. Modern agriculture is characterised by numerous unknowns when it comes to directions of future development. Many authors have seen and predicted numerous changes which happened till date (*De Wit et al., 1987; Lazić Branka, 1997; Bertlin, 1992; Birkas Marta et al ., 1995; Kovačević i sar., 1996; Kovačević i sar., 1997; Kovačević i Momirović, 2003*).

Defined concept under the name sustainable agriculture has been differently interpreted. Sustainable agriculture is higher level of principles which are to be maintained and supported in long terms.

Sustainability of agricultural systems should be based on using of renewable resources or on renewing the used resources. Modern humans endanger the biosphere and environment at planet Earth in high measure which threatens to endanger its own existence. Water pollution, air pollution therefore food pollution already has dramatic consequences.

Sustainable development is concept based on intergenerational justice, meaning that present generation must not compromise the possibilities of future generations to satisfy material needs and enjoy healthy and nice environment. Sustainable development represents care for future generations which is followed by question: what will be the trace we will leave behind us and for which future generations will remember us for?

From the sustainable development definition, sustainable agriculture as source for food production where ecologic, economic and social aspects are synchronised is derived. Rural areas in Serbia are our advantage in application

of the sustainable development concept regarding the food production. Approximately 85% of Serbian territory is rural area.

In past developments these areas were neglected and devastated primarily in economic and demographic terms, however ecologically they were preserved. It is up to us to turn the present backward condition of rural areas in to our advantage. Therefore the turn towards villages is needed, especially towards its development followed by financial support. That is also European trend.

Improvement of sustainable agricultural production is also connected to improvement of education, usage of economic resources, development of proper technologies, employment and management of natural resources and protection of environment. In practice that means:

- Sustainable usage of land, water and natural resources;
- Increase in capacity and inclusion of national research and professional services in the development process;
- Organising of farmers.

When it comes to promotion of sustainable agriculture and rural development accent is mainly on environment. Sustainable development represents managing of natural resources and their preservation, orientation towards technologic and institutional changes in order to preserve traditions and to continue with satisfying the present and future needs of human kind. That kind of sustainable development in agriculture, forestry and fishery departments which preserves water, plants and genetic resources is ecological, technologically advanced and socially acceptable.

Sustainable agriculture is the mean which will provide future generations to enjoy the advantages of specific natural heritage and natural resources, as we are doing today.

To achieve sustainability means to face three challenges: 1) Economic (through strengthening of production and competition in agriculture sector); 2) Social (through promoting the environmental and economic possibilities for life in rural areas); 3) Ecologic (through promoting applied ecology, forming special services for natural habitats, biodiversity and landscapes).

Sustainable agriculture should take care about consumers especially in terms of quality, security and traditional – organic production methods. That

practically means that farmers will run the environment and they will be encouraged to actively participate in preservation of rural wealth.

Ecologic agriculture does not mean application of ancient methods. For example organic agriculture as form of sustainable agriculture uses modern yet natural biological protective methods thus usage of pesticides is avoided.

Aspect of sustainable agriculture:

- Managing of land resources;
- Managing of water resources;
- Biodiversity protection;
- Sustainable animal husbandry;
- Sustainable plant production;
- Diseases and pest management;
- Multipurpose in usage of the land;
- Social – economic facts in agricultural production.

Based on obtained data about Sjenica municipality, it can be said that at that area there are ideal conditions and possibilities for organic animal husbandry, therefore for production of organic products: meat, milk and milk products which are wanted in European Union and our country. Animals at this area can be kept in traditional way in free keeping system. By breeding autochthonous breeds of rough constitution biodiversity is being preserved.

Advantages and disadvantages for faster economic development

Sjenica municipality is in the category of underdeveloped municipalities. Agriculture and natural beauties are not utilized even though agriculture is the main scope of work for the Sjenica population.

For faster economic development of the municipality of Sjenica advantages are: 1) In the terms of area, Sjenica municipality is one of the largest municipalities in Serbia; 2) Good geographic position; 3) Ecologically clean area; 4) Natural beauties; 5) Traditional animal husbandry production; 6) Big pastures; 7) Large amount of miniature industries; 8) Enough of population which is able to work etc.

In the future priority in municipality development is improvement of road infrastructure, which is the base for agricultural development of one area. If agricultural development speeds up and manages to highly develop the finalisation of the products, along with tourist attractions it would provide

economic prosperity for the municipality. Sjenica-Pester highland with developed agriculture would have been region with strong and live villages and highly productive production of branded and traditional products.

Conclusion

In the concept of development of sustainable cattle and sheep breeding at Sjenica municipality condition, problems and possibilities of development were analysed. Based on analysed following conclusions can be made:

- 1. Surface area of Sjenica municipality is 1059 km², agricultural lands cover 80.297 ha, arable land covers 7.917 ha, orchards 30 ha, meadows 25.703 ha and pastures 45.581 ha. Therefore there are ideal conditions for development of animal husbandry (cattle and sheep breeding).*
- 2. Cattle and sheep population state at municipality is significantly below expected, considering available resources.*
- 3. Modern cattle breeding concept should be based on breeding the Domestic Spotted cattle in the Simmental type, with milk-meat, meat – milk direction of production, depending on the area where cattle is bread.*
- 4. Modern sheep production concept should be based on principle of creation of new population (more productive one) of lighter type and with dual direction, meat-wool with keeping the milk yield at the level of superior maternal base group.*
- 5. Territory of Sjenica municipality is area of unpolluted nature, therefore it is ideal for organic food production through development of cattle and sheep breeding.*
- 6. Within the animal husbandry sector it is possible to produce quality milk, sheep milk and meat and their products. Products such are sjenica cheese, sudzuk, sjenica lamb have been geographically protected and have become brands. Also there is still lot of work to be done especially in protecting the beef ham, sheep stjelja and capsicum in milk cream.*

At the end it should be mentioned that at Sjenica municipality there are all necessary conditions for development of animal husbandry and production industry, therefore for production of highly valuable organic products that are branded and with geographic origin.

Through improvement of animal husbandry which is at the moment at very unfavourable level, it is possible to utilise the existing for now not utilised natural resources to increase the production especially to increase the sustainable production – organic animal husbandry.

In order to put to work specific programme deciding point will be economic and agricultural politics measures, especially price management politics, also in finding the proper market for produced organic products.

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SOME ASPECTS RELATED TO THE POTENTIAL OF RENEWABLE ENERGY SOURCES IN ROMANIA

Dorel Dusmanescu¹, Jean Andrei²

Abstract

Energetic resources represent a key factor in the consolidation of every high competitive and well functioning market economy, through the very important role that they have in assuring the competitiveness of the economic system components. Romania has a good technical potential concerning the renewable sources of energy, but that potential are inefficiently evaluate in the present. The paper main aim is to present some results about the renewable energy potential of Romania.

Key words: *sustainable development, green energy, wind energy, photovoltaic energy, thermal solar energy, biomass, biodiesel, bioethanol*

Introduction

Human society evolution was and still is closely related to the degree of exploitation, development and diversification of energy resources. Exploitation of energy resources has ensured not only the ambient conditions that are necessary for survival of the humanity, but has also created the necessary premises for human society development as itself, by stimulating and implementing technologies based on energy use.

The key role owned by energetic resources in the functioning of modern economies imposes a good knowledge of the issue that is imposed not only by the availability and diversification of the resources, the security of the supply but especially by their efficient usage. Numerous studies as (*Logan et al.*,

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1994; Băhnăreanu, 2006; Dobrescu, 2009 Filip and Iulian, 2012 or Paul, 2012) have been dedicated to these aspects.

The evolution of the resources of energy is closely related by the history of human society, and especially by the ability of the human being to understand and exploit it. As it is referred in literature (Eric, 2007; Hoogwijk, 2004; Băhnăreanu, 2010 or Zamfir, 2011), the economical and social development of any society involves high energy consumption.

Energy also should be analyzed in a straight connection to sustainable development of the human society. The energy production must follow the environmental restrictions, in order to respond to a well functional green market economy, taking into account that the right for a cleaner environment is guaranteed. As (Nedelcu and Sandulescu, 2010) argues, ‘the environmental protection is incorporated in many European constitutions that explicitly recognize the right to a healthy environment. The insertion of such an environmental right into national constitutions (of states like Romania, France and Greece) elevates not only the importance of the environment but also identifies legal effects’.

If the first energy resources, used by humanity since ancient times, were the force of water and wind, diversification of the structure of the resources of energy was also imposed through social evolution. So, the development of the industry and the passage from manufacturing to industrial production took place based on the switching to the intense exploiting of coal, as a primary energy resource, used in the production of steam which was needed for industrial machines to start. This was the first step in modifying the human society and in the development of technology.

The discovery of the procedures of exploiting the oil and gas deposits has enabled the transition to a new stage concerning the creation and the usage of the energy in the human activities. Compared to coal, oil has offered a source of energy easier to exploit, with lower production costs, easier to transport and with less problems of polluting the environment. Simultaneously, coal, oil and natural gas also became raw materials in the obtaining of other materials (plastics, synthetic fibers, fertilizers, medicine, etc.). This has led to the increasing demand of oil used in industrial applications or transportations.

The XXth century was dominated by the search and insurance of the possibilities of exploiting the oil and natural gas resources. These resources have led to various economic effects, from economic crises (like the ones from

1973, 1979 and 2011) to the waging of armed conflicts between states (Băhnăreanu, 2010). Along with the classic energy resources, in the second half of the XXth century, nuclear energy also developed, which, even though it is cleaner than the energy obtained from coal or oil products, is less used because of the dangerous radioactive residues. In the table 1 is presented the evolution of renewable energy share in gross final energy consumption in some EU-28 countries.

Table 1. *Share of renewable energy in gross final energy consumption, in some EU-28 countries, 2004-2011*

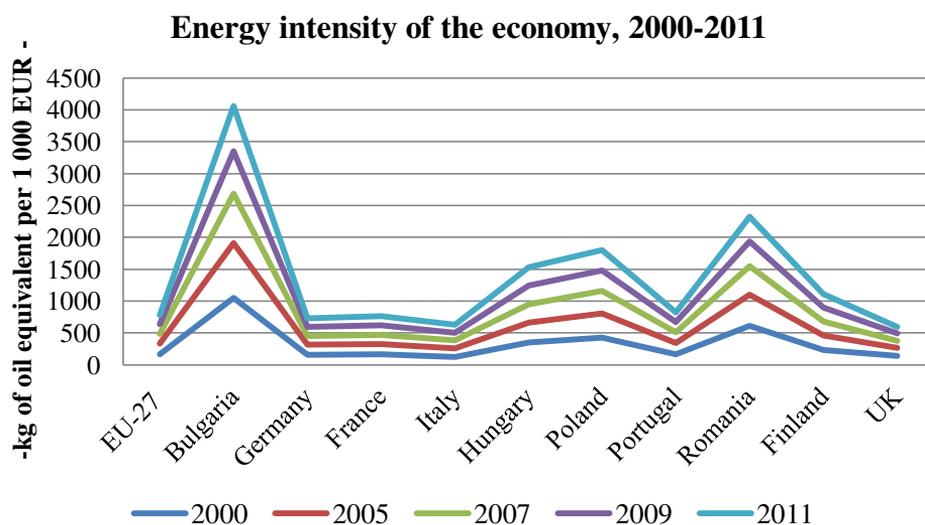
Country	2004	2006	2008	2009	2010	2011
EU-28	8.1	9	10,4	11,6	12,5	13
Belgium	1.9	2,6	3,2	4,4	4,9	4,1
Denmark	14.9	16,4	18,6	20	22	23,1
Germany	5.2	7	8,4	9,2	10,7	12,3
Estonia	18.4	16,1	18,9	23	24,6	25,9
Spain	8.3	9,1	10,8	13	13,8	15,1
France	9,3	9,6	11,3	12,3	12,8	11,5
Croatia	15,2	13,8	12,2	13,3	14,6	15,7
Italy	5,1	5,5	6,9	8,6	9,8	11,5
Latvia	32,8	31,1	29,8	34,3	32,5	33,1
Luxembourg	0,9	1,5	1,8	1,9	2,9	2,9
Hungary	4,4	5	6,5	8	8,6	9,1
Austria	22,8	25,3	28,3	30,2	30,6	30,9
Portugal	19,3	20,9	23	24,6	24,4	24,9
Romania	17	17,1	20,3	22,3	23,4	21,4
Slovenia	16,1	15,6	15	19	19,6	18,8
Slovakia	6,7	6,9	8,1	9,7	9,4	9,7
Finland	29	29,8	30,7	30,4	31,4	31,8
Sweden	38,7	42,4	45	47,7	47,9	46,8
UK	1,2	1,6	2,4	3	3,3	3,8
Norway	58,6	60,7	62,1	65,2	61,4	65

Source: authors own processing based on Eurostat database (2013), http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/nrg_indic_esms_a/n14.pdf

As can be noticed from the data presented in the above table, the share of renewable energy in gross final energy consumption, during 20014-2008 has been increased mainly due the Governmental policy in the field. Countries as Norway (from 58.6% in 2004 to 65.0% in 2011), Sweden (from 38.7% in

2004 to 48.8% in 2011) or Denmark (from 14.9% in 2004 to 23.1% in 2011) has majorly improved the share of renewable energy in gross final energy consumption during this period. In case of Romania, the share of renewable energy in gross final energy consumption has slowly increased from 17.0% in 2004 to 21.4% in 2011. This evolution was imposed by the official regulation for increasing both the renewable energy production and the consumption from these sources.

Another major aspect, regarding the energy policy, is the evolution of energy intensity, computed as gross inland consumption of energy divided by GDP (kg of oil equivalent per 1 000 EUR). This indicator reflects some major aspects regarding the energy efficiency of the economy.



Source: *author`s own processing based on Eurostat (2013).*

The evolution of energy intensity of the economy, at least in case of the Romania shows a decrease from 609.5 kg of oil equivalent per 1000 Euro in 2000 to 392.1 kg of oil equivalent per 1000 Euro in 2011. This decrease does not mean necessary a loss of energy competitiveness, as it can be understood as the first look. These values reflect the industry production decrease and the industrial loss of competitiveness.

At the moment, the global economy is going through a crisis period. But, from the energetic point of view, it has been going through a profound crisis for a

longer time, due to the increase of the demand of energy, requested by the economic activities and the limited energy resources.

The energy resources of the planet are finite, limited in time, so that the problem of energy options for the future appears, especially because in many specialized studies, such as (*Apergis and Danuletiu, 2012*) or (*Shahbaz, 2013*), a series of correlations between the internal energy consumption, the industrial development of a society and the national income were highlighted.

The national economies' high dependence of the energy resources, to which is added their rarity and finite nature has imposed the realization of checking and prospection concerning the energy reserves. Results are various, proposing different terms concerning the depletion of energy resources. Even though there is no data to certify the existence of new oil and gas reservoirs, it is estimated that the ones which are known will assure the functioning of the world economy until 2100. Other estimations consider that the known coal reservoirs will be enough for a few hundreds of years, and the gas and oil ones for less than 50 years.

Only one thing is certain: sooner or later fossil fuels (coal, oil, gas) will run out. Studies made on a global scale, concerning the offer and demand of energy in the next decades, have estimated that the crossing of this crisis period of energy will be able at the price of a significant effort, in two steps (*Lima, 2012*):

1. the transition from the usage of natural liquid hydrocarbons to the usage of synthetic liquid fuels (as, for example: synthetic oil derived from coal) and biofuels;
2. the development of the production technologies and diversification of the ways of using the electric energy, originated from infinite sources: solar energy and nuclear energy.

Another important problem was generated by the intense usage of fossil fuels, which has led to the substantial modification of the CO₂ level (but also the level of other gases that have the greenhouse effect) in the atmosphere, resulting in an express tendency of global warming, due to the greenhouse effect. According to estimations (*Cotorobai, 2013*), in the year 2050, in order to satisfying an energy demand of 50 TW/year, Terra's temperature could increase by 2°C. A moderate scenario, with a demand of 30 TW/year, would determine an increase of the temperature with 0.5 °C by 2030. The extreme

case, which would lead to an increase of the temperature by 4°C, would facilitate the melting of the polar ice.

On the other hand, the depletion of coal, oil or gas reservoirs has led to the beginning of the exploitation of the reservoirs in zones with tough climate conditions (Alaska, Siberia etc.) or on the bottom of seas and oceans. This involves a strong rise of the costs needed for exploiting these reservoirs.

After analyzing these aspects, the following problems appear and need solutions (*Bostan et al., 2007; Băloi, 2010*):

1. the depletion of the current energy resources due to the limited nature of raw energy resources, considering that over 90% of the global consumption of energy comes from fossil fuels;
2. the occurrence of the various forms of pollution: chemical, thermal etc., generated by the intense usage of fossil fuels.

Solving of these problems could be accomplished by taking complex measures, which include both the reduction of the consumption of fossil fuels by perfecting the technologies existing at the moment and the identification of new energy resources, which would be cleaner and would never deplete, or at least not in a close horizon of time.

Alternative energy resources, that do not lead to the increase of the pollution level and which are practically undeletable, are the following: solar energy, thermal water energy, wind energy, wave energy, nuclear energy etc., and due to the fact that they do not represent the depleting danger in time, these resources of energy are also called renewable.

The European Union has assumed, in the context of the Kyoto Protocol, the reduction of the CO₂ quantity that is lost to the atmosphere by 20% in 2020 compared to the year 1990. To reach this target, certain objectives specific to every country have been established, Romania having an aim of reducing the quantity of CO₂ that is lost to the atmosphere by 24 % in 2020 compared to year 1990. The adopted solution was based on the replacement of energy resources that work with fossil fuels, with unconventional sources of energy.

To establish the potential of the various zones, many studies have been made and many papers were published, however they present analysis methods and less actual results. In Romania's case, a review of the unconventional sources

of energy has been realized through the medium of specialized studies, such as the ones made by (*Maghear, 2011*), (*Zamfir, 2011*) or (*Paul, 2012*).

The energy sources that can fit in the category of the renewable are of different types. Some of them can be efficiently exploited in Romania, while others do not have an efficiency that could allow them to be exploited.

In this paper, we have analyzed the potential of the renewable energy sources that can efficiently be exploited in Romania. Even though they exist and they have been exploited for years, we did analyze neither the geothermal energy, nor the electric energy sources produced by micro-hydropower plant-type installations, nor the energy obtained by processing household and industrial waste.

For the geothermal sources of energy we did not have enough technical or economical data. From the experience we accumulated in the domain of technological processes and on the basis of the available information, we consider that Romania does not currently offer a viable geothermal potential, which could be exploited with economic efficiency. The exploiting of this potential has started before 1989, in order to obtain the thermal energy required for heating houses, in the Arad and Bihor counties.

The technical problems that need to be solved, along with the high prices, that the installations which are to exploit this source of energy need, do not currently justify the expansion of the volume of the thermal waters that are being exploited at the moment. Perhaps in a reasonable horizon of time, this source of energy coals is used efficiently; especially because there are specialists who consider that the geothermal potential Romania has is more extended than in the western area of the country.

Concerning the energy that comes from micro-hydro, we preferred not to consider this source to have potential for the future, due to the negative impact it could have on environment. The starting of a micro-hydro plant implies the arrangement of a collector channel and of channels to direct the water taken from the riverbed.

Unfortunately, in Romania the hunt for easy income has led to the violation of the legal stipulations (which exist and are correct, but not always followed) and to the introduction of the whole river on the channel. Actually, the law allows the exploiting of micro-hydro plants if the water flow that is needed is assured by taking over a part of the exploited river, its leading through

channels to the turbine and release of the water back in the river, upstream of the micro-hydro plant.

By evading the law, some investors dragged the channels through the riverbed³ (which is against the law), sometimes even in natural reservations and in protected areas, such as Natura 2000, and took over on channels the entire flow of the river, with disastrous effects on the ecosystem that is afferent to the certain river.

In conclusion, I consider that this alternative should not be considered as a potential source of energy because the benefits would not justify the damage caused to the ecosystem, the power of hydro-micro plants being low in general. They can be considered as sources of energy where the arrangement their installation need does not affect the ecosystem.

The processing of industrial a household waste can be realized through many technological processes (*Logan et al.1994; Delucchi and Jacobson, 2011*):

- the direct combustion of combustible waste (paper, envelope and other pieces of rubber, plastics etc.);
- the fermentation of the biodegradable waste (rests of food, agricultural waste, sludge left from wastewater treatments etc.);
- pyrolysis processing of any organic waste, in order to obtain combustible gasses, combustible liquid, and/or coal.

Keeping in mind what was stated above, along with the fact that raw material has to be sorted out and transported to the processing places with the afferent costs of these operations, I believe that processing waste is more important for the cleaning effect of the environment and less important as a viable economic source of energy.

To evaluate the potential of the renewable energy sources from Romania, I took into consideration the next aspects:

- sources of renewable energy do not pollute at all or pollute very little;
- sources of renewable energy have a low density of energy, so that they need bigger collecting installations or in a greater number, in order to produce a proper quantity of energy for an efficient exploitation;

³Examples: rivers Sâmbăta de Sus, Buda, Capra, Otic and many others places, <http://www.sambata-de-jos.ro/?p=593>, <http://stirileprotv.ro/emisiuni/romania-te-iubesc/duminica-18-00-romania-te-iubesc-goana-dupa-profituri-uriase-distruge-ecosistemul.html>

- sources of renewable energy occupies important land areas which cannot be used for other activities.

In the paper I have analyzed as renewable energy sources the wind power, the solar power, in their two forms: thermal and PV, and energy from biomass for biofuels and for wooden fuel for combustion. I will further present, the main results obtained for each analyzed source of renewable energy.

Wind potential

It is a source of energy that can be exploited permanently, without generating the pollution of the environment. The main disadvantage of wind power is given by the viability of the electric energy production, which is induced by the variation of the wind speed in time, so that there is no good predictability of the produced quantity of energy and no possibility to modify the production according to the demands.

Another disadvantage represents the form of generated energy itself-electric energy, because it cannot be stored directly, in economy efficiency conditions. So, if it is not used in the moment of its production and if it is not exported either, it is lost. In table 2 is presented the wind technical potential of Romania.

Table 2. *Wind technical potential of Romania*

	Turbine	Power generated [toe/year]			
		Vestas 90/2000	Vestas 90/3000	Vestas 5000	Vestas 8000
Hours number of full-load functioning per year	1500 hours/year	10.065.864	15.098.796	25.164.654	40.263.446
	2000 hours/year	13.421.152	20.131.728	33.552.872	53.648.595
	2500 hours/year	16.776.440	25.164.660	41.941.089	67.105.743
	3000 hours/year	20.131.728	30.197.592	50.329.307	80.526.892
	3500 hours/year	23.487.016	35.230.524	58.717.525	93.948.040
	4000 hours/year	26.842.297	40.263.446	67.105.743	107.372.284

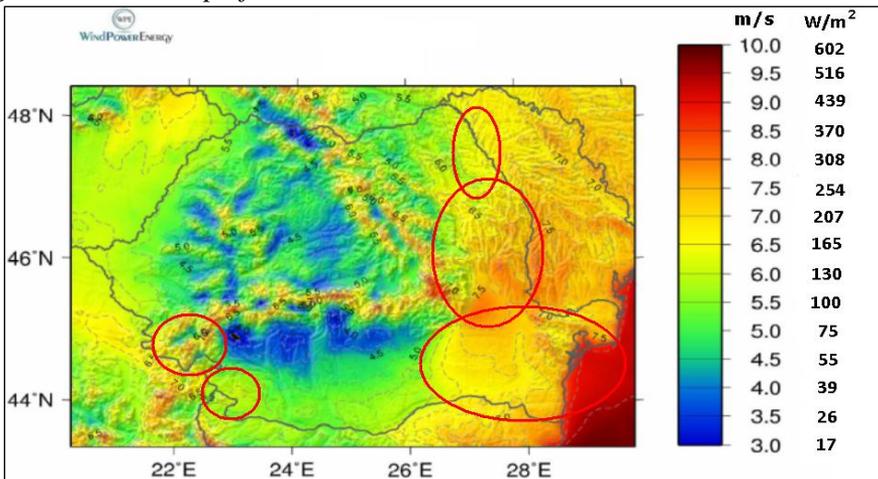
Source: *author's processing.*

The wind potential of Romania was assessed based on a map of the winds, map which corresponds to the theoretic wind potential. On the base of this map, the geographic wind potential was determined, though which the zones

where wind turbines can be efficiently installed were highlighted, and through which their approximate area was determined as well. In estimating this surface the urban and rural agglomerations, protected areas and other places that could be restricted (roads, airports etc.) were taken into account.

The technical wind potential was determined for four dimension types of wind turbines: of 2, 3, 5 and 8 MW installed peak power. The first two types of turbines are already installed in the wind parks from Romania, and the other two are being offered since last year by the same producer. In fig.1 is presented the wind map of Romania, according to studied estimations.

Fig.1. *The Wind map of Romania*



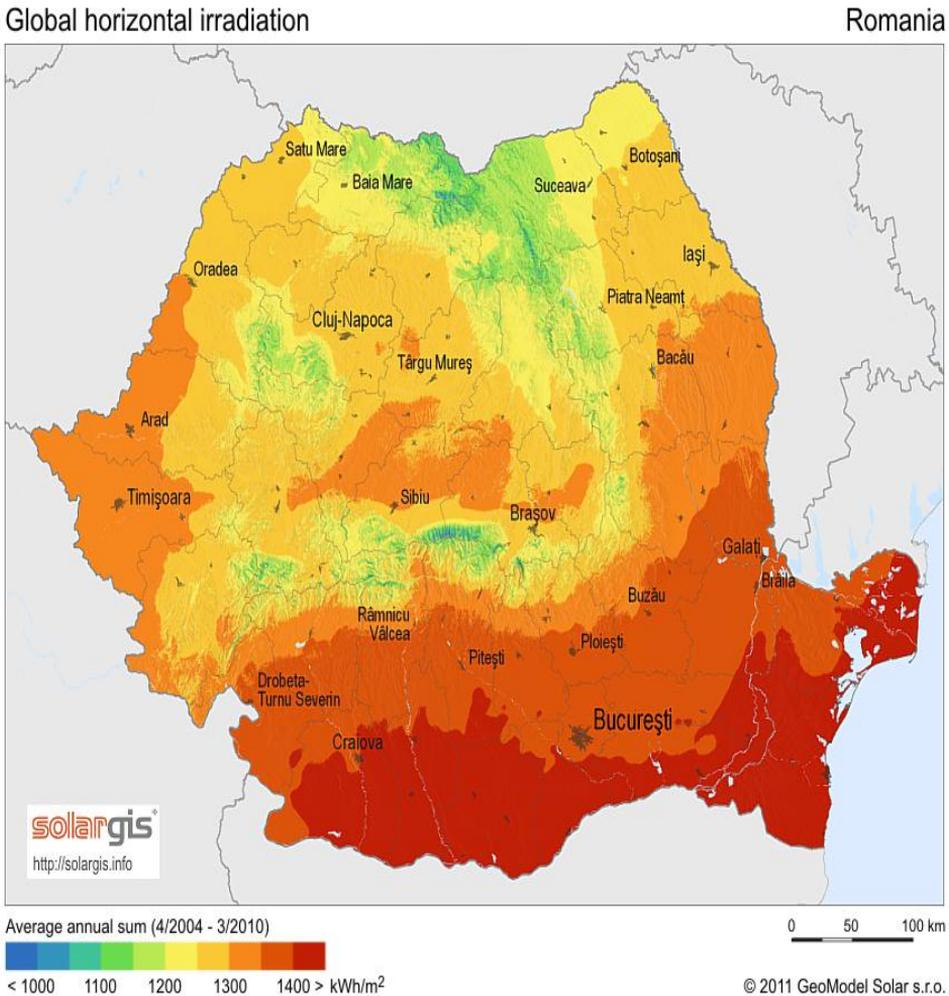
Source: authors according to Wind potential energy website (2012).

The final consumption of electricity in Romania for year 2011 was 3.673.000 toe, and the gross consumption of energy from raw sources was 36.349.000 toe. It can be observed that, the potential of the 3 MW turbines at 4000 hours full-load/year can assure the entire demand for gross consumption of Romania, and if turbines of greater capacity are used, then all this gross consumption is assured for less functioning hours or less turbines.

Thermal Solar energy potential

Theoretically, Romania has a good potential for generating thermal or electric energy by direct capturing of the radiant energy of the Sun. For thermal energy, the most used applications are those that generate warm household water and/or thermal energy for heating the living spaces or with other purposes.

Fig. 2. Global horizontal irradiation map for Romania



Source: authors according to GeoModel Solar s.r.o, 2011.

Thermal solar installations, for warm water and additional thermal input, are only used for living spaces or that have another purposes. Because of this, the review was made taking into consideration only the existing buildings in Romania.

It was considered that each building that is destined for living is equipped with thermal solar panels of 5 m² and each building that is destined for other purposes is equipped with solar panel of 30 m². The thermal solar potential of Romania, as resulted from the calculus, is represented in the table 3.

Table 3. Thermal solar potential of Romania

The use of the buildings	Thermal potential		
	GWh/year	Gcal/year	thousand toe/year
Housing	14.800	12.725.709	1.272,57
Other destinations	132,42	113.861	11,39
TOTAL	14.932	12.840.000	1.284

Source: *author's processing.*

Photovoltaic solar energy potential

In order to determine Romania's Photovoltaic potential, the following distinct situations have been analyzed:

- installations with PV panels of 2 kW peak power, mounted on each building destined for living;
- installations with PV panels of 5 kW peak power, mounted on 75% of the buildings destined for other purposes, and for the rest of 25%, installations with 50 kW peak power;
- solar farms, it is installed powers equal or greater that 1 MW peak power, which requires large tracts of land for installing.

For the solar farms, the vasted land or the terrains which are not included in the agricultural circuit were taken into consideration. The technical potential of Romania, for electric energy PV source, is represented in the table 4.

Table 4. PV potential of Romania

Plant size	PV potential	
	GWh/year	thousands toe/year
2 kW peak power	9635	828,4
5 kW peak power	61,3	5,27
50 kW peak power	613	52,7
Solar farms	150.990	12.982,8
TOTAL	161.299	13.869

Source: *author's processing.*

Since the final consumption of electricity Romania, for the year 2011, was 3.673.000 toe, and the gross energy from raw sources was 36.349.000 tep⁴, it can be observed that Romania's PV solar potential can cover completely the final consumption for 2011 and, in proportion of 21,98 %, the gross consumption of energy of the same year.

Biodiesel potential

Biodiesel is a fuel obtained from vegetal oils, which can be used directly or blended with diesel fuel. As vegetal oils, a great variety of oils can be used, obtained from a great variety of plants, such as sun – flower, soya and rapeseed as (*Haas et al., 2006*) remarks in his study. Energetically, Romania's biodiesel potential is of about 547.528 biodiesel tones, which is equivalent to 21.901.112 GJ, or to 6.084 GWh or 523.000 thousands toe.

Bioethanol potential

Bioethanol can be obtained by the fermentation of various organic materials, such as: cereal, sugar beet, molasses, cellulose etc. In Romania, for the industrial production of ethanol there are used raw materials with high starch content, mostly cereal and potatoes. In my paper I have only analyzed the potential of bioethanol derived from cereal (wheat and corn) and potatoes.

An aspect which should be kept in mind is the fact that these cereals are intensively used in both human and animal alimentation, besides the fact that the ethanol that is extracted from cereal is used for the production of medical alcohol and alcoholic beverages.

Romania's bioethanol potential is of about 5.507.629 tones/year, or, energetically, of about 163.577 TJ, which is equivalent to 3.908,84 thousands toe/year.

Biomass solid fuel potential

Many products are included in the biomass category for solid fuel, as following (*Voivontas, 1998, Bostan et al.2007*):

- wooden and waste that results from processing wood;

⁴According to Eurostat database, Gross inland consumption of primary energy, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ten00086&plugin=1>

- agricultural waste (corn cobs, straw etc.), which are used for the obtaining of thermal energy by combustion;
- wooden mass for combustion, obtained from cultures which were specifically founded for this purpose (energetic willow).

In order to determine the suitable potential of the products that fit in the solid fuel category, three values will have to be calculated, corresponding to the products that were listed previously.

In order to analyze the potential of the wooden biomass and wooden waste, there were taken into account firewood, sawdust, the tree crust and the secondary products (chipper etc.) which resulted after harvesting the wooden and the sawdust that were obtained while processing the wooden to lumber, at the log.

Other rests (sawdust, wood powder, remnants etc.) that were obtained in the secondary operation of processing the wooden, for the obtaining of furniture or other wooden final products, have a reduced volume compared to the processed wooden volume and are usually processed by producers in order to obtain secondary products (PFL, PAL etc.). In conclusion, the potential of wooden biomass and waste resulted after processing the wood is of about 1.751 thousand toe.

Agricultural waste implies the rests that are left behind after harvesting crops, especially from cereal (straw, cobs, strains etc.) and which are currently harnessed only partially, especially for forage, and less as a source of energy. For agricultural waste, the potential that resulted was 43.099 GWh, which equals 3.706 thousand toe.

The term "Energetic cultures" is referring to the plant cultures with a high rate for obtaining firewood material. There are various plants which fit in this category, but, in Romania, only energetic willow and energetic aspen can be successfully grown. The energetic willow fits best the climate in our country; there already exist cultures which were founded for the production of wooden mass. The potential of wooden mass for combustion which originates in energetic cultures is of about 15.833 GWh, which equals to 1.361 thousand toe. In the end, it resulted a potential of biomass for solid fuel of 6.188 thousands toe/year, or 258.786.108 GJ/an. This equals to 17.252,4 thousands of tons of firewood, with a calorific value of 15 MJ/kg for firewood, or 26.542.154 m³ of firewood, with a medium density of 650 kg/m³ for firewood.

Conclusions

The global potential of Romania for producing energy from unconventional sources, estimated at the level of technique and at the level of productions of the year 2011, has a value that ranges between 35.839 and 66.037 thousand toe/year, in case of using the 2 and 3 MW installed power turbines. If it would use 5 and 8 MW wind turbines, Romania's potential would be ranged between 50.938 and 133.146 thousand toe/year. As unconventional type of energy, wind power and solar power have the best potential.

Romania has a good technical potential concerning the renewable sources of energy, but does not have the required technological background for exploiting efficiently this potential yet. In order to increase the level of usage of the unconventional energy sources and of the production of energy coming from these sources, I believe that the following aspects should be taken into account:

- *the national implementing of a scheme that grants discounts for the taxes on buildings or vehicles, for individuals or legal entities which verifiably prove that they currently use renewable energy resources or biofuels.*
- *the promoting of the applicative research topics, both technical and economic, in order to solve certain problems, generated by implementing unconventional sources of energy;*
- *the imposition of technical specifications for the development of wind farms through which the implementing of greater efficiency and production capacity turbines would become mandatory;*
- *further development of the wind farms, but in the efficiency conditions which were specified previously, and with a more drastic tracking of the way of implementing the projects and their effects on the environment.*
- *the penalization of the investors who do not respect their obligations of rehabilitating the condition of the terrains that are used for the implementing of the projects, in order to discourage these practices.*
- *the development of the solar farms, but the approval of their installation only on degraded terrains, which cannot be used for agriculture (including pasturing), or on the terrains that cannot be used for something else (steep slopes etc.);*
- *the granting of interest-free loans, or with very low interests, in order to implement unconventional source of energy, both for individuals and legal entities, in equal conditions;*

- *the implementation of the installations for processing waste, which have the possibility to assure themselves the demand of energy needed for functioning, perhaps also generating an additional production of energy;*
- *the restoration of the railway infrastructure, in order to introduce the high-speed trains, which would offer reasonable durations of the traveling and, through this, to become attractive to the passenger and freight transport;*
- *the promotion of the usage of electric vehicles, especially inside cities, where the covered distances are relatively small and stations for recharging accumulators for small distances can be built.*
- *the promotion of the research topics for creating more efficient electric vehicles destined for public transport, different from the current solutions (trams, trolleybuses etc.), which would (eventually) require a simpler infrastructure, easy to integrate in the scenery;*
- *the promotion of the development of a smart power grid, for which connecting a user or a small producer would not represent a technological problem;*
- *the imposition of the endowment with PV installations of all the public institutions that allow this and their connection to the national energetic system, so that they reduce their expenditures on electric energy and heating. Promoting heating with pellet and/or lighters to public institutions, wherever wooden is currently used.*

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MILK PRODUCTION AND NITROGEN EFFICIENCY IN DAIRY COWS

Gjoko Bunevski¹, Blagica Sekovska²

Abstract

Nitrogen (N) efficiency is one of the key drivers of environmentally and economically sustainable agricultural production systems. Also, nitrogen is an essential part of many different aspects of operating a sustainable dairy farm. Totally 45 dairy farms were under the control of milk content of proteins and fats. In the breeding organizations, the average milk production per cow is about 6300 kg milk per cow per lactation, in the family farms around 5100 kg, with 3,7-4,1% of fats and 3,3 to 3,6% of milk proteins. Also, survey was done for their willingness to explore nitrogen by urea milk analyzing. According to the statistics, after the previous explanation of the meaning of urea measuring in milk, only 42% of farmers wish to explore urea in milk and to pay for that, from which young and big farmers are the dominant farmers with positive altitude. According to the way of payment for analyses, only 26,7% were agreed to paid from themselves, 33,1% want to pay partially, and all the rest (40,2%) agreed analyses to be paid by some project or another budget, but not from their farm budget. Bulk tank milk sampling can be useful tool for periodically estimation of urea concentration, together for milk fat and protein content to balance properly the energy and protein ration, as well as for controlling the nitrogen environmental pollution from dairy farms.

Key words: *nitrogen efficiency, urea, milk components, dairy cows*

Introduction

Nitrogen is an essential part of many different aspects of operating a sustainable dairy farm. Dietary protein contains nitrogen (N) that provides amino acids for growth, maintenance and milk production in dairy cows.

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At the other side of the Nitrogen chain on farms, N is essential for maintaining soil composition for sustainable and economical crop production.

Dairy farmers are taking steps to manage excess N. However, a way to reduce excess N that can get overlooked is nutritional management. This is a proactive approach to reducing the possibility of excess N excretion before it becomes harmful to the environment (*Trajkovski, Bunevski, 2006*).

There is a direct link between N in feed and N in feces and urine. An effective approach to reduce N excretion is to feed animals more accurately on dairy farms. Using nutrition to reduce excess N excretion is four times more efficient than adjusting manure storage facilities and application rates. Ration balancing, as its name implies, avoids nutritional imbalances and inefficient nutrient use. Imbalances that create inefficient use of protein can be caused by inadequate or excessive supply of dietary protein fractions or fermentable carbohydrate.

Monitoring milk urea nitrogen (MUN) values provides a practical way to monitor the dietary protein efficiency of dairy cows. MUN values vary considerably from cow to cow, so MUN facts are best used to gauge the efficiency of groups of animals. MUN concentrations also vary with the time of year, with highest levels measured in the summer. Monitor MUN regularly over time to provide an accurate picture of the efficiency of use of dietary protein on individual farms.

Higher MUN concentrations are linked to high levels of crude protein, rumen undegradable protein and rumen degradable protein in the diet. Lower MUN concentrations are associated with greater amounts of dietary energy, non-structural carbohydrates and lower protein to energy ratios. This reflects the importance of evaluating both the energy and protein in diets when trouble-shooting unusual MUN results.

The determination of urea, fat and protein concentrations in milk is a reliable indicator of the energy and protein status in dairy cows. Also, it is rational and financially acceptable. Those analyses provide a good opportunity for further recommendations for correcting the feed rations and improving the health of dairy cows.

There are some recommendations for the relationship between urea and protein concentration in milk.

Table 1. Ratios between urea and protein concentration in milk, as well as milk proteins and fats

Milk urea concentration	Protein concentration	Result
Lower than 4 mmol/l	Higher than 32 g/l	Feeding is proper
higher than 4 mmol/l	Higher than 32 g/l	Moderate deficit of ratio energy is present
higher than 4 mmol/l	lower than 32 g/l	Ratio is insufficient in energy
Lower than 4 mmol/l	lower than 32 g/l	Deficit of both ratio energy and protein is present
Ratio between milk proteins and fats		
Milk protein is higher than 32 g/l	Milk fat lower than 4,5 g/l	Energy supply is proper
Milk protein % decreasing	Milk fat % increasing	Energy deficit in ratio

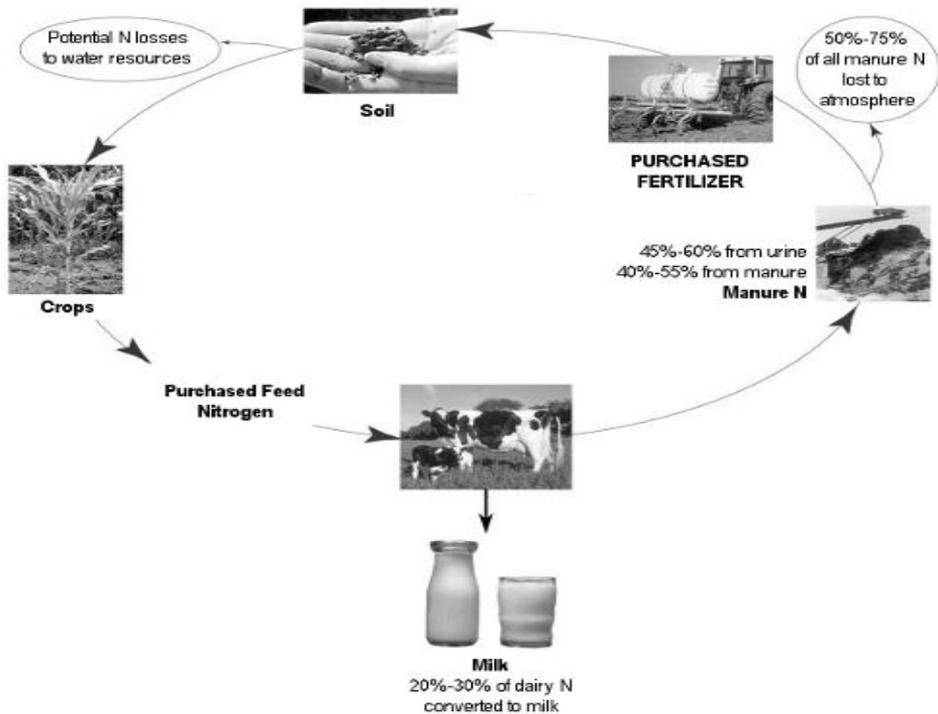
Source: Kirovski et al, 2011.

Literature review

There are several benefits of reducing the N concentration through cows' nutrition:

- Efficient way to manage manure N,
- Improved air quality,
- Reduced odour from ammonia,
- Maintain or improve productivity while controlling or lowering feed costs,
- Reducing N output reduces potential risk to water resources.

Fig. 1. Cycle of nitrogen on a dairy farm



Dairy cows are one of the largest sources of N emissions from livestock in the world. The high concentration of very labile N in the urine leads to the rapid production of ammonia gas. Regulations controlling N emissions are likely to occur as pressure mounts to reduce the environmental footprint of food production. Dairy producers should be aware of how regulations may affect their business, and investigate strategies to improve N management.

The extensive conversion of dietary N to microbial protein in the rumen provides both opportunities and challenges for dairy production systems. In situations where protein supply is low, physiological changes in renal function are made that salvage urea from excretion and help maintain delivery of the urea to the rumen.

When dietary protein is low, recycled urea can make up a significant proportion of N flowing into the rumen which can subsequently be captured by rumen microbes and made available to the animal. However,

excess dietary N is generally excreted in the urine as urea which can have important environmental consequences.

Literature data have shown little benefit from feeding over 16% crude protein (CP) in the diet and suggest significant reductions on fecal and urinary N can be achieved by reducing dietary CP to approximately 15% dry matters (DM). The addition of a readily fermentable carbohydrate source has been also been shown to enhance the capture of both dietary and endogenous N and can help drive milk protein output (*Ryan John Higgs, 2009*).

Generally, only 20% to 30% of the crude proteins (CP) fed to dairy cows is captured in the milk (*Ensminger, 1993, 1997*). Feed N that is not transformed into milk protein or accreted in body tissue is excreted in the feces and urine. The majority of urinary N (UN) is in the form of urea which, when mixed with urease enzymes found in soils and feces, is rapidly converted to ammonium and ammonia gas.

After release, ammonia gas can be re-distributed to the land as acid rain and nitrates which can have detrimental effects on natural ecosystems. Particulates are also formed with other atmospheric chemicals which adversely affect air quality and human health. Environmental pollution of N began rapidly increasing in the last 40-50 years.

As a consequence, much of this new reactive N began accumulating in various environmental reservoirs such as the atmosphere, soils, and waters. Ammonia emitted from dairy farms and other agricultural systems contributes to this accumulation along with emissions from industrial processes, waste disposal, biomass burning, and the generation of energy.

Globally, animal farming systems emit approximately 20 Tg N/yr as ammonia (*Ensminger, 1993*). On release it follows a sequential cascade, first impacting atmospheric visibility and air quality, followed by soil acidity, forest productivity, terrestrial ecosystem biodiversity, stream acidity, and finally coastal productivity.

Dairy cows are one of the largest livestock sources of ammonia emissions due to the high concentration of N in their urine. Changing the cow's diet to improve N utilization can substantially reduce the amount of N that is lost to the atmosphere.

Material and methods of working and results

Dairy sector is one of the most promising sectors in Republic of Macedonia. Dairy sector generates employment and business opportunities, particularly in the rural and peri-urban areas. A number of people in urban areas are also involved in dairy based business. The public sector departments hold primary responsibility to guide the farmers and play significant role in dairy sector development. Dairy enterprise is dominated by the private sector and the role of government is regulatory.

Dairy farms are spread all over the country except in the high mountainous regions where the costs of milk collection would be very high. The major cow milk production areas are found around the perimeter of the northern, western and eastern boundaries of the country near the cities in which neighborhood are located focal dairy plants. These production areas surround the field crop growing regions, which encourage interaction and use of arable by-products. In order of importance, the main raw milk production areas are the Pelagonia region in the south, Polog region in the north-west and the North-eastern region in the country.

The Macedonian dairy farming, similarly as other sub-sectors, went through dramatic structural changes during the economic transition period, since the country gained its independency in 1991. The brake-up of the former Federation and the ensuing regional conflicts meant a loss of a large and protected traditional market, so farmers were left vulnerable to the competition, and had limited contacts in potentially interesting markets.

However, the situation is so far improving, with an abrupt halt in 2001 because of the ethnical conflict within the country, but henceforward 2002 the country has made considerable progress. A big decline in the dairy industry is seen with the collapse of one of the largest dairy factories Swed Milk. This event was a huge disappointment for farmers, and the consequences are still felt today.

The dairy sub-sector, nowadays, is embodied by a large number of small, subsistence oriented farm households and a decreasing number of large, specialised dairy enterprises that originate from the former socially owned large-scale agricultural enterprises, so-called agro-combinats.

The milk production is mainly concentrated in the private sector, hence is very much focused on small scale family units. The largest share of the produced milk in the country is sold to the dairies, while small amount quantities are remained on farm for household's and animal feed, or sold directly to the consumers via street market. Dairy farmers have two alternatives where to sell the raw, namely large scale and small dairies.

Agriculture has historically been an important sector in Macedonian economy. In Macedonia agriculture sector contributes more than 18 percent of the GDP of which the share of agriculture is about 12% and food industry accounts for 6% of GDP. Although, agriculture sector employs more than 20 percent of the total workforce (10).

Dairy sector in R. Macedonia is consisted of many farmers that keep breeds for both milk and meat production, but there are also farmers who specialize in high productive milking cows. The main reason for choosing the milk instead of the meat is that milk sale brings more frequent turnover of the capital invested. Farmers claim that is cheapest to produce milk since the price of the feed has increased dramatically over the last years.

It has already been noted that Macedonian dairy farming is characterized by a large number of small farms - traditional farmers (75% of the total) who have low 1-3 cows with low annual milk production of 2-3 thousand liters per cow.

Very small is a number of large specialized farms with over 20 cows (about 3% of the total) with high productivity and annual milk production around 5 thousand liters per cow. Only 1% of farms has more than 50 heads and should be the production of quality genetic material remaining farms (reproductive centers)(8). These dairy farms are well organized in a single line connection system for milking that is protected from contamination.

These dairy farmers invest in milking equipment, improved housing, milk storage equipment, fodder preparation, breeds and breeding, etc. Small scale dairy farming causes increase in the cost of collecting milk and cooling equipment (lacto-freezers). This specialization means investments in modern production equipment and facilities that comply with the quality and safety standards.

Milk components (protein content, fat content, DM in milk (%)) and milk yield (in kg) were investigated on 45 different cattle farms in the R. of Macedonia, in different agricultural regions, according to the ICAR recommendations. Five of them are breeding organizations (BO), named as farm 1 to farm 5, but the other 40 are family farms with the average of 10-50 cows per farm.

Also, those dairy farms were surveyed about their willingness to explore nitrogen by urea milk analyzing. All the investigated farmers were divided on several groups by different criteria.

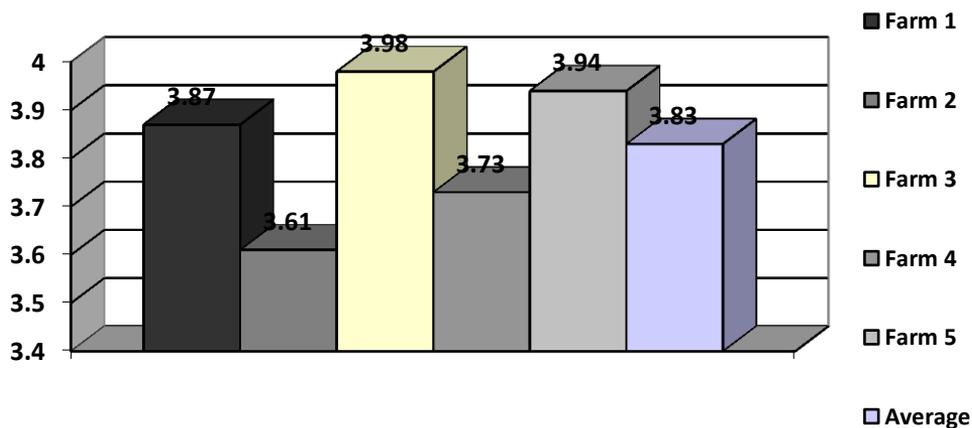
Table 2. *Farm capacity in the controlled breeding organizations (farm 1 to 5) according to the cattle category*

Parameter	Milking cows	Dried cows	Heifers	Calves	Other	Total
Farm 1 ZK	779	191	391	294	463	2118
Farm 2 DU	147	37	82	17	132	415
Farm 3 SR	370	100	180	298	28	970
Farm 4 BG	350	50	90	180	30	700
Farm 5 PE	80	15	34	27	34	190
Total	1726	393	777	816	687	4399
In %	39,22	8,94	17,67	18,55	15,62	100,00

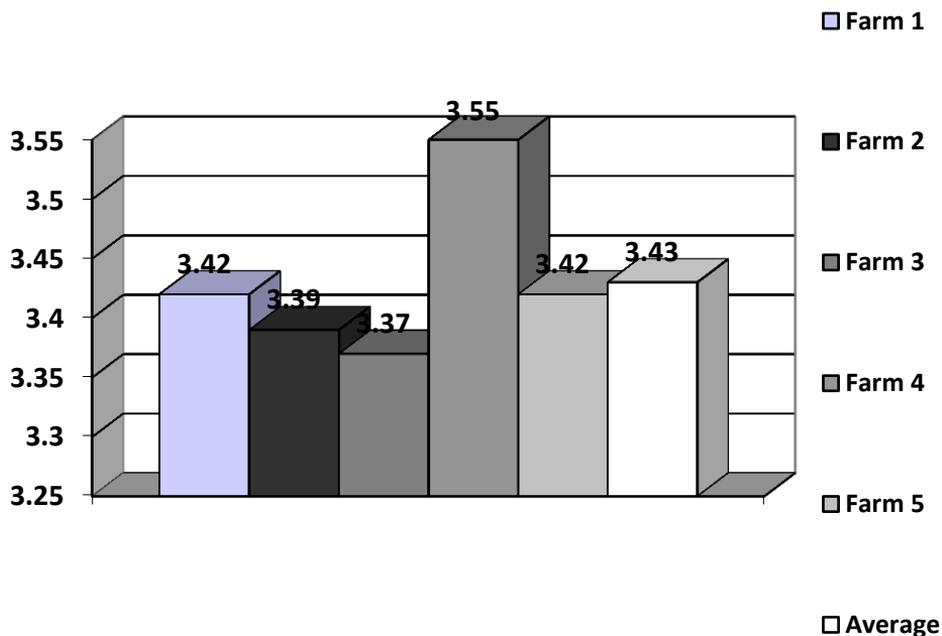
Table 3. Corrected milk yield per cow on 3th lactation in controlled farms (BO)

Parameter	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Average
Milk yeild, kg	7838	8490	6061	5769	3556	6342,8
Corrected milk yield on III L	7688	8796	6328	7106	4267	6837,0

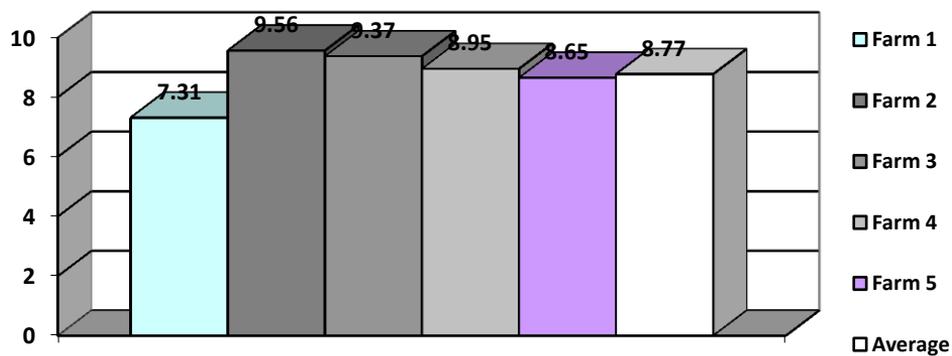
Graph 1. Fat content (in %) in controlled dairy farms (BO)



Graph 2. Protein content (in %) in controlled dairy farms (BO)



Graph 3. Content of dry matters in milk in controlled dairy farms (BO)



Graph 4. Comparing milk yield per cow between bigger 5 farms (BO) on average lactation yield (A), corrected on III lactation (B), the average at the 40 family farms (C) and the national average milk production per cow (D) from State Statistical Chamber of RM

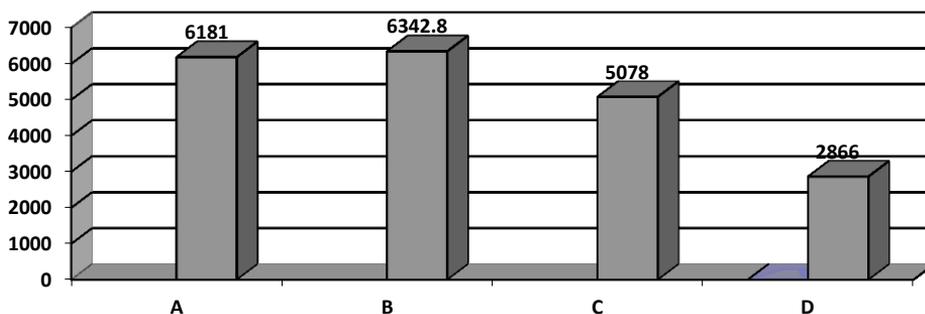
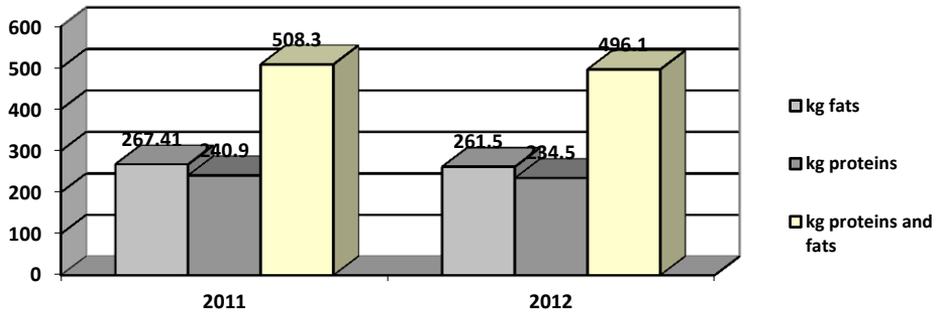


Table 4. Average milk protein and fat yield (in kg) in controlled dairy farms (BO) in 2012

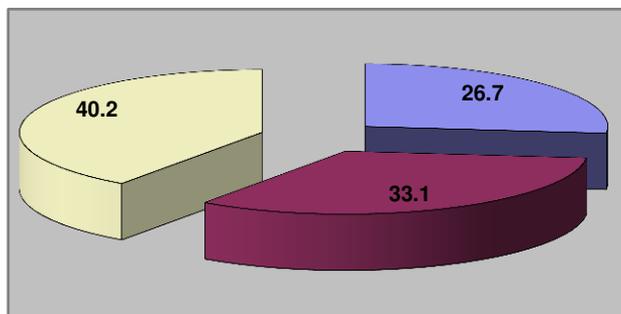
Parameter	Kg milk fats	Kg milk proteins	Total kg proteins and fats
Farm 1	297.53	262.93	560.46
Farm 2	317.54	298.18	615.72
Farm 3	251.85	213.25	465.11
Farm 4	265.05	252.26	517.32
Farm 5	168.12	145.93	314.05
Average	261.58	234.51	496.09

Graph 5. Compared milk protein and fat yields for controlled cows from BO farms, separately and together, in 2011 and 2012



According to the statistics done at the totally 45 investigated farms, after the previous explanation of the meaning of urea measuring in milk, only 42% of farmers wish to explore urea in milk and to pay for that, from which young and big farmers are the dominant farmers with positive altitude. According to the way of payment for analyses, only 26,7% were agreed to paid from themselves, 33,1% want to pay partially, and all the rest (40,2%) agreed analyses to be paid by some project or another budget, but not from their farm budget.

Graph 6. Way of thinking of 45 farms for their willingness for additional paying for urea analyzes



Discussion

The increasing global demand for dairy products and the constant drive to improve efficiency and profitability have resulted in a rapid consolidation and expansion of the dairy industry. Larger, more intensive, farming systems have led to growing concerns over nutrient density, animal welfare and human safety. Ammonia and nitrous oxide emissions are of particular concern due to their adverse effects on both human health and the environment.

Dairy production systems contribute just 0.05% to annual greenhouse gas emissions from N₂O but are a significant producer of ammonia. The high concentration of very labile N in the urine of dairy cows leads to the rapid production of ammonia gas. Changing the cow's diet to improve protein utilization can substantially reduce the amount of N that is lost to the atmosphere. Regulations controlling N emissions are likely as pressure mounts to reduce environmental pollution (*Nadeau, 2007, Van Amburgh et al., 2008, Ryan et al, 2011*).

The high value of milk protein, increasing feed costs, and growing concerns for the environment has made N utilization a central component in ration balancing. Improving N utilization can be a sensitive process due to the complexities of digestion and metabolism in dairy cows. Improving the N utilization in dairy cattle can be done with increasing of ruminal energy supply, reducing dietary crude protein content and balancing the supply of amino acids to the duodenum.

Synchronizing the supply of protein and energy has been suggested as another important means of improving the capture of rumen degradable protein, which means microbes have an access to high quantities of energy in synchrony with high quantities of ammonia reducing the lag in energy supply as fibrous carbohydrates are fermented.

Improving feed nitrogen utilization efficiency was related to several aspects of the dairy operation that give suggestions for how a producer could improve whole-farm nitrogen balance:

- Feeding according to production. Herd nitrogen efficiency of feed conversion into product usually is higher for dairy farms with more than 100 cows, because of better grouping of animals based on production and therefore decrease over-feeding of protein.

Grouping animals according to stage of lactation, and feeding a balanced ration based on production helps to improve the overall feed nitrogen utilization efficiency for the herd. Smaller farms may not have the grouping capabilities because of space considerations and low numbers of cows per group, and it is easier to overfeed protein in cattle nutrition in this case.

- Accurate and complete records. Usually, larger herds keep more complete records than smaller herds. Accurate records are essential for correctly monitoring and increasing the efficiency on farm.

- Higher per cow production. Higher feed nitrogen efficiencies is positively related with milk production (i.e., increased feed efficiency was related with increased milk per cow), which can improve the nitrogen utilization efficiency.

- Properly balanced ration. Because the cow is a biological system, 100% utilization efficiency is probably impossible. Some protein nitrogen will always go to things other than milk and meat production and may be wasted. The goal is to maximize protein utilization by making sure that total protein is not overfed, too much non-protein nitrogen is not used, and rumen degradable and undegradable protein (by-pass) is balanced.

Ration carbohydrate to protein ratios and degradable and undegradable carbohydrates should also be balanced. Improved herd nitrogen utilization efficiency can help economically and environmentally. Feeding excess protein that is not used by the cow costs money in a higher costing ration. Excess protein increased the amount of nitrogen excreted by the cow and thereby increases the amount of protein available to cause an environmental problem. A regular milk urea nitrogen (MUN) test can be helpful in monitoring these ration problems.

- Three subsystems monitoring: For farms that grew feed crops, whole-farm nitrogen balance and efficiency can be categorized into three subsystems: the cows (as measured by herd nitrogen utilization efficiency), manure storage efficiency and crop management, which influenced on whole-farm nitrogen balance. The next most important component was crop management, which involves things such as crop selection and nitrogen application methods that are most appropriate to the type of production.

A lot of producers do not give attention for any manure nitrogen that is applied to crops. Management practices that maximize the crop utilization of manure nitrogen can decrease the cost of purchased fertilizer plus decrease the environmental risk on dairy farm (*Philips, 1995, Eriksson, 1998, Trajkovski and Bunevski, 2006*).

The least effective subsystem was manure storage management. It is interesting to note that we were unable to show an advantage of any type of manure storage system in improving whole-farm nitrogen balance. By the main goal to reduce the potential environmental effects of nitrogen, we should be focusing on improving feed nitrogen efficiency, as well as a manure storage efficiency.

Conclusions

Dairy cows are one of the largest sources of N emissions from livestock in the world. The high concentration of very labile N in the urine leads to the rapid production of ammonia gas. Regulations controlling N emissions directed to reduce the environmental footprint of food production. Dairy producers should be aware of how regulations may affect their business, and investigate strategies to improve N management.

The extensive conversion of dietary N to microbial protein in the rumen provides both opportunities and challenges for dairy production systems. In situations where protein supply is low, physiological changes in renal function are made that salvage urea from excretion and help maintain delivery of the urea to the rumen.

When dietary protein is low, recycled urea can make up a significant proportion of N flowing into the rumen which can subsequently be captured by rumen microbes and made available to the animal. However, excess dietary N is generally excreted in the urine as urea which can have important environmental consequences. Balancing the nutrition of cows for energy and protein supply will have positive effects, not only on ration cost and profitability, but also on the environment.

Milk urea N is a useful indicator of N utilization in lactating dairy cows. A periodically bulk tank milk samples collected during milk pick up can be used not only for chemical, microbiological and quality control, but also for estimation of milk urea nitrogen content, for balancing the energy and protein ration and for reducing the N emission to environment.

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ECOLOGICAL SPECIFICITIES AND PERMACULTURE IN FUNCTION OF ORGANIC AGRICULTURE

Gorica Cvijanović, Gordana Dozet¹

We can never know the answers
To the great spiritual questions.
We were born and we live on the Earth in order to
Face with the reality of life.
Masanobu Fukuoka

Abstract

Sustainable development concept takes central place in considerations of long-term perspective of progress of human society burdened by the consequences of the dramatic environmental degradation over the past century, a strong demographic pressure and the real limitations of natural resources. For harmonious relationship with nature and creation of sustainable ways of life in the food production there was developed an innovative framework called permaculture. It is a harmonious relationship between people and the landscape through which are provided food, energy, material and non-material needs in a sustainable way. Organic agriculture is a part of permaculture system. The advantages of this mode of production are great, especially in increasing the biodiversity of plants, animals and microorganisms, soil conservation, development of farm type production. According to the position and the advantages of Serbia presence of organic farming in the country is small, only 0.4% of the total arable land. The development of organic production provides an opportunity for the development of other industries as tourism through the preservation of landscapes, gastronomy, higher employment, rural development, especially in rural areas.

Key words: *biodiversity, organic agriculture, permaculture*

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Introduction

The human species has existed on the planet for 20 million years and like all biological species has undergone profound changes and evolved in its development. Yet in 1803 Thomas Malthus was the first who explained that the number of organisms grows exponentially, and the amount of the food source, arithmetically, and suggested that the consequences of this phenomenon will produce a problem with insufficient food and the incidence of poverty. Along with the increase in the number of people in the world, after the Middle Ages, many technologies that have developed led to the emergence of a large number of new products, both in industry and in agriculture (*Trevor and Derry, 1982*). The humans survived the changes in social development, which have changed forms of social communities, too.

With the development of information and globalization revolution, it has become clear that it is necessary to harmonize human progress and survival of life on earth, because sustainable development is a balance between the needs of human society to evolve and the natural environment. And that is how the first thoughts about sustainable systems and sustainable development were given in the early twentieth century (*Cvijanović, et al. 2011*). The term "sustainable development" is associated with the condition or vulnerability of the environment. Since the time factor has to be considered, this means that sustainability must be watched as a process. In recent decades, prevails the idea that sustainable relates to non-renewable and renewable resources (*Milanović, et al. 2011*).

Sustainable development concept now takes central place in considerations of long-term perspective of progress of human society burdened by the consequences of the dramatic environmental degradation over the past century, a strong demographic pressure and the real limitations of natural resources (*Đukanović, 1991*).

Soil regeneration and revitalization is a process that takes a long time and requires high investments. Soil represents a good of all mankind, not of a generation or individual. The concept of sustainable soil development has agro-ecological and socio-economical character thanks to the development of awareness on the conservation of basic agricultural resource (*Cvijanović G. and Dozet, 2012*).

Permaculture

The basis of sustainable development is food production and agriculture. For harmonious relationship with nature, especially in food production, it is necessary to build a solid foundation, to live within the limits permitted by natural environment, and it is necessary to achieve a sustainable economy, responsibly apply research achievements, thus ensuring the strict healthy and just society.

In 1970s, this caused the development of a special area, named permaculture, as a synthesis of ecology, economics, geography, biology, anthropology, sociology. It was created as a synthesis of traditional agriculture and scientific achievements in agricultural practices.

Sometimes permaculture is seen as a way of returning to traditional ways of food production; however, it is true that they provide only an initial basis and inspiration, while the permaculture is way more than that. In permaculture are applied ecological principles, health principles (of animals, people and land) that can restore the stability of disturbed ecosystem. Permaculture allows the development of ecological principles, including raising awareness and adoption of traditional values that allow the biological and cultural survival, which can permeate through all the structures in order to provide conditions for sustainable development. It can be said that permaculture draws from several disciplines including organic farming, agroforestry, integrated farming, sustainable development, and applied ecology (*Paull John, 2006*).

For the development of sustainable systems in the environment it is necessary to abide the following guidelines: to learn from nature and copy it, not to exhaust and degrade agricultural land, material and non-material goods, not to reduce biodiversity, nor take too much from nature. In addition to these guidelines for sustainable development is necessary to implement strategy measures: not to use renewable resources faster than they can be renewed, more rely on alternative energy sources, encouraging biological cycles, recycle, compost organic waste, reduce waste production, and second, to build eco-settlements (*eco-city*), to build settlements for the people and not for cars, create communities that promote cultural and economic diversity.

Organic farming in the permaculture framework

In mid-twentieth century, public interest increased in environmental and social consequences of conventional food production system. In fact, it became clear

that "the food is far from its wild state, and it is grown in chemical or completely artificial environment, disrupts the chemical balance of the body (*Masanobu Fukuoka*).

The roots of "the wonders of modern agricultural science" can be found at the beginning of the twentieth century. The lectures by Rudolf Steiner in 1924 "The course of agriculture in eight lessons", Steiner emphasized the role of farmers and balancing the interaction of animals, plants and soil. He developed a system of production known as "biodynamic agriculture" - the first comprehensive system of organic agriculture. Steiner emphasized the role of farmers in managing and establishing harmonious coexistence between animals, plants and soil that share a common living space. Animal health depends on healthy plants used for food, healthy plants from "healthy" soil, healthy soil manured from healthy animals (*Kirchmann et al., 2008; Paull John, 2011*). This is an easy way to produce healthy food that is being developed together with the environmental engineering and environmental design where is taken enough care about the emergence of environmental changes (*Paull John, 2007*).

Organic farming as part of sustainable development, is a system of food production that does not reject the advances of conventional systems, but involves the use of methods that encourage natural biological cycles, in order to protect the ecosystem and the function of the production of health safe food (*Lotter, D.W.2003*).

To this should be added the fact that today the market lost direct producer-consumer relationship, and that the differences of living and working in the countryside and in the city even more emphasized. In organic agriculture the aim is that the manufacturer and the consumer know each another, to agree on products processing, which promotes "on the doorstep" purchase of eco-labeled products.

This way promotes the life and work in the village, which is now abandoned and forgotten. Because of its specificity in the technology of closed-loop balanced crop and animal production, organic farming requires an organized type of farm household (eco-farms). Eco-farm could become a place of keeping the genetic diversity of local native plants, as producers on farms use seed of local plant species that are resistant to climate changes and soil quality, as well as to diseases and pests.

Biodiversity and organic farming

Biodiversity for food and agriculture lists the components of biological diversity that are essential to the nutrition of the human population and improvement of life quality. It includes the variety and variability of ecosystems, animals, plants and micro-organisms at the level of genes, species and ecosystems, as well as key features of the ecosystem that is necessary to sustain human life. The man is an integral part of biodiversity and is completely dependent on it (*Cvijanović G. et al., 2013*).

It is evident that annually 0.01% various species extinct, the absolute number is about 10,000 (*World Wildlife Fund, 2008*). By methods of organic agriculture it is held a high level of biological diversity (biodiversity), maintained and increased soil fertility, as a basis for food production. Biodiversity and soil fertility levels are in directly correlative dependence. In fact, the smaller the fertility of the soil, the diversity of plants and soil microbes is poorer. That is why organic farming is a good example of protecting the diversity of genes of plants, insects, mammals, birds, microorganisms etc. The most significant threats to the environment are land degradation processes, extreme hydrological events and adverse changes in the biochemical cycling of elements (*Kovačević, 2011*). Biochemical cycling of elements is unthinkable without the biodiversity of microorganisms involved in the cycle of elements (nitrogen, carbon, phosphorus, sulfur, potassium and iron), and which adversely affects directly the application of various types of chemicals (fertilizers and pesticides). According to biodiversity of soil can be defined as a diversity from genes to communities and habitat variation.

Activity and the number of microorganisms in the soil is very important. Microbes actively take part in many processes, such as decomposition of fresh organic matter in the synthesis of specific organic compounds that participate in the creation of humus. It can be said that they take a central place in the preservation of soil fertility and release of nutrients for plants. The increase in biodiversity of microorganisms is affected by organic matter that enters the soil in the form of fertilizers of different origin (manure, green manure, crop residues, plant extracts) (*Widmer et al. 2006*).

According to research of *Cvijanovic et al. (2006a)* plowing the corn stalks increased the total number of microorganisms, as well as the number of microorganism groups (fungi and actinomycetes) that have a very powerful enzymatic system which mineralizes harder degradable substances (Table 1). By activation of microbial processes in the soil, rapid synthesis and

mineralization of organic matter is achieved, and therefore better nutrition of plants (Cvijanović *et al.*, 2006b). These processes influence the transformation of ingested organic matter (corn stalks) in soil organic matter. Researches of Dozet (2009) point at this, which found that while plowing corn stalks in the preceding crop of soybean, the number of Azotobacter in the rhizosphere of soybean has increased.

Table 1. *Effect of fertilization on the number of different systematic and physiological groups of microorganisms*

Biodiversity of microorganisms		135 kgN.ha ⁻¹	270 kgN.ha ⁻¹	Plowed all the quantities of corn stalks 8 t.ha ⁻¹
The total number of microorganisms	Log N ^o cells	1.49	1.44	1.51
	Index Level	113.7	109.9	115.3
The number azotobacter	Log N ^o cells	1.39	1.41	1.09
	Index Level	115.3	116.5	90.8
The number ammonifiers	Log N ^o cells	0.10	0.13	0.18
	Index Level	125	162.5	225.0
The number of actinomycetes	Log N ^o cells	0.15	0.18	0.20
	Index Level	75.0	90.0	100.0
The number of fungi	Log N ^o cells	0.04	0.07	0.10
	Index Level	30.7	53.8	76.9
Average	Log N ^o cells	0.63	0.65	0.62
	Index Level	105.0	108.3	103.3

Source: Cvijanović G. *et al.*, 2006.

Intake of organic matter by using microbial preparations with different diazotrophs significantly increases the number and activity of different groups of beneficial soil microbes, which positively affects the biogenous value of soil (Cvijanović G. *et al.*, 2007, 2012; Cvijanović D. *et al.*, 2008). In order to increase the diversity of pollinators and predators in organic production different types of sowing are recommended as crop rotation, intercropping, growing crops as a cover crop. Intercropping, usually of different plants (small grains and legumes, clover and grass as intercrop) increase protection of the main crop from pest attack and weeds, and soil biological activity. Due to the way of intercropping, the mass of the root system on the same unit area increases, and thus increases the amount of root

exudates which affects the dynamics of abundance and enzymatic activity of microorganisms and the overall number of microorganisms and very important physiological and systematic groups of soil microbes (Table 2).

Table 2. *Effect of intercropping small grains and soybeans on the dynamics of microbial populations*

	<i>Azotobacter</i> $\times 10^1 \text{ g}^{-1} \text{ soil}$	Ammonifiers $\times 10^5 \text{ g}^{-1} \text{ soil}$	Total numb. 10^6 g^{-1} soil	Fungi 10^3 g^{-1} soil	<i>Actynomicetes</i> $10^3 \text{ g}^{-1} \text{ soil}$	DHA μrTPFg^{-1} $^1 \text{ soil}$
Corn+Soybeans	52	124	433	163	14	148
Sorghum + Soybeans	85	213	492	98	19	136
Sunflower + Soybean	118	173	538	49	21	263
Soybeans	28	138	450	43	13	155
Average	71	162	478	88	17	141
Initial State	10	24	23	31	2	51
Index leavel	674	675	2079	277	882	277

Source: *Cvijanović and Dozet, 2012.*

Applied herbicides significantly affected biodiversity of microbes in the soil (Table 3). The intensity of the herbicide effect depends on the type of active ingredient, concentration and the speed of dissolution of herbicides (*Cvijanović G. et al., 2006; Milošević et al., 2006*). Various organic production methods help reduce soil erosion losses by 20% to 40%.

The biodiversity of soil microbes and their activity directly affect the grain quality and quantity of grown plants.

By applying the method in organic production, except the microbial diversity of soil, significantly increases the diversity of cultivated plants and animals in the agroecosystem. By intensive plant cultivation technology, in all climate zones, nowadays are grown 12 kinds of cereals, 23 vegetables and 35 fruits. Only 6 genotypes of corn take 70% of corn production.

The loss of cultivated plants genetic diversity means loss of potentially useful genes that could be used in plant breeding to increase resistance to disease or pests.

Table 3. The total number of bacteria $10^6 \cdot \text{ha}^{-1}$

Herbicides	Herbicide activity period (in days)						Average	
	3	I.N.	30	I.N.	90	I.N	Br.	I.N.
Kvizalofop-p tefuril 48g.ha ⁻¹	43	79	44	51	259	123	99	92
Oksasulfuron 60g.ha ⁻¹	39	73	93	107	218	104	107	99
Imazetapir 0,8 l.ha ⁻¹	32	61	86	98	187	89	97	91
Klomazon 0,75 l.ha ⁻¹	36	68	105	120	179	85	90	84
Average	37	71	82	94	211	101	-	-
Control	53	100	87	100	209	100	108	100

I.N.-Index level

Source: Cvijanović G. et al., 2006.

Loss of genetic diversity occurs because conventional agriculture is based on short-term production gains. Organic farming promotes the native plant species that are almost forgotten.

Alternative plant species occupy a relatively small area, but they are important diversification factors of crop production. They occupy a small area but satisfy the special needs and have a solid price. Very often the alternative plants mean plants that are almost forgotten in our area, and those that were not known but because of good agro-climatic characteristics could be grown. The group of alternative plants that are increasingly being introduced in the production are millet, sorghum, oil pumpkin, squash tickle, oil flax, hemp, foxtail millet, buckwheat, medicinal and aromatic plants etc.)

Lately, there are works on the selection of cereals for special purposes in baking and food industry (*Triticum spelta*, *Triticum durum*, *Triticum aestivum ssp. Compactum*), and the seed production of soybean and corn in organic production.

Biodiversity and development of natural and traditional farming systems is a priority in the EU, which is defined in the Strategy of biodiversity conservation by 2020 in agricultural politics. The strategy integrates the principles of conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans and programs.

In many studies of applied methods of conventional and organic production, it can be concluded that organic farming increases biodiversity, including important functional groups such as plants, pollinators and predators that enhance natural pest control (*Krauss et al., 2011*). The analysis showed increase of quantitative indicators of crops in organic production, as well as increase in soybean oil content (*Strunjaš et al., 2010; Dozet et al., 2013*). Also, examining the two varieties of peppers, both achieved better results in organic cultivation technology treated with the spores of the fungus *Trichoderma* compared to control samples without microbial treatment. In treatment of soil and seeds, significant differences are noted in plant growth, both above ground parts of stems and leaves, and roots, compared to the plants in the control group.

The best results were obtained by microbiological treatment of pepper seed, in both cultivars. Plants from these samples had better developed and larger leaves and stems, and root was more developed than in controls (*Djokovic et al., 2012*). It is very important the right choice of adaptable varieties selected to specific environmental conditions, methods and goals of production. By the expansion of areas under legumes it is preferable to apply microbiological fertilizers to maintain soil fertility and increase the economic and environmentally reasonable effect (*Dozet and Cvijanovic, 2012*).

In developed countries where conventional (intensive, modern) agriculture has resulted in the disruption of natural cycles and significant accumulation of residues of agrochemicals in the soil, the conditions for the establishment of organic agriculture do not exist. On the other hand, after all the scandals that have erupted in the food market (BSE, foot-mouth disease, dioxin, GMO...) there has increased the demand for organic products.

Worldwide, only in the past decade, organic exploitation included more than 26 million hectares with a constant increase in share of organic farming areas according to the area of a state. At the moment, the highest percentage is recorded in Liechtenstein (27.3%) and Austria (19.7%), while the most important organic farmers, who comprise the largest area, the UK, Germany and Italy. The tendency of organic production development is more expressed in the countries of Central and Eastern Europe (Czech Republic, Slovakia and Poland).

Development of organic production in Serbia started in 1990 by establishing the NGO Terra's in the municipality of Subotica. In 2009 was established the National Association for organic production "Serbia Organica" (NASO). The main objective of the establishment was to unite participants in the sector of organic production by stimulating interaction and promoting primary organic production and processing, both at home and abroad. So far, in Serbia were established five centers for organic production (Selenča, Leskovac, Svilajnac, Valjevo and Negotin).

Table 4. *The structure of the area under organic production in Serbia in 2012 (ha)*

	Area in the interim period	Area with organic status	In total	Share in total area (%)
Crops	1734.39	2.850,43	4584.82	41.31
Fruits	1091.19	4054	5145.19	46.36
Vegetables	233	296.5	529.5	4.57
Pastures and meadows	818.97	20.83	839.8	7.57
In total	3877.55	7222.26	11099.31	100

Today in Serbia under organic production are 11,000 hectares, accounting for 0.5% of the total arable land (Table 4). Fruit production is the most common in percentage with 46.4%, followed by crop with 41.3%, meadows and pastures take 7.6%, while the vegetables are grown on 4.8% organic surface. Grains, soybeans, and vegetables are the main one-year grown species. From perennial fruit plant species organic plums are grown in an area of approximately 1,188 hectares (ha), 1,177 ha of apple, cherry 409.9 ha and raspberries about 550 ha. Survey data show that more than 4,000 farmers involved in organic production. Due to the lack of clear empirical data, the total value of organic production in Serbia can not be precisely determined.

Based on the NASO research most of households own less than 6 hectares of arable land and farms that have 10 to 20 ha are less prevalent. In households with less than 5 ha of arable land crops are grown in small areas and for owners' own use, and the remaining land is used for the cultivation of berries and other fruits. Vegetables are mostly grown on farms which size is in the range of 5-10 ha. Households with more than

20 ha are grow grains and oilseeds. All farms larger than 5 ha still have a land where nothing is grown and is used for pasture or is abandoned. The larger the farm, the greater the area under organic production, but it does not exceed 15-25% of the total available land. It is mainly used for growing berries. In the category of berries raspberries dominate, while apples and plums are the most abundant other species of grown fruits (Ulrich März et al., 2013).

Agricultural land in Serbia is an important natural resource compared to many countries in the region, not only because of its scale (more than 5 million hectares, in central Serbia 60.2% and in the Autonomous Province of Vojvodina, 82%), but also because of its regional position.

Picture 1. Sites suitable for the development of organic agriculture in Serbia



The geographical position of Serbia in the Balkans provides a framework for international support to organic development. At this point, development plan of organic farming predicts that areas covered by this process in 2020 will cover more than 20% of Serbia. This should be considered in creating a plan for economic development.

The development of organic farming brings many benefits, as well as increase in gross domestic product, employment for large number of people, the prosperity of small family farms in rural areas, development of a special form of agriculture that has multifunctional access. This means production of safe certified food, educational services and agri-, eco-, ethno- and rural tourism.

Diversity of geographic, agroecological and traditional conditions of Serbia with enough environmental clean areas provides very different directions of organic farming development. Using the advantage of rural areas Serbian Government adopted the National Rural Development Programme 2011-2013 which defines:

- a) *The development of farms that operate in accordance with the standards of the environment protection.*
- b) *The development of profitable manufacturing industry, able to produce products of great demand in the domestic and foreign markets.*
- c) *The development of rural areas where the rural population could live, work and develop their own identity.*
- d) *Grant of loans for organic production.*
- e) *The legislation to harmonize organic production with EU standards.*

Climate and geographical position, in plant and animal production, has a decisive role in the production. Due to this potential, agriculture in Serbia is not an ordinary economic sector, as in all municipal and regional strategies is defined as a branch of the strategic importance of development (Cvijanovic D. et al., 2012). Vegetation conditions of plant production and soil determine the character of production. Since Serbia is located in the center of the Balkan Peninsula it has a moderate continental climate suitable for all European cultivated plants and domestic animals.

According the altitude, macro-regions of Serbia are defined, which define the production structure and have different characteristics for the development of organic agriculture (Babović et al., 2005).

1. *Lowland region to 200 masl includes the Vojvodina-Srem, Banat, Bačka. In this region 89% is agricultural land, 2% orchards and vineyards, 3% meadows and 7% pastures. In structure of areas for organic production the most represented are grain and oil crops, vegetables, fruits and vineyards. Also, in this region could be grown all kinds of medicinal and aromatic plants.*
2. *Lower hilly region from 200 to 500 masl in plant production could be labeled as fruit, crop and wine region, known for small households. The region includes the area of Belgrade, Mačva region, Posavina, Lower Morava, Danube river basin, Resava district. This region can develop an organic vegetable and fruit production.*
3. *Higher hilly region from 500 to 1000 masl can be marked as pastures and forest region in higher altitude and crop farming regions in lower altitude. Region occupies 20% of total agricultural land of Serbia. It covers the central part of Serbia, a part Braničevo region, Niš district, Upper Morava river basin, part of the Jablanica and Toplice region. On the basis of environmental factors this region has great natural resources for the production of organic food. Natural and environmental conditions make it possible to develop fruit growing, viticulture, vegetable growing and the large percentages of meadows 20% and pastures 30%. This area is defined to livestock production.*
4. *Mountainous region with an altitude above 1000 masl occupies part of the South-Eastern Serbia, Pirot and Pčinjski district, western Serbia Zlatibor, Morava, Raška district, Kosovo and Metohija district. Except in the region of Kosovo and Metohija, the region is characterized by a lower production of grain due to unfavorable agro-meteorological conditions and poor soil quality, and sufficient of the fruit and potatoes production. Because of great abundance of meadows and pastures in this region mostly dominates livestock production.*

Each of these regions has its own characteristic villages, different customs, culture and traditions. This rich heritage gives an advantage for organic production development.

Conclusion

Modern agriculture is developing on ecological principles, which means more economic production while preserving the agro-ecosystem and health of the land and people. So, this is a very complex problem, which has not been studied from the scientific point of view yet. Organic agriculture is a complex process that requires a lot of time in the implementation and integration of new methods and modification of conventional production methods. It requires involvement of the entire community through the adoption of the legislative framework, subventions for the production certification. It is necessary to carry out the plant selection and breeding for the needs of agrobiodiversity.

Serbia's geographical position, favorable climatic characteristics of each macro-region with sufficient environmental clean areas provides very different directions of organic production. Characteristics of agro-ecological conditions of the four macro-regions in Serbia enable multifunctional development of organic agriculture through a number of non-agricultural products, various types of tourism by promoting the traditions and cultural heritage.

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ORGANIC PRODUCTION AND PERMACULTURE AS CONCEPTS OF PRESERVING OF THE UNIQUE ENVIRONMENTAL FEATURES OF RURAL AREAS

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Abstract

Questions related to the possibility of survival of the planet arising from the relationship between man and nature are raised more with increasing frequency over the past decades, and the offered answers are often different to the point of diametrical opposition. Such a setting gives rise to the increasingly significant issue of sustainable development, i.e. development through which future generations should at least inherit the resources available to their ancestors. Large-scale reintroduction of the almost forgotten farming tradition into our economy requires maximising the utilisation of our natural resources, geographic position, relief, i.e. landscape, and climate. Organic farming focuses on people's future and well-being as well as enhancing the environment, so that the advantages of investing in it are of permanent character.

Key words: *organic production, sustainable development, permaculture, agriculture.*

Introduction

Organic farming and the entire food industry based on it can take up a particularly significant place in the overall contemporary economic conditions. In other words, it must be pointed out that, unlike the industrial revolution era, when the basic business model of currently existing corporation was established, human resources were a less scarce production factor, whereas natural resources and the environmental system, i.e. natural capital, which provides the basic prerequisites for life is has been shrinking substantially and is becoming an increasingly costly resource (Davčik, 2004). This, however,

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should not suggest that the emergence of organic farming and organic food industry results from a search for a solution that would re-establish the disrupted balance in the availability of individual production factors. The history of its development stretches over several decades, highlighting both the development of the basis of the concept itself, and the special motives and incentives to its application, specific of particular parts of the world.

Without disputing the benefits that the green revolution has contributed to resolving the food-population-poverty problems in the developing countries, if favouring the chemicals-based strategy in food expressed with an increasing frequency.

It is clear that the intensifying shortage of oil-based production resources will result in a further drop in food production unless a substitute is found. Such an assumption suggests that there is not too much choice: the world must turn to finding a possibility of relying on renewable energy resources available to man. Among other things, a special emphasis is placed on recycling organic waste in order to replace artificial fertilisers, on the use of available energy sources, including adherence to a crop mix shift that would enable a natural balance of pests and reduce the use of pesticides, on higher reintegration rates of cattle and crop farming, etc.

Real breakthroughs in radical agriculture technology are related to establishing new priorities in the research domain. What is essential is achieving full agreement on what should be the fundamental issues of post-industrial agriculture.

This area abounds with disagreement. Firstly, a considerable number of researchers are still starting from the basic assumptions such as: that the most important objective in agriculture is to achieve high yield; that agriculture's energy requirements will still be satisfied with cheap energy sources; that the primary farming segment can function efficiently in an already created industrial environment (*Zakić & Stojanović, 2008*).

Instead, it is clear today that the world is facing a different reality. The cheap energy sources are known, but increasingly scarce. An important role of agriculture is harmonising the exploitation of its resources with environmentally acceptable methods. The development strategy of chemistry for agriculture, machine-based farming and genetic engineering open even more alternatives in agriculture. All of this leads to new areas of scientific research in agriculture.

Secondly, a shortcoming in the avenues of research into radical agriculture is the fact that most of the works and achieved results remains within the limits of individual, specialised disciplines such as farming economics, soil microbiology, humus bio-chemistry, entomological control, solar energy technology, etc. (*Zakić & Stojanović, 2008*).

Contemporary agriculture, with a tendency to augmenting arable property size, monoculture, increased use of machinery and chemicals has been degrading the soil over the years, destroying natural diversity, and polluting the environment (retrieved from <http://kpv.rs/?p=2029>). Small farmers are becoming an endangered species, exposed to the impact of legislation, over-regulation and unpredictable changes on the market. Is there a way to fulfil humanity's needs cooperating with nature, rather than fighting it?

Organic farming means avoiding the use of chemical stimulating plant growth or protecting them from pests. Instead, it relies on natural principles used for thousands of years. Permaculture goes a step beyond, emphasising sustainability and working with the natural environment. The popularity of permaculture is growing as an increasing number of people realise that this inexpensive and simple growing method is an excellent way to produce healthy food, vegetables and medicinal herbs – in other words, a healthy life.

Man's relation to nature

Ancient Greeks envisaged man as a being of nature and related to nature. Cosmologists took a stand that the source of cosmos is of material nature, while Plato and Aristotle conceive man's soul as genial, passionate and rational, and argue that it was reasonable for man to use his reason to possess and guide the other two segments of the soul. In other words, man relates to nature reasonably, in accordance with the manner of his own concern. Plato constructs man's relation to nature in such a way that man is born nude and barefoot, and is oriented to nature to take from it what will protect him from hunger and cold. Aristotle argues that man by nature pursues knowledge, forming both himself and nature itself.

Christianity views nature as created by God, where man does not own nature – nether the soil, nor water, air or time, but it was all given at his disposal. New age, with a new side line based on the paradigm “knowledge is power perfecting and learning the nature to rule it” paves the way, rationally and empirically, to the Age of Enlightenment (and subsequently moderns), with

their stance that man is a being of progress, that progress is accomplishment, conquering nature technically and technologically, and reducing it to an object of man's cognitive powers and spheres of interest. Many scholars, however, expressed their concern, pointing to the need for a rationalisation of man and humanisation of nature, or, to put it metaphorically, man sees a tree only as an object of wood processing industry (as much as tables and benches), rather than an aesthetic entity and natural oxygen producer.

The 20th century and the first decade of the new millennium witness the fact that humans have reduced nature – and themselves – to an objects treated explicitly, which, in turn, backfires as nature's retaliation, as ubiquitous climatic changes result in endangering the environment.

The endangered and compromised natural environment, survival and existence of mankind resulted from the development of technology, science and scientific accomplishment. Awareness is rising that, alongside the environmental crisis, the very survival of human species is at risk. The concept of sustainable development for sustainable future implies a balance between resource exploitation and the ability of natural systems to meet the needs of future generations.

Disrupting the ecological balance was initiated by industrialisation, to the extent that it questions the survival of life on the Earth. Production based on developed production forces has disregarded the fact that ecosphere as a unity of biosphere and the ecosystem is irreplaceable, and if it were to be destroyed, it could not be renewed either by natural processes or by human activity.

The environmental crisis is also caused by the globalisation of profit-driven economic production activity. Mankind is currently facing a problem of exhausted and limited natural resources. The modern man must answer the questions related to energy crisis, demographic explosion, environmental impact and other issues about harmonising the natural development with environmental principles. Bearing this problem in mind, it is necessary to shed light on the issue of man's moral responsibility, but also the social responsibility as far as environment is concerned. This issue is currently being contemplatively and critically reflected on by a scientific discipline termed environmental ethics, as a normative ethical discipline. Environmental ethics implies the protection of environment as the shell of human life. Environmental ethics is based on moral responsibility, as only this way can criteria for a higher-quality lifestyle be created.

Organic production

Agriculture is of essential significance for the development of the Republic of Serbia. This fact was also realised almost a century ago by Archibald Reiss, a great friend of the Serbian people, who wrote about the contemporary detrimental practice of “pushing” as many young people to universities so that they could become clerical officers, rather than qualifying them as farmers, “knowledgeable in their trade” (Reiss, 2006). The question that any benevolent person could raise is how different it is nowadays. However, even if really notable attention were devoted to encouraging the development of agriculture, orientation to farming production in the contemporary conditions can also be supplemented with the question as to whether to opt for organic or conventional agricultural production.

Over the past two years, Serbia has been taking certain steps suggesting its interest in supporting the development of organic farming – adopting legislation, establishing the National Association for the Development of Organic Farming, setting up centres for the development of organic farming in Selenča, Valjevo, Svilajnac and Leskovac, subsidising organic farmers, etc. However, at the level of farmers as individuals, a need can be identified for education about the economic effects of opting for organic rather than conventional agricultural production.

Some scholars argue that organic farming can contribute to social, economic and environmental development, especially in underdeveloped countries. This is possible due to the application of organic principles, which implies efficient management of local resources, and thus cost efficiency. On the other hand, the organic product market at the local and international level is characterised by huge growth prospects, offering creative producers and exporters’ excellent opportunities for increasing revenue and improving standard of living.

As regards Serbia, significant potentials for organic food production are noticeable (Sudarević & Davčik, 2005). Particularly beneficial factors are the geographic position and moderate continental climate, several decades of low-rate soil chemisation and preserved biodiversity, but also a significant human potential in the area of food production and trade. Viewed by individual regions of Serbia, one may observe that its northern regions, i.e. the Province of Vojvodina, are characterised by notable potentials in field crops, oil crops and vegetables, whereas central and southern Serbia produce significant amounts of fruit (raspberries, strawberries, apples, plums, blackberries etc), medicinal herbs and wild berries. Indigenous varieties of apples and pears,

unavailable at plantations, are still found in the forest areas of Mt Zlatibor, Mt Tara and Mt Kopaonik, and may be particularly significant. As highlighted before, the long-term sustainable development process implies constant economic growth, but one that will, in addition to economic efficiency and technological progress, higher participation of clean technologies, innovativeness of the entire society, and socially responsible business, enable reduction of poverty, better resource utilisation in the long run, enhancement of medical conditions and quality of life, and reduction of pollution to a level tolerable by the factors of the natural environment, prevention of future pollution and preservation of biodiversity (retrieved from www.odrzivi-razvoj.gov.rs).

The above mentioned definition, taken from the National Strategy of Sustainable Development of the Republic of Serbia, indicates that the aim of sustainable development will be to balance three key factors, i.e. three pillars of sustainable development: sustainable economic growth, sustainable social development and environmental protection, unifying them into a single entity supported by appropriate institutional framework.

Interdependence of organic farming and biodiversity

From the very beginning of developing the system of organic farming, biodiversity is of key significance, and is focussed on two issues. The first is the impact of agriculture on process quality, and concerns the issue of benefit for nature, whereas the other concerns biodiversity and the beauty of natural of natural and wild varieties, habitats and biotopes, down to the level of the appearance of natural landscapes.

The interdependence of organic agriculture and biodiversity stems from the basic environmental principles of circulation of substances and the interaction of wildlife in nature. Agro-ecology has always been the basis of agriculture, but highlighting its role (*Oljača, 2013*), significance and application has been changing with the growth and development of the system of agriculture.

Like it always has, traditional agriculture has always relied on agro-ecology. In addition to supplying sufficient amounts of food and other products, conventional agricultural production has produced a whole range of negative consequences, not only environmental, but also social and economic. The world is faced with the emergence of environmental diseases - the biotope disbalance and the biocenosis disbalance:

1. Biotope disbalance includes harmful emissions of gasses in air and water, pesticide and heavy metals residues in water, soil and air; degradation of physical and chemical features of the soil (humus content reduction and acidification, but also disbalance in the proportion and number of individual groups of microorganisms; pollution of surface and subterranean waters, loss of arable land to urbanisation, erosion etc.
2. Biocenosis disbalance includes: loss of genetic resources of cultivated and wild animals and plants, reduction and loss of the natural enemies of harmful insects and pathogens, increased number and intensity of pests and their resistance to pesticides, chemical pollution and destruction of natural control mechanisms. The most significant threats to the environment are soil degradation, extreme hydrological events and unfavourable changes in the biochemical circulation of elements (*Kovačević et al., 2011*).

Such a condition has given rise to the development of numerous agro-ecological production systems as a response (*Lazić et al., 2008*), with the aim to achieve sustainability of agriculture and overall sustainable development. A prominent segment of these systems is organic farming, regarded as a model of sustainable agriculture in the EU as well.

Numerous studies comparing the impact of different agricultural systems clearly show the beneficial effects of organic farming methods on biodiversity parameters such as more varied taxa, higher levels of biodiversity, and greater abundance. (*Bengtsson, 2005, Frieben & Koepke; 1996; Fuller et al., 2005; Norton et al., 2009; Wetterich & Haas, 2000*).

Unlike conventional agricultural systems oriented to purchasing inputs, organic farming focuses on its own inputs in creating production systems adapted to their own localities. An organic farming system is organised in accordance with the system of low-level external input utilisation, relying on its own resources to the maximum possible extent.

The holistic approach of multifunctional organic production, which was created as supplementing agricultural production with non-agricultural products and services, does not allow the application of synthetic chemicals and GMOs. Biodiversity enables variety of production manifested through an extended crop mix shift, growing intercrops and cover crops, as well as green manure crops and predators, provided of course, that resistant, indigenous varieties and breeds are chosen.

In addition to preserving natural resources and ecosystem, multifunctional organic agriculture offers additional employment opportunities and achieving higher yields as a basis for a higher quality life in the countryside.

Organic farming focuses on product quality, respecting environmental principles and natural cycles, with a high degree of protection of the ecosystem and the environment. Organic farming is defined as a production management system based on environmental principles, high biodiversity level, preservation of natural resources, and application of high animal welfare standards, with production methods using natural substances and methods. Organic farming does is not merely agriculture that avoids the use of mineral fertilisers, pesticides and other synthesised chemicals; it is much more complex than that. With express environmental principles, it is sometimes difficult to understand, because it requires understanding, knowing and applying the integrated production system and technology, rather than individual agrotechnical measures (*Lazić, 2012*).

Today, amid the conditions of evident environmental and climatic changes, organic farming is of crucial importance. Undoubtedly, the greatest contribution of organic farming is the production of high-quality, healthful, safe food, and protection of biodiversity.

Interdependence of organic farming and biodiversity

The mid-1970s saw the emergency of the term “permaculture”, when two environmentalists, David Holmgren and Bill Mollison, coined two words together: PERMANent agriCULTURE.

In its initial development stages, the idea of permaculture was regarded as subversive and revolutionary, only to become the basis for creating entire urban communities. Permaculture, or the permanent culture of living, is related both to the organisation of farming and the overall society.

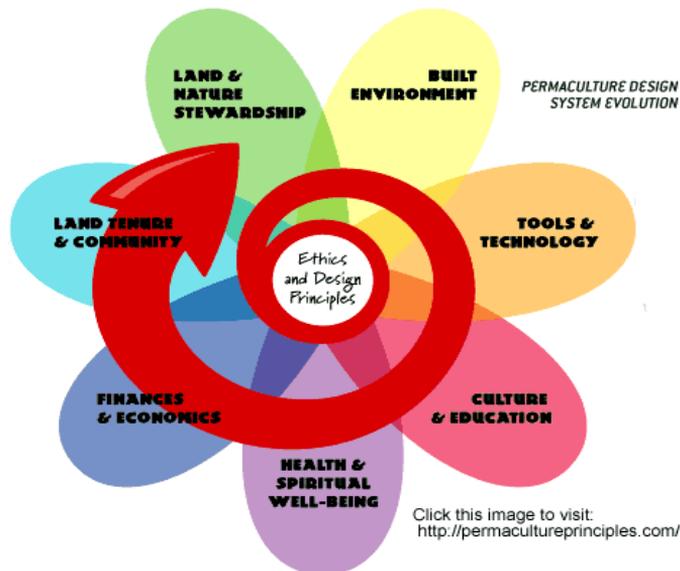
Rather than imitating the appearance of natural system, the essence of permaculture is understands the principles along which they function, and their active application. Permaculture is defined by a sustainable lifestyle of human communities, modelled on nature.

A synthesis of ecology, geography, anthropology, sociology and design is what makes permaculture highly complex. Permaculture is often understood as simple return to the traditional patterns of the past, although it is far more

complex than that. Permaculture is a synthesis of traditional agricultural practices and innovative technologies representing a way of life with recognisable pathways and principles, using the knowledge assembled from numerous areas of science.

The complexity of relationships, interaction and fusion in permaculture is represented as follows:

Figure 1. *The permaculture flower*



Source: Retrieved from <http://www.arculture.org/permaculture.html>

The spiral represents the evolution and application of permaculture principles. The initial personal initiative builds on the local, collective and global level. The petals of the permaculture flower represent the areas used for expanding and designing the permaculture project (<http://cuvariprirode.org>).

1. Building: natural materials, solar design, biotecture, organic design of resistant constructions;
2. Tools and technologies: hand tools, do-it-yourself craftsmanship, renewable energy sources, fuel from organic waste, reuse and recycling, energy storage, adaptation and redesign of infrastructure and technology;
3. Culture and education – home education, active participation in problem resolution, social ecology, interactive school-based learning;

4. Health and spiritual well-being – preventive and alternative medicine, regular tai chi, developing emotional intelligence, real values and harmony with natural laws;
5. Finances and economies – rural area development, efficient resource utilisation, eco-chain (producer-consumer), fair trade, use of new technologies;
6. Land tenure and community – legal structure for environmentally designed communities (common property and organisation), consensus in decision making.
7. Land and nature stewardship: bio-intensive gardens, organic production, gathering and storing the seeds of selected cultivars, productive landscape analysis, sustainable development, developing forest ecosystem, gathering wild berries, integrated aquacultures.

The basic principles of permaculture

Permaculture is a holistic approach applicable to all aspects of life. The essence of any sustainable design and practice contains the basic set of values and ethical principles, constant regardless of the situation. The nucleus of permaculture is in the ethics and design of principles permeating all structures in order to enable the conditions for sustainable development. Above all, the ethics of permaculture includes developing awareness and adopting traditional values enabling biological and cultural survival. The ethics of permaculture is greatly different from the concept of currently existing social norms and thinking patterns. To put it simply, it is retro-innovation.

Figure 2. *The basic principles of permaculture*



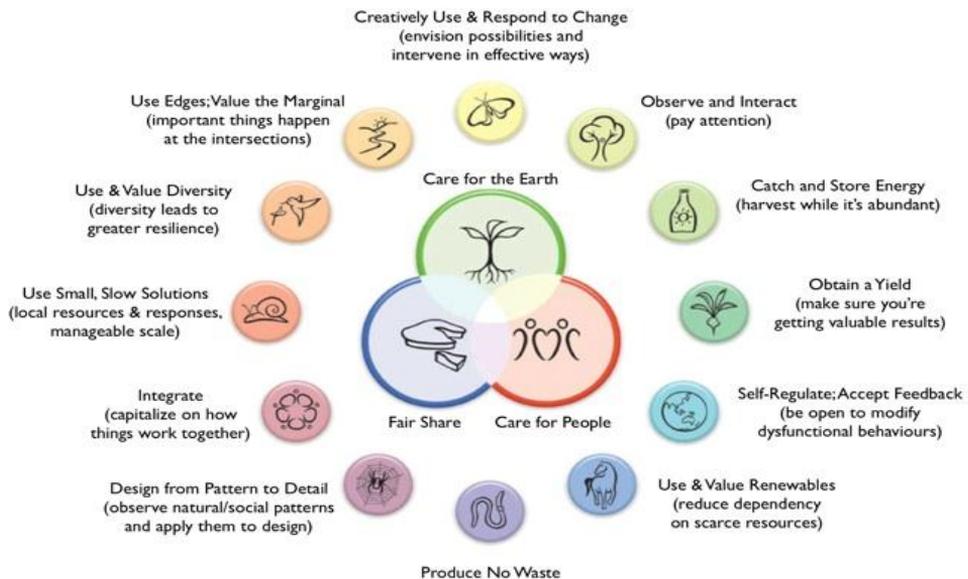
Source: Retrieved from <http://www.habitatreimagined.com/permaculture/sustainability-and-permaculture-ethics-2/>

1. Care for the Earth – overall care for the planet and life, and reduction of one’s own environmental impact:
2. Care for people – developing love and respect to oneself as a prerequisite for understanding and love of others, social cooperation, focussing on the positive and developing the opportunities it offers, accepting personal responsibility
3. Fair share – moderation in the consumption of natural and social goods, gaining personal and social benefit from established balance, mastering oneself. “Man who has mastered himself can behave appropriately at any opportunity in an appropriate manner. Such a man is rightfully referred to as the artist of living” (retrieved from <http://cuvaripriode.org>).

The principles of permaculture

Permaculture is based on twelve principles enabling creative redesigning of the environment, as well as a personal attitude and treatment of natural resources and sustainable communities. The principles are universal and applicable on various segments of the society. Permaculture is the response for the organic redesign of the society and culture.

Figure 3. *The principles of permaculture*



Source: Retrieved from <http://www.habitatreimagined.com/permaculture/the-principles-of-permaculture-extend-beyond-the-landscape/>

Permaculture as a concept of rural environment preservation

Permaculture solutions strive to harmonise the needs of modern-day man with environmental preservation. In permaculture, man and his actions return to the natural circulation of things, as a part of cyclical system without waste and wasting energy. Permaculture merges traditional skills with modern achievements and methods.

1. Energy

Energy used nowadays is mostly of fossil origin, and its application raises great environmental problems. It is recommendable to use energy from renewable sources. Renewable energy sources are the energy of wind, sun, biomass, tide, and geothermal energy. Sustainable design and blueprinting may result in high amounts of saved energy. Some of the common and available solutions for households are solar collectors for warm water, wind turbines and solar cells for electric energy, solar cookers, biogas, use of wood for fuel, installing stoves with large thermal mass, etc.

2. Water

Water resources are exposed to most polluting systems, because, eventually, all waste waters, oil spills on land and at sea, chemicals from agriculture, and urban sewage systems finish in subterranean waters, rivers and seas. Due to abrupt climate changes, the level of subterranean waters is dropping, thus jeopardising pumping facilities and wells. Due to all of the above, it is essential to know how to manage water sustainably, save water, build rainwater accumulation systems, gather precipitation water for agriculture, purify waste water, use composting toilets and purify grey water with plant-based purifying facilities.

3. Soil

Soil is the habitat of people, animals and plants, and also the main source of food for them. As it serves as a filter of precipitation waters, soil quality influences water supplies. Conventional agriculture, with supporting agrobiochemical industry, degrades soil permanently. A response to this destructive trend lies in all types of environmentally friendly agriculture and organic food production. The application of permacultural and other organic solutions in agriculture, construction and infrastructural intervention does not destroy soil or pollute subterranean waters.

4. Air

Just like other above mentioned elements, air is exposed to all types of polluters, and is essential for life on the Earth. Nature needs to be protected from air pollution, although everyone may influence the quality of air in their own area, at least by their positive example. The use of bicycles, public transport, electric bicycles and moped, biodiesel fuel and bio-ethanol, common automobile use and planting trees that will absorb carbon monoxide can influence the air pollution statistics.

5. Construction

One-third of waste on the world's landfills is accounted for by construction waste, remaining from conventional construction. In addition to being a great ecological problem on the planet, the newly constructed facilities are unhealthy environment, teeming with toxic substances, and also electromagnetic, light and sound pollution. Investors rarely comply with quality regulations, and new structures are not insulated in accordance with energy standards that are inadequate anyway, so that these facilities use huge amounts of energy from fossil fuels for heating, cooling and maintenance. Sustainable construction is full of inexpensive, natural and healthy solutions. The use of local resources supports the development of local communities and reduces CO₂ emissions. The past thirty years have seen a rise in the popularity of compressed straw boards, earthship structures, houses made of natural material like wood, brick, adobe, stone, clay etc. Structures are insulated with cellulose, wool, expanded clay, straw, coconut fibre etc. Green roofs are constructed where food can be grown; buildings are designed with vegetable gardens and orchards incorporated in the architecture itself or immediate surroundings. Real productive green oases, healthy neighbourhood have been created in the centres of many modern cities.

6. Organisation / society

A large number of books have been written and many discussions have been held, criticising modern political systems. Unfortunately, we are living in societies of unhealthy competition, lobbying interests of the governing elite, non-cooperation and absence of scruples. This is how a political system was set up which only sees material profit as a goal, not choosing the means of achieving it, responsible for almost all disasters that have happen or will happen to the civilisation and the planet Earth. Political changes are occurring slowly. There are many positive initiatives and projects offering a higher-quality and more integrated view of the perseverance of human communities. These are, primarily, the eco-village movements, numerous towns and cities incorporating environmental and sustainable principles, commendable projects

of many ministries, projects of enterprises acting along ethical principles, and a large number of networked organisations and individuals devising a better future. Care for people is the key factor for successful projects. Real synergy among people will occur only if things are set up transparently, and if the principle of consensus is applied in decision making.

Conclusion

Organic agriculture contributes to socio-economic and environmentally sustainable development, especially in underdeveloped countries, owing to the application of organic principles, implying efficient local resource management, and thus cost efficiency. The organic product market at the local and international level is characterised by huge growth prospects, and it offers creative producers and exporters excellent opportunities for increasing income and improving standards of living (*Berber, Đokić, Vugdelija, 2011*).

Supporting the thesis that organic agriculture can contribute to the sustainable development of the Republic of Serbia, we can state that the overall goal of the National Strategy of Sustainable Development of Serbia related to agriculture is conceived as the creation of cost-effective and environmentally acceptable agricultural production, which should be the basis of livelihood of rural population in areas where there are natural conditions for achieving a competitive level adequate for entry into European and other markets (National Strategy of Sustainable Development of Serbia), while the goals of organic agricultural production can be summed up as (*Subić, Bekić, Jeločnik, 2010*):

- *increasing the productive ability (fertility) of soil;*
- *minimising energy input on farms;*
- *reducing environmental impact; and*
- *maintaining the achieved production level.*

Integrations into the European Union suggest the expectations that organic agriculture will be developed, as this is where its role is significant. Attitude to agriculture in general, at least because of the surplus it yields to Serbia, and its great natural wealth and potential is likely to become highly important for the state. No less relevant is the discussion on bureaucracy and questionable economic structure. The only current question is whether another hundred years will be enough for achieving success in this direction, and even if it were successful, where it all would lead.

At the same time, in a setting where a large number of employees work substantially more than the prescribed hours, in the current standards of living and collapse of all the system of value, a feeling of nostalgia for human and family relations, including food, that used to exist, is bound to emerge.

As it usually is, presenting statistical data on unemployment, poverty, even starvation, especially in cities, would apparently play down and turn into mere figures the human plight visible worldwide. On the other hand, in half a century, from 1950 till 2000, eight million people have moved from the countryside to cities. Villages are full of empty houses – an estimated figure of about 200,000 homes; at the same time, almost half of the population of Serbia live in the countryside, and less than 40 percent are involved in agriculture.

Permaculture as such is still inadequately researched, although it does not require high investment and projects. Accepting permaculture as a lifestyle and bringing it closer to people would present a significant leap for Serbia, as it makes itself concrete and possible. As it has already been stated above, bearing in mind that a large segment of Serbian population has rural roots, in villages that are neglected, empty, overgrown with weeds and surrendered to extinction, permaculture is offered not only as a benefit, but also as a salvation (retrieved from <http://www.zov.rs>).

Another reason is the necessity for Serbia to turn to massive-scale organic food farming which, practically, relies on permaculture. Moreover, bearing in mind that an increasing number of modern people want and try not only to purchase products labelled s ‘bio’, but also to choose and pick them themselves, this possibility and orientation is becoming not only increasingly acceptable, but also inevitable (retrieved from <http://www.zov.rs>).

Bearing in mind all the above, a whole range of facts, internal and external factors point to the fact that the further development of organic agriculture is based on permaculture principles as not only likely, but essential not only for the world but also for Serbia. Its contribution to sustainable development unifies all the stated facts.

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POTENTIALS OF FORAGE CROPS PRODUCING IN PURPOSE OF ENCOURAGING THE SUSTAINABLE DEVELOPMENT OF UPPER DANUBE REGION¹

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Abstract

The goal of this paper is analysis of forage crop production in area of Upper Danube Region, which for the purpose of this research includes the territory of four municipalities: Apatin, Bač, Bačka Palanka and Sombor. We have used the data from the Republic Statistical Office for the period of 2002-2011, so that in analyzed municipalities represented the dynamics of production of most important forage crops (alfalfa and clover), as well as production of voluminous forage crops on meadows and pastures. It will be presented the significant of this type of plant production in sustainable development of mentioned bioregions.

Key words: *forage crops, meadows, pastures, sustainable development, Upper Danube region.*

Introduction

Sustainable development for its goal have task to satisfy the needs of consumer society, while at the same time decreasing or completely elimination of damaging impacts, which represents threat for environmental and natural conditions. Because of its wide applications, principle of sustainability for it goal have consolidation of *pier I – development of economics, economy and technology, pier II- sustainable development based on social balance and pier III – environmental*

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protection with rational managing of the natural resources. The assumption of sustainable development is based on that society should be managed with three types of capital (economic, social and natural capital), on way which that they considered an irreplaceable and which consumption can be irreversible. On that indicates and fact that natural capital not necessarily be replaced with economic or society capital, although is possible to find a replacement for certain natural resources (Jovanović, M.; Bekić, B.; 2012).

One of goals of *National strategy of sustainable development* (“*Official Gazette of Republic of Serbia, number 57/08*”)⁴, is increasing the agricultural land under organic and others ecologically acceptable systems of agricultural producing and also raising and strengthening awareness of agricultural producers about environmental protection issues, with respecting principals of protection the biodiversity and benefit of all kind of animals.

Conservation of environmental and genetic resources in agriculture represents turn point of development the agricultural productions on territory of local communities, because based on it later can be expected growth and development of sustainable production. In correlation with that, besides using the principals of sustainable development, it is useful to use the term – bioregionalism, as well as biodiversity.

Bioregionalism can be observed as subspecies of regionalism⁵, which borders are determined by natural borders of ecosystem. Title derives from Greek word *bios- life* and Latin word *lagere - space on which should rule (life territory – place defined by live forms which inhabit it)*. Conceptually, bioregionalism represents the way of development and organization of society life which relies on natural characteristics of place, i.e. bioregion (Puđak, 2010).

Bioregions strive to ecologic, economic and cultural self-sufficiency, so they interact with other (bio) regions in the surrounding, which in itself is

⁴“Official Gazette of Republic of Serbia, number 57/08”, National strategy of sustainable development, Government of Republic Serbia, Belgrade, 2008.

⁵Regionalism is conceptually above notion which defined bioregionalism and etymologically derives from latin word *legere – space on which should rule*. Region represent homogeneous space (on the basis of physical-geographical, historical-cultural, economic and/or political criteria) in relation to the parent entity, with the remark that one region can territorially include more countries.

considerate to natural environment (water, land, air, climate) and who its ecosystems do not consumed across their upper limits (*Sale, 2000.*). Bioregionalism was created in late '60s of past century as product of work the great number of activists, which try to find in her the modus between economic growth, from one side and cultural and ecologic sustainability, from the other hand.

Borders of bioregions are not determine based on administrative borders, but natural characteristics and borders of ecosystem, which are not clear, but gradually flow from one to another (*Puđak, 2010*). They are formed with creating of human settlements which follow the unique characteristics of climate, land, flora and fauna, which are characteristics for specified place.

Bioregionalism, because of that is completely leaning on biodiversity. Biodiversity represent the total biological diversity, which includes all forms of disparity, changes and occurrences, precisely all process of organisms and biosphere at all. It includes genetic, specific and ecosystem variability, which provides the diversification and sustainability of natural resources.

As a result of bad regional planning and non-application of good agricultural practice it coming up to impoverishment of biodiversity. Due to intensive and non-planning cultivation of soil and intensification of agricultural production comes to reducing of biodiversity and its weakening, in some cases to completely disappearance certain species or breeds of animals. Non-planning intensive agriculture can lead to rinsing the fertilizers, pesticides, animal excrements and rinsing of soil, which pollute overhead and underground water, until pollution with nitrates from agriculture presents major problem (*Jovanović, M.; Bekić, B.; 2012.*).

Considering that on the area of Upper Danube is dominated present the intensive conventional production of primary agricultural products for mass consumption, processing and export, may come to endangering of soil, water, air, biodiversity and landscapes (*Popović, Mijajlović; 2013*).

Because of that the respecting of standards in area of human protection, plants and animals, environmental protection and good agricultural practice during managing the soil and waters, parallel with the implementation of agro ecological measures and programs, is the way to

ensure the ecological sustainability of agriculture in this region (*Popović, Sarić, Jovanović; 2013*).

Using the potential for development of agriculture, in context of good agricultural practice, implies respecting of satisfying need of present on way which doesn't question the ability of future generation to satisfy their own needs. On that way will be establish the balance between on consuming the resources and ability of natural systems to satisfy need of future generations. Instruments which possible can contribute to creating this framework are **instruments of sustainable development**.

Sustainable development of local communities largely depends on the orientation of population on development of ecological conscience about limited resources. One of the spheres of sustainable development, important for the research in this paper is environmental protection (use of natural resources, appropriate management, prevention of pollution), through emphasizing smaller invasive methods of agricultural production in the smaller communities.

Production of sufficient amounts of forage crops presents basis for further development of crop production, as and creating technological basis for production of sufficient of quantities of milk, dairy and meat products in agricultural holdings and in industry, which was later improve livestock production and reduces the need for imports feed.

Advantage in using the characteristics of forage crops s that the their growing as a basic crop or stubble crops on meadows and pastures is realized constant utilization of surface soil, after removal of aboveground biomass soil remains loosely, non-infected by diseases, rich with organic remains and mineral substances.

Is created a good basis for the production of fresh voluminous feeds, while the process of haylage and silage can produce enough food for the periods when the stock is not in the open. On that way is create the good basis for proper differentiation of meals domestic animals, along with concentrates and supplements in a smaller proportion Forage production is the basis of sustainable development of the region in which it is grown because food causes the further development of sustainable farming.

In Republic of Serbia, the AP Vojvodina and the region of the Upper Danube, the production of all categories of crops facing a limit in terms of

area, soil quality and other factors. With the same problem is faced production of all categories of forage crops. With continued rises the area under cultivation of culture for human consumption and high energy plants, reducing the surface area that can be used for forage production. Therefore it is necessary that on the surfaces which are available, with more rational managing produces a sufficient amount of forage necessary to satisfy the emerging needs (*Z. Štafa and authors, 1997*).

On the surface is better and more economical to produce culture for feed mixtures, because with the dense planting is the best exploiting the land, light, nutrients, plants less flattening, it is easier to dry, for mowing, give the yields of better quality. Besides that, the production of forage it is possible to use a period in the production between of major crops (interpolation) - when it comes to fodder crops with a short growing period. (*Z. Štafa and authors, 1997*).

Given that the Research conducted on small location, which covers an area of special nature reserve "Upper Danube" (which are located Sombor municipality and Apatin) and municipality of Bač and Bačka Palanka, the notion of sustainability, as well as the concept of bioregionalism has its own significance and role. For the purposes of the subject research, the entire region will be called the Upper Danube region.

Materials and method

For research purposes is defined area of the Upper Danube region, which includes the administrative territory of Sombor, Apatin, Bač and Bačka Palanka. Based on the data the Republic Statistical Office and the strategic documents of municipalities in the area of the Upper Danube region, it will be realized the analysis of the current situation of forage plants production, as the most important crops (alfalfa and clover) and production in meadows and pastures. Presented research are also performed and on national, and also on the level of AP Vojvodina, for purposes of comparative analysis. Research was conducted for period 2002-2011 year.

Results and discussion

The entire area of Upper Danube region is characterized by favorable geostrategic position, natural resources, with richness of flora and fauna, with good infrastructural connection of all municipalities. On this area is

located the special nature reserve "Upper Danube", which represent the protected natural goodness of I category. This Reserve extends along the left bank of the Danube, from 1,367 to 1,433 km of the overall flow, covering an area of 19.500ha⁶ and one of the last areas of the floodplain soil of the European continent. Because of interweaving of the ecosystem, which this nature reserve classified into one of the few bioregions in Europe, there is a mosaic of different vegetation forms.

Also, due to high micro of relief, at least the difference in altitude, cause the development and survival of different species. The most typical inhabitants of the region are shrub species: dogwood (*Cornus sanguinea*) and hawthorn (*Crataegus sp.*). In Red book of flora of Serbia are following endangered taxa: water violet (*Hotlonia palustris*), winter aconite (*Eranthis hyemalis*) and horsetail (*Hippuris vulgaris*). Addition to the above species which represent, there are a number of species of animals that are taken shelter here.

Development potentials of Upper Danube Regions municipalities lies in realization of strategic goals of local communities, which are possible to achieve by implementation different strategic documents, as well as realization certain programs cross border collaboration, which are realized in period 2007-2013 (IPA projects), in which emphasis is given on creation of framework priorities and measures which are related to sustainable socio-economic development, with special accent on protection and preserving of natural goodness of gross border area, taking joint measures and increased public consciousness, and particular attention is directed to agricultural production and association and organization of agricultural producers.⁷

Agricultural activity on territory of Upper Danube region have very long tradition, where is in spite of dominantly present intensive agricultural production, year after year, increasing the area under organic agricultural production (*Jovanović, Bekić, 2012*). The aim this kind of diverting is consequence of need for decreasing the influences of agricultural activity on environment, it's somewhere in opposing positions, when viewed from the production of basic agricultural products.

⁶ Gornje Podunavlje Special Nature Reserve: www.gornjepodunavlje.info (12.09.2013.)

⁷ IPA cross border program Hungary - Serbia 2007-2013., www.hu-srb-ipa.com, IPA cross border program Croatia - Serbia 2007-2013., www.croatia-serbia.com (14.08.2013.)

Agricultural land represent significant natural resource, based on which is possible to talk about sustainable development. Because of that the land of good characteristics is crucial significant for agricultural production, because represents medium where taking place all biochemical process need for further growth and development of plants.

In the past few decades in the area of Republic of Serbia and AP Vojvodina is noticeable decrease total agricultural land (as for permanent settlement and expansion of industrial facilities and road infrastructure at the cost of quality sites. At the same time, in the Upper Danube region is noticeable slightly increase in agricultural fields. Based on the data from Tables 1 and 2, it is evident that on territory of the Upper Danube region are favorable characteristics for agricultural activities in the agricultural area. Table 1 provides an overview of agricultural land in the Republic of Serbia, AP Vojvodina and the area of the Upper Danube region.

Table 1. *Total agricultural land in Republic of Serbia, AP Vojvodina and Upper Danube region, in period 2002-2011*

(in ha)

	Republic of Serbia	AP Vojvodina	Upper Danube region
2002	5.106.900	1.783.175	198.974
2003	5.115.072	1.793.572	200.698
2004	5.113.307	1.792.159	199.876
2005	5.112.323	1.790.565	199.836
2006	5.105.008	1.780.950	198.798
2007	5.052.957	1.747.441	194.136
2008	5.093.192	1.781.253	199.606
2009	5.096.646	1.780.756	198.392
2010	5.091.507	1.784.352	201.271
2011	5.096.267	1.780.588	200.949

Source: *Municipalities in Serbia 2003-2010, Municipalities and regions in Serbia 2011-2012. Republic Statistical Office, Belgrade, Serbia.*

The following table gives an overview of the area under fodder crops in the Republic of Serbia, AP Vojvodina, and the Upper Danube region. Forage crops were statistically significant at all three monitored areas.

Table 2. Areas under forage crops on arable land and gardens, 2002-2011
(in ha)

	Republic of Serbia		AP Vojvodina		Upper Danube region	
	Arable land and gardens	Forage crops	Arable land and gardens	Forage crops	Arable land and gardens	Forage crops
2002	3.351.086	466.444	1.580.541	76.159	179.445	6.717
2003	3.345.154	463.122	1.582.691	74.013	179.697	5.712
2004	3.343.916	463.924	1.581.822	76.814	179.964	6.050
2005	3.329.973	460.631	1.581.845	75.211	180.317	5.886
2006	3.318.392	458.413	1.574.421	72.751	180.474	5.274
2007	3.298.701	456.837	1.571.524	73.001	176.258	5.165
2008	3.302.089	465.558	1.574.477	74.975	179.696	5.464
2009	3.300.999	455.004	1.049.735	180.230	180.230	5.041
2010	3.294.922	459.987	1.578.331	182.749	182.749	4.979
2011	3.293.577	455.017	1.577.733	184.113	184.113	4.900

Source: *Municipalities in Serbia 2003-2010, Municipalities and regions in Serbia 2011-2012. Republic Statistical Office, Belgrade, Serbia.*

Arable land and gardens are the most present way of using the agricultural land. Based on Table 2 it can be seen that share of arable land and gardens at total agricultural areas ranges in next spans:

- 64,63%-65,75% on level of Republic of Serbia;
- 88,24%-88,95% on level of AP Vojvodina;
- 89,56%-91,62% on level of Upper Danube region.

Based on data in *table 2*, share of forage crops in arable land and gardens on level of **Republic of Serbia** is characterized a positive, but cyclical trend in observed period. Lowest share of forage crops are noticeable in 2009. (13,78%), biggest in 2008 (14,09%).

On territory of **AP Vojvodina** share of forage crops in arable land and gardens are also characterized with cyclical trend, and share moves from 4,62% (2006) until 17,17% (2009). Especially is interested that in last three years of observing share of forage crops increased to three to four times in compared with past year, which is consequence higher orientation of agricultural production in general to production of plants for domestic animals feed.

At the territory of **Upper Danube region**, there are favorable conditions for the development of forage plants in total area of arable land and

gardens, no matter what the second half of the period reduced the proportion of acreage under fodder crops (Table 2). The largest share of fodder crops in the fields and gardens was recorded 2002 year (3.74%), while the lowest proportion (2.66%) recorded in the 2011th year, which may be due to increase in area under cereals.

Meadows and pastures represent one of the most important ways for using the agricultural land, on which are of which produce different types of forage crops as well as other crops that are important for animal nutrition. Meadows and pastures are an important factor in determining the level of development of rural areas, although there is reason to fear that because of the reduction in the total number of animals that grazing biomass amounts, can completely change the floristic composition and share useful forage plants, because there is a higher share of weed culture, the account of reduction of useful legumes and other grasses. In Table 3 is given the presence of meadows and pastures in the total agricultural land in all three observed levels.

Table 3. *Share of meadows and pastures in total agricultural surface, on area of Republic of Serbia, AP Vojvodina and Upper Danube region (in %)*

Year	Republic of Serbia			AP Vojvodina			Upper Danube region		
	Total agricultural land	Meadows	Pastures	Total agricultural land	Meadows	Pastures	Total agricultural land	Meadows	Pastures
2002	100	11,55	15,99	100	2,02	5,95	100	2,68	4,18
2003	100	11,62	16,15	100	2,12	6,28	100	2,92	3,65
2004	100	11,70	16,10	100	2,06	6,25	100	2,63	3,91

2005	100	11,92	16,27	100	2,15	6,10	100	2,74	3,49
2006	100	11,94	16,42	100	2,16	6,01	100	2,86	3,32
2007	100	12,28	16,53	100	2,40	6,09	100	4,33	4,03
2008	100	12,19	16,35	100	2,30	5,91	100	3,34	3,21
2009	100	12,26	16,36	100	2,28	5,69	100	2,69	3,89
2010	100	12,25	16,41	100	2,37	5,72	100	2,70	3,83
2011	100	12,19	16,57	100	2,32	11,29	100	2,37	3,28

Source: *Municipalities in Serbia 2003-2010, Municipalities and regions in Serbia 2011-2012. Republic Statistical Office, Belgrade, Serbia.*

Increase the share of meadow in total agricultural land in the territory of the **Republic of Serbia** was recorded in the period from 2002 to 2009, after which, the last two years, lead to decreased areas under grassland. Pastures are present in higher percentage of the meadow, but their share in total agricultural land is characterized by cyclical trend, which may indicate problems in the production of sufficient quantities of nutrients and greater reliance on imports of raw materials and increased use of concentrated feed.

Share of meadows and pastures in total agricultural areas in **AP Vojvodina** are also characterized by cyclical trend. Biggest share of areas under meadows is notice in 2007 (2,40%), until the lowest share is recorded in 2002 (2,02%). areas under pastures are three to four time bigger that areas under meadows, so that the largest share of grassland recorded in the 2011 (11,29%) and the lowest was observed in the area 2009 (5,72%).

The **Upper Danube region** is characterized something smaller share of meadows related on pastures, which is case also on level of Republic of Serbia and AP Vojvodina. Observing the given data meadows and pastures represents stimulus for sustainable rural development, no matter that trend of share the meadows and pastures are characterized with cyclical rhythm. Highest share of agricultural lands under meadows is recorded in 2007 (4,33%), until the lowest share of meadows areas is recorded in 2011 (2,37%). Pastures recorded for one third higher areas relater to meadows, so is recorded that the highest share was in 2002 (4,18%), until lowest was in 2007 (3,21%).

Production of forage crops represents one of the most important links in the chain of maintenance of livestock fund. No matter if doesn't exist the forage fodder that contains all necessary nutrients in sufficient quantity and favorable relation, plant nutrition (forage crops) occupy the most important place in the diet of ruminants, and are the most important forages (fresh and cured in different ways). Food costs make up 50% of the total cost of livestock production, which adds to the cost of the final product. Cheaper feed can be found in the production of cheap fodder, purchase of necessary nutrients through a balanced meal. (*Jovanović i autori, 2012*)

From pastures the green aboveground biomass caring out by graying of livestock, while from the lawn is caring out by haymow. Nutrition of forage crops depends from botanical composition (share of important legumes), from way of using (when we speak about pastures), as well from the way of storing/processing (in the form of silage, haylage or just dried - hay).

Clover and alfalfa are the most common and most important forage crops in livestock nutrition, occupying the largest area, which are at the same statistically significant. Reason profitability of these crops on arable land

can be explained by the high nutritional value which they have in use in fresh and processed state and that can be grown in almost all soil types.

Accordingly, in Table 4, it will be presented to the ten-year period of production of important forage crops (alfalfa and clover) and the production of green biomass meadows and pastures in Republic of Serbia, Autonomous Province of Vojvodina and Upper Danube region.

Table 4. *Production of forage crops in Republic Serbia, AP Vojvodina and Upper Danube region, in period 2002-2011*

(in t/ha)

	<i>Republic Serbia</i>				<i>AP Vojvodina</i>				<i>Upper Danube region</i>			
	Clover	Alfalfa	Meadows	Pastures	Clover	Alfalfa	Meadows	Pastures	Clover	Alfalfa	Meadows	Pastures
2002	525.328	1.006.359	1.198.891	384.762	24.102	321.953	50.454	76.895	3.078	25.977	9.343	8.052
2003	419.468	836.470	996.514	335.912	22.681	258.144	40.493	55.841	1.101	16.899	8.606	6.532
2004	572.483	1.135.347	1.309.738	452.711	39.005	352.323	61.830	97.554	1.423	36.031	10.549	5.196
2005	574.332	1.166.529	1.268.755	475.375	45.371	387.485	90.967	94.736	1.605	35.576	12.350	8.951
2006	548.436	1.104.287	1.253.319	489.375	49.688	363.390	71.058	98.450	1.808	28.169	12.649	9.809
2007	435.499	904.838	1.013.773	360.413	45.067	316.425	64.818	71.575	1.688	27.588	12.882	9.047

	2011	2010	2009	2008
	480.354	556.537	543.813	522.956
	985.410	1.104.840	1.114.846	1.069.668
	1.189.910	1.354.586	1.236.976	1.151.487
	478.939	509.636	471.043	424.747
	54.437	52.981	45.604	40.405
	350.291	384.331	378.204	359.418
	65.506	78.201	69.708	65.856
	111.864	105.657	90.805	81.544
	1.437	2.163	2.242	2.493
	17.838	27.628	32.058	28.581
	8.876	10.076	11.376	11.683
	9.838	12.949	13.063	9.509

Source: *Municipalities in Serbia 2003-2010, Municipalities and regions in Serbia 2011-2012. Republic Statistical Office, Belgrade, Serbia.*

Forage crops production (clover, alfalfa, meadows and pastures) in the territory of the **Republic of Serbia** occupies an important place after wheat and corn, while acknowledging unbalanced trend of production in the observed period. Clover production is characterized by a slight increase to the 2005, after which followed a decline in the 2006t and 2007, followed by a re-intensified production and yields have increased, but the 2011th were again noticeable decline significantly in yield clover. The yield of alfalfa records also unbalanced trend, what with clover. Yield was recorded with meadows and pastures are very important, but also unbalanced and recorded the alternating decline and increase yield per unit of area.

Share of clover production in territory of **AP Vojvodina** in relation to total production in Serbia ranges from 4.59%, respectively, in 2002, to 11.33%, respectively, in the 2011th year. Between the first and last years, there has been a cyclical trend yield clover. The yield of alfalfa, also varied in the observed period, with the highest yield recorded in the 2005th year (387.485 t / ha) and lowest in the 2003rd year (258.144 t / ha). Production of green biomass, in meadows and pastures AP Vojvodina is also an important factor in the overall development of the region, with the most intense year 2005 (for the meadow) and 2011th (for

pasture). The lowest yields were recorded in the 2003rd, and in meadows and pastures.

Regarding the production of fodder crops on the territory of the Upper Danube region Clover production is much smaller than alfalfa. Clover production is uneven; the largest quantity of Clover produced per unit area was 2002nd, while the lowest yield was recorded in the 2003rd. Last year (2011), was also characterized by decreasing returns clover. Production of alfalfa is far ahead from yield of clover, also and meadows and pastures, and the most intensive production recorded in the 2004th year (36.000 tons/ha) and the lowest in the 2011th year (17.838 t/ha). Meadows and pastures in total production per year, an important place and make up a quarter of biomass produced.

In the municipalities of the Upper Danube there are real opportunities for the production of sufficient quantities of fodder, as well as for the improvement of the current potential, with proper organization of production and the closing value chain of products on family farms. Sufficient quantities of fodder ensure utilization of natural resources meadows and pastures, which can act as an incentive for retail banking, to return and remain in rural areas, using the same sustainable agricultural practices.

Conclusion

Production of forage in aim of preservation of bioregions and sustainable development at national and local level is high. By growing of these crops, you can create a foundation for further development of more efficient and productive livestock (by reducing the price of milk, meat and meat products), a beneficial effect that is manifested in the meadows and pastures bioregions and help preserve the environment.

Forage crops production in the observed location of the Upper Danube region is characterized by a variable proportion of the yield in ten-year period as a result of limited space, but also reduction livestock production. Potential for production of fodder crops are in the future it can be expected that the strategy documents and agricultural policy directed towards household livestock production, livestock pasture, etc., In accordance with the concept of organic farming and other non-conventional measures of production.

Exploiting benefits the strategic position of municipalities in the region of the Upper Danube, the presence of a special nature reserve can create opportunities to strengthen bilateral ties and strengthening of all forms of agricultural production, not just forage plants.

Although there are problems in the limited space that is used for the production of forage, which can reduce the account of cereal for human consumption, it can be expected that in the future additional use green conveyer mechanisms, which will ensure the continued use of agricultural land.

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MIGRATION MOVEMENTS IN THE AREA OF GRDELIČKA KLISURA AND THE CONCEPT OF BIOREGIONALISM

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Abstract

The concept of bioregionalism must acquire importance in Serbia. As a transitional country that adopted the course of joining the EU, it must organise lives of its citizens in accordance with the new developmental-civilisation concepts and opportunities. On the other hand, Serbia is a centralised state that records negative demographic and economic trends in the majority of local self-governments, creating little opportunities at that level for fostering local and regional development and maintaining existence. The paper outlines the possibilities for application of the concept of bioregionalism in the area of Grdelička Klisura. It has been established that the demographic abandonment of the area has occurred as a result of migration movements, which, in consequence, resulted in revitalisation of natural ecosystems.

Key words: *bioregionalism, population, natural resources*

Introduction

The amendment to the Club of Rome Report “Limits to Growth. 30 Years Later” (Meadows et al, 2004), establishes a close connection between accelerated industrialisation, uncontrolled population growth, broadly widespread malnutrition and exploitation of renewable and non-renewable natural resources in the process of environmental pollution. These mutually correlated elements will create “Limits to Growth” on the planet, resulting in a large decrease of industrial production and a drop in

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population figures. The catastrophe, according to this Report, might happen already in 2020. Such a gloomy forecast can be avoided by establishing an economic and ecologic stability, where the world politics must address the realisation of the concept of sustainable growth.

Anthropocentrism is the major cause of the global ecologic crises, and it is manifested in the following:

- climatic changes caused by human activities
- degradation of water and soil
- reduction of plant and animal world
- enormous consumption of energy and ever-increasing production of risk
- development of modern science resulted in change of habits, demands, characteristics of individuals and their interaction with nature.
- increasing lack of morality, infertile search for identity and a failure to establish better-quality and different value systems

Anthropo-biocentrism (moderate biocentrism) involves concepts of sustainable use of natural resources and close-to-nature management principle.

“Deep Ecology”, which belongs to radical biocentrism, is based on philosophical and religious concepts, offering natural philosophy that justifies the eco-primitivist perspective of eco-activists, who support a significant decrease in population and a decrease or abolishment of industrial technology. In addition to development of eco-awareness, as a way of overcoming the current crisis, it adopts a life in small, ecologically balanced communities that survive by practising ecological agriculture and other nature-friendly solutions. Proceeding from this philosophical approach, a concept of bioregionalism was developed, involving such organisation of social life that exerts a positive impact on environmental protection. The advantage of bioregionalism is fully apparent in territorial units rich in natural resources: water, different ambient values, fertile soil, high biodiversity, etc.

The basic principles of bioregionalism are: “living-in-place”, ”re-inhabitation” and “bioregion”.

- A society practicing living-in-space is in balance with its religion through interconnections between people, other living beings and natural processes.
- Re-inhabitation means mastering the living-in-place concept. That

involves evolution of social behaviour in such a manner that enriches the life in a place and establishes ecologically and socially sustainable forms of living.

- Bioregion is both a geographic area and an awareness area, and it concerns a place and previously developed ideas on how to live in that place.

In recent years, bioregionalism has been discovered by politicians, managers and decision-makers who are primarily serving the interests of government institutions and corporate sector. Such initiatives entirely ignore one of the key values of bioregionalism – redistribution of power to decide to independent territories, capable of adopting an ecologically sustainable and socially just policy. The inadequate use of bioregional concepts clearly indicates that governments and the corporate sector do not employ authentic bioregionalism premises, but that their intention is to keep the pace with the increase of ecological awareness of their electorate, that is, with adaptation of consumer society (*Puđak, 2010*).

Is the bioregionalism concept feasible and what measures should be taken in circumstances of demographic abandonment of Serbia's hilly-mountain regions?

Bioregion boundaries – Grdelička Klisura

Grdelička Klisura consists of the Južna Morava River Basin, in its segment from Vladičin Han to Grdelica. In administrative terms, the area of Grdelička Klisura belongs to municipalities of Leskovac, Grdelica, Vladičin Han, Surdulica and Crna Trava. The Grdelička Klisura Basin's surface area amounts to 430.44 km² (Braunović, 2013). Grdelička Klisura is a territorial unit, the social organisation of which is not determined by administrative divisions, but by natural and ecologic characteristics. A criterion used for identification of the bioregion was a river drainage principle. It is a direct method, as drainage basins are clearly distinct units in topographic maps. This principle was also used for defining the problem of application of bioregionalism under circumstances of demographic abandonment of the area and migration movement of population to large industrial centres. The history proved that the most successful human communities (ecologically, economically and politically sustainable) – regardless of continent, climate or cultural patterns – were those whose population figures varied between 500 and 1,000 inhabitants, when it concerns rural communities, that is, between 5,000 and 10,000 when it comes to large communities (*Sale, 2000*).

Within Grdelička Klisura, four inhabitation zones have been identified:

- Zone One consists of urban settlements (Grdelica, Vladičin Han and Surdulica). Urban settlements have a central role in implementation of programmes aimed at reduction of ecologically adverse impact on the bioregion. That objective is attained by ensuring the supply of energy from renewable resources, urban gardens, small recycling centres, purification of waters, improvement of public transport, etc.
- Zone Two consists of suburbs. They act on the basis of the same recommendation as urban centres, therefore giving their contributions to sustainability of towns and cities.
- Zone Three consists of villages, which occupy the role of promoters of permaculture projects and serve as the main support in providing necessary resources to the majority of population in the bioregion.
- Bioregion Zone Four is wilderness. Every bioregion must have a space not altered by human activity. It must be preserved for the sake of itself, but also for the purpose of affirmation of natural ecosystems.

In 1950s, the area of Grdelička Klisura was an area characterised by erosion processes of highest intensity. Devastating torrential streams endangered human lives, the motorway, the Belgrade-Skopje-Thessaloniki railway route, ploughed land, etc. By means of intensive anti-erosion works, conducted in the 1960s, mitigation of erosion and a complete or partial revitalisation of natural ecosystems were attained.

Demographic characteristics

Settlements in the study area have been classified into five categories, as per the population figures: settlements of up to 100 inhabitants, settlements with a population between 101 and 300 inhabitants, settlements with a population between 301 and 500 inhabitants, medium-size settlements with a population between 501 and 1,000 inhabitants and large village and urban settlements of 1,000 and over 1,000 inhabitants. Surdulica, Vladičin Han and Grdelica hold the status of urban settlement, while the Municipality of Crna Trava does not have any urban settlements. The population figures according to censuses in 1948, 1953, 1971 and 2011 are presented in the Table 1. The population analysis was conducted based on the data for the following municipalities (segments of municipalities), which constitute a part the study area: Leskovac 25 settlements, Crna Trava 7, Vladičin Han 21 and Surdulica 4 settlements (total 57 cadastral municipalities). The data on changes in population figures, as recorded in censuses from 1948-2011, as per drainage basins and cadastral municipalities, were presented in Tables 2-5.

Table 1. *Population figures as per municipalities and census years*

Municipality	1948	1953	1971	2011
Leskovac	12,776	13,070	14,242	10,611
Crna Trava	2,352	2,297	1,292	94
Vladičin Han	9,094	9,351	8,679	3,304
Surdulica	3,127	3,461	2,271	339
Total	27,349	28,179	26,484	14,348

Source: *Statistical Office of the Republic of Serbia*

Table 2. *Population figures as per census years - Leskovac*

Drainage Basin	Cadastral Municipality	Elev. mmm	Population figures as per census years			
			1948	1953	1971	2011
Bistrica	Graovo	610	713	727	559	215
Bistrica	Bistrica	631	200	215	176	50
Kozarska river	Kozare	369	376	376	419	301
Kozarska river	Tupalovce	506	311	334	411	324
Kozarska river	Sejanica	626	680	699	750	698
Kozarska river	Dedina bara	639	631	642	716	782
Kozarska river	Kovačeva bara	652	310	330	289	130
Kozarska river	Novo Selo	798	1,137	1,043	868	38
Kozarska river	Vilje Kolo	900	106	114	121	4
Džepska river	Mrkovicica	1,053	277	250	257	3
Bistrica	Oraovica	470	1,929	2,113	2,289	1,961
Palojska river	Palojce	794	551	475	446	451
Predejanska r.	Predejane	592	631	528	616	401
Predejanska r.	Predejane varoš	592	469	625	857	1,086
Predejanska r.	Crveni breg	800	400	392	287	13
Južna Morava	Grdelica	362	840	1,007	1,893	2,119
Južna Morava	Grdelica (selo)	362	1,000	978	1,255	1,056
Južna Morava	Koračevac	427	190	185	174	172
Južna Morava	Bojišina	486	337	382	369	183
Južna Morava	Nesvrta	577	204	236	241	48
Južna Morava	Bričevlje	661	278	282	292	196
Južna Morava	Ličin Dol	684	323	319	273	97
Južna Morava	Krpejce	779	262	172	118	17
Južna Morava	Suševlje	836	376	401	338	153
Total			12,776	13,070	14,242	10,611

Source: *Original*

In comparison to 1948, in 2011 the area's population figures decreased by 47.5%. The process of population redistribution resulted in an increase of urban and a distinct decrease of rural population. It led, in consequence, to an emergence of an area of demographic increase (cities) and an area of demographic decrease (most villages), with entirely different characteristics. The population movement in the area (natural and mechanical) can be divided in two periods: until the mid-1950s, a period of the highest agrarian over-population, and from the 1950s until present (Zlatić, 1983).

Table 3. *Population figures as per census years – Crna Trava*

Drainage Basin	Cadastral Municipality	Elev. mmm	Population figures as per census years			
			1948	1953	1971	2011
Kozarska river	Bajinci	1,449	420	398	130	11
Kozarska river	Bankovci	1,293	468	434	360	26
Džepska river	Mlačište	1,335	474	486	234	20
Kozarska river	Ostrozub	1,275	246	239	75	1
Kozarska river	Pavličina	1,339	402	464	295	10
Kozarska river	Rajčetine	1,231	267	225	177	21
Kozarska river	Ruplje	830	75	51	21	5
Total			2,352	2,297	1,292	94

Source: *Original*

Table 4. *Population figures as per census years - Surdulica*

Drainage Basin	Cadastral Municipality	Elev. mmm	Population figures as per census years			
			1948	1953	1971	2011
Koznica	Danjino selo	979	203	205	161	48
Koznica	Dikava	751	474	483	397	68
Vrla	Kijevac	915	954	1,305	718	99
Džepska river	Mačkatica	860	1,496	1,468	995	124
Total			3,127	3,461	2,271	339

Source: *Original*

The first period is characterised by a constant increase of population figures and household figures. This period is marked by a higher increase in household figures in comparison to population figures, which is largely due to a fragmentation of agricultural holdings. The highest agricultural over-population was reached in the mid-1950s, when, as a result, Grdelička Klisura became the most densely populated area of Serbia. The

economic-demographic development in the past was disproportional, as the population movement was not accompanied by a corresponding movement of production. The economic development did not enable a necessary outflow of agricultural population to other activities, either in the local region or out of it. The increased population figures, with minimum agricultural land, which was largely located in steep drainage basins, did not provide basis for maintaining subsistence either for human or livestock population. For that reason, local inhabitants obtained new agricultural land through deforestation, pruned forests for leave fodder and allowed 'free' browsing of cattle in forests. An inadequate land treatment (ploughing along slopes at high inclinations) disturbed the ecological balance. The above-mentioned activities resulted in accelerated erosion, which attained an enormous extent in the mid-1950s, precisely at the time of the highest agrarian pressure.

Table 5. *Population figures as per census years – Vladičin Han*

Drainage Basin	Cadastral Municipality	Elev. mnm	Population figures as per census years			
			1948	1953	1971	2011
Rdovska river	Balinovce	391	254	270	199	120
Koznica	Dupljane	758	338	362	369	108
Džepska river	Džep	433	270	239	200	181
Rdovska river	G. Jabukovo	762	650	679	571	127
Južna Morava	Garinje	809	436	449	550	491
Jastrebačka river	Jastrebac	582	590	629	578	120
Južna Morava	Kopitarce	657	142	144	181	50
Koznica	Koznica	550	284	298	323	208
Južna Morava	Kržince	333	302	304	314	236
Džepska river	Lebet	1,165	304	307	302	63
Letoviška river	Letovište	479	375	396	325	141
Džepska river	Ljutež	707	480	480	507	140
Koznica	Manajle	486	219	216	152	33
Džepska river	Manjak	721	871	902	1016	366
Južna Morava	Mrtvica	412	653	702	675	297
Rdovska river	Rdovo	847	390	402	314	80
Južna Morava	Repište	403	984	968	733	205
Džepska river	Ružić	590	601	677	576	95
Južna Morava	Tegovište	509	387	381	295	131
Južna Morava	Urvič	612	144	132	119	43
Letoviška river	Zebince	682	420	414	380	69
Total			9,094	9,351	8,679	3,304

Source: *Original*

In the second period, from the mid-1950s to present, the study area has been characterised by significant migration flows and change of agricultural production structure. There are three significant factors leading to migration movements. The first one is income, which was barely sufficient for a simple reproduction in this hilly-mountain region. The second factor is living conditions, on account of which the area is abandoned. Residential areas are small, houses made of poor-quality materials, mainly of timber and earth. Inadequate road connections to mountain villages resulted in the fact that many agricultural products remained unused. The third, the most important factor, is the altered social-economic relations in the country, which was the primary cause, along with other factors, of the intense population migration from this hilly-mountain area (Zlatic, 1985). The segment of Municipality of Surdulica that belongs to Grdelička Klisura (Table 6) is characterised by a decrease in population density, except for the Danjine Selo Cadastral Municipality (Braunović, 2013). The most pronounced decrease in population density in the Municipality of Crna Trava is recorded in the area of Grdelička Klisura (Table 7).

Table 6. *Population density in Municipality of Surdulica*

Cadastral Municipality	Surface area (km ²)	Elev. (m)	Population density			
			1948	1953	2002	2011
Dikava	8.27	751	57.32	58.40	17.17	5.80
Mačkatica	17.06	860	87.69	86.05	15.18	3.99
Kijevac	31.90	915	29.91	40.91	5.74	3.10
Danjino selo	4.95	979	41.01	41.41	16.36	25.05

Source: *Original*

Table 7. *Population density in Municipality of Crna Trava*

Cadastral Municipality	Surface area (km ²)	Elev. (m)	Population density			
			1948	1953	2002	2011
Bajinci	8.06	1,449	52.11	49.38	2.85	1.36
Bankovci	8.39	1,293	55.78	51.73	7.99	3.10
Mlačište	15.84	1,335	29.92	30.68	1.83	1.26
Ostrozub	8.26	1,275	29.78	28.93	0.12	0.12
Pavličina	5.97	1,339	67.34	77.72	6.70	1.68
Rajčetine	5.02	1,231	53.19	44.82	6.57	4.18
Ruplje	8.60	830	8.72	5.93	0.70	0.58

Source: *Original*

The sharpest decrease in population density was recorded in Ostrozub, Ruplje and Mlačište Cadastral Municipalities. Population density in the Municipality of Leskovac (Table 8) and the Municipality of Vladičin Han (Table 9) recorded a decrease in all analysed cadastral municipalities.

Table 8. *Population density in Municipality of Leskovac*

Cadastral Municipality	Surface area (km ²)	Elev. (m)	Population density			
			1948	1953	2002	2011
Bistrica	7.67	631	26.08	28.03	10.30	6.52
Bočevica	2.78	488	88.13	88.13	54.32	40.65
Bojišina	4.81	486	70.06	79.42	50.94	38.05
Bričevlje	5.39	661	51.58	52.32	44.71	36.36
Crveni breg	10.46	800	38.24	37.48	2.87	1.24
Dedina bara	6.62	639	95.32	96.98	121.15	118.13
Graovo	10.68	610	66.76	68.07	25.94	20.13
Grdelica	0.62	362	1,354.84	1,624.19	3,843.55	3,417.74
Grdelica selo	5.66	362	176.68	172.79	207.07	186.57
Koračevac	4.40	427	43.18	42.05	43.64	39.09
Kovačeva bara	5.15	652	60.19	64.08	32.43	25.24
Kozare	5.09	369	73.87	73.87	71.12	59.14
Krpejce	3.34	779	78.44	51.50	14.07	5.09
Ličin Dol	4.21	684	76.72	75.77	33.02	23.04
Mrkovicica	4.93	1,053	56.19	50.71	2.84	0.61
Nesvrta	2.82	577	72.34	83.69	45.39	17.02
Novo Selo	21.79	798	52.18	47.87	5.51	1.74
Oraovica	20.81	470	92.70	101.54	106.20	94.23
Palojce	7.57	794	72.79	62.75	63.94	59.58
Predejane	9.28	592	68.00	56.90	52.91	43.21
Predejane varoš	0.52	592	901.92	1201.92	2350.00	2088.46
Sejanica	8.28	626	82.13	84.42	95.53	84.30
Suševlje	5.47	836	68.74	73.31	41.68	27.97
Tupalovce	3.15	506	98.73	106.03	120.63	102.86
Vilje Kolo	1.07	900	99.07	106.54	10.28	3.74

Source: *Original*

Until 1970s, most villages had followed a positive natural movement trend, which later, on account of relocation of young, reproductively able population, acquired a negative character. A combination of a low birth rate and migration resulted in depopulation of rural areas. Most villages have been permanently deprived of population, while municipal centres and suburban villages are recording an increase in population.

Table 9. *Population density in Municipality of Vladičin Han*

Cadastral Municipality	Surface Area (km ²)	Elev. (m)	Population Density			
			1948	1953	2002	2011
Balinovce	3.60	391	70.56	75.00	42.78	33.33
Dupljane	5.26	758	64.26	68.82	30.61	20.53
Džep	2.34	433	115.38	102.14	82.91	77.35
G. Jabukovo	14.85	762	43.77	45.72	10.37	8.55
Garinje	5.05	809	86.34	88.91	109.70	97.23
Jastrebac	16.65	582	35.44	37.78	13.27	7.21
Kopitarce	1.45	657	97.93	99.31	51.72	34.48
Koznica	5.57	550	50.99	53.50	42.19	37.34
Kržince	5.01	333	60.28	60.68	51.30	47.11
Lebed	4.59	1,165	66.23	66.88	22.22	13.73
Letovište	4.37	479	85.81	90.62	40.50	32.27
Ljutež	8.76	707	54.79	54.79	32.08	15.98
Manajle	2.69	486	81.41	80.30	22.30	12.27
Manjak	13.40	721	65.00	67.31	47.84	27.31
Mrtvica	12.22	412	53.44	57.45	31.10	24.30
Rdovo	12.24	847	31.86	32.84	11.11	6.54
Repište	14.88	403	66.13	65.05	23.12	13.78
Ružić	6.22	590	96.62	108.84	29.10	15.27
Tegovište	4.41	509	87.76	86.39	41.50	29.71
Urvič	2.22	612	64.86	59.46	31.98	19.37
Zebince	11.68	682	35.96	35.45	10.36	5.91

Source: *Original*

Demographic abandonment of rural areas has led to changes in the size of settlements, particularly to fragmentation of villages. The 1980s mark the beginning of the process of expansion of urban impact on villages in the immediate vicinity of towns, which resulted in demographic increase of villages, a drop in share of agricultural population in the total and active population, and an increase in numbers of households with a non-agricultural and mixed source of income.

For the purpose of identifying the trend of movement in settlements' number and size, an analysis as per municipalities has been performed and presented in Table 10.

“The highest settlements at the mountain of Čemernik (Pročolovci, Jovanovci, Bajinci, Mlačišće, Ostrozub, Dobro Polje, Bistrica, Ruplje, Borovik, Mačkatica, Troskač and Vlasinska Mahala) have been almost abandoned during last thirty years, the schools have been closed, the life has nearly come to an end. Villages of Vlasina and Crna Trava have been

emptied, people moved out. At Čemernik there are no flocks of sheep, no herds of cattle, no horses. There are no people. The roads are overgrown. The villages in the lower area of Grdelička Klisura and the lower course of the River Vlasina are still holding on in terms of population.” (Petrović, 2007).

Table 10. *Number of municipalities and population figures*

Category according to a population figure	1953		1971		2011	
	Number of Settlements	Population Figures	Number of Settlements	Population Figures	Number of Settlements	Population Figures
Municipality of Leskovac						
Up to 100	-	0	-	0	8	270
101-300	8	1,699	11	2456	7	1,162
301-500	8	3,009	5	1983	4	1,477
501-1,000	6	4,199	6	4366	2	1,480
> 1,000	3	4,163	3	5437	4	6,222
Total	25	13,070	25	14242	25	10,611
Municipality of Crna Trava						
Up to 100	1	51	2	96	7	94
101-300	2	464	4	836	-	-
301-500	4	1,782	1	360	-	-
501-1,000	-	-	-	-	-	-
> 1,000	-	-	-	-	-	-
Total	7	2,297	7	1292	7	94
Municipality of Vladičin Han						
Up to 100	-	0	-	0	7	433
101-300	6	1,299	6	1146	12	2,014
301-500	9	3,495	7	2327	2	857
501-1,000	6	4,557	7	4190	-	0
> 1,000	-	0	1	1016	-	0
Total	21	9,351	21	8679	21	3,304
Municipality of Surdulica						
Up to 100	-	0	-	0	3	215
101-300	1	205	1	161	1	124
301-500	1	483	1	397	-	0
501-1,000	-	0	2	1713	-	0
> 1,000	2	2,773	-	0	-	0
Total	4	3,461	4	2271	4	339

Source: *Original*

The analysis has been performed for the purpose of identifying trends in movement of settlements' number and size and a decrease in population figures, as per municipalities. A trend towards a decrease in population figures and a drop in number of larger settlements (over 300 inhabitants)

has been identified, and at the same time, a rise in number of settlements of up to 300 inhabitants, particularly of settlements of up to 100 inhabitants (Table 11). The total population figure in settlements of up to 100 inhabitants is increasing, since the number of settlements of this size is increasing. The settlements of over 1,000 inhabitants are also experiencing an increase in population figures (urban settlements).

Altitude distribution of settlements and population figures

The largest number of settlements is located in the altitude zone between 500 and 700m (18 settlements), followed by the altitude zone between 700 and 1,000m (17 settlements) and the altitude zone between 300 and 500m (14 settlements). In the altitude zone over 1,000m, there are 8 settlements (Table 12).

Table 11. *Number of settlements and population figures in the area of Grdelička Klisura*

Category according to a population figure	1953		1971		2011	
	Number of Settlements	Population Figures	Number of Settlements	Population Figures	Number of Settlements	Population Figures
Up to 100	1	75	96	25	25	1,012
101-300	17	3,791	4599	20	20	3,300
301-500	22	8,572	5067	6	6	2,334
501-1,000	12	10,349	10269	2	2	1,480
> 1,000	5	4,562	6453	4	4	6,222
Total	57	27,349	26484	57	57	14,348

Source: *Original*

Table 12. *Altitude distribution of settlements and population figures*

Elevation zone	Number of Settlements	%	Population figures as per census years			
			1948	1953	1971	2011
300-500	14	24.56	7,974	8,381	9,225	7,118
500-700	18	31.58	7,318	7,612	7,632	4,743
700-1,000	17	29.82	9,199	9,383	7,797	2,332
>1,000	8	14.04	2,858	2,803	1,830	155
Total	57	100.00	27,349	28,179	26,484	14,348

Source: *Original*

The analysis of a number of settlements as per altitude distribution (projection 2012), indicated that abandonment of 46 settlements, of size up to 100 inhabitants, will occur, 3 out of which are in the altitude zone of up to 300m, 6 in the zone between 500 and 700m, 17 in the zone between

700 and 1,000m, and 20 settlements in the altitude zone over 1,000m. The increase in number of settlements of between 101 and 300 inhabitants is projected in the 300-700m altitude zone, whereas a decrease is anticipated in the zones over 700m.

A decrease in number of settlements of between 301 and 500, between 501 and 1,000 and over 1,000 inhabitants will take place at the altitude of over 500m, while an increase in number of settlements of the above-mentioned size will occur in the zone between 300 and 500m (Table 13).

Table 13. *Settlements' population figures as per altitude distribution – projection 2021 as per municipalities*

Population figures projection for 2021					
Elevation	Up to 100	101-300	301-500	501-1,000	over 1,000
Municipality of Leskovac					
300-500	1	2	1	-	3
500-700	4	3	-	4	-
700-1,000	4 (4)	1	1	-	-
> 1,000	1 (1)	-	-	-	-
Total	10	6	2	4	3
Municipality of Crna Trava					
300-500	-	-	-	-	-
500-700	-	-	-	-	-
700-1,000	1	-	-	-	-
> 1,000	6 (4)	-	-	-	-
Total	7	0	0	0	0
Municipality of Vladičin Han					
300-500	7 (3)	9	2	2	5
500-700	10 (2)	2	1	-	-
700-1,000	6 (1)	3	1	1	-
> 1,000	2 (1)	-	-	-	-
Total	25	14	4	3	5
Municipality of Surdulica					
300-500	1	1	1	1	2
500-700	3 (1) ²	-	-	1	1
700-1,000	6 (5)	1	-	1	1
> 1,000	5 (5)	-	-	-	-
Total	15	2	1	3	4

Source: *Original*

The analysis of the movement of population figures in drainage basins indicated that in the studied period, except for the immediate Južna

² Values in brackets indicate a number of settlements with 0 inhabitants

Morava River Basin, a decrease in population figures has taken place. A recorded increase in population figures in some of the below-mentioned drainage basins is a result of the development of the urban settlement Vladičin Han (Table 14).

Table 14. *Population figures as per drainage basins in the study area*

Drainage basin's name	1948	1953	1971	2011
Kozarska river	5,429	5,349	4,632	2,351
Palojska river	551	475	446	451
Predejanska river	1,500	1,545	1,760	1,500
Bistrica	2,842	3,055	3,024	2,226
Džepška river	4,773	4,809	4,087	992
Jastrebačka river	590	629	578	120
Koznica	1,518	1,564	1,402	465
Letoviška river	795	810	705	210
Rdovska river	1,294	1,351	1,084	327
Vrla	13,261	16,062	17,006	99
Immediate Južna Morava River Basin	27,160	28,185	29,451	5,494
Total	126,608	134,709	150,502	14,348

Source: *Original*

Conclusions

Bioregionalism emerges as one of the formulae for implementation of principles of integrally sustainable development. The basic specific characteristic of bioregionalism is decentralisation. The immediate negative impact of adoption of “wrong” development decisions is clearly apparent in the example of Grdelička Klisura, where the effect of adverse consequences will be felt even more intensely in the following periods. Bioregionalism aims at transformation of modern society for the purpose of improving quality of life, preservation of healthy environment and a just distribution of goods at local and regional levels. As such, it does not come under the sphere of interests of large businesses, which are based on logic of unfair distribution of goods and unsustainable exploitation of resources. The supporters of bioregionalism are primarily local population and civil society and local government.

The concept of bioregionalism must acquire importance in Serbia. As a transitional country that adopted the course of joining the EU, it must organise lives of its citizens in accordance with the new developmental-civilisation concepts and opportunities. On the other hand, Serbia is a

centralised state that records negative demographic and economic trends in the majority of local self-governments, creating little opportunities at that level for fostering local and regional development and maintaining existence.

The inhabitants of peripheral areas and hilly-mountain regions move to large industrial centres, taking with them their knowledge, ideas and skills. It creates poor living conditions for the population that remains in this area. On account of ageing and a drop in population figures, the human, social and economic capacity for development is constantly decreasing. In such circumstances, bioregionalism emerges as a “promising” model. Municipalities, for instance, could, on their own accord, prepare development plans aimed at improving the quality of life.

Natural resources are rich; they remained well-preserved or are in the phase of intensive revitalisation. Planning and organisation of development of Grdelička Klisura Bioregion should be based on preservation of resources, for the benefit of its inhabitants. This area is rich in natural forests, unploughed agricultural land, water and renewable sources of energy, all of which enables implementation of sustainable development. Conditions for organic agriculture should be created, along with a local supply of renewable and clean energy, waste recycling, preservation of waters, etc.

Table 15 presents a land use pattern in the area of Grdelička Klisura. An important step in the implementation of bioregionalism is a resource (development potentials) recording and mapping, and establishing a link with development goals, strategies, projects and initiatives. The assumption that it is possible to stop or protract the effect of human destruction of nature by the implementation of the Kyoto Protocol is NOT REALISTIC. Stopping the climate changes would become impossible even if all industrial countries reduced the emission of harmful gasses even more than the Kyoto Protocol prescribed. A return to the former state, or conservation of the present, is not realistic any more, and we are facing a gloomy scenario of our future – a destruction of all plant and animal species (human including).

Climatic changes represent only the tip of an iceberg, and it is only the most apparent manifestation of human destruction of nature and simplifies the complex circumstances in which the development of civilisation, for centuries, has systematically destroyed natural

environment. We are witnessing the decadence of contemporary (western) civilisation, but we are also seeing a birth of a new era – ‘an early stage of building a new model of world society, which will be different from the present model, in the same way that the society created by industrial revolution differed from the agrarian society which preceded’ (King, Schneider, 1991). Expecting that human awareness will evolve to that extent in next ten years, that we adopt, on our accord and for moral reasons, birth control, ascetic way of life (which involves taking only the basics from nature and environment), moral sense for the needs of other people and species, (which is the basic prerequisite of realisation of the idea of living in small balanced communities) is UNREALISTIC.

Table 15. *Land use at Grdelička Klisura*

Land Use	Surface Area ha	Share %
Forests	23,660.5	54.97
Meadows and Pastures	10,772.61	100.00
Ploughed Land	2,727.59	6.34
Vineyards	68.26	0.16
Fruit Orchards	127.75	0.30
House adjacent plots and gardens	1,296.97	3.01
Total productive area	4,220.57	89.80
Settlements (Building Land)	698.37	1.62
Stone Field	23.79	0.06
Gravel	81.96	0.19
Road network and watercourses	3,586.16	8.33
Total unproductive area	4,390.28	10.20
Total	43,044.00	100.00

Source: *Braunović, 2013*

The world is at the brink of the first global revolution. Ecologic revolution will be a brutal confrontation with the present social model and it will represent a violent arrival of a new model of society. Climate changes, a population explosion, a decrease of natural resources, consumer (market) way of life, an increase of industrial production, globalisation, environmental pollution and moral indifference provide assurance that it will happen soon. People’s consciousness cannot be influenced by remarks, such as: “What are we going to leave to our children to inherit?”. As a solution to ecologic crises or less painful transition to a new type of society, an “aggressive” education of population and popularisation of the ecologic ethics aimed at every individual, are required.

In order to attain (retain) harmony with nature today, it is necessary to find ways:

- *How to transfer perennial wisdom to the post-modern world?*
- *How to use knowledge and technology of the post-modern world for a return to the tradition of co-existence with nature?*
- *How to merge perennial wisdom and post-modern knowledge, creating a new understanding and its practical application?*

One of the approaches to the resolution of the above-mentioned issues is the Carl Jung's concept of 'Gnostic Mediator' (Walsh, 1999). Gnostic mediators are people who are so profoundly full of wisdom that it enables them to communicate, directly from their experience, with the language and the concepts of another culture. The world must avoid the regression in the fight against global warming and work on "**Ecologic New Deal**", purpose of which would be a concurrent resolution of both climate and economic crisis. "Together, we are facing two crises: in ecology and in the world. However, they also represent a great opportunity – to tackle the both challenges at the same time" (General Secretary of the United Nations, Ban Ki-Moon – The UN Conference on Ecology, Poznan, Poland)

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INFLUENCE HERBICIDES ON MICROORGANISMS AND THEIR MUTUAL INTERACTION

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Abstract

Ever since the first appearance of herbicide molecules to present days advanced agricultural production would be hard to imagine. Tendency for making compounds with favorable eco-toxicant properties has the role of protecting life environment. After reaching soil, herbicides as toxic substances have influence on micro flora of soil in various ways. Such effect can be perceived over numerous processes of physical, chemical and biological decomposition. In most microorganisms there easily come to reduction in population only a few days after herbicides have been applied while presence of specific microorganisms remains the same. The fact is that these compounds have great effect on the population of microorganisms which are responsible for biogenesis of soil. In this paper, we have tried to give further explanation of the way the interaction between soil and microorganisms occurs; which factors lead to changes in oxide-reduction process and what consequences may occur. As a result of disorder in such relations. We also suggest the way particular groups of herbicides affect the change in number of individual microorganisms.

Key words: *Herbicides, microorganisms, soil, degradation*

Introduction

Great quantity of herbicides used in soil with the aim of controlling weed population may be one of the limiting factors of soil biogenesis. Research shows that only 5% of herbicides applied reach the target organism (Somerville, 1987). Significantly greater residue of herbicide reaches life environment. Herbicide compounds are present in overall ecosystem and in particular percentage they cause chronic and acute intoxication.

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Microorganisms in soil have irreplaceable role. Their role is of crucial significance in keeping fertility, they have influence on growth of vegetables; they decompose pesticides and other pollutants and they are also indicators of changes in physical-chemical properties of soil occurring under influence of various factors from environment (*Pascual et al., 2000; Miloshevich et al., 2001; Thompson et al., 2001*). Enzymes are catalysts of biochemical processes; they are involved in each process of circulation of matter and energy, making and keeping soil fertility. Around fifty types of enzymes from oxidoreductase, hydrolase, transferase and lipase groups are present in soil (*Tabatabai, 1982*).

The largest sources of enzymes are microorganisms (bacteria, fungi, protozoa and algae) and they are found in soil as extracellular (free or bonded to clay minerals and humus colloids) and intracellular (in live and dead cells of microorganisms). Degradation of organic matter in soil, which is basically oxide-reductive process, is catalyzed by enzymes of dehydrogenase in soil which are most often of microbiological origin. Their activity in soil depends on total physiological activity of microorganisms where greater activity indicates stronger intensity of organic matter mineralization in soil (*Tabatabai, 1982; Benitez et al., 2004*). Advanced synthesis of herbicide molecules moves toward making compounds that express efficiency on target organism while in the same way indicate selectiveness towards other organisms. With disorder of oxide-reductive processes in soil i.e. expressing negative effect on microorganisms in soil, herbicides can disturb soil pedogenesis and keeping soil fertility.

Adsorptive capacity of soil

Under the adsorptive capacity of soil means its ability to adsorb a variety of solid, liquid and gaseous substances or to increase their concentration on the surface of colloids. It has long been known characteristics of the soil to absorb a variety of substances. Middle of the last century, special experiments were carried out in order to investigate the adsorption of various salts and fertilizers from the land. Then it was found that the soil absorbs the salt base, in exchange releases the same amount of other bases, ie. changes that occurs between cations and soil solution. Adsorption is mainly carried zeolites - minerals soluble acid. Adsorption is largely dependent on the temperature.

Forms adsorption capacity of the soil

We are five different forms of adsorptive capacity of the soil:

- *mechanical*
- *physic-chemical*
- *chemical*
- *physics and*
- *biological*

Under mechanical adsorptive capacity of soil means the capacity of soil to the pore retains particles of other substances, for example. that the water absorbs suspended particles of clay, the remains of organic matter, algae and the like. This type of adsorption is widespread in nature. Physical, chemical or substitute adsorptive capacity is to replace the cations in the soil adsorptive complex with the cations of the solution. This capacity varies with the moisture entering fertilizers, irrigation, etc.. Chemical adsorptive capacity is referred to as adsorption, which flows into the soil to create a hard-soluble salts of easily soluble. An example of such adsorption can mention the creation of gypsum in the soil effect of sodium sulphate on calcium chloride. Under the physical adsorptive capacity means increasing the concentration of molecules of different substances on the surface of colloids. In this way absorb the organic matter. Under biological adsorptive capacity means the ability of micro-organisms, plants and other living organisms to adsorb different ions and elements from the soil solution.

Soil organic matter

Soil organic matter consisting of a mixture of plant and animal products at different stages of their cleavage, which is synthesized in soil chemical and biological. This complex subject can be divided into humic compounds and non-humic. The amount of organic carbon that is in the earth is in the form of humus is 50×10^{11} t, and the amount of organic carbon contained in living organisms is 7×10^{11} t (*Eglinton and Murphy, 1969*). Most of the organic matter in the majority of the soil is established at the biological decomposition of the remains of various organisms. The final products of the decomposition are humic substances of low and high molecular acids, carbohydrates, proteins, peptides, aminoacid, lipids, waxes, lignin and other fragments. (*Brady, 1978*).

Composition and properties of organic matter depend on climatic conditions, soil type and use of cultural practices. The most stable components of soil humic substances. They can be divided into Subfraction humic acid, fulvic and Humine which differ in their reactive abilities. The total weight of individual organic compounds in nature constitute approximately 10-15% of the total amount of humus in the soil. The basic mass of soil organic matter of about 85-90% are specific humic substances. Humic substances, due to the presence of functional groups have a high adsorptive capacity for cations, but also for a variety of herbicides due to soil.

Soil acidity and alkalinity

The remains of plants and animals, products of their vital activity and decomposition, cause acidity and alkalinity of soil. Cause different reactions are hydrogen ions (H^+) and hydroxide (OH^-) in solution. If the solution is dominated hydrogen ions over hydroxyl ions reaction is acidic, while the reverse reaction against the base. When the concentration of these ions is equal, the reaction is neutral. The importance of soil reaction and soil solution is very high. From the reaction of soil and soil solution are closely related to the intensity of microbial activity, dissolution of soil minerals, the transformation of various compounds, including herbicides. Depending on the concentration of hydrogen ions differ acidic, neutral and basic soils. Soil reaction is very strong influence on the growth and development of plants, the intensity of the soil and plants, and therefore the fate of herbicides in the soil, the direction and dynamics of their degradation, as well as the adoption and transformation processes in the organism of plants.

Main pathways microbiological transformation

Metabolism of herbicides in soil is highly influenced by the level of biological effect of soil determined by number and type of live organisms present in it. Life activity of these organisms depends on characteristics of soil, its temperature, and humidity; obligate aerobe and obligate anaerobe conditions in it etc. Decomposition of herbicides in soil includes various organisms, bacteria, fungi, actinomycete and other flora and fauna. Most organisms of soil decompose organic herbicides to higher or lower extent; use them as source of carbon while in rare occasions and particular cases as the source of other biogenic elements.

Compounds of aliphatic order easily decompose under the influence of microorganisms as well as hydroxyl compounds do.

Greatest quantity of herbicides in soil is decomposed under the influence of microorganisms. The types of fungi, bacteria and actinomycete that affect decomposition of herbicide by their activity have also been determined. That is the reason for fast decomposition of herbicides in soil in positive correlation with the activity of the soil microorganisms. Bearing in mind that the microbiological activity in various conditions and soil types is not equal, herbicides are not decomposed at the equal pace in such conditions which leads to the fact that in particular years there can come to occurrence of non-decomposed quantities of herbicides in soil that may have toxic effect to sensitive vegetables grown. The quantity of microorganisms in surface layer of soil is changeable and depends on soil and weather conditions. Microorganisms have a major role in the transformation of herbicides and other toxic substances that get into the soil. Many microorganisms are able to use a wide group of different organic compounds for their growth (*Kaufman and Kearney, 1970*).

The main pathways of transformation of herbicides in soil under the influence of microorganisms occurs through hydrolysis (esters connections, amide bond, $C = N \rightarrow CONH_2$), oxidation (aliphatic and aromatic hydroxylation), reduction ($NO_2 \rightarrow NH_2$), dehalogenation, cis - trans isomerisation. In the organism of plants and animals may be to accumulate conjugates of herbicides, until this phenomenon is not observed in soil microorganisms. Metabolic processes in higher organisms often take place less intense than that of heterotrophic bacteria and fungi (*Alexander, 1980*). The entire activity of the microorganisms in the soil is related to the transformation of different organic and inorganic compounds. In recent years, particular attention is drawn herbicides, especially those such as triazine herbicides, which are applied through the soil, which may have toxic effects on microorganisms and their activity (*Popovic et al., 1992; Milosevic et al., 1996*).

Mechanism of microorganism resistance to herbicides

During evolution microorganisms developed various resistance mechanisms to toxic effect of numerous compounds as well as to herbicides. Basically, there are three ways that microorganisms defend against toxic influence of not only herbicides but other hazardous and

toxic materials too. They are: adsorption, bioaccumulation and activity of metabolism products. Pesticides bond to the surface of cell over adsorption and as doing so penetration into internal part of cell and its toxic effect is prevented.

It has been determined that cells of microorganisms possess own ability for herbicide sorption. At the same time, one part of molecule moves to the inner cell content. As about this, it is very complex to separate those processes so in the study of these types summary effect of lowering herbicide concentration from dilution the microorganisms are found in is determined. By bioaccumulation, forming conjugates with different constituents of cell, herbicides are immobilized and the transport to the activity spot is slowed or prevented. In the process of metabolism, herbicides in the microorganism cells can suffer numerous physical and chemical changes that most often and in most cases reduce toxic effect of metabolites formed that way.

The third mechanism of reducing toxic effect of herbicides does not depend on physiology – biochemical processes in the microorganism cells and does not relate to the presence of herbicides in cell but the changes occur outside the microorganism cell. Some microorganisms synthesize and excrete numerous carbon and other polymers, organic acids, enzymes and other excretes into surrounding which physically, chemically and biologically influence various processes and changes that in most cases lead to reduced effect of herbicides.

Influence of herbicides on microorganism activity

In our country, there are not many research proceedings that refer to studying influence of herbicides on content and great presence and activity of soil microorganisms. Our previous studies (*Janjic et al. 1986, 1989, 1993, 1996*) along with studies of many foreign researchers (*Grishna and Morgun, 1984; Grossbard and Davies, 1976; Joshi et al. 1985; Milevoj, 1977; Rosenberg and Alexander, 1980; Tu 1996*) indicate that by their activity some herbicides, depending on their structure and conditions independent from the herbicide nature, can directly influence complexion, great presence and irreplaceable role in providing soil fertility, impoverishment of taxonomic structure of micro flora and reducing their biological activity represent a specific issue for agriculture. It should be noted that herbicides not only affect the activity of microorganisms but also that of their actions depends the fate of

herbicides in soil. Dissolution rate, pathways and routes of biotransformation and other changes that occur with a molecule of herbicides in the soil are directly related to the composition, numerical representation and activity of microorganisms in soil.

Measuring extraction of CO₂ from soil is a common ecological method for studying microbiological activity in soil. According to Walter, extraction of CO₂ from soil is marked as “soil breathing”. Many researchers indicate that herbicides affect basic processes in soil unevenly. It is rational if we consider that effect of herbicides depend on chemical structure and structure of herbicide molecule of applied quantity, intensity of applying, rate of degradation as well as great number of other factors that are independent from the nature of compound used (physical and chemical characteristics of soil).

Factors that influence interaction between herbicides and microorganisms

There is a great number of factors the toxic effect of herbicides on microorganisms depends on. In natural environment, they are biotic and abiotic factors primarily. Influence of these factors is not easy to control, it is often difficult to measure them and we must say that they are rather changeable. We may also say that influence of herbicides on microorganisms depends on type and concentration of herbicides, types and age of microorganisms, temperature and activity time as well as chemical structure of the environment the microorganisms live in (*McCormic and Hiltbold, 1996; Zinchenko and Osinski, 1979*).

Type and concentration of herbicides

Effect of herbicides depends greatly on concentration of it. If the concentration is higher, the effect is more intense. It is very common that small concentrations affect microbiostatically slowing the growth and propagation of microorganisms. Sometimes with particular herbicides these compounds can affect in a stimulating way encouraging growth and propagation of microorganisms. In greater concentration some herbicides can affect oligodynamically causing dying of microorganisms. High concentrations of herbicides led to a significant reduction in bacterial populations. This agrees with the report Moorman et al. (2001) and Ayansina and Oso (2006) who state that the use of certain herbicides perform soil contamination.

Type and age of microorganism

Herbicide activity depends greatly on type of microorganism these compounds have influence on. Different groups and types have different biochemical structure and cell structure. A microorganism whose cell wall contains more fatty substances, cellulose, and chitin or have mucous layers around the cell and capsule are more resistant to herbicide effect. Older cells and forms for conservation (slow ones) are far more resistant than young cells and types of microorganisms that do not possess ability to form such life forms. Resistant types of microorganisms have well developed mechanisms for detoxification of herbicides and in such way they reduce toxic effect of herbicides. More often, resistant types of microorganisms tolerate concentration of herbicides that are 10, 20 or dozens times higher than sensitive types. With particular types of microorganisms, genes have been set and they are liable for resistance to herbicides.

Temperature and time of activity

There is a specific relation between temperature and activity time of herbicides. With temperature increased, toxic effect of herbicides is intensified particularly if the temperature is above 40 °C. By increasing the herbicide time of activity on microorganisms, its effect becomes stronger and more obvious. Longer effect of low herbicide concentrations on microorganisms has almost the same effect as shorter effect of high concentration.

Tabela 1. *Decomposition of some herbicides depending on the soil temperature (Melnikov et al., 1974)*

Herbicide	Period of half - decomposition in months	
	At 15 °C	At 30 °C
Ametrin	6,0	4,5
Atrazin	6,0	2,0
Bromacil	7,0	4,5
2,4-D (acid)	-	0,1
Monuron	5,0	4,1
Terbacil	7,5	5,0

Chemical structure of environment

Environment microorganisms live in is very diverse for its structure and the quantity of materials and compounds. Presence of proteins, cellulose, hemicellulose, carbohydrates, simple sugar, organic materials, salt, heavy metals and other materials may affect weakened or intensified activity of herbicide. Lately, there has been an extensive research of possibilities for using various selective types of particular microorganisms for their practical use in biological decontamination of sewage water and waste water, soil and protection of environment from toxic effect of great number of various pollutants in general.

Influence of carbamate on microorganisms

Hill et al. (1995) determined that bacteria of *Pseudomonas* species can use monuron as the only source of carbon. It was set that if growth factors and other bacteria of *Pseudomonas* are added to nutritious base, they can easily oxidize monuron. Many other bacteria (*Xanthomonas sp.*, *Bacillus sp.*) can use monuron as the source of carbon (Hill and McGahen, 1995). In soil these herbicides bond to organic and mineral colloids. Ability of bonding is to significant level different for particular herbicides from this group of compounds. Presence of azo compounds has not been set in many experiments with numerous carbamate herbicides in soil and field conditions. Kinetics of carbamate vaporizing from soil has not been completely determined. Problem is becoming complex by the fact that adding new chemical compound into soil develops new population of microorganisms so that the curve of decomposition shows starting period of decomposition which is slow and in which bacteria are adapted to the presence of new compounds (Grossbard and Davies, 1976; Bogdanovic, 1991a, 1991b; Janjic et al. 1986, 1989, 1996). Many physical factors can affect the rate of decomposition of urea at this stage of microbial decomposition. In creating metabolites of urea in soil involves not only microorganisms, but also for plants. The nutrient solutions containing labeled herbicide was found not only the resulting compound, but also significant amounts of its metabolites.

Influence of triazines on microorganisms

According to its physical-chemical properties, it belongs to the group of compounds that are relatively seeded and movable in soil. Time of atrazine half-decomposition, depending on conditions of surrounding, frequency and measure of using, is between a few days and few months.

Microbiological degradation is the basic way of its decomposition in soil. It is known that bacteria *Pseudomonas spp.*, *Rhodococcus spp.*, *Agrobacterium spp.*, and fungi from species *Fusarium*, *Penicillium*, *Aspergillus* and *Trichoderma* decompose atrazine (De Souza et al. 1996; Struthers et al. 1998; Ostrofsky et al. 2002). Due to its common and frequent use, as well as physical-chemical properties, atrazine has been detected in surface and underground water (Hoffman et al. 2000; Rhine et al. 2003). According to the research results published in our country, amount of atrazine found in surface water is in range between 1.0 – 4.13µg/L; in underground water up to 0.3µg/L (Gashic et al, 2000). The occurrence of atrazine in surface and ground water has caused serious concern to human health and the environment, leading to a reduction in volume and a gradual withdrawal of the application.

Atrazine shows different effect on groups of microorganisms studied so that it had an inhibitory effect on aminoheterotrophes and cellulolytic organisms. As about fungi and actinomycetes, atrazine has reflected stimulating effect after the starting inhibitory one; it was stimulating for the total number of microorganisms. Some other researches came to the similar results (De Souza et al. 1996; Janjic et al. 1996; Govedarica et al. 1997; Struthers et al. 1998; Ostrofsky et al. 2000). They established that under the influence of atrazine the total number of microorganisms, aminoheterotrophes and *Azotobacter sp.* is reduced while the number of actinomycetes and fungi is increased during the whole vegetative period of corn. Tamburic and Levic (1995) established that atrazine caused increased number of bacteria but reduced number of fungi and that the ratio of these two groups of microorganisms is in negative correlation ($r=0.85^*$) i.e. bacteria are more important for decomposition of atrazine. By increasing the concentration of atrazine, the level of toxic effect on each group besides aminoheterotrophes was intensified. As for this group of microorganisms, level of inhibitory effect shown did not depend on concentration of herbicides. When we look at the time of exposure to atrazine action, we note that in almost all microorganisms except fungi and aminoheterotrophs, there is a significant negative correlation between the level of expressed changes and exposure time. This type of correlations means that over time reduce the toxic effects of atrazine on microorganisms. To decreased activity and increased number mikroorganizams probably occurs because the microbial atrazine breaks down, so there is a decrease in its content in the soil, while the intense population growth of microorganisms that are used primarily carbon and nitrogen from atrazine molecules in their physiological processes.

Taking into account that the studied concentrations of atrazine are within the limits recommended to implement, but significantly higher, and that the nature and intensity of the recorded transient changes. It can be concluded that atrazine does not violate the microbial processes that could affect the fertility land.

Influence of sulphonylurea on microorganisms

Sulphonylurea is herbicide that belongs to the group of herbicides used in small quantity per one hectare. The widest range of use is found with Motivel and Tarot 25 WG. Tested herbicides had various effects on soil fertility. Both herbicides applied reduce total number of bacteria in rhizosphere significantly. When Nicosulfuron herbicide was used, 14 days after the treatment negative effect on rhizosphere was not noticed. On the contrary, rimsulfuron herbicide reduces total number of bacteria. The total number of bacteria was not dramatically reduced 28 days after applying herbicide. Effect of dehydrogenase in soil that rimsulfuron was used in reduced significantly while the effect of dehydrogenase was not changed in soil nikosulfuron was used in. Negative effect of examined herbicides is the most noticeable 7 days after applying it. Both herbicide types cause statistically noticeable reduce of total number of bacteria and number of *Azotobacteria sp.* Effect of dehydrogenase has been increased 7 and 14 days after rimsulfuron was applied.

Influence of chloroacetanilide on microorganisms

S-Metolachlor herbicide is one of the three most used herbicides in the world in the chloroacetanilide class. This herbicide has a high toxicity and can be leached, representing a powerful source of groundwater pollution (*Liu et al., 2001; Scribner et al., 2000; Ferrer et al., 1997; Rodrigues and Almeida, 1998*). Generally, acetanilide residues and their metabolites are common in aquifers in close proximity to agricultural soils where these herbicides have been applied (*Stamper and Tuovinen, 1998*). Acetanilide biodegradation is a very important factor for its elimination in aerobic and anaerobic environments. Hydrolysis is not as important in soil and water pH conditions, while adsorption in argil and organic matter probably retards the biodisposability (*Stamper and Tuovinen, 1998*). These herbicides are somewhat resistant to photodecomposition (*Humburg et al., 1989*). In several organisms, the greatest factor of acetanilide transformation is detoxification by glutation-S-transferase (GST) (*Stamper and Tuovinen, 1998; Zablotowicz*

et al., 1995; Hammond *et al.*, 1983). Despite this, microorganisms do not easily metabolize aromatic fragment (*Liu et al.*, 1987), raising a serious environmental concern.

Until now, pure bacterial cultures able to metabolize acetanilide or its sulfonate derivatives have not been described in the literature. Tiedje and Hagedorn (1975) were able to isolate a soil fungus, *Chaetomium globosum*, which could partially transform alachlor into several metabolites, but the aromatic ring remained intact. About 6 to 14% of the alachlor herbicide was metabolized by *Ceriporiopsis suvermispora*, *Phelebia tremellosa* e *Phanerochaete chrysosporium*, after 122 days of incubation (*Ferrey et al.*, 1994). The low degree of enzymatic degrading of this herbicide suggests that a co-metabolism hypothesis might be possible. *Chaetomium globosum* fungus is able to utilize 55% of the Metolachlor molecules as a unique carbon source, in a 6 day period, without altering the aromatic ring, with a high level of byproduct production (*Saxena et al.* 1987; *Liu et al.*, 1989). Other bacteria and fungi capable of metabolizing Metolachlor were isolated (*Saxena et al.*, 1987; *Liu et al.*, 1989), but the break down of the ring has not been successfully obtained as yet. Propachlor was the only herbicide of this group passive enough to be completely metabolized (*Villarreal et al.*, 1991). S - Metolachlor was a very selective herbicide, as only four bacteria were isolated from the soil samples (humus, direct system and conventional system plantation soils). The S-Metolachlor degradation rate yield was far superior to that shown by alachlor, another acetanilide compound, according to Ferrey *et al.* (1994), who observed around 6 to 14% of degradation by *Ceriporiopsis suvermispora*, *Phelebia tremellosa* and *Phanerochaete chrysosporium*, after 122 days of incubation.

Conclusion

Microorganism activity is significantly reduced due to use of herbicides. Reduced microbiological activity has results on smaller decomposition of plant residues therefore lower grade of forming humus matter. The role of microorganisms in forming nutritious elements in soil is immeasurably useful. Group of microorganisms *Azotobacter* is the most sensitive to use of herbicides and can be a reliable bio indicator of soil biogenesis. Presence of this azotofixan group is reduced to great extent after only a few days of applying herbicides. The presence of actinomycetes and fungi to lower extent is increased which indicates that this group of microorganisms use herbicides as a source of biogenetic elements.

Degradation of herbicides in soil depends on properties of the substance used, then amount (dose) of herbicide as well as on physical-chemical properties of soil (humidity, temperature, vegetation, cultivation) and types of microorganisms.

In the future, use of herbicides should be controlled. Anthropogenic factor has crucial role in keeping and improving the condition of soil. It should be strived to raise awareness about timely and sustainable use of herbicides for it is the only way we can to certain extent protect environment and hope for a better tomorrow.

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ORGANIC AGRICULTURE AS A FACTOR OF RURAL DEVELOPMENT IN SERBIA*

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Abstract

In this paper the role of the concept of organic food production in the rural development of Republic of Serbia is discussed. The authors are discussing the limiting factors and problems of rural areas in the Republic of Serbia and possibilities of organic agriculture as a sustainable method of development. Methods used are analyses and comparison using published data of official institutions and farm survey. As a conclusion, authors discuss that organic agriculture can be one of the potential ways of development of rural areas, emphasizing the positive outcomes of such way of farming.

Key words: *Rural Development, Organic Agriculture, Sustainable Method of Rural Development, Republic of Serbia.*

Introduction

In Republic of Serbia concept of rural development is relatively new. The fact is that Serbia has long applied an industrialized concept of development that favored the cities and neglected rural areas, which led to disparities and uneven development of rural and urban area (Tomaš, 2010). In Republic of Serbia among the most significant issues of rural regions are the problems of land fragmentation, poor development of infrastructure, extensive agricultural production and the so-called problems of “nursing households” or senility of rural population (Njegovan and Pejanović, 2009). For a long time the primary function of

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rural areas in Serbia was the production of agricultural products and food, with the accent on a quantity more than quality (*Pejanović, 2013*).

On the other hand, there is a growing ecological crisis worldwide that is related to air pollution, land pollution, overpopulation in some parts of the world and low fertility rate in others, that all together leads to world hunger and poverty. Agriculture has been recognized as one of the major polluters of nature and environment. That is significant for the Republic of Serbia, since agriculture is still one of the important and dominant sectors of its economy.

Organic production is a possible solution to this problem, because it is chemical free way of production and it pays special attention to the nature, as a sustainable method of agricultural production. According to this, it can be also related to the mentioned problem of rural depopulation, as an alternative concept that can slow down the process, because it offers new perspectives to the households in rural areas and suitable quality of life.

Rural development of the Republic of Serbia

The Republic of Serbia is a predominantly rural country, with farming as the dominant industry. There are different classifications and data, but approximately 70-80% of the territory of the Republic of Serbia is a rural area where about 43-56% of the total population of our country lives. According to the same sources², more than 30% of the population is engaged in agriculture. Rural areas are facing many problems, and poverty is a significant and persistent problem in our country³.

In the document "Strategy Plan for Rural Development for the period 2009 - 2013"⁴ drafted by the Ministry of Agriculture, Forestry and Water Management is stated that one of the primary problems of rural areas is the high rate of unemployment, which is around 20% and is a major

²Source: Hopić, S. et al: "Rural Development in the Republic of Serbia", a study conducted by the SKGO Exchange2 project, the project of Joint Support to local governments, financed by the EU, 2008.

³Detailed in: Pejanović, R., Tica, N., Tranzicija i agroprivreda, Poljoprivredni fakultet, Novi Sad, monografija, 2005.

⁴Strategy Plan for Rural Development for the period 2009 - 2013, material from the Internet. http://www.spos.info/images/uploaded/file/Plan_20strategije%20ruralnog_20razvoja%202009-2013_.pdf

problem for Serbia and for the development of agriculture, which is the main activity in the villages.

On the other hand, out of the total working population over 30% is employed in agriculture. The employment rate in agriculture is one of the highest in Europe. Consequently, agriculture is a very important activity, not only in rural areas but also for the national economy as a whole. Of about 4.600 villages in Serbia in 190 villages are no inhabitants. In over 200 villages there are no young people aged 20. Nearly a quarter of the agricultural population is older than 60 years (*Pejanović et al., 2007*). Generally, rural areas in Serbia are uneven and could be classified in:

- areas with relatively high agricultural productivity and integrated economy;
- small urban economies with agriculture, which depends on labor;
- economies based on natural resources.

Poverty is a significant and persistent problem in Serbia. Some municipalities have developed differently due to different levels of development of formal and informal institutions that reflect the different level of development of rural and urban population. So, there are drastic structural imbalances, institutional problems, unfavorable demographic trends and material constraints in most municipalities (*Njegovan and Pejanović, 2009*).

Serbian agriculture is based on small farms, small and fragmented land areas (average area is around 4 ha), that results in low income and lack of productivity. Farms are low equipped and equipment is not modernized with little specialization of production, a marked extensive production, and at the same time without an adequate response to the needs of the market. Also, according to Pejanović et al. (2011) production is primarily intended for personal consumption of household members, the direct producers, and only a small surplus goes to the market.

What directly affects both the quality of life for residents of rural areas, and the development of their economies and links with other parts of the country and other markets is underdeveloped infrastructure (roads, railways, sewers, electricity, communications, water quality, schools, kindergartens, health centers, cultural centers, and the like.) (*Njegovan et al., 2010*).

Underdevelopment of infrastructure has a direct impact on reducing the competitiveness of rural areas, distortion of their image and business climate, and thereby causes the withdrawal of potential investors. Funding thus goes into another, urban, better connected and more infrastructure built up areas.

Rural areas in Serbia have marked differences in the social, demographic, economic, and other characteristics. However, what they have in common is unfortunate "diminishing" because of the migration from rural to urban areas in search for better employment, sources of income and a better living standard (*Pejanović et al., 2011*).

Due to migration from rural to urban areas, there is a so-called "depopulation" of the village. It's often the case that the whole household "disappears" in a way. This phenomenon is not only related to the working population but also to young professionals and educated people who could affect the economic development and the improvement of the current situation. The process of migration in some parts of Serbia, like East Serbia and a number of municipalities in South Serbia is far above the average migration in Serbia and Europe, which has to be taken as a very dramatic problem.

According to Hopić et al. (2008) Serbia has about 5.1 million ha of agricultural land (0.68 ha per capita), of which about 4.2 million ha of arable land (0.56 ha per capita), which is above average in comparison with EU countries. In Serbia there are 2.521.190 households and 363.642 registered agricultural holdings. These parameters are not good for conventional agriculture but, due to the higher prices of organic products in the market and the fact that organic agriculture is labor intensive, they can be considered as an advantage in organic agricultural production.

The first and fundamental step of creating a successful strategy and helping the rural areas is the precise definition of rural areas, identifying rural regionalization, which means defining indicators of rural development, which will enable the monitoring of their condition and development. In Serbia, there is still the problem of defining rural areas, a step without which we cannot go on. We used, as a parameter for the distinction between rural and urban population, density of 150 inhabitants per square meter.

Only when we properly define rural areas and indicators, we can make a more detailed analysis of the situation, gain perspectives and insights, monitor the situation and based on that, see the key points of the development and possible obstacles. This is not just a problem of our country. The world in this sense uses the methodology of the OECD, EU, FAO and the World Bank, but still there is no single international methodology, in order for this process to be done in a uniform and standardized way. It primarily creates problems of comparability between different countries. In line with this, there is not a unique position in defining what is "rural", or the term "rural area".

According to the document "Strategy Plan for Rural Development for the period 2009 - 2013" drafted by the Ministry of Agriculture, Forestry and Water Management, Serbia's rural areas faces a number of problems, which were systematized and presented in the table below.

Table 1 (a). *The comparison of fundamental characteristics of urban and rural areas*

INDICATORS	Total in Serbia	Urban areas	Rural areas	% of rural areas in total in Serbia	EU 25. Rural areas
Total area (km²)	77508	11556	65952	85,1	56,2
Number of settlements	4715	811	3904	82,8	-
Population 1991	7576837	3257374	4319463	57,0	16,6
Population 2002	7498001	3336341	4161660	55,5	-
Density 2002	96	288	63	-	38,5
Changes in population in % (1991-2002)	-1,04	2,42	-3,65	-	-

Source: *The document "Strategy Plan for Rural Development for the period 2009-2013" MoA.*

Table 1(b). *The comparison of fundamental characteristics of urban and rural areas*

The age structure					
Over 65 years (%)	16,5	15,4	17,5		16,6
Below 15 years (%)	15,7	15,1	16,2		17,6
Employment by sector					
Primary sector (%)	23,36	11,26	32,98		13,2
Secondary sector (%)	30,08	29,32	30,69		28,7
Tertiary sector including public enterprises (%)	43,74	56,74	33,44		58,1
Unknown	2,80	2,69	2,89		
GDP per capita index, Serbia = 100	100	132,8	73,7		74,1
Unemployment (%)	22	23	21		11,6
The female unemployment rate (%)	24	25	23		
Infrastructure					
Number of phone linde/1000 inhabitants (2004)	331	391	284		
Number of inhabitants per doctor (2004)	369	272	512		

Source: *The document "Strategy Plan for Rural Development for the period 2009-2013" MoA.*

Table 1(c). *The comparison of fundamental characteristics of urban and rural areas*

Tourist accommodation					
Number of beds in hotels	83993	26919	57074	67,9	
Number of beds in hotels per 1000 inhabitants	11,2	8,07	13,71		
Number of nights	6642623	2147850	4494773	67,6	

Source: *The document "Strategy Plan for Rural Development for the period 2009-2013" MoA.*

The concept of sustainable development of society is dealing with the issue of environmental protection. Serbia in general and rural areas specially has a variety of preserved ecosystems and biodiversity characteristic. Therefore, it is necessary to have ecological approach to everyday life activities. It is necessary to develop a higher level of environmental consciousness considering natural wealth and resources. Current environmental awareness and practical activities in the field of environmental protection are not satisfactory.

Organic farming plays an important role in rural development, as it enables economic development, diversification of activities, attracts financial resources, but it is also an integral part of the strategy for rural and agricultural development (Čikić and Petrović, 2010).

Trends of organic agriculture in the Republic of Serbia

Organic farming is the new concept of production which places an emphasis on quality and safety. It is part of the so-called sustainable agriculture, and it is legally regulated and subject to inspection (by authorized organization), and obtaining the certificate (in Serbia - "organic produce"). The main feature of this production is to avoid the use of synthetic fertilizers, plant protection products, plant growth regulators in livestock and livestock feed additives. The quality of the product is controlled by the Codex Alimentarius standards for organically production (passed in 1999, and revised in 2001) (Pejanović et al., 2011). The history of organic food production and processing in Republic of Serbia stretches over the last 20 years. The sector is still only marginally

organized, although a number of different locally acting associations, organizations, cooperatives and interest groups have been developed.

Since January 2011, in the Republic of Serbia, organic agriculture is regulated by the Law on Organic Production („Official Gazette of RS“ No.30/10) which was enacted in the Republic Parliament in May 2010. This law and following legal acts had been prepared according to the European Council Regulation (EC) No. 834/2007, Reg. (EC) No. 889/2008. and Reg. (EC) No. 1235/2008. The law is followed by the two rulebooks on organic production and import rules. In order to achieve the standards set by world markets, support to the organic sector is necessary. The action plan for organic farming in Serbia reflects the “political will to establish strategic goals in the field as well as to engage all state administration capacities in achieving them” (MATFWM: National Action Plan for the Development of Organic Farming in Serbia, 2010).

After a number of activities aimed to support the organic sector, in May 2010, GIZ⁵ launched a project on organic sector analysis as well as opportunities for the development of different segments that can contribute to the improvement organic production in Republic of Serbia, and indirectly, to the development of rural areas. For the purpose of research, GIZ engaged advisory consortium comprising German consulting houses AFC and the Swiss Research Institute of Organic Agriculture FIBL, with the support and cooperation of Serbian experts. The conducted research has included: site visits and scanning of the situation in the sector through interviews with various stakeholders in the sector; sector analysis with the collection of statistical data (area, species, regional distribution, number and type of actors, processing, etc.) in cooperation with relevant institutions and certification bodies whose activity is registered in the Republic of Serbia; farm survey with number of certified organic farmers from all over the country. In the autumn 2012 GIZ supported by Serbia Organica and MATFWM (Ministry of Agriculture, Trade, Forestry and Water Management) renewed data on organic agriculture in Serbia according to the methodology of the Swiss FIBL institute for World Organic Agriculture.

The proportion of country`s total utilized agricultural area (5,05 million hectares) under organic agricultural production is about 0,13 percent. First

⁵ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Private Sector Development Program ACCESS.

assessment for 2013 shows that the organic area could be approximately 11.000 hectares (Haas, 2013).

According to Haas (2013) some sources publish high numbers for large areas of organics wild collection for Serbia. However, a systematic evaluation of these areas is needed to avoid multiple counting of the same areas and realistic collecting area coverage of single operations, so that only officially registered operators are considered.

The survey shows that around 829.000 hectares of land are currently either organically certified or in the process of certification. This area also includes land used for harvesting wild berries, mushrooms and herbs. It is important to notice that in Serbia there is no official methodology for calculating data related to wild collection areas. Arable land under organic agriculture accounts over 11.000 ha or 1-1.1% of the total surveyed land. The survey results suggest that organic agriculture is mostly practiced in southern and western Serbia, followed by Autonomous Province of Vojvodina. Out of total agricultural land under organic cultivation, perennial crops are planted on almost 46,7% and annual crops on 46%. The balance (7,3%) goes to grassland and pasture. Within the category of perennials apples dominate, then go plums, followed by various berries, notably raspberries. Cereals, soybeans and vegetables are the main annual crops grown (GIZ, 2012).

Table 2. *Structure of land areas according to structure of crop production (2012)*

	ORGANIC PLANT PRODUCTION, 2012			
	Areas in conversion (ha)	Areas with organic status (ha)	Total (ha)	Share in total area
Crop production	1734,39	2850,43	4584,82	41,31%
Fruit production	1091,19	4054	5414,49	46,36%
Vegetable production	233	296,5	529,5	4,77%
Pasture and meadows	818,97	20,83	839,8	7,57
TOTAL	3811,55	7222,26	11099,31	100%

Source: *Organska poljoprivreda u Srbiji, GIZ, 2013*

Table 3. Areas of organic plant production (2012)

	Plant production	Areas with organic status (ha)	Areas in conversion	Total areas (ha)
Perennial fruit crop	Apple	1177,55	6,02	1183,57
	Raspberry	550	142,46	692,46
	Strawberry	41,42	11,54	52,96
	Plum	1188,56	39,48	1228,04
	Cherry	409,94	26,38	436,32
	Other	686,53	865,31	1551,84
Total for category		4054	1091,19	5445,19
Annual crops	Corn	280,37	539,33	819,7
	Wheat	284,66	281,72	566,38
	Soya	104,53	39,5	144,03
	TOTAL	669,56	860,55	1530,11
	Vegetable	296,5	233	529,5
Other crops		2181,47	873,74	3055,21
Total for category		3147,53	1967,29	5114,82
Pastures		20,83	818,97	839,7

Source: *Organska poljoprivreda u Srbiji, GIZ, 2013.*

Table 4. Organic livestock production (2012)

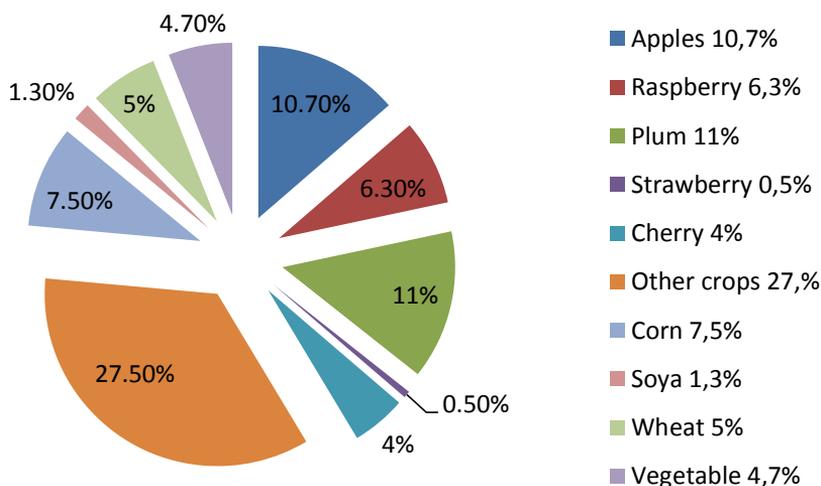
	Organic livestock production, 2012	
	Conversion period number of livestock, poultry, beehives	Organic status number of livestock, poultry, beehives
Herds (cattle, buffaloes, horses, donkeys)	2164	230
Flocks (sheep, goats, pigs)	3404	983
Poultry (chickens, geese, ducks, guinea fowls, turkeys)	4276	3600
Beehives	2610	4394

Source: *Organska poljoprivreda u Srbiji, GIZ, 2013.*

The survey data suggest that almost 4.000 small-scale farmers are involved in organic production. Yields on such farms cannot be the same

as in conventional agriculture and prices obtained are usually not identical to those obtained for conventional crops.

Graph 1. *Organic plant production, ha (2012)*



Source: *Organska poljoprivreda u Srbiji, GIZ, 2013.*

In terms of regional distribution and importance of organic agriculture in some regions, research has shown that 90% of field and vegetable crops are produced in Province of Vojvodina, while perennials, pastures and meadows are mainly localized in the region of Southern and Western Serbia. In Vojvodina, the most important are soybean, corn and wheat and most of these areas are in the period of conversion. In addition to cereals and industrial crops in Vojvodina in the system of organic agriculture are also fruits and various vegetables (Pejanović et al., 2011).

In addition, farmers involved in wild collection in certified regions are not registered. Small farms with less than five hectares cultivate cereals on small plots and for home consumption only, growing fruit trees and berries on most of their land instead. Vegetables are grown mostly on farms whose size ranges from 5 to 10 ha. All farms having more than 5 ha, however, have land that is not cultivated and is used either as a pasture or simply left fallow. The larger the farm is, the bigger its acreage under organic certification is, but it never accounts for more than 15-25% of total land available.

Problems of organic agriculture in Republic of Serbia

Problems in organic agriculture are very similar to general problems in agriculture of Serbia (VIP, 2010). There has recently not been much investment in organic farms: plantations are usually old, machinery likewise (usually older than ten years), greenhouses and organized stores are available only to every third farmer and leasing land or purchasing inputs or machinery on credit is practiced by just 5-20% of all farmers surveyed. Future investment plans are therefore very moderate. They concentrate on rehabilitating the irrigation infrastructure, deemed problematic mostly for fruit farmers (GIZ, 2012). Along with modernizing organic production, population in rural areas will have a chance to revive villages and attract young people to countryside.

Serbia, along with other countries in the region, has been facing enormous financial and general economic problems since the world financial crisis. On top of that, agriculture was hit by a very severe drought during summer 2012 with significant yield losses of the key commodity crops.

As a consequence of the overall struggle, the hectare payment for organic farmers in 2012 was offset, and the payments for support in 2011 did not arrive before mid-2012. It is likely that the low lobbying power, due to the small share of organic land and the low number of operators, are additional reasons for the sudden halt to financial support. The latest per hectare payment level was 250, 350 and 450 euros for arable crops, vegetable and fruit production, respectively. The rate is high compared to other European countries, but most farmers are smaller than five hectares so the amounts paid per farm are also small (Haas, 2013).

To some extent, farmers are aware of these problems. While low yields (insufficient fertilization), diseases and pests (absence of appropriate pesticides), as well as irrigation (especially in case of fruit trees) are seen as major production constraints, advice and the quality of extension are not highlighted as major weakness.

Respect to market-near actors, most of them are involved in different activities at the same time. Processors are likely to be also exporters, traders, input suppliers and importers. The survey data relates to approx. 20 companies who are currently involved in organic processing and trading activities.

Additionally, retailers, certification bodies and supporting government and non-governmental institutions are relevant for the sector. Besides mentioned, some results of survey have shown (Pejanović et al., 2011):

- Obtaining organic inputs is considered by virtually all participants as a challenge. Certified seed is only rarely available; pesticides permitted under organic regimes practically do not exist and even fertilizing is an issue; organic farming relies on manure and on compost. But considering that only every second farmer keeps animals, and if so only a few, manure available to them is hardly enough to provide.

- Organically certified product is typically sold to wholesalers and to processing companies, with which almost 70% of the growers conclude contracts prior to the start of the season. Direct selling e.g. on the green market is practiced only by 20% of farmers. Due to such system, the mark-up in price they obtain for their organic produce is very moderate (with 10-20% on average) and confirms that value-addition is not generated on the farm level. However, the products offered are usually also not ready for optimum marketing. Since there is often lack of storage facilities, products are only available during peak periods, when the growers flood the market. Sorting is only carried out by every second farmer and usually according to size, rarely according to quality. Packaging and transport logistic are also mayor issue.

- Such economic situation, however, has not motivated farmers to form cooperatives or associations. Only 5% of them are organized in associations and only 30% in business associations, such as Serbia Organica, Terra's and Topas –these three being the most popular.

Farmers involved in organic production in Serbia are faced with many problems. However, organic production is a new concept of agriculture production in Serbia and as such is still adapting to conditions at the macroeconomic level.

On the other hand, it is a concept that could partially solve the existing problems in rural areas (fragmentation properties and senility) because it relies on traditional production methods using modern scientific approaches. On the global scale, the organic market has shown continuously growth and resistant to negative economic trends, which proved its prosperity despite the global economic crisis.

It should be noticed that organic agriculture cannot by far solve all problems which Serbian agriculture faces but it can contribute to their reduction by creation new work opportunities and export opportunities, which Serbian producers have in comparison with suppliers from other countries.

Reasons of creation of a new alternative system of economy were motivated by the negatives of the intensive conventional way of economy which damaged the nature; treated animals badly; reduced the food quality; endangered social safety of farmers; and the health of population. That way an organic agriculture arose which represents one of the possible approaches to solve the structural policy and present agriecological, economic and social problems of the countryside, in harmony with the principles of sustainable development (Brožová, 2005).

Conclusion

As a predominantly rural country, Republic of Serbia is facing many problems that are connected to rural areas. Rural development is a part of overall development of the country, which has to be in a balance with the development of industry and service sector.

Organic production has a significant role in the development of rural areas because it enables economic growth, diversification of activities, attraction of financial resources and it is also an integral part of the Strategy for agriculture and rural development (National Action Plan, 2010). In this way, organic agriculture can be seen as a contributive method that can help rural areas, together with other alternative methods of development.

In contrast to conventional agriculture, organic agriculture enable successful development of multifunctional agriculture, which includes food production as well as non-agricultural products (eg. souvenirs, handicrafts) and services such as education, recreation, agro, eco, ethno and rural tourism. Multifunctional agriculture contributes to the conservation of soil, water, health of plants, animals and people, biodiversity and agrobiodiversity and to preserving the values of rural environment, household farms, local ethnological, cultural values and traditions (Lazić, 2009). Overall ecological and economic importance of organic agriculture is reflected in the revitalization of rural areas.

Organic production enables hiring of young people and active involving of women in agribusiness, which leads to decrease of unemployment rate in Serbia and contributes to economic development of rural areas, creating added value to the product or service.

According to these facts, it can be concluded that Serbia has a good agricultural potential for the development of organic production, and that there is an increasing interest in the private sector to invest in organic production. This would contribute mainly to human health and the health of the environment, enhance quality of life and economic development, while preserving the values of rural environment, cultural values and traditions of the region.

Organic farming can offer perspectives for the essential social-economic challenges in rural areas. These are particularly important in the central and southern hilly and mountainous regions of Serbia, which suffer from an immense domestic migration drain of young people due to high poverty, high unemployment rates, and a high level of land fragmentation of the smallholder farms (Haas, 2013).

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IMPACT OF CLIMATE CHANGE ON ADAPTING OF ORGANISMS IN THE REPUBLIC OF SERBIA¹

Mirjana Arandjelović², Vedran Tomić³

Abstract

Global warming majorly changes the environment and affects plant and animal species. Climate change is too abrupt for plants and animals to adapt easily. Plant and animal species respond to new conditions with adaptations in space and time, during which changes in phenological stages and migration take place. Over the last decade, plant and animal populations have been decreasing due to an unsynchronized response of co-dependent species to climate change. When there is a mutually-dependent relationship between species with temperature-based phenological stages and species that depend on the number of sunshine hours, a change in the temperature cycle when the cycle of sunlight remains the same can result in extinction of species. The paper shows the impact of climate change on change in phenological stages in general, and its indirect impact on yield and agriculture. The goal is to point out the need for analyzing effects of global warming in the Republic of Serbia in order to anticipate potential deviations from the expected and enable sustainable development.

Key words: *sustainable development, yield, impact on the environment, climate change*

Introduction

Constant changes on earth come as a direct result of a constant change in environmental conditions. Life in fluctuating environmental conditions sustains due to higher or lower ability of a species to adapt. During evolution, plants and animals adapted to environmental conditions and changes in their

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habitats, thus forming certain phenotypic, morphological, and physiological and biochemical properties. Each property formed during evolution as a heritable trait necessary for survival and reproduction of a species is a result of this ability of adaptation. Adaptive properties make organisms competitive and expansive in conquering their habitats, and make them use external conditions and resources more efficiently. Submersed plants therefore have a very thin layer of epidermis and no protective structures so that they can use a reduced amount of the sun's rays that penetrate water, whereas in dry habitats plants have a thick cuticle layer and protective organs.

A series of special structural and functional properties forms an adaptive mechanism of an organism. Adaptive mechanisms help evading or enduring (tolerating) adverse environmental conditions. Early-spring ephemeral plants (*Corydalis* – spring fumewort, *Galanthus nivalis* – common snowdrop), due to their short period of vegetation, skip the summer months with high temperatures, whereas halophytes are tolerant to high salt concentrations in soil.

The adaptability of species can be seen in their morphology, anatomy, character of physiological and biochemical processes and in dynamics of phenological shifts. Very often, similar environmental conditions lead to similar ecological forms, even in plants that are very different from systematic aspect (environmental analogy), such as the cactus (*Echinocactus ingens*) and the melon spurge (*Euphorbia meloformis*) (<http://plantlust.com/plants/echinocactus-platyacanthus/>).

Image 1. *Cactus (Echinocactus ingens)* **Image 2.** *Melon spurge (Euphorbia meloformis)*



Source: <http://plantlust.com/plants/echinocactus-platyacanthus/>

There is also another type of adaptive properties visible in phenotypic characteristics of an organism, but significant only on the short term. Reversible changes that occur in changed environmental conditions are modifications. These changes are not passed directly to the next generation, and organisms can restore their characteristics again when put in the optimal living conditions. Some of the examples of modifications can be seen in the heterophylla (*Ranunculus aquaticus*), as well as in xeromorphic and heliomorphic canopy leaves (oak, beech).

Reasons for sustainable development are **environmental and ethical** (by sustainable it is considered a situation in which resources are used in such a way to save future prospects for production), since sustainable development is a synergy of sustainable, environmental, economic and social development (*Agenda 21, UN 1992*).

Providing enough food for people and animals is one of the most important businesses of the future, directly dependent on the ability of plants and animals to adapt to environmental conditions, and we can say that agriculture is jeopardized by slow genome adaptation to external conditions. Intensive agricultural production can cause some disorders in soil structure, and forming plough soles, whilst underground waters can be contaminated due to intense use of mineral fertilizers (somewhere also pesticides), which certainly affects climate and genetic resources, since varieties and hybrids that give high and stable yields will be chosen in times when environmental conditions change.

Environmental factors

Environmental factors are characterized by changeability and interdependence. Each of them varies in size and intensity and changes over time (day-night, shifting of the seasons and centuries) and space (the equator to pole temperature difference). The relief of the earth has been constantly changing over geologic time, together with the distribution of sea surface. The same factors differently impact different organic species and even certain stages of their growth (*Janković, M., Đorđević, V. 1981*). The effect of one factor is always relative and depends on other environmental characteristics. Thus, for example, the upper lethal temperature of the oriental rat flea (*Xenopsylla cheopis*) depends on the relative humidity of air (<http://www.wri.org>). No organism can at the same time be adapted to all living conditions on earth. Each organism can survive only within a certain range of environmental change. This range of environmental change in which certain species can survive is called ecological range. The ecological range of

a species is not the same for all factors. It can be wide for one and narrow for another factor. Organisms with a narrow ecological range for a particular factor are marked as stenovalent, whereas ones with a wide range are marked as eurivalent (*Stanković, S, 1979*).

Environmental factors are linked, interdependent and changeable, influencing living beings together, as a whole. Organisms adapt to those changes to survive. Adaptations are always habitat-related and reflect its character. All adaptive characteristics of an organism that are its response to environmental factors form a life (ecological) form (<http://www.epa.gov/climatechange/impacts-adaptation/adapt-overview.html>). The phenomenon of similar morphological and physiological properties in species that are not closely related shows those species have adapted to the same environmental conditions in a similar way, and therefore got the same ecological form. Conversely, there are some cases of similar species living under different conditions and having completely different life forms. Richness and diversity of life forms can be illustrated by many examples. In plants, those forms are life forms of trees, bushes, grass, etc. When it comes to animals, those forms are freshwater, underground, forest, desert and other life forms.

Almost all life on earth is in a range of 10 km from the earth's surface to the tropopause. One of the results of climate change is narrowing of this life space called the biosphere. Increasing of carbon dioxide in the deeper atmospheric layer leads to trapping heat in the troposphere preventing it to go to the upper layers. As a result, the upper layers cool for about 50°C. Cool air coagulates, lowering the upper layers of the atmosphere.

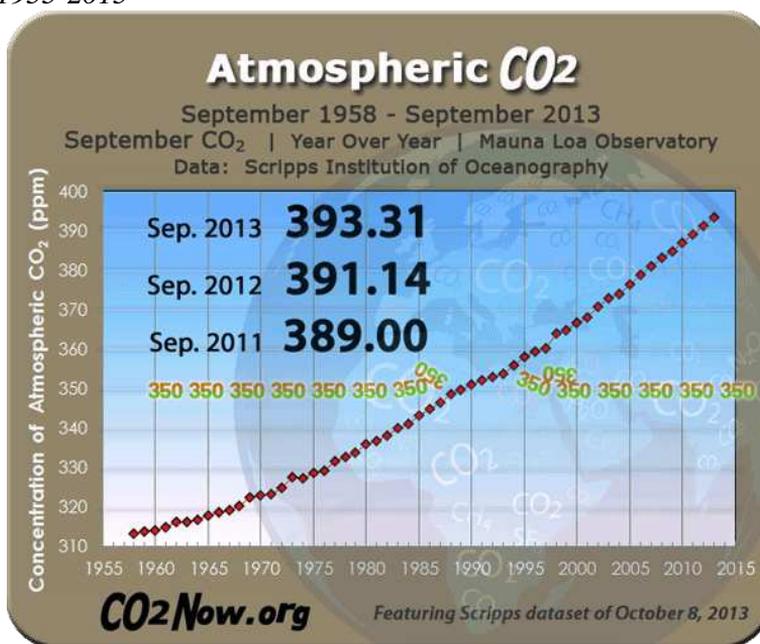
Climate variability jeopardizes a biodiversity, directly changing the environmental factors necessary for survival. Global warming and the factors that cause it, such as industrialization and increased concentrations of carbon dioxide have led to other changes in ecosystems.

Impact on plants and animals

Coal and oil facilities massively emerged in 1920, when the first impact of industrialization on forest ecosystems was determined. Studying annual rings of 130-year old trees on Mt. Vermont, Detroit, has shown a change in their width and structure. The change in width implied that trees had started to grow faster due to higher concentrations of carbon dioxide. Faster growth caused an increased emission rate for steam and requirements for rain (*Charles Little, 1997*). Precipitation did not increase proportionally with an increase in carbon

dioxide concentrations. Due to intensive industrial production, rain became acidic, which led to washing out calcium and alkaline metals from soil and releasing aluminum and other heavy metals. Changing mineral balance in soil caused tree root damage. Tree rings started having lead, zinc, mercury, and vanadium, and their concentrations increased gradually until the 1950s, after which the accumulation rate has increased abruptly. In fourteen years' time, from 1965 to 1979, more than 40% of the red spruce, 73% of the red maple, 49% of the striped maple and 35% of the sugar maple were lost (Hartmann T., 2007). Due to the use of oil, gas and coal, each year more than 6 billion metric tons of carbon dioxide is emitted, which has resulted in increased concentrations of atmospheric carbon dioxide from 280 ppm (in the pre-industrial era) to 393.31 ppm (in 2013).

Image 3. Increase in concentrations of atmospheric carbon dioxide in the period 1955-2015



Source: www.co2now.org

Increased concentrations of carbon dioxide cause higher heat (Third Assessment Report of the Intergovernmental Panel on Climate Change IPCC, 2001) and higher heat cause more energy. Additional concentration of energy in the atmosphere creates much less stable and destructive climate worldwide with much stronger storms and bigger floods.

In the last century, greenhouse gases caused the temperature increase in Europe of about 1⁰C, what is faster than the average global rate, which resulted in frequent extreme temperatures, heat waves and floods (Forth Assessment Report of the Intergovernmental Panel on Climate Change IPCC, 2007). The south of Europe is therefore characterized by less rain and many dry periods, whereas the north is characterized by more rain and snow.

Impact of climate change on flora and fauna

“Global warming” is a term frequently illustrated through images of a very hot summer. Despite high summer temperatures being the fact all over world, temperature, however, is increasingly higher in the winter as a result of climate change. Studies have shown that in the winter temperature increase is twice as much than in the summer (*Global Warming Is Marmot Wake-Up Call, 2000*).

Global warming has been changing the environment, causing abrupt climate change, too abrupt for plants and animal to adjust easily (*Đukanović M. 1991*).

A direct result of a warmer and shorter winter is the early coming of spring, according to temperatures. In the whole Northern Hemisphere spring comes 1.2 days earlier per decade. The early spring and the hotter summer make growing season last longer.

Growing season constantly prolongs. In the period 1960-1999 it prolonged for 10.8 days, so the spring started 6 days earlier and the summer ended 4.8 days later (*Third Assessment Report of the Intergovernmental Panel on Climate Change IPCC, 2001*). Soil surface keeps more heat in the summer, frequently causing high temperatures in autumn. A longer growing season causes an increased need for precipitation.

According to the⁴IPCC report from 2007, on the analysis of 29,000 species, changes in 89% (25,810) of species are a result of global warming. Plants and animals respond to new conditions with spatial and temporal adaptation (www.aip.org/pt/vol-55/iss-8/captions/p30_cap2.html).

⁴ IPCC - Intergovernmental panel on climate change is an authority formed by the United Nations to evaluate scientific, technical and socio-economic aspects important for understanding climate change, its potential consequences and chances for adaption and diminishing its negative impacts.

Spatial responses to climate change

Many plant and animal species have expanded their areals to the north in the Northern Hemisphere, to the south in the South Hemisphere and to high-altitude areas. Since the winter in high-altitude areas has become milder, species from lower areas have started to inhabit there, expanding their areals. This tendency can be good for species that easily migrate.

However, more vulnerable species and those species that do not have chance to migrate can be endangered. Migrating to a new territory is often impossible because animal migration or seed dispersion can be stopped, due to human activities (i.e. building houses and highways) or natural barriers (rivers and mountains).

Migrating to zones with improved climate characteristics will also be limited by soil conditions. Millennia should pass for soil profiles to develop and poorly developed soils cannot change fast enough (*Ottersen, G. et al., 2001*). In most cases, habitat potential is not in line with the intensity of climate change. One more obstacle for migration to new habitats is a spatial, geomorphological limitation. Typical examples of it are populations pushed up into the hills (*Pinus mugo* – the mountain pine), having nowhere to migrate. In general, all species living in habitats where there are no geographically continuous corridors are going to be mostly affected by the upcoming climate change. Like species at high altitudes, Mediterranean species could also be endangered due to sea-level rise (http://wwf.panda.org/sr/o_naoj_planeti/klimatske_promene/priroda_u_opasnosti/).

Temporal responses to climate change

Impact of global warming is reflected in the following changes in phenology of plants and animals:

- Growing season, the period of vegetation starts earlier
- Dormancy (hibernation period) of mammals and insects ends earlier
- Birds, insects and mammals migrate earlier
- Plants become covered with leaves earlier
- Reproduction period of mammals, insects and birds starts earlier
- Autumn phenological cycles are late. Due to the summer period, leaves stay longer on trees, while birds and mammals migrate later in the autumn.

The consequences of phenological shifts will depend on the level of biological organization of a species. For a long-lived individual tree, leafing out several days earlier each spring may allow it to get a rapid head start in its growth, especially if neighboring trees remain leafless, which would allow its leaves to receive a great deal of sunlight.

On the other hand, if a tree produces its leaves earlier than any of the other members of its population, it may be vulnerable to leaf-eating insects (e.g. moths, and butterfly larvae, ants), simply because it will be a rare and limited recourse for them at that moment (*Nicolas J. et al., 2003*).

The impact of phenological shifts on a given population of a species will also depend on whether the other species on which it relies - for food, pollination or seed dispersal - react in the same way to climate change. For example, if populations that benefit from each other respond differently to climate change (e.g. if a plant population flowers on average five days earlier but its pollinators have not arrived), then one or both of them may exhibit population declines. On the other hand, if a population flowers early enough to evade one or more of its natural enemies (e.g. flower bud-eating beetle larvae), it can reap the benefits of high flower and fruit distribution.

Birds are coming earlier in the spring and the summer and forming nests earlier and earlier. The impacts of these altered migration patterns on both the birds and the species they interact with (as seed dispersers or predators) are specific for certain species. However, several cause-effect links have been determined.

Populations with many specialized interspecies relationships and some vulnerable species will be mostly affected by shifts in phenological cycles, caused by climate change. For example, plants species that are pollinated by only one species of pollinator are more vulnerable to losing these pollinator services than other species that are visited by a wide range of pollinator species. Similarly, insects that rely on a single plant species as their food source may experience a noticeable decline in populations if the flowering season of their "host plant" has changed.

Animals that habitually migrate between geographically distant biomes to complete different stages of their lifecycles (e.g. growth, sexual maturation, mating, and bringing up offspring) are particularly vulnerable to the phenological effects of climate change, since there are more inter-specific interactions that may be disrupted.

For example, species of birds that migrate over long distances have to co-occur with their food sources (while avoiding their enemies) in the biome in which they grow and reach sexual maturity, and then, following migration to their breeding grounds, they again have to be in synchrony with their food sources that they feed to their newborns.

These shifts in spatial and temporal range are called “the environmental blueprint of climate change”. Over the last decade, populations have been decreasing due to asynchronous responses to climate change among co-dependent species.

The results of a study that analyzed 700 species over 50 years have shown that animals reach their life cycle, such as mating and laying eggs, five days earlier per decade, on average. The process of budding and flowering, however, has been postponed for only three days per decade.

The most common reasons for this “mismatch” among species lay in the fact that activities of some species (such as “coming out of dormancy” in the spring, migration or hibernation) rely on temperature, whereas seasonal changes of others rely on number of hours and minutes of sunlight.

When temperature system changes and sunlight cycle remains the same, if there are interdependent species that rely their phenological stages on these completely different systems, this may result in extension of species. There are various examples of asynchrony between interdependent species caused by climate change.

Great tit (*Parus major*) is a European bird that does not migrate in the winter. These bird species needs large amounts of winter moth (*Operophtera brumata*) caterpillars to feed their offspring that hatch in the spring. The caterpillars, on the other hand, need fresh buds of the English oak (*Quercus robur*).

Hatching of caterpillars is much vulnerable to temperature change than the oak, so the caterpillars hatch 2-3 weeks before oak buds open. The caterpillars can survive without food only 2-3, maximum 10 days. These asynchronous changes in time of hatching caterpillars, appearing their food on oak trees and hatching of birds have triggered potential disaster both for the moth and the great tit.

Image 4. Great tit **Image 5 and 6.** Caterpillar and an adult winter moth
Image 7. English oak



Source: <http://www.flickr.com/photos/85963466@N00/3973943448/>
<http://postomania.ru/post125506495/>
http://www.google.com/search?q=Hrast+lu%C5%BEnejak&source=lnms&tbm=isch&sa=X&ei=9DtqUvrDF4jMgsaav4CgAw&ved=0CAkQ_AUoAQ&biw=1920&bih=989

Similar problems in synchronization can be found in the case of the auk, a seabird that lives along the North America coast, between northern Mexico and southern Alaska, and its primary food source – a small orange crustacean called *Neocalanus cristatus*. Due to climate change and change in sea temperature of the Pacific Ocean, this crustacean has altered his period of being close to the sea surface for two months. The auk, however, has not changed its hatching cycle, that relies more on sunlight than on temperature. As a result, its food source appears and leaves before birds are hatched. Adult birds have then started to catch fish larvae that live in the rocks to survive. Number of oaks in North America is therefore getting smaller each year, and individuals are much smaller in size than average (Hartmann T., 2007).

Image 8. *Neocalanus cristatus* **Image 9.** Auk **Image 10.** *Cristatus larva*



Source: <http://www.promea.es/resources/pubhub/enotes/wizard-genomic-dna-purification-kit-provides-high-quality-genomic-dna-template-for-molecular/>
http://www.google.com/imgres?imgurl=http://blog.cenim.se/tjasa/files/2007/10/njorka.jpg&imgrefurl=http://blog.cenim.se/tjasa/22102007/njorke/&h=368&w=490&sz=54&tbnid=ZdZIKimQLcsVpM:&tbnh=90&tbnw=120&prev=/search%3Fq%3DNjorka%26tbnid%3DDisch%26tbo%3DU&zooom=1&q=Njorka&usq=vqomdGrNncjDukUshJD1m2IVXcc=&docid=Wx0e-yn_9GSZjM&sa=X&ei=7DlqUrfNE4uHswbf_YFo&ved=0CD8O9QEwAg

The most endangered are the species from colder areas, the species that live at higher altitudes and the ones limited to small areas, as well as those less tolerant to climate change.

Butterflies that once lived at high altitudes in North America and southern France vanished, whereas polar bears and penguins are facing with melting of their habitats.

When temperatures increase, animals migrate to find a cooler habitat. Of 1500 species in Texas, 40% gradually migrate, mostly to the poles. In Britain, about 20 bird species have shifted 19 km to the north, and in Europe and North America 39 butterfly species have shifted even 200 km to the north.

Most animals are with their fur or skin color completely adapted to the surroundings (mimicry). If they migrated to new surroundings, these species would become easy prey for predators. The examples of this phenomenon can be the brown and the arctic hare (*Calvin H.W., 2002*) (Image 11, 12, 13).

Image 11. *Brown hare*
(*Lepus europaeus*)



Image 12. *Arctic hare*
(*Lepus arcticus*)



Image 13. *Havana rex*
(*Havana rex*)



Source: <http://www.google.com/imghp>

The part of the Antarctic that facing South America is getting warmer five times faster than the rest of the world, endangering all penguin species, among which the population of the emperor penguin is the largest and most numerous. Since 1950, the average temperature on the Antarctic has risen by 2.5⁰C, increasing summer temperatures in this region above the freezing point. (<http://www.grida.no/climate/vital/17.htm>). On its western part, the Antarctic now has 40% less sea ice than 30 years ago, which has dramatically reduced the food sources of gentoo penguins, recognized by a wide white stripe across the top of their head, and so-called “hatters”, recognized by the pattern on their feather.

On the southwestern coast of the Antarctic, where ice is melting very fast, the population of adélie penguins has reduced for about 65% in the last 30 years. The number of “hatter” penguins in some of their colonies has decreased by 30-66 %, since the lack of food results in the growing number of young penguins that die during the first year of life. The number of emperor penguins is now twice as less compared with the first half of the 20th century. Higher temperatures and strong winds force penguins to make nests on thin ice sheets, breaking of which can destroy whole nests. Animals and plants accustomed to cooler climate are shifting towards the poles or higher altitude areas, even when there is a little change in climate. This process has been noticed in many places – in the Alps, mountainous areas in Queensland (Australia) and foggy forests of Costa Rica. Very few animal species could benefit from climate change. The species able to mate fast that live in different climate conditions and are able to adapt fast could be the species least affected by climate change. This includes cockroaches, rats, pigeons, weeds and fungi.

The average temperature in the region has risen by 0.5⁰C in the south and 1.6⁰C in the north (Siberia) since the early 20th century (<http://www.grida.no/Climate/Vital/25.htm>). Given minimum 25 years to feel the greenhouse effect, i.e. the effect of already emitted concentrations of carbon dioxide, methane and nitrogen dioxide, we could anticipate the tendency of those changes (*Bill McKibben, 1999*). Due to global warming, 60% of species migrate, mate or flower earlier in the spring, which disturb the balance between birds and insects they eat, as well as the balance between insects and plants they pollinate. Agricultural production is much targeted but still leaves consequences to the agro ecosystem, due to pursuit of maximum profits, best quality and quantity. Accordingly, a dominant way of agricultural production such as practiced in Serbia (traditional intensive agriculture) changes the environment through conquering a new land, reducing biodiversity by using a monocrop system of production, more mineral fertilizers and through growingly popular genetic engineering. Although conventional agricultural production provides enough food, there is a growing tendency for alternative ways of development, among others organic farming (*Kovačević, Lazić, Milić; 2011*).

Impact of global warming on phenological stages of cherry varieties Regina and Kordia in Serbia

In the Republic of Serbia no comprehensive analysis of climate change impacts on phenological stages is done. The Agricultural Extension Service in Šabac recorded changes in the beginning of the flowering period of cherry

varieties Regina and Kordia. These two leading varieties, beside Burlat and Sambarst also planted in this orchard, are at the very top when it comes to quality. The trees are in the fifth vegetation period and they are located in Poczeski Metković, in the municipality of Šabac, Mačva district. This cherry orchard was established in this municipality as a result of a project, at the area of 150 ha, 98 meters above the sea level. The image 14 consists of four pictures that show the flowering period in 2012. The trees were in full bloom on April 3rd.

The image 15 shows the orchard in full bloom in 2013. The flowering period started 13 days later this year, so the trees were in full bloom on April 16th. We cannot make some pretentious conclusions after only two-year monitoring, but these data should be seen as a signal that implies how important is to monitor the effects of climate change on phenological stages, weeds and insects. Only in this way, through measuring, analyzing, estimating and forecasting, can we talk about sustainable production and development.

Image 14. *Cherry orchard in full bloom, April 3rd, 2012*



Source: *Agricultural Extension Service of Šabac, 2012.*

Image 15. *Cherry orchard in full bloom, April 3rd, 2013*



Source: *Agricultural Extension Service of Šabac, 2013.*

Moreover, not only shifting but also shortening of the flowering period has been recorded. These changes cause overlaps between different plant species, which results in a shorter picking period and higher fruit supply at markets. Very high temperatures during the flowering season lead to explosive flowering. Early, mid and late plant species are overlapping, i.e. all of them are flowering in a very short period, thus ripening almost at the same time. One more anomaly is that, due to high temperatures and relatively low humidity of air, the flowering period is now shorter, pollen germination reduced and, consequently, pollination is poorer, which leads to reduced yields (Wood S. et al., 2000). This can harm yields, since the cherry cannot stay long. Moreover, periods of rain can occur during a shorter ripening period and early picking, which can cause fruit cracking. The shortening of the ripening period causes reduced yields and lower fruit quality, which results in a lower price and, consequently, a lower value of production per hectare. In case of fruit cracking in the raining period, there are more rejected fruits, which can burden the production even more.

Apart from climate factors that negatively affect the result of production, it is important to point out the effects of both market and organizational factors of production. That is, due to a glut in the market, farmers despite having quality products may not reach the price that would cover their production costs and bring them profits. In case we neglect the effect of the above mentioned delayed cherry picking we could also have problems in the organization of a picking activity, during which we should have in mind the proper time from a phenological aspect, since it is very difficult to have all seasonal workers needed for this operation to finish in the optimal period.

Overlapping can be diminished by planting species with different flowering and ripening periods. Hence we can avoid a danger of late spring frost, and therefore avoid frost damage in the entire yield. In this way we could prevent overlapping of fruit picking periods and leave species to ripen and be picked successively.

Conclusion

The consequences of global warming are hitting the entire world but have also started to be visible in Serbia. Not one species is adapted to all environmental conditions, and even the adaptation of euryhaline organisms is not universal. The degree of adaptations depends on how fast the environmental changes are and also depends on the dynamics of evolutionary changes within populations.

Since the efficiency of field crop production is valorized through livestock production and directly affects its efficiency, it is important to increase field crop yields along with reducing costs per unit unit of production.

The effect that climate change has on animal species also reflects negatively on plant species. Frequent “Indian summers” mostly affect fruit production, triggering a rapid physiological activity that results in bud burst. These buds would not resist to frost in the months to come, which would lead to reduced yields in the following year.

The effects of global warming do not reflect only to fruit production mentioned in the previous example, but also to other areas of primary agricultural production, above all, field crop production.

Plants and animals are silently witnessing rapid changes on the planet. The effect on species is actually becoming so important that their movements and changes they are going through can be an indicator of warming of the planet. It is undisputed that climate change, predictable or not, and being within calculated or projected anticipations, happens on a global level as well as in our country. It can leave consequences that are becoming more complex as affecting more and more interdependent species. One should not ignore those impacts when setting up a sustainable plantation. Whether the solution will be the application of different plant species or a more detailed analysis of these impacts, it is sure that the effect of climate change should not be ignored, because it can increase over years, affecting even more species.

Using different plant species when setting up perennial plantations could help preventing the overlapping of the flowering, ripening and picking periods, and this is desirable because it is important not to let yields be affected by bad weather i.e. frost in the summer. Preventing different plant species to ripen at the same time contributes to easier production and picking. Economic effects are the factors that dictate agricultural production, and all activities in the future period will focus on achieving higher yields and reducing expenditures.

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CONTRIBUTION OF INSURANCE IN DEVELOPMENT OF BIOREGIONALISM¹

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Abstract

This paper have role to show how insurance in agriculture in stimulating the development of bioregionalism, especially in food production. People have always had to overcome obstacles in order to ensure food. Although the technology has largely failed to sufficiently increase the food supply, food security, especially in emerging markets, has not significantly improved, despite the enormous efforts made by national governments and supranational organization. Insurance of food is becoming more challenging as the population of the world is growing. It is estimated that global agricultural production must increase by 60 % by 2050, to meet the growing needs of people for food. Da meet the growing food needs of the growing population, required huge investments in agriculture, it is therefore necessary point out the risks that may occur in food and thus the importance of ensuring that gives in support this branch in development on bioregionalism.

Key words: *insurance, agriculture organization, protect natural resource, increasing population*

Introduction

Bioregionalism can be viewed as a kind of regionalism, however, while the border region mainly determined administratively, bioregion boundaries are determined by natural the limits of the ecosystem. It is a

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living space (life- territory) - place defined life forms that inhabit it (*Gk* : bios = life + lat: *regere* = space which should rule) . Bio - Regions / bio-regionalism are ways of understanding access to the region, which highlights the method development and organization of social life that rely on the natural properties space. This mode of development and the organization of society itself is sensitive to the natural environment (water, soil, air, climate) and their ecosystems does not spend over the limit of their load-bearing capacity. Bioregionalism the political, cultural and environmental system based on naturally defined territorial units called bioregion.⁴

Agricultural insurance helps to manage risks in the agricultural food value chain, stabilize farming income and promote investment in agriculture. It is one of the means via which farmers in emerging markets can make the jump from subsistence farming to sustainable farming. In addition to insuring agricultural risks, insurance can also act as collateral for credit, making funding available to small-holder farmers. In many emerging markets where infrastructure is still underdeveloped, it can also be leveraged to encourage investment in storage and transportation, distribution and other logistics services. Agricultural insurance is growing. Global agricultural insurance premiums were estimated at USD 23.5 billion in 2011, with emerging markets generating around USD 5 billion of the premiums. Between 2005 and 2011, agricultural insurance premiums from emerging markets registered strong annual growth of around 30% (versus 20% globally). This growth came mainly from China and India, which together accounted for some 62% of emerging market agricultural insurance premiums in 2011.⁵ Proactive government policies and higher crop values/commodity prices have been some of the strongest contributors to this fast paced growth in emerging markets. New products, distribution channels, and technologies have also been key to the solutions devised for the risk landscape particular to emerging markets.

The role of insurance in supplying a sufficient quantity of food

Projections of climate change are inherently uncertain, due to the natural variability in the climate system, imperfect ability to model the

⁴ Pudjak J., Koncept organizacije društvenog života i model razvoja koji doprinosi očuvanju okoliša i integralnoj održivosti, Institut društvenih znanosti "Ivo Pilar", *Soc. ekol. Zagreb*, Vol. 19 (2010.), No.1, p.34

⁵ www.swissre.com, Publication 2012, 30.09.2013.

atmosphere's response to any given emissions scenario, difficulties in evaluating appropriate methods to increase the temporal and spatial resolution of outputs from relatively coarse climate models, and the range of possible future emissions. These uncertainties are compounded by the paucity and unreliability of basic information related to agricultural production. Land-based observation and data collection systems in parts of the world have been in decline for decades. This affects the most basic data: weather data, land-use data, and crop and livestock distribution data, for example. Estimates of the cropland extent in Africa range from about 1 to more than 6 million km², the value depending on choice of satellite-derived product. The uncertainty in such basic information as which crops are grown where, and how much of them there is, adds considerable difficulty to the quantification and evaluation of impacts and adaptation options. Another key gap is existence of data, tools and models at spatial and temporal scales appropriate to decision-making. Production impacts are often aggregated over large areas such as the country or region, and this can hide considerable heterogeneity in climatic conditions and agricultural production. Nonetheless, as outlined below, scientific knowledge is improving, with growing certainty around major trends, and emerging approaches to improve data and tools for decision-making.

The potential impacts of climate change on agricultural production in different parts of the world have been assessed in numerous studies and reviewed in successive assessment reports of the IPCC (2007). Ranges for major crops depend on the region under study, the methods and models used, and the emission scenarios simulated, and, as noted above, there is considerable uncertainty about such estimates. Nevertheless, most studies indicate that agriculture in the tropics is likely to be severely affected in the coming decades by climate change. Some of the key impacts on farming and food systems are noted below.⁶

level can seriously impact an individual's access to sufficient, safe and nutritious food. National and regional policies on food production and distribution (eg food trade policies) affect a household's access to foodstuffs. Such policies can affect where and how food is available as well as the balance between food supply and demand. Households make consumption decisions based on factors such as income level, job security, household demographic structure, and food preferences. At the individual level, the modern concept of food security means that people's

⁶ Climate Change, Agriculture and Food Security (CCAFS), CCAFS Report No. 3, p.5

food consumption is always greater than their individual, basic, physiological survival needs. Achieving global food security therefore requires taking the appropriate decisions and action at all levels and involves a massive coordination effort on the part of national and regional governments as well as international organizations. In pursuit of reaching this goal, in 2000, 189 nations developed the eight Millennium Development Goals (MDG), whose first objective (MDG1) was to “eradicate extreme poverty and hunger”.

Insurance Agriculture is one of the most complex and challenging. Has a long history in the developed markets of the U.S. and Europe, and is becoming increasingly important in emerging markets. In developed markets, there are several types of products that are offered in this sector.

"Named-peril" insurance covers individual risks such as fire and storm. This type of insurance is highly developed in most European markets and is available in some markets in the developing world.

"Multi-peril" insurance contribution (MPCI) covers more risks, including floods, sometimes disease. Policy includes coverage of income, and the most common in the U.S., where it has a long history. Insurance for a specific region based on ensuring that region, which can be defined as a municipality or county in which the products are the same culture. Such policies exist in many markets - the U.S., Indian, Brazilian, Mexican and Canadian. Their advantages are easy administration and rapid damage assessment.

Insurance for agricultural products from the elements is also one of the products that are offered on the world market. Of developing countries in Central and Eastern Europe, this type of insurance was first introduced in Serbia, but it has been a little present, although in future strong Livestock insurance covers insurance of cattle, pigs and animals from death and disease that are epidemiological nature, fire, natural hazards and disasters. Diseases that are a result of the epidemic may also be covered by insurance. These manufacturers often underestimate the risk, and they can be quite significant. During the first decade of the 21st century losses of bird flu in Asia climbed to nine billion and 250 million poultry had to be killed. Ensuring aquaculture provides coverage for certain fish, such as tuna, salmon and other types of "water farms" such as shrimp and clams from natural hazards, algal blooms, predators, disease. Although their cultivation is becoming increasingly popular, security in this sector is not

developed. Insurance plantations intended for owners of plantations of eucalyptus or pine trees, covering the risks of fire and storm. This type of insurance has a very small percentage of the overall security of the economy. Is present in the markets of Australia, Canada, New Zealand, Germany and France. Quickly developed and in South America. It is estimated that in Chile and Uruguay secured 80 percent of the forest area .development.

Insurance greenhouse covers damage from frost, which can damage equipment and greenhouse. For example, in East Africa is highly developed production of flowers in greenhouses. Aircraft flying with fresh products for Europe and it is a very sophisticated supply chain and that kind of production requires adequate insurance and reinsurance. In that market, local insurers sell insurance, but are supported by international reinsurance companies.

Challenges of agricultural insurance in the global market are reflected in the lack of appropriate support policies and legal framework, awareness of farmers on the necessity of insurance distribution channels in rural areas, high-quality data to determine the cost and how much insurers are willing to find a more effective business models. Access to the insurer in each market would have to be tailored to the needs of local farmers, and consideration should be taken and the unique characteristics of the market. It takes specialized expertise, efficient assessment process claims and innovative assessment of risk exposure, and the preservation of an acceptable level of premium.

Food security depends heavily on improving the agricultural sector

Much of the battle for food security involves improving the agricultural sector. In fact, many of the drivers of food security depend on developing agricultural sector productivity. With at least 70% of the world's extreme poor living in rural areas, 24 raising agricultural production is expected to improve their income and their access to sufficient food. As Table 1 shows, many emerging markets suffering from a high incidence of food insecurity also rely heavily on agriculture as their main source of income. Improving agricultural output and productivity can go a long way to helping to reduce the number of people suffering from hunger, thereby making a sustainable agricultural system vital for global food security in today's world.

Adequate agricultural production is arguably the most weight-bearing pillar in determining the strength of global food security. Strengthening food security requires balancing food demand and supply at affordable prices. However, the supply side in particular will remain vulnerable due to challenges such as climate change, weather events, natural disasters, water scarcity, the degradation of natural resources and insufficient infrastructure. At the same time, the world's population, which is expected to grow another 34% by 2050, will require a sustained increase in future agricultural output. For the emerging markets and their agricultural sectors characterized by small farm holdings, limited use of technology, and insufficient agricultural investment, sustaining high supply growth will require major investment, improvements in productivity and innovation on the part of all stakeholders. Effective food distribution is another important pillar of food security. Since approximately one third of the food produced globally for human consumption is lost or wasted each year⁷, there is ample room to raise the food supply. Improved government policies, better transportation networks and warehouse availability are needed to enhance food distribution and allocation in emerging markets. In fact, a key reason behind the high amount of food wastage in emerging markets is poor infrastructure, including insufficient refrigeration facilities and a lack of processing and packaging plants. Going forward, a more effective supply chain system will be required to ensure everyone has physical access to foodstuffs. The alleviation of poverty is also critical for strengthening food security because increased earnings will allow lower-income households to afford their basic food needs. Around 40% of the population, or close to one billion people, in South Asia and sub-Saharan Africa live in extreme poverty and lack the financial means to ensure that they have adequate access to food. Moreover, the livelihood of many small-holder farmers is vulnerable to agricultural uncertainties since many of them depend fully on agricultural production not only for income, but also to meet their basic food needs.

Risk connected with produce of food and risk management

Farming as an outdoor business is susceptible to climate change and natural catastrophe events, which pose a significant risk to food producers by skewing crop yield and food prices.

⁷ "Global food losses and food waste", Food and Agriculture Organization of the United Nations, (Rome, 2011), p. 4.

Production risk is one of the key risks that farmers face, and its impacts can range from revenue loss for the individual farmer to chronic food shortages at the national level. Predicting output and quality with certainty is challenging, especially considering such factors as: adverse weather and natural disasters, including floods, windstorms, hailstorms and droughts; the availability of natural resources, including water and arable land; pests and crop diseases that can destroy produce or affect crop quality at the farm level. Outbreaks of livestock epidemics such as foot-and-mouth disease can also lead to losses; social risk such as war, terrorism, riots or social instability. In short, risks related to volatility in yield and shortfall in production stem from multiple factors, some of which can be controlled at the farm or regional level, while the impact of others (such as natural catastrophes) can only be mitigated through effective financial risk management at the national level.⁸

Market/price risk arises from price volatility, in terms of both input and output prices, and is triggered by demand and supply conditions in the local or global marketplace. International prices for maize, for example, dropped 26% in 2009 only to rise sharply by 12% and 57%, respectively, in 2010 and 2011 similarly volatile price patterns have been observed in other basic foodstuffs. The extent to which local prices (and demand/supply factors) move in concert with those of the global marketplace is influenced mainly by the degree to which the markets are open to trade. External shocks have a more significant short-term impact on open economies.⁹

Operational risk comes in many forms, including unavailability of labor during the harvest season, input shortages, critical equipment failure, theft, fire, or accidents. Risks relating to liability (such as food recall risk) and business interruption can affect food processing companies and exporters. Liability risk stems from deficiencies in the quality control of agricultural produce or infected food grains/livestock that lead to health concerns and sometimes litigation. Contaminants can also be added during food processing. Rising consumerism has also contributed to increased regulations on food safety. At the same time, the growing use of genetically modified seeds and complex fertilizers has given rise to uncertainties regarding the longer-term health impact of these agents.

⁸ www.sweess.re, date 25.09.2013.

⁹ Source: IMF World Economic Outlook Database April 2012.

Meanwhile, food processing companies and distributors face the risk of revenue loss when supplies are received late or in inadequate amounts.

Table 1. *Possible farm risk management instruments and strategies*

Risk	Farm/house hold/community	Market	Government
Risk reduction	Technological choice	Training on risk management	Macroeconomic policies Disaster presentation
Risk mitigation	Diversification in product Crop sharing	Futures an options, Insurance, Vertical integration, Production /marketing, contract, Spread sales, Diversified financial investment, off farm work	Tax system income smoothing, Counter-cyclical programs, Border and other measures in the case of contagious disease outbreak
Risk coping	Borrowing from neighbors/family, Intra community charity	Selling financial assets, Saving/borrowing from banks, Off farm income	Disaster relief, Social assistance, All agriculture support programs

Source: “*Managing risk in agriculture: A holistic approach (extracts)*”, *OECD, 2009, p. 22*

Financial risk includes risks related to the access and/or availability of financing, interest rate risk and currency/foreign exchange risk. Agricultural production usually incurs a funding gap due to its long production cycle during which financing is required at different stages: when purchasing/leasing agricultural land, purchasing inputs and investing in farming equipment. The lack of access to financing is a major challenge in emerging markets and has contributed to the limiting of agricultural production.

Technology risk involves advances in technology (such as the launch of an advanced fertilizer or new genetically modified seeds) that render some farmers’ existing processes or equipment outdated in the short to medium term, thereby reducing their competitiveness. The risk can also emerge from the failure of new technologies when, for example, the use of advanced fertilizer or genetically modified seeds fails to deliver the expected higher yields. Institutional and regulatory risk arises from policy changes at local or national governmental level. These entities usually

have a policy framework within which to govern, support and protect the domestic agricultural sector. The framework can consist of favorable policies, large-scale national agricultural programmers, price support mechanisms, subsidies or other measures. Changes to these policies or a reduction in support can significantly affect a farm's earnings. For instance, ad-hoc export restrictions to meet domestic demand mean that farmers cannot reap the full benefits of higher international prices for their products.

Infrastructure risk originates from inadequate infrastructure for agricultural production and distribution. Infrastructure challenges may stem from warehouses (for storage), financial institutions (for credit) or wholesale/retail networks (for distribution). For instance, an inefficient distribution network or a poor warehousing setup can result in the loss of perishable agricultural products before they reach end-consumers.

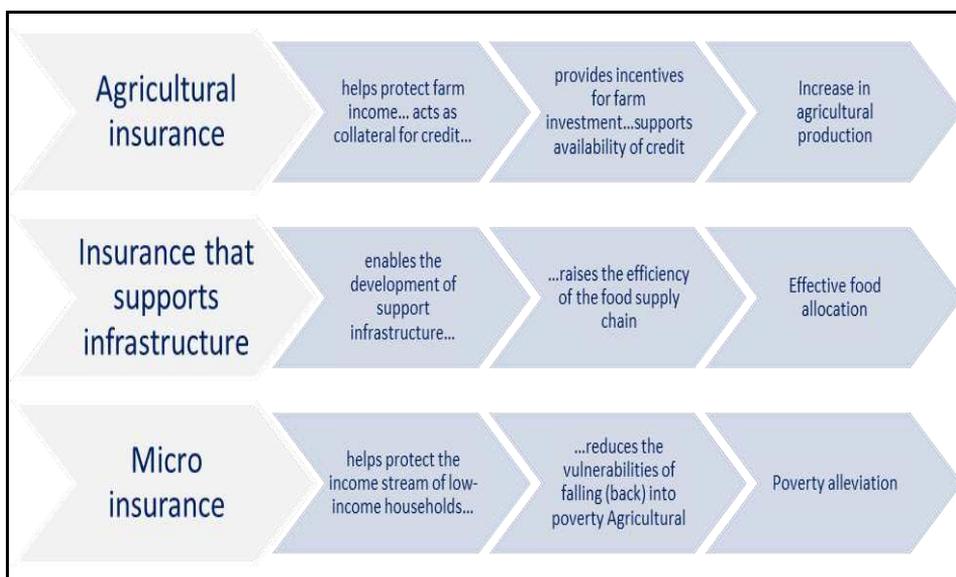
Agricultural risk management is important in helping to raise farm output and income. It allows farmers to focus on boosting production levels and productivity. The failure to manage the risks adequately can result in under-investment in farm productivity, while some farmers may simply avoid farming in exposed regions. An efficient and effective risk management framework is thus important for incentivizing farmers and producers to invest in agriculture. Agricultural risk management in emerging markets has evolved rapidly over the past few decades. Initially, farmers and local communities relied heavily on self-insurance, government support and international aid to deal with adverse events or natural catastrophes.

Farmers can also engage in risk prevention through production diversification and crop sharing. However, these measures tend to be insufficient when major disasters or financial/regulatory shocks hit. Most of the severe shocks that hit agriculture are systematic in nature and affect whole regions or communities. Therefore, formal risk management instruments need to be combined to create a sustainable risk solution and avoid additional financial burdens following loss events. The most effective risk management strategies are both market-based and government-supported and include a degree of risk prevention, risk control and financing. Table 1 summarizes the key risk management instruments and strategies that can be deployed at the local, regional market and country levels.

Insurance also provides risk management solutions across the agricultural food value chain. It provides protection against various non-weather-related risks including business risks specific to food processing (such as input shortfall), or infrastructure and transportation risks. This risk management and protection all along the food value chain help support food security at the local, national and global levels. Furthermore, agricultural insurance helps ensure that farmers' earnings are protected and stabilized. This income stability allows low-income farmers to increase their children's education, improve their diet, and further their skills. Micro insurance, in particular, offers low-income farmers/households a viable way to manage their life and health risks and reduce their vulnerability to extreme events.¹⁰

As risk awareness increases and low-income farmers gain a better understanding of the benefits of agricultural insurance, there is a strong possibility that demand for conventional insurance products will rise. This could include, for example, term life covers, savings insurance products, family health protection or hospitalization products.

Picture 1. *The role of re/insurance in agricultural risk management*



Source: *Swiss Re Economic Research & Consulting*

¹⁰ Source: IMF World Economic Outlook Database April 2012

Agricultural insurance in world

Almost 80 percent of agricultural insurance programs are offered on a voluntary basis. In lower middle- and low-income countries, agricultural insurance is often compulsory for borrowers of agricultural loans. This type of credit-linked insurance may offer new opportunities to develop agricultural insurance in middle- and low-income countries.

Although weather derivatives have been used primarily in the energy sector, the potential market for these instruments in agriculture is significant. Weather-based crop insurance products are currently offered in a few developed countries (Canada, the United States) and developing countries (India, Malawi, Mexico), mainly on a pilot basis. The effectiveness of the weather insurance contract and its likely acceptance by farmers is determined by the extent to which the index reflects their individual losses. For a farmer with yields that are poorly related to the index, the index-based plan will provide little protection against yield risks. In Mongolia, for example, the complexity of the *dzud* (a dry summer followed by a harsh winter that causes the starvation and death of livestock) and the underfunded meteorological network ruled out the use of weather indexes. Policy makers therefore decided to use local livestock mortality rates (available for the past 30 years through the annual animal census) to design an insurance product that pays out whenever the adult mortality rate (as reported in the annual animal census) exceeds a specific threshold for a localized region. This product is simpler than weather-based insurance and less prone to moral hazard, adverse selection, and high administrative costs than individual insurance. Satellite imagery offers new opportunities for agricultural insurance. The new generation of crop index-based insurance products will be based on the combination of historical ground data and high-precision earth observation remote-sensing real time data. The use of advanced remote-sensing satellite technology for insurance underwriting and monitoring purposes provides independent, reliable information about field sizes, date of sowing, crop yield measurement at time of harvest, and so forth. The first agricultural insurance program based on this technology is the pasture satellite imagery insurance program in Canada, launched in 2001. Use of this technology in the development of agricultural insurance programs is under investigation in some developing countries.

Agricultural reinsurance is purchased mainly from private reinsurers. It is usually critical for domestic agricultural insurers to secure enough risk

capital in case of a major disaster causing catastrophic insurance losses. In two-thirds of the surveyed countries, the provision of agricultural reinsurance is from private reinsurers. In 22 percent of the surveyed countries, agricultural reinsurance is provided by both public and private entities. Some countries (including Costa Rica, Iran, Japan, and Kazakhstan) rely only on public reinsurance. Premium subsidies are the most common form of public intervention in agricultural insurance. Almost two-thirds of the surveyed countries (at all levels of development) provide agricultural insurance premium subsidies, with subsidies usually on the order of 50 percent of the original gross premium. Some countries also offer variable premium subsidies. A few countries, such as India, cap premiums. Premium subsidy programs are offered mainly under MPCII or area-yield insurance (a major exception is South Africa, which offers nonsubsidized MPCII to individual farmers).

Most named-peril crop insurance products, such as hail insurance, have been offered for many years without any public subsidies. Government intervention in livestock insurance is much lower than for crop insurance: only 35 percent of the surveyed countries offer livestock insurance premium subsidies. Governments also provide public reinsurance (32 percent of surveyed countries), subsidies on administrative and operational expenses (16 percent), and loss adjustment subsidies (6 percent). Public sector support to reinsurance is higher in high-income than middle income economies. Forms of support range from national reinsurance companies to agreements under which governments act as excess-of-loss reinsurers (in such cases, the government charges no reinsurance premium). Governments can also provide support with legislation (51 percent of crop programs and 33 percent of livestock programs reviewed) and research, development, and training (44 percent of crop programs and 33 percent of livestock programs reviewed).

Only 11 percent of the surveyed countries have developed special programs for small and marginal farmers, usually in the form of additional premium subsidies. In some countries, such as Chile, rural banks and insurance companies have developed such programs. In Mexico the public reinsurance company supports small farmers' self-insurance groups. The total public cost of agricultural insurance programs is estimated at 68 percent of the 2007 global premium volume, of which upfront premium subsidies represent 44 percent. On the basis of the World Bank survey in 65 countries, the overall government cost of upfront premium subsidies is estimated at 44 percent of original gross

premiums. With the inclusion of administrative and operating subsidies and claim subsidies, the total cost to governments of agricultural insurance provision may be as high as 68 percent of original gross premiums.¹¹

The public cost of agricultural insurance subsidies represents 50–300 percent of the premiums paid by farmers in the majority of the countries surveyed. Public support to agricultural insurance in many high-income countries (including Italy, Spain, and the United States) represents more than twice the premium paid by farmers. In contrast, in most of the middle- and low-income countries surveyed, public support to agricultural insurance represents 50–150 percent of the premium paid by farmers

Securing the food supply for the world's estimated 9 billion people by 2050 remains a major challenge for policymakers globally. The situation is further complicated by the close to one billion poor who currently remain undernourished. There is no doubt that the agricultural sector requires both sustainable development and higher investment to ensure adequate food supply. Support infrastructure also needs significant development to minimize loss and wastage, particularly in emerging markets. For successful and sustainable agricultural insurance programs in emerging markets.

The results achieved in ensuring agriculture resulting from its economic position that in developed countries is much better than ours. Coverage of agricultural insurance in Serbia is very low. The reason for this is not informed farmers about the benefits offered by insurance, and the other in low agricultural production, as well as lack of finances. For economic development of the agricultural sector by reducing the risk of production and development of safe and reliable insurance requires active role of the state and the insurance companies themselves. Insurance against drought is currently a key issue for Serbian agriculture and unsolvable at this point the reason that insurance companies do not trust the state and hence the farmers because the apparent lack of financial resources, small plots of less than 3.5 ha , old farms, old-fashioned machinery, reduced income, reduced livestock, expensive loans and lack of investment. Known Not exactly state of agriculture, but it is expected that the list of the Statistical Office of the appropriate measures to help create a real and realistic

¹¹ Mahul O. and Stutley C, *Government Support to Agricultural Insurance*. World bank, USA, 2010. p 34

picture because without such data it is impossible to improve the current poor situation in this branch.

In order to ensure sustainable insurance programs, insurance product pricing must be based on actuarially sound principles and not on opportunistic pricing for market penetration. Insurers should strive from the onset to design modular schemes that can achieve both socio-economic and commercial objectives. Actuarially sound pricing and fair loss assessments often depend on the objectivity, accuracy and timeliness of weather and yield data. Lack of infrastructure is a major challenge, particularly in emerging markets. Financial services such as credit and banking, logistics, transportation, storage, road networks and the like are critical for effective risk management and agricultural insurance to function. It is difficult for the agricultural insurance sector in emerging markets to develop without supportive government policies given that governments and policymakers play an active role in enabling greater participation from the private sector. Through premium subsidies, they can stimulate higher agricultural risk protection uptake from low-income farmers. Enabling policies are also important. There are instances, for example, where local regulators do not recognize index-based agricultural products, hence limiting the growth of agricultural insurance. The regulatory/ legal framework, which includes licensing conditions for insurers, agents, loss adjusters, and so forth, needs to be aligned to the development of the agricultural insurance sector. Governments can also provide essential infrastructure and services for the development of the agricultural sector and agricultural insurance, such as building roads or collecting.¹²

Conclusion

Bioregionalism certainly falls into the sphere of public interest because it seeks to transform the modern society to improve the quality of life, preserve the health of the ecosystem and fair distribution of resources at the local and regional, those specific levels of society. As that he does not belong to the sphere of interests of big business, which is based on the logic of unequal distribution of goods and unsustainable exploitation of resources. It is therefore necessary to provide coverage risk that may prevent this development and the insurance company has a very important role.

¹² www.swissre.com (5.10.2013.)

Significant uncertainty exists regarding the direction and magnitude of climate change, which in turn leads to uncertainty in the realm of food production and its impact on food systems and food security across complex geographies and societies. It remains to be seen whether uncertainty propagates, remains the same or reduces along the causal pathways and associated analysis from climate science through agriculture to human systems. Research in agriculture, food security and climate change must continue to improve understanding of uncertainty, to allow more confident decision-making and allocation of limited resources towards new climatic futures. Food systems faced with climate change need urgent action in spite of uncertainties. The urgency of climate change provides a new impetus for paradigms of integrated research, policy and action. There is a pressing need to invest in databases and tools to inform policy and practice in the spheres of agricultural risk management, adaptation and mitigation; these need to be co-developed with users.

Likewise, initiatives to develop capacity to tackle climate change impacts on farming and food must address not only scientific capacity but also the capacity of users to demand interpret and apply scientific outputs effectively. Decision-makers need not just a holistic view of the system but rather a strategic approach that focuses on key dependencies and processes. Some of the work outlined above demonstrates that this approach can work for well-defined subcomponents of the farming system, for example crop yield. A key challenge in assuring future food security is to apply such approaches across the whole food system and across multi-purpose landscapes. This calls for collaboration among researchers and practitioners from a range of backgrounds, sectors and disciplines. Action will need to move ahead of knowledge, with decisions made and reviewed on the basis of emerging research and consensus.

Although it is just one of the many effective measures that can be taken to meet the objectives of food security, insurance is an integral part of an agricultural risk management strategy. The global re/insurance industry can be a partner in enabling the agricultural sector to improve output, increase productivity and reduce revenue volatility. It can also facilitate further investment in the sector and support infrastructure, thereby reducing some of the pressure on global food suppliers. Despite recent fast-paced growth in agricultural insurance premiums in emerging markets, penetration remains low compared to advanced markets. While this low penetration reflects the daunting challenge of promoting

agricultural insurance in emerging markets, it also indicates its great potential. Properly managed agricultural insurance in emerging markets could grow to three to four times its current market size.

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SUSTAINABLE DEVELOPMENT OF SERBIAN DANUBE BIOREGIONS¹

Nada Mijajlović, Bojana Bekić²

Abstract

Danube Region in the Republic of Serbia has its numerous specificities regarding biodiversity, cultural, sociological and economy characteristics. Serbian Danube region can be divided into three sub-regions called bioregions. Each bioregion has its natural and cultural resources that must be preserved and improved. Aim of this work is to present specific features of each bioregion with special emphases on protected areas. Upper Danube bioregion is characterized by Special Nature Reserve „Gornje Podunavlje“, Metropolitan bioregion is characterized by large urban areas where there is a possibility of permaculture model application and in the third bioregion, Lower Danube, the main characteristic is National park „Đerdap“. In some of these regions there is a possibility of crossborder cooperation with neighbouring countries where natural goods are extending.

Key words: *bioregions, permaculture, sustainable development, serbian Danube region, biodiversity*

Introduction

Bioregionalism is a concept created during the sixties of the last century in the United States of America. In the beginning of this concept, there was an activitistic approach which indicated at and emphasised the need to protect environment and limited resources, which were uncontrollably

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exploited. Today, concept of bioregionalism clearly indicates the need to rationally and controllably use all natural resources according to their capacities which is completely in accordance with the principles of sustainable development concept.

Bioregionalism is political, cultural and ecological concept based on naturally determined territorial units called bioregions. Today, this idea is being accepted again and bioregional concept have its full expression in the case of territories, provinces and regions which have rich natural resources: water, different abiental values, soil and biodiversity (*Puđak, 2010*).

Bioregionalism is an understanding and approach which puts in the first plan organization and development of social life in sence of reliance on natural characteristics of areas, which is in contrast with traditional industrial - commercial understanding of human society limited within administrative - state borders. Considering that nowadays dominant production and consuming practice follows the logic „*business - as - usual*“, with fast depletion of nonrenewable resources, concepts such as bioregionalism increasingly gaining in importance.

Serbian Danube region, which follows the stream of Danube River, has its special characteristics in natural, historical, economical and sociological sence and the concept of bioregionalism in this case is entirely acceptable. In particular, must be emphasised the need for crossborder cooperation with neighbouring countries due to common natural resources, which is especially needed in the case of Upper Danube region where it is necessary to create and conduct cooperation plans with Hungary and Croatia. Alos, international cooperation can be established through common plans and programmes between serbian Lower Danube region and Romania.

Local people, who directly rely on their natural surroundings for their livelihood, develop an intimate knowledge of these surroundings. Sustainable agriculture that requires minimum external inputs, giving a sense of independence to the small farme and it can can be applied in Danube bioregions and especially in the protected areas. Small - scale local industries, low - growth economies, self - determination, self - sufficiency, non - hierarchical cooperation and participatory democracy are the cornerstones of decentralized development, which is gaining in importance in todays world of increasing globalisation. This new

paradigm of sustainable development involves abandoning consumptive growth, integrating traditional ecological knowledge into the holistic wisdom, conserving the biological and cultural diversities and adopting a decentralized bottomup approach (*Jonnalagadda Rajeswar, 2002*).

Permaculture as an idea was created during seventies of the last century from the word „*permanent agriculture*“ and it was being designed by australians Bill Mollison and David Holmgren. In modern civilisation, permaculture can and should be applicable as a life style which supports the sustainable development concept which main goal is to reduce consumption and to satisfy the human needs by balancing the production and the recycling of created waste. In rural areas, permaculture should be compatible with the principles of organic production of agricultural products. In urban areas this concept considers abiental and designed transformation of building terraces and suitable areas into small „farms“ according to the natural principles. Permaculture is in the function of overcoming the gap and antagonism between rural and urban areas. Permaculture in Serbia is in its beginning and it is applicable in metropolitain area such as Belgrade, Novi Sad and Pančevo.

Urbanization will continue to shape the future, as essentially all new population growth is projected to take place in urban areas, and over 60 % of the total population is expected to reside in cities by 2030. In 1996, the United Nations Development Program estimated that 800 million people are engaged in urban and peri - urban agriculture worldwide, a quarter of whom are market producers, employing 150 million people full-time and producing 15 % of the world's food (*Kyle H. Clark and Kimberly A. Nicholas, 2013*).

Permaculture models its designs for agroecosystems, buildings, and communities on patterns observed in nature, but perhaps more importantly, permaculture views humans and their creations and activities as part of the natural world. Permaculture is an eclectic and adaptive approach that emphasizes local and bioregional perspective and practice. The overall aim of these design principles is to develop closed - loop, symbiotic, self - sustaining human habitats and production systems that do not result in ecological degradation or social injustice (*James R. Veteto and Joshua Lockyer, 2008*).

Protected areas in Serbia

Republic of Serbia has protected certain number of natural resources in Serbia by adoption of national laws and by ratification of international agreements. Law on Environmental Protection and other laws and by-laws which directly or indirectly concern nature and natural resources normatively regulate environmental protection. Law on Nature Protection („Official Gazette of the Republic of Serbia“, No. 36/09 and 88/2010) governs protection and preservation of nature, its biological, geological and ecosystem diversity. Harmonisation and regulation of by-laws in this area is in compliance with legal acts of the European Union, related to environmental protection. The most significant strategic documents adopted at the level of the State are: „National Sustainable Development Strategy“ („Official Gazette of the Republic of Serbia“, No.57/2008), „National Strategy of Sustainable Use of Natural Resources“ („Official Gazette of the Republic of Serbia“, No.33/2012), „Strategy on Biodiversity of the Republic of Serbia for the period 2011 - 2018“ („Official Gazette of the Republic of Serbia“, No. 13/2011) and „National Programme of Environmental Protection“, („Official Gazette of the Republic of Serbia“, No.12/2010).

In the light of global climate changes, protected areas are one of the main tools for mitigation of climate changes consequences. Protected areas, especially forest ecosystems and water resources, can moderate climate changes by accumulation of carbon and thus prevent its agglomeration in the atmosphere. Sustainable use of protected ecosystems has its economy importance in the sence of tourism and fisheries development, which can be especially pointed out in the Danube region.³ Forest richness in Serbia, from the aspect of species and genetic diversity of woody plants, is unique in Europe. Total number of autochthonous species of trees and shrubs is 205, among which should be singled out endemic and endemo - relict species such as: Macedonian pine (*Pinus peuce*), Bosnian pine (*Pinus heldreichii*), Serbian Spruce (*Picea omorika*) and Turkish hazel (*Corylus colurna*). It is estimated that in Serbia there is about 1.000 plant communities. Gorges and canyons from eastern to western part of Serbia are significant refugiums of tertiary vegetation of the Balkan Peninsula and the largest part of these communities are forest ecosystems. At the

³ WWF (Svetski fond za prirodu), Centar za unapređenje životne sredine (2012): Procena ranjivosti na klimatske promene, Beograd, http://awsassets.panda.org/downloads/cva_srbija_srpski.pdf, (23.09.2013);

same time, it should be emphasised that in Serbia there are currently 600 endangered plant species and about 500 endangered animal species. Preservation of plant and animal species is being conducted at two ways: *in situ* (preservation of biodiversity by conservation of existing communities through legal protection of natural reserves, national parks, seed stands, group of trees or individual trees) i *ex situ* (preservation of gene pool by growing of specialized cultures such as arboretums, tests of origin, progeny tests and seed plantations). For the purpose of biodiversity preservation, in the Republic of Serbia there are identified natural communities with different character: 50 natural reserves at total area of 569.000 ha; 5 national parks („Fruška Gora“, „Đerdap“, „Tara“, „Kopaonik“ and „Šara“) at area of 246.000 ha and seed stands at area of 934 ha with thick net of comparative clonal plantations with domestic and foreign clones of poplar, willow and acacia.⁴

Protected areas in Vojvodina

Vojvodina as autonomous province of the Republic of Serbia has territorial jurisdiction for many protected areas with different protection regime level and most of them are located in the Danube coastal region. At the territory of Vojvodina province there is a public company “Vojvodinašume” which manages 16 protected areas at the area of 69.595,85 ha and it is also the owner of forests and forest land within seven more protected areas. PC “Vojvodinašume” manages protected areas based on legal acts, adopted by the Serbian Government (*Regulations on areas protection*) and municipalities assemblies where protected areas are (*Decisions on areas protection*). PC „Vojvodinašume“ as protected areas manager, in accordance with the Law on Nature Protection („Official Gazette of the Republic of Serbia“, no. 36/09), keeps the Register of protected areas and sees that all beneficiaries of protected areas (owners of private forests, owners of agricultural areas, owners of tourist objects and other users of natural and created values and services) conduct designated protection regimes.⁵ Special nature reserves and Nature monuments managed by PC „Vojvodinašume“, and their size in hectares are presented in the table below (Table 1). Each of this area is differently structured regarding protection regime level (Table 2).

⁴ Organizacija Ujedinjenih nacija za hranu i poljoprivredu (2008): Stručne osnove za izradu nacionalnog šumarskog akcionog programa, Projekat “Razvoj sektora šumarstva u Srbiji” (Projekat GCP/FRZ/003/FIN), Beograd;

⁵ Vojvodina šume - Gornje Podunavlje <http://www.vojvodinasume.rs/zastita-zivotne-sredine/gornje-podunavlje>, (25.08.2013);

Table 1. Overview of protected areas managed by Public Company „Vojvodinašume“ (january 2010)

Protected area	Number	Area (ha)
<i>Specijal nature reserve (SNR)</i>	5	69.212,50
„Koviljsko-petrovaradinski rit“		4.840,60
„Bagremara“		117,58
„Gornje Podunavlje“		19.605,00
„Deliblatska peščara“		34.829,32
„Obedska bara“		9.820,00
<i>Nature monument (NM)</i>	3	186,34
„Šume Junaković“		180,05
„Ivanovačka ada“		6,07
„Veštačka sastojina močvarnog čempresa“		0,22
Total area – SNR and NM	8	69.398,84

Source: <http://www.vojvodinasume.rs/zastita-zivotne-sredine/gornje-podunavlje/>

Table 2. Overview of protected areas by protection regime level (january 2010)

Protected area	Structure of areas under protection regimes (ha)			
	I	II	III	Total
<i>Specijal nature reserve (SNR)</i>				
„Koviljsko-petrovaradinski rit“	508,98	2.082,24	2.249,38	4.840,60
„Bagremara“	34,80	82,78	0,00	117,58
„Gornje Podunavlje“	261,62	4.843,81	14.499,57	19.605,00
„Deliblatska peščara“	2.353,80	8.218,59	24.256,93	34.829,32
„Obedska bara“	314,92	2.565,08	6.940,00	9.820,00
<i>Nature monument (NM)</i>				
„Šume Junaković“	0,00	58,12	121,93	180,05
„Ivanovačka ada“	0,00	6,07	0,00	6,07
„Veštačka sastojina močvarnog čempresa“	0,22	0,00	0,00	0,22
Total area - SNR and NM	3.474,34	17.856,69	48.067,81	69.398,84

Source: <http://www.vojvodinasume.rs/zastita-zivotne-sredine/gornje-podunavlje/>

According to listed data it can be noticed that under the first protection level is 5,01% of total protected area (3.474,34 ha), second protection level includes 25,73% of total protected area (17.856,69 ha) while under

the third protection level is about 69,26% of total protected area (48.067,81 ha). In the State ownership is 64.090,22 ha (92,35 %), in the private ownership 4.209,42 ha (6,07%) while in the social ownership is 1.099,20 ha or 1,58% of all protected areas. Many protected areas managed by PC „Vojvodinašume“ have international importance and status and they are territorially linked to the Danube region in large extent:

- *SNR „Koviljsko-petrovaradinski rit“*: Important Bird Area - IBA (1989), International Commission for the Protection of the Danube (2004), Important Plant Area - IPA (2005), potentially Ramsar site;
- *SNR „Gornje Podunavlje“*: Important Bird Area - IBA (1989), International Commission for the Protection of the Danube (2004), Important Plant Area - IPA (2005), Ramsar site (2007), PBA (Prime Butterfly Area) i potentially MAB area;
- *SNR „Deliblatska peščara“*: Important Bird Area - IBA (1989), International Commission for the Protection of the Danube (2004), Important Plant Area - IPA (2005), Ramsar site - Labudovo okno (2006);
- *SNR „Obedska bara“*: Important Bird Area - IBA (1989), Important Plant Area - IPA (2005), Ramsar site (1977);

Very important activities which are connected to the activities of environmental preservation and protection in Vojvodina, are activities related to planing and development of hunting. Within PC „Vojvodinašume“ are hunting grounds at area of 109.824,34 ha, which is 5,1 % of total hunting grounds in Vojvodina (2.152.635,60 ha). At this area is functioning 17 hunting grounds managed by five lumber camps (LC „Novi Sad“ - Novi Sad; LC „Sombor“ - Sombor; LC „Banat“ - Pančevo; LC „Sremska Mitrovica“ - Sremska Mitrovica and „Vojvodinašume - Lovoturs“ Novi Sad - Petrovaradin). Of this hunting area, 27.462,33 ha or 25,01% is fenced. Fenced hunting grounds serve for intensive and modern farming of autochthonous species such as deer and wild boar and alochthonous species such as fallow deer and mouflon. Accompanying species in public hunting grounds is roe deer, present in significant number. In economic sence, the most important is intensive production and breeding of big game because it is directed to foreign hunters/tourists.⁶

⁶ Vojvodinašume - lovstvo, (<http://www.vojvodinasume.rs/lovstvo>, (26.09.2013).
<http://www.vojvodinasume.rs/lovstvo/>

Upper Danube bioregion

Within the borders of the Republic of Serbia, Upper Danube is a bioregion which is characterized by specific Ramsar flood sites, unique in Europe. This region represents one natural unity with Danube areas in Croatia and Hungary and it is one of the potential candidates for Biosphere Reserve.

Special Nature Reserve „Gornje Podunavlje“ is a large flood area at the far north - west of Vojvodina and it represents one of the most preserved wetlands through entire stream of Danube River in Serbia. It extends to 19.648 ha, along the left bank of Danube River, including nearly 70 km of the river stream. It is a part of large flood valley which also spreads in neighboring Hungary and Croatia and after delta, it represents the most important wetland through entire Danube River stream. Upper Danube is one of the last shelters for species linked to flood areas.

Within the borders of the Upper Danube region is special nature reserve „Gornje Podunavlje“ (protected by Regulation on the Protection of „Gornje Podunavlje“ Special Nature Reserve, „Official Gazette of the Republic of Serbia“, No. 45/01). This special nature reserve is a natural good of exquisite value under the state protection as the category I of protected natural goods. According to IUCN classification it is in IV category as Habitat and Species Management Area. This reserve, at area of 19.648 ha, represents the left Danube valley plane from state border with Hungary to Bogojevo, at the territory of Sombor city and Apatin Municipality. Special Nature Reserve „Gornje Podunavlje“ is a part of large wetland complex. This is one of the last large flood areas in Europe. Within this reserve are „Monoštorski rit“ (Monostor marsh) and „Apatinski rit“ (Apatin marsh), composed of various plant communities presented by forests, meadows, swamps and marshes, right next to Danube River and on its meanders. This flood area is very narrow due to land drainage and it represents only the remains of former large marsh ecosystems. Large impact of human activities in this area reflects also in plantation of forests which are then being used also as a hunting grounds. At large areas (over 1.000 ha), in areas „Tikveš“ and „Karapandža“, are planted oak forests and by establishment of hunting - lumber camp „Jelen“ in 1952, managing of forestry, hunting and fishery in this area started. It was understood that this forest complex must be managed integrally and more comprehensive because it was valuable natural resource and natural rarity.

Today, it can be stated with certainty that Special Nature Reserve „Gornje Podunavlje“ is one of the last shelters for plant and animal species linked to flood areas. Regarding fauna, this area has 51 mammal species, 248 bird species, 50 fish species, 11 amphibian species, 9 reptile species and large number of invertebrates. Because there is over 60 daily butterfly species, this area is placed in the list of Prime Butterfly Areas. Regarding flora, there are over 1.000 plant species with presence of endangered species such as: *Eranthis hyemalis*, *Hottonia palustris* and *Hippuris vulgaris*. Reserve is a habitat of thick almost impassable marsh forests composed of autochthonous poplars. Thick autochthonous forests of poplar and willow are relict which is confirmed by 40m high and 10m thick trees. The largest population of european deer (*Cervus elaphus*) is located here and this area is considered to be one of the last authentic marsh ambients. Also, some of the best hatcheries in entire Danube River stream are settled in „Gornje Podunavlje“. Development of hunting tourism and good predispositions for fishing are certainly potentials of this area.

Also, this reserve must be considered not only from the aspect of biodiversity and natural values but also from the aspect of tourism. Large potential exists in cultural heritage of this areas which makes it very authentic destination. Local population has high awareness about the need and significance of preservation and protection of these ecosystems on the basis of sustainable development principles.⁷

Within this bioregion there is Special Nature Reserve „Bagremara“, which is put under legal protection in 2007 by adoption of Regulation on protection of Special Nature Reserve „Bagremara“ („Official Gazette of the Republic of Serbia“, No. 12/07), as natural good of I protection category. This protected area is located at the territory of Bačka Palanka at total surface of 117,58 ha, while the protected zone, as integral part of protected natural good, is at the area of 271,16 ha. SNR „Bagremara“ is the only habitat of plant species winter aconite (*Eranthis hyemalis* Salisb.) in Serbia. Winter aconite is a perennial early spring plant from the family of crowfoots (Ranunculaceae) for which is determined that it represents natural rarity and therefore it belongs to the category of extremely vulnerable species in the Republic of Serbia. At the territory of „Bagremara“ there are two protection regimes and there are very serious

⁷ Vojvodina šume - Gornje Podunavlje <http://www.vojvodinasume.rs/zastita-zivotne-sredine/gornje-podunavlje>, (25.08.2013);

measures, at the entire area of the Reserve, aiming to preserve this natural good: maintenance of stability and protection status of the forests, revitalisation of natural autochthonous forest communities, establishment of species monitoring and control of invasive species.

Metropolitan area

Within the metropolitan area that is Middle Danube Bioregion there are large urban areas such as Belgrade, Novi Sad and Pančevo. This area is largely transformed by agricultural and urban activities and it does not resemble to original appearance.

Within this bioregion there is a special nature reserve „Koviljsko - Petrovaradinski rit“ as a complex of swamp and forest ecosystems at area of 4.840 ha. This special nature reserve is located in south - east Bačka, in inundation area of Danube River, and due to large number of bird species (172 species), it has been declared as international important bird area in 1989. Also, since 2004, it is at the list of protected areas conditioned by flood and important for Danube Basin and it is also a candidate for the List of Wetlands of Ramsar Convention. In this nature reserve are preserved orographic and hydrographic shapes characteristic for marsh areas (distributaries, river islands, swamps, marshes etc.) as well as plant communities (meadows, forests etc.) with specific flora and fauna. Due to nearness of Novi Sad (20 km) and Belgrade (60 km) as well as good traffic connections, this reserve is real tourist attraction (especially for fish hunting because here live about 46 fish species). Important cultural - historical building at this area is Kovilj Monastery from XIII century.

Near Novi Sad there is a National Park „Fruška Gora“, marked as internationally important area for bird and plant species. This is hilly - mountain area where the highest top is 539 m and it is rich with oak, hornbeam, beech and linden forest. Flora of this protected area includes over 1,500 species and in plant communities of this national park live over 50 protected species. It should be stated that here there are over 30 species from the family Orchidaceae, of which 18 have international importance. Within the fauna there are protected species of insects, amphibia and reptilia, which are at the IUCN⁸ Red List of Endangered Species. Birds are presented with 211 species of which 130 are nesting

⁸ IUCN - The International Union for Conservation of Nature

birds. NP „Fruška gora“ is one of the most significant areas for nesting of rare birds in Pannonian Basin and Serbia. Only at this place, endangered species Eastern Imperial Eagle (*Aquila heliaca*) is nesting. From numerous mammal species there are protected species: bats, ground squirrels and lesser mole rat.

Situation regarding forests in Novi Sad, which is highly urban area, is not satisfactory. Out of total area of the City, under forest is 2,618 ha that is 3,74%. Considering numerous pollutants in this area it is necessary to increase forest area which must be one of the priorities at the level of Novi Sad.

Total forest area at the territory of Belgrade, including urban and periurban municipalities, is 39,141 ha that is 12,2%. Forest area per inhabitant is 0,025 ha but for the purpose of its positive ecological function expression on the environment, minimal forest area per inhabitant must be 0,33 ha. So, afforestation is one of the priorities at the territory of Belgrade. Modern approach to climate changes as one of the possible solutions sees in larger afforestation in urban areas such as Belgrade. According to the study of prof. Brian Stone from the Georgia Institute of Technology, it is proposed to plant more million trees to create cities forests which would be part of the solutions for global climate changes⁹.

At area of Pančevo city there are ecosystems with relict and endemit flora and fauna species. Among woody species dominate hybride *Populus euramericana*, white willow, black poplar, pedunculate oak, elms and common juniper which is the only wild conifer of Pannonian Basin. Herbaceous plants include *Paeonia officinalis L. subsp. banatica*, *Atrémisia pancicii*, *Stipa joannis*; in marsh and pond communities there are *Typha latifolia*, *Phragmites australis*, *Nymphaea alba* and *Nuphar lutea*; at drier loess plateau there are: *Cynodon dactylon*, *Arctium sp.*, *Amaranthus retroflexus*, *Sinapis sp.*, *Taraxacum officinale* and *Achillea millefolium*. Hunting game includes big game (deer, roe deer, wild boar, fox, wolve) and small game (badger, hamster, otter, nutria, rabbit, skunk, mole and hedgehog). In steppe habitats there are rare species such as: desert ants, antilion, steppe gerbil, ground squirrel, lesser mole rat and skunk steppe.

⁹Urban forest key to international climate responses <http://openalex.blogspot.com/2009/11/urban-forestskey-to-international.html>, (23.09.2013);

At the territory of Pančevo city, as highly urban area, there is a reduction of forest areas from 12,925 ha in 2006 to 3,160 ha in 2008. This fact can not be neglected considering the importance of forests for reduction of aero-pollution at the territory of Pančevo city. Afforestation activities must be intensified and unplanned and uncontrolled deforestation must be prevented.

Nature monument „Ivanovačka ada“ is a protected natural good at the territory of Pančevo city. It is located at river island, in Danube flood area, near Ivanovo village, and it represents the remains of once dominante wetland forests. This nature monument is a long zone with 2 -7 km width and composed of two forest segments. „Ivanovačka ada“ has importance in preservation of habitats characteristic for river islands where live animal and plant species adjusted to specific flooded forest areas. Natural rarity in this area is protected animal species such as White - tailed Eagle (*Haliaeetus albicilla*).

Rare plant species - Creeping Yellowcress (*Rorippa sylvestris*) as pannonian subendemic plant inhabits wet meadows, edges of field roads and partially saline habitats. Here one can find wild Common Grape Vine (*Vitis vinifera*) which is rare in the flora of Vojvodina. In forests are dominant the following species: White Elm (*Ulmus laevis*), Green Ash (*Fraxinus pensylvanika*), black poplar (*Populus nigra*), white willow (*Salix alba*), pedunculate oak (*Quercus robur*) and Narrow - leafed Ash (*Fraxinus angustifolia*). Entire area of „Ivanovačka ada“ is under protection regime and controlled usage of natural resources and activities.

Lower Danube bioregion

Lower Danube bioregion is a specific area from more aspects. Central part of this area is sparsely populated, wooded, hilly - mountainous territory of National Park „Đerdap“. Administratively, this national park is under authority of several municipalities: Golubac, Kučevo, Majdanpek, Kladovo and Negotin. NP „Đerdap“ is an area which fulfils geomorphological, hidrological and natural conditions for the status of national park („Official Gazette of the Republic of Serbia“, No. 36/09). National Park „Đerdap“ is a territory at the southeast Europe and at the northeast Serbia it borders with Romania.¹⁰

¹⁰ Vojvodinašume - lovstvo, (<http://www.vojvodinasume.rs/lovstvo>), (26.09.2013).

Spatial plan of National Park „Đerdap“ determines goals and tasks regarding protection of nature and measures and conditions for improvement and sustainable development of this area. This document sets zones with three protection levels. Besides this, National Park „Đerdap“ represents Important Bird Area (IBA), Important Plant Area (IPA), Prime Butterfly Area (PBA) and it is a part of the Emerald Network of Areas of Special Conservation Interest, which is important from the aspect of application of Bern Convention in Serbia (Convention on the conservation of European wildlife and natural habitats). Area of this park is at the preliminar list for World Cultural and Natural Heritage (UNESCO), it is a candidate for Biosphere Reserve (UNESCO's Man and the Biosphere (MAB) Programme) and at the list of Carpathian Areas (The Framework Convention on the Protection and Sustainable Development of the Carpathians).

Although there are specific forest communities in this area, their health condition is not satisfactory. Drying out of forests is moderately presented in large part of the National Park while in sessile oak forests is more intensive. Causes of drying are pests, mostly gypsy moth, and fungal infections. Also, forests are impacted by climate change and air pollutants. NP „Đerdap“ is rich with forest communities (64% of the total territory is under forest), which are very diverse. There are over 1.100 registered plant species among which are many relict and endemic species. Turkish hazel (*Corylus colurna*) is one of the relict species which builds here, together with other relicts, thick and old phytocenosis. In Đerdap Gorge there are evergreen species: holly (*Ilex aquifolium*), spurge - laurel (*Daphne laureola*) and European yew (*Taxus baccata*). Besides relict species in these communities are also “modern” species of plants and shrubs. Of about 50 plant communities at this area, 35 communities have relict character. Besides already mentioned species *Corylus colurna*, relict communities are consisted of the following species: common lilac (*Syringa vulgaris*), walnut (*Juglans regia*), Small-leaved Lime (*Tilia cordata*), Montpellier Maple (*Acer monspesulanum*), Pubescent Oak (*Quercus pubescens*), European nettle tree (*Celtis australis*) and smoke tree (*Corinus coggigrya*). Very important are also forests of moesian beech (*Fagus moesiaca*), sessile oak (*Quercus petraea*) and common hornbeam (*Carpinus betulus*). Main characteristics of this national park is that there are many diverse types of forests at small area and there are large differences in plant communities between forests at silicates and forests at limestone. In this national park there is a very interesting mosaic of forest types and communities attractive from scientific and tourist aspects.

Tourist offer of the Lower Danube is rich and certainly deserves larger marketing activity. Lepenski vir is a significant cultural and historical tourist attraction. It is a prehistoric locality and one of the largest mesolithic and neolithic archaeological sites in Europe. Lepenski vir is settled on the right bank of Danube River, in Đerdap Gorge, in the central part of the Balkan Peninsula. This locality is considered to be the cradle of the European civilisation and one of the main recognizable features of it is Trajan's memorial plaque, stone inscription of Roman emperor which built here path, bridge and rest area for his legions. From geographical aspect, this locality is interesting because Danube River is the widest, the deepest and the narrowest here.

Đerdap and Negotin Krajina is, thanks to rich tradition and culture monuments, cultural center of the eastern Serbia. Rajačke pinnacles are, besides city center and memorial house of Stevan Stojanović Mokranjac, the most visited destinations in this area. Negotin Krajina has several tourist attractions such as: wines of Krajina, authentic architecture, rich hunting grounds and the Festival „Day's of Mokranjac“. Nature Park Vratna is special by its Vratna River Gorge where there are three giant stone gates and over four hundred plant species. Biodiversity is rich with tertiary relict species and endemites. Here there is an Eco-camp and all activities are controlled and in accordance with preservation and protection of this natural wealth. Besides this, Negotin Krajina can also be interesting for its mountain path at the Deli Jovan mountain which leads to the mountain top of 1.138 m (Mijajlović et al., 2013).

Besides present tourist capacities the plan is to expand tourist offer at the level of respective municipalities: Golubac, Kladovo, Negotin, Kučevo and Majdanpek. Tourist offer, besides already mentioned natural attractions at Danube River, is expanded by autochthonous products such as wines of Negotin Krajina and branded Homolj honey.

Conclusion

In the process of European integration Serbia has largely adopted certain legislative regarding the protection of natural resources and the environment. Based on the presented natural goods and cultural-historical monuments, it can be concluded that the Serbian Danube region can be divided into three specific bioregions: Upper Danube, Metropolitan area and Lower Danube. Within the Upper Danube there are natural habitats linked to flood areas of Danube River with unique marsh ecosystems and special nature reserve which has features of MAB areas. In cultural, economy and social sense, this area has special features and it represents tourist attraction. Metropolitan area with highly

developed economy and large urban areas presented with capital city Belgrade followed by Novi Sad and Pančevo are the main characteristics of this bioregion. Tendency of permaculture development as a way to develop intraurban and periurban agriculture is a trend which gaining in importance, so, such approach can be helpful in overcoming the antagonism between rural and urban areas in Metropolitan area. Lower Danube is a bioregion which has specificity of National park and forest complexes which must be protected and preserved but also utilized on the principles of sustainable development.

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IMPORTANCE OF THE EUROPEAN FUNDS FOR AGRICULTURE AND RURAL DEVELOPMENT IN EU MEMBER STATES

Nicolae Istudor, Dan Cosmin Petrache¹

Abstract

European Union allocates funds for the socio-economical development of member states, one of the most important sector being represented by agriculture. Romanian agriculture has known an improvement since the accession of European Funds, but still has significant gaps compared with other EU countries regarding especially production. This is the reason that the next programming period (2014 - 2020) and funds allocation need to continue the increasing trend, fundamented by economic efficiency of the agricultural exploitations and to encourage the diversification of the rural activities as well as environment protection.

Key words: *agriculture, rural development, European Union*

Introduction

Agriculture is an important sector of the European Union as it ensures agro-food security for Member States, market equilibrium, protects life and the natural environment. Among the major states for agro-food production: France, Italy, Germany, Spain, UK, Netherlands, Poland, and Romania. Regarding agricultural employment at EU level about 4% of the total population has as main activity agriculture. In the old Member States, the share of agriculture in GDP rises from in 5.4% in Greece to under 1% in Germany, Sweden, Great Britain, Luxembourg. The main reason is the fact that the economy of these countries is being dominated by services and industry. Although France is the country with the most extensive agriculture and most important natural resources, agriculture has only 2% of GDP and 2.2% in Italy.

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The importance of agriculture in the European Union`s economy

Romanian agriculture has significant gaps compared with Member States of the European Union. During 2007 - 2011 the value of crop production in the European Union varied. It notes that in 2011 in all EU Member States recorded significant increases in the value of crop production due to favorable crop year high culture, registering record production in certain cultures (Table 1).

Table 1. Value of crop production in the European Union member states- mil Euro-

Nr crt.	Statele membre ale UE	2007	2008	2009	2010	2011
1.	UE 27	192046,3	200738	173644,9	189189,5	205658,3
2.	Belgia	3315,91	3230,93	3030,37	3501,55	3113,23
3.	Bulgaria	1565,84	2489,46	2016,76	2135,59	2576,94
4.	Republica Cehă	2391,46	2505,77	1933,61	2252,45	2799,61
5.	Danemarca	3584,87	3181,96	2818,85	3237,34	3568,22
6.	Germania	23557,22	25172,11	21590,22	22796,32	26833,17
7.	Estonia	336,18	249,73	226,54	275,27	342,26
8.	Irlanda	1595,59	1603,63	1366,34	1478	1706,51
9.	Grecia	7393,35	6915,49	6423,38	6682,02	6883,53
10	Spain	26148,35	25756,49	22509,9	24781,5	24344,09
11	Franța	38046	37663	35343,2	38024	39165,9
12	Italia	26607,53	28331,2	25210,5	25759,57	27485,65
13	Cipru	327,39	304,53	312,03	324,1	336,03
14	Letonia	525,3	529,72	434,94	473,75	531,59
15	Lituania	1146,95	1238,42	1004,69	1062,59	1479,89
16	Luxembourg	172,65	156,93	148,81	133,6	142,92
17	Ungaria	3896,12	4655,5	3216,19	3470,29	4791,53
18	Malta	47,96	52,71	50,36	47,25	52,45
19	Olanda	11723,62	11418,51	10856,58	12238,63	11936,9
20	Austria	2879,56	2863,64	2574,51	2897,33	3438,93
21	Polonia	10626,6	11542,39	8645,76	10009,31	11878,87
22	Portugalia	3336,44	3430,55	3245,32	3388	3202,75
23	Romania	8611,96	12421,16	8428,38	10324,41	13084,99
24	Slovenia	598,91	600,1	545,84	595,9	632,94
25	Slovacia	951,31	1108,49	850,59	867,88	1252,11
26	Finlanda	1485,7	1373,2	1287,5	1354,2	1584,6
27	Suedia	2388,58	2050,97	1732,07	2281,3	2429,58
28	Marea Britanie	8784,96	9891,36	7841,69	8797,4	10063,07

Source: Eurostat

France is the country with the highest value of crop production, representing 19% of the European Union, followed by Germany, Spain and Italy. Romania, in 2011, recorded the highest value of crop production, which resulted in a contribution of 6% of the EU total.

Table 2. Value of the animal production in EU member states

-mil Euro-

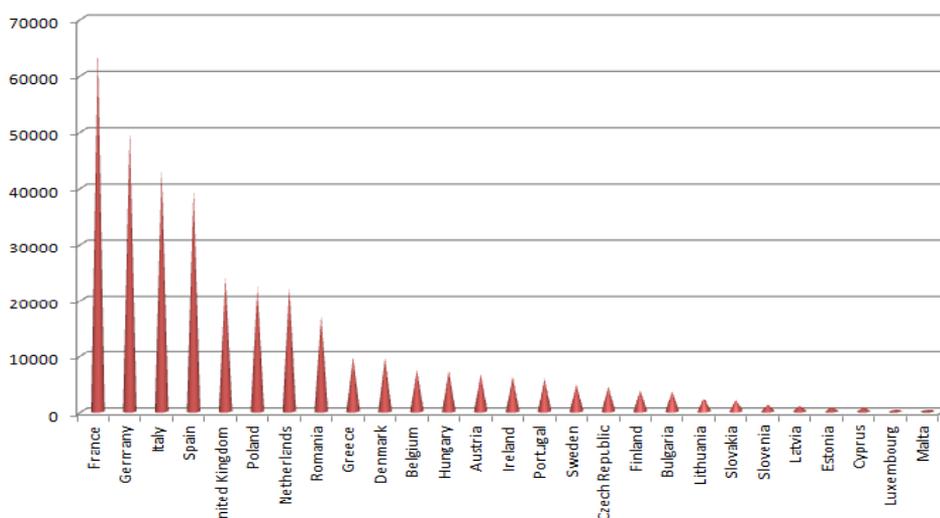
Nr crt.	Statele membre ale UE	2007	2008	2009	2010	2011
1	UE 27	142301,3	151629,6	136980,7	142579,7	156448
2	UE 16 (zona Euro)	102784,4	109184,7	99270,09	102312,1	112280,7
3	Belgia	4003,01	4180,96	3735,97	4077,57	4411,69
4	Bulgaria	1246,5	1375,24	1162,05	1080,76	1145,16
5	Republica Cehă	1770,18	2101,21	1604,01	1619,9	1746,46
6	Danemarca	5000,4	5361,19	5098,71	5639,36	6037,23
7	Germania	20923,76	22967,29	20194,8	21298,12	23449,13
8	Estonia	300,89	342,42	280,65	320,77	376,78
9	Irlanda	4056,65	4213,98	3378,79	3868,35	4551,23
1	Grecia	2665,7	2711,51	2800,03	2809,05	2842,34
1	Spain	14776,98	14161,61	13911,36	13616,68	15221,7
1	Franța	23468,5	25570,3	22630,4	23264	25483
1	Italia	14431,95	15374,71	14500,22	14432,22	15896,18
1	Cipru	279,39	297,8	321,53	329,61	329,89
1	Letonia	396,22	404,01	346,08	386,2	424,91
1	Lituania	819,97	901,47	687,73	810,79	921,84
1	Luxembourg	164,77	184,87	153,07	165,74	178,76
1	Ungaria	2260,3	2563,76	2136,77	2177,54	2500,34
1	Malta	71,45	77,72	71,57	69,34	69,46
2	Olanda	9061,89	9760,93	8713,81	9319,41	10252,38
2	Austria	2848,05	3162,9	2838,47	2921,41	3224,42
2	Polonia	8937,64	9641,14	8291,74	9379,29	10427,37
2	Portugalia	2559,38	2698,4	2567,36	2587,9	2727,12
2	Romania	4374,6	4261,97	4229,64	3635,65	4018,29
2	Slovenia	509,18	556,71	494,86	494,95	537,68
2	Slovacia	889,47	1038,1	813,36	805,17	789,1
2	Finlanda	2074,27	2226,86	2144,47	2252,6	2316,63
2	Suedia	2217,21	2426,75	1982,04	2349,55	2556,59
2	Marea Britanie	12193,04	13065,78	11891,16	12867,74	14012,34

Source: Eurostat

Analyzing the value of livestock production in the European Union, it is found that it has increased in the period 2007-2011. Regarding Romania,

it is found that the value of agricultural production decreased in the period due to lower number of livestock, with the exception of 2011, the year favorable for high culture, registering record production. Romania's share in the total value of EU livestock production has declined from 3% in 2007 to 2.5% in 2011. EU Member State with the highest value of animal production is Germany (5 times higher than Romania), followed by Italy and Britain which have strong tradition in livestock.

Graph 1. Value of the agricultural production in EU member states, 2011

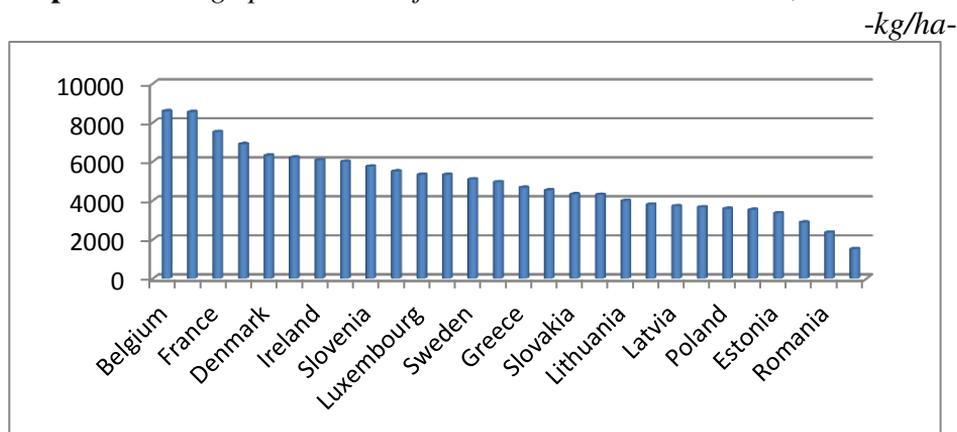


Source: EUROSTAT

Agriculture is the main economic activity in Romania, which means that, at least in the medium term, will continue to be an important branch of the Romanian economy. Because Romanian agriculture is still dependent of the changes in natural conditions, this dependency can represent a source of instability for the for the GDP and agro-food security, this is way are required investments in modernization of the branch that could be financed through European Funds for the next programming period. In the EU27 grain yield obtained is 4948 kg/ha in 2012. States with the highest yields are Belgium (8587.2), Netherlands (8545) and France (7523.9). In Romania grain surface was 5.4 million ha in 2012, total production of 12.8 million tones which resulted in a yield of 2364.1 kg/ha, with an increase of 43% comparing with 2007, but still too small in comparison with EU average. During 2007 - 2012, the average cereal production has fluctuated and still is half of the EU average and 4 times smaller than Belgium, Netherlands placing Romania on the 26th place

among EU member states. It can be shown that the best year for the cereal production in Romania was 2011, when the yield was 3993 kg/ha with 23% smaller than EU average.

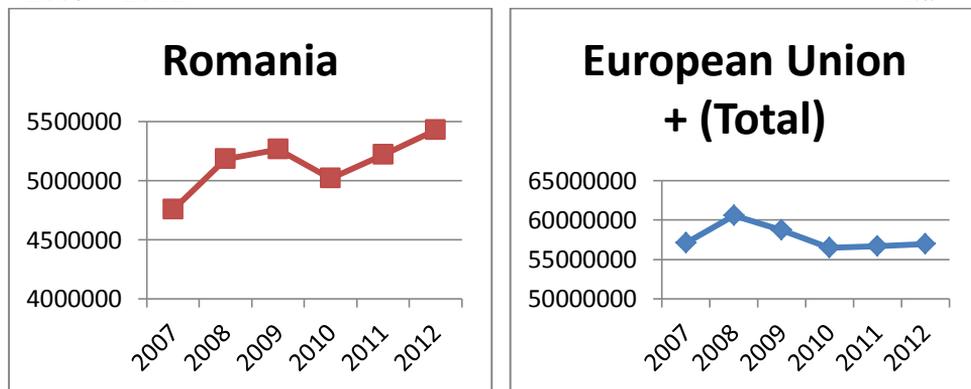
Graph 2. Average production of cereal in EU member states, 2012



Source: FAO STAT, 2013

Analyzing average fruit production in some EU Member States, it appears that the Netherlands is getting the highest yields due to high intermediate consumption. These production increases were recorded in the period 2007 - 2012, reaching in 2012 to be 5 times higher than those obtained in Romania.

Graph 3. Evolution of the cereal area in Romania and EU in the period 2007 – 2012



Source: FAO STAT, 2013

It can be noticed that in the period 2007 – 2012, although the surface harvet with cereal in Romania has increased, the average production did

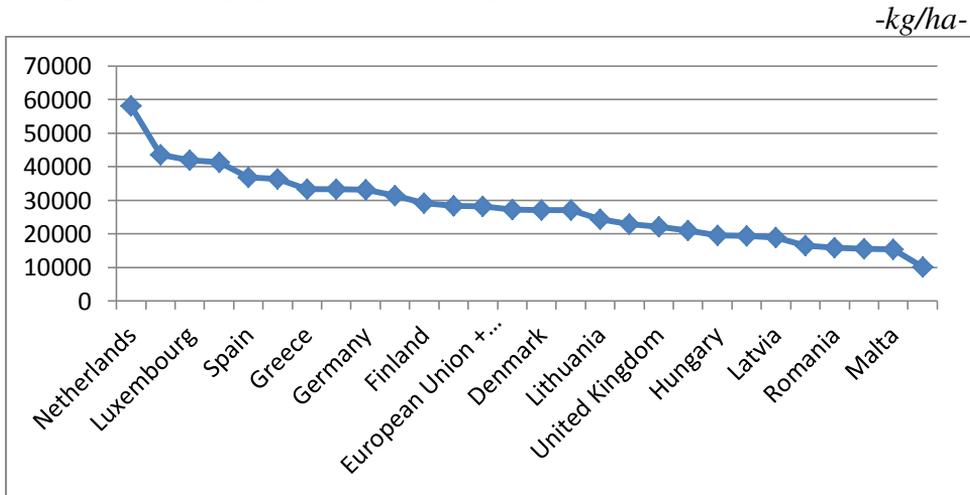
not have the same trend. This represents the opposite trend registered by the European Union, which surface has decreased but yield increased. In terms of area with fruits and vegetables in Romania after 1990, its share in total cultivated area has seen significant fluctuations due to difficulties in valuing production (marketing, processing) and the fact that these crops require large amounts of employment and spending to combat pests and diseases.

Table 3. Average production of fruit, 2011 -kg/ha-

Countries	2007	2008	2009	2010	2011	2011/2007
Austria	16728.3	17347.6	16862.6	14600.4	17872.2	106.8
Belgium	33869	26586.2	32219.3	35308.3	28472.9	84.1
Bulgaria	2684.5	2721.9	2449.5	2651.2	2982.2	111.1
Cyprus	8201.4	10326.4	8261.8	12113.9	11476.4	139.9
Czech Republic	6680	7866.5	6649.6	4928.6	5875.8	88.0
Denmark	10383.8	10588.9	11418.3	10279.6	11689.4	112.6
Estonia	772.6	673.4	1106.5	714.9	828.6	107.2
Finland	2202.3	2484.7	2721.1	2439.2	3134.5	142.3
France	9650.3	9223.7	9895.7	9726.6	10745.1	111.3
Germany	16391.7	15507.3	15535	12163.8	14393.2	87.8
Greece	12845.6	14047.2	13705	13099.6	12440.7	96.8
Hungary	5669.8	8622	9125.7	6913.4	6274.5	110.7
Ireland	18953.7	21561.1	20587.4	19641.5	20444.1	107.9
Italy	13748.6	13513.6	14087	13237.3	14268.3	103.8
Latvia	3378	4250.9	2942.8	2466.2	1944.7	57.6
Lithuania	2133.3	3828.8	3532.4	2075.1	2795.4	131.0
Luxembourg	6668.3	11274.1	13731.2	11476.7	13179.7	197.6
Malta	5061.9	4192.1	4033	4175.5	4584.3	90.6
Netherlands	32898.9	27778.6	34911.2	30987.9	38603.2	117.3
Poland	4286.9	9830.2	9312.3	7206.5	8498.3	198.2
Portugal	4460	4373.9	4862	5075.5	4897	109.8
Romania	5819.3	6352.2	6863.9	6598.7	7326.1	125.9
Slovakia	4314.4	5787.2	5436.5	4668.9	5390.1	124.9
Slovenia	11993.9	10643.7	10995	11183.7	11244.7	93.8
Spain	8589.5	9289.7	8713.8	9841.4	9776.7	113.8
Sweden	4148.7	4053.1	3838	4203.3	4470.9	107.8
United Kingdom	14438.5	14916.5	14184.4	14525.2	14343.7	99.3
European Union + (Total)	9482.3	10068.1	10242.5	10013.9	10550.1	111.3

Source: *FAO STAT, 2013*

Graph 4. Average production for vegetables, 2011

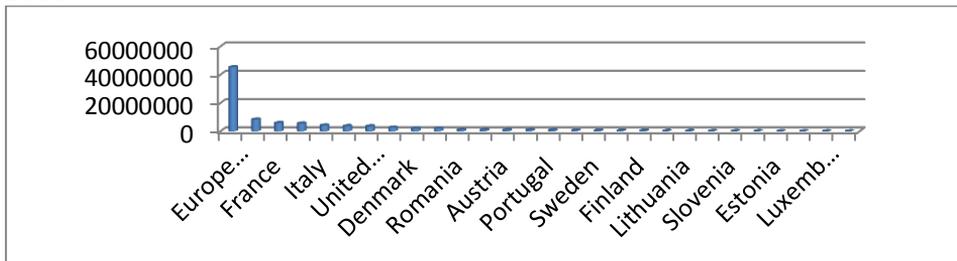


Source: FAO STAT, 2013

During 2007 - 2011 the area cultivated with vegetables and fruits in Romania decreased, however, the average yield increased with 27% for vegetables and with 26% for fruits.

This food chain is being dominated in Romania by high imports even though Romania has strong potential for vegetables and fruits, showing again the need for right fundamentation of the financial scenarios of the European Found for Agriculture and Rural Development in the period 2014 - 2020.

Graph 5. Meat production in Member States of the European Union in 2011



Source: FAO STAT, 2013

In the EU27, the production of meat increased during 2007-2011 with 4%. In the analyzed period, the highest production of meat is in Germany,

France, Spain and Italy. With a total meat production of 1.007.213 tonnes, Romania ranks the 10 place.

Romanian agri-food sector has significant gaps compared with EU. Competitiveness gaps represent the result of numerous factors, including:

- Structure crops (cereals and sunflower as the most representative);
- Lack of crop rotation and land improvement;
- Degradation of irrigation systems;
- Lack of phytosanitary treatments in households etc.

Rural development - the second pillar of the CAP

Rural development component of the CAP has gained attention only after the European Commission strategy document Agenda 2000, becoming the second pillar of the CAP due to two major reasons justifying the need for an approach in this direction: first, is given by very high proportion 80% of the agricultural areas in European Union and the second is the primary objective of economic and social cohesion of the European Union, whose achievement would be utopian without due attention to the harmonious development of rural areas². Rural development policy objectives are³:

- Improving farm;
- Ensuring the safety and quality of agricultural products;
- Ensure fair and stable levels of farmers' income;
- Environmental protection;
- Complementary and alternative development activities generating jobs to counter the depopulation of agricultural and strengthen social and economic substance of rural areas;
- Improving the working and living conditions in rural areas and promoting equal opportunities.

² Istudor N. – *Dezvoltarea rurală și regională a României în contextul integrării în Uniunea Europeană*, editura ASE, București 2006.

³ Council Regulation no. 1257/17, mai 1999.

In the context of an enlarged EU, the differences in development are major and reasons justifying the need for a rural development policy, the first being on very high proportion - 80% - they hold relative to the surface farmland Union European and the second being the primary objective of economic and social cohesion of the European Union, whose touch requires paying attention to the harmonious development of rural areas, the European Commission in 2004 considered the key moment for launching new configuration on the financing of a new Policy Rural Development.

European Agriculture Fund for Rural Development is a tool that was created by Regulation (EC) 1290/2005, aimed at strengthening the EU's rural development policy and simplify its implementation. In particular, using his control improves the management and rural development policy for the period 2007-2013.

The EAFRD has been allocated a budget of 96.3 billion euros (current prices) for the period 2007-2013, or 20% of CAP funding. At the initiative of the Member States, the Fund may finance up to a maximum of 4% of the total amount for each program measures on preparation, management, monitoring, evaluation, publicity and control assistance program (European Commission, 2006).

Similar to the SAPARD Programme and EAFRD based on the principle of co-financing private investment projects. In using the funds, recipients must provide part of the money to the investment, i.e. private financing from own sources or where they cannot have a bank address to obtain a bank loan.

Program priorities, resulting in four areas (axes) are:

- Axis I - Improving the competitiveness of agriculture and forestry;
- Axis II - Improving the environment and the countryside;
- Axis III - Quality of life in rural areas and diversification of the rural economy; Axis IV – LEADER.

Table 4. Accession degree of the European Found for Agriculture and Rural Development in EU member states, December 2012

(a)	(b)	(c)	(d)	(e)	(f)	(g) = (e) / (b)	(h) = (e) / (c)
MS	Financial Plan in force 2007-2013	Commitments *) 2007-2012	Net Advances	Total Payments (including Advances)	RAL	Payments / Total FP (%)	Payment / Commitments 2007-2012
AT	4.025.575.992,00	3.492.619.044,00	273.802.899,44	3.053.333.577,42	439.285.466,58	75,85%	87,42%
BE	487.484.306,00	409.707.674,00	29.302.721,40	402.280.334,44	7.427.339,56	82,52%	98,19%
BG	2.642.248.596,00	2.246.548.815,00	182.636.901,72	1.077.440.567,66	1.169.108.247,34	40,78%	47,96%
CY	164.563.574,00	143.525.632,00	11.376.650,18	92.242.823,62	51.282.808,38	56,05%	64,27%
CZ	2.857.506.354,00	2.433.244.104,00	197.085.444,78	2.059.726.598,47	373.517.505,53	72,08%	84,65%
DE	9.078.378.263,00	7.648.663.313,25	567.876.193,78	6.152.882.601,79	1.495.780.711,46	67,78%	80,44%
DK	577.918.796,00	471.430.245,00	31.126.255,72	335.769.842,19	135.660.402,81	58,10%	71,22%
EE	723.736.855,00	610.434.253,00	50.026.119,84	499.059.913,08	111.374.339,92	68,96%	81,75%
ES	8.049.474.764,00	6.765.210.501,00	504.974.245,80	4.277.237.140,81	2.487.973.360,19	53,14%	63,22%
FI	2.155.018.907,00	1.866.401.854,00	145.595.303,48	1.656.280.587,57	210.121.266,43	76,86%	88,74%
FR	7.584.497.109,00	6.305.502.777,00	450.937.557,62	5.119.269.376,90	1.186.233.400,10	67,50%	81,19%
GR	3.906.228.424,00	3.234.480.467,00	259.511.309,68	2.015.042.589,42	1.219.437.877,58	51,59%	62,30%
HU	3.860.091.392,00	3.275.481.649,00	266.409.037,44	2.246.146.377,70	1.029.335.271,30	58,19%	68,57%
IE	2.494.540.590,00	2.143.037.001,00	163.794.021,30	2.112.840.971,24	30.196.029,76	84,70%	98,59%
IT	8.985.781.883,00	7.544.575.887,00	580.440.691,80	4.567.058.404,06	2.977.517.482,94	50,83%	60,53%
LT	1.765.794.093,00	1.511.895.920,00	122.035.206,50	1.157.838.337,62	354.057.582,38	65,57%	76,58%
LU	94.957.826,00	81.745.742,00	6.302.647,82	78.845.727,82	2.900.014,18	83,03%	96,45%
LV	1.054.373.504,00	903.175.072,00	72.877.945,28	760.420.840,15	142.754.231,85	72,12%	84,19%
MT	77.653.355,00	66.990.030,00	5.364.334,84	42.275.786,33	24.714.243,67	54,44%	63,11%
NL	593.197.167,00	490.446.934,00	34.056.481,68	343.351.233,36	147.095.700,64	57,88%	70,01%
PL	13.398.928.156,00	11.547.781.909,00	926.102.670,92	8.051.414.429,37	3.496.367.479,63	60,09%	69,72%
PT	4.056.570.600,00	3.466.698.443,87	275.052.751,96	2.479.207.661,38	987.490.782,49	61,12%	71,51%
RO	8.124.198.745,00	6.768.025.495,00	561.575.332,14	3.884.828.366,36	2.883.197.128,64	47,82%	57,40%
SE	1.953.061.954,00	1.677.302.672,00	127.795.356,78	1.456.157.910,92	221.144.761,08	74,56%	86,82%
SI	915.992.729,00	802.961.433,00	63.018.671,02	626.010.974,61	176.950.458,39	68,34%	77,96%
SK	1.996.908.078,00	1.677.098.500,00	137.859.265,46	1.523.404.406,17	153.694.093,83	76,29%	90,84%
UK	4.612.120.420,00	3.862.896.268,00	133.670.209,38	2.886.996.533,22	975.899.734,78	62,60%	74,74%
Total	96.236.802.432,00	81.447.881.635,12	6.180.606.227,76	58.957.363.913,68	22.490.517.721,44	61,26%	72,39%

*) situation on 31 December 2012

Source: DG AGRI

The analysis of EFARD accession in EU, shows that almost 72% has been commitment by December 2012. Countries like Belgium, Ireland and Slovakia have the highest share of commitments, over 90%, compared with countries like Romania and Bulgaria that rank the last places. Regarding

Romania, the analysis of accession degree of EAFRD is good compared with other operational programs within the country, but still small compared with EU. The analysis of Romanian rural areas indicates the need to accelerate the processes of restructuring and modernization of agriculture, rural development and fisheries in view of the social and economic importance for the provision of integrated economic development and sustainable rural areas. An important role in rural development of our country is implementing policies and programs financed by the structural funds (EAFRD), but also of national programs complementary to address residents and potential investors in rural areas who do not have access to European funds. The need to prepare and negotiate with European Union a complementary program of rural development in the next programming period (2014 - 2020) and to support farmers in our country adrift, on the one hand, the impossibility of actors from the rural to meet the eligibility requirements of European projects, and on however, the large disparities that exist today between the level of development of Romanian rural and the EU member countries, namely between the financial backing given to the farmers in our country and those united Europe. Given the current issues of agriculture and rural areas, and the interdependence of them, Romania is necessary to apply a multifunctional model of agricultural and rural development. The basic principle in applying this model is to promote agricultural development functions of the rural areas accompanied by the promotion also the nonagricultural functions of these areas. This model is compatible with the economic and social policies of the European Union, whose main objective is to reduce development disparities between regions and, implicitly, the reduction of disparities in development between urban and rural areas which divide peripherals (including rural) called development centers.

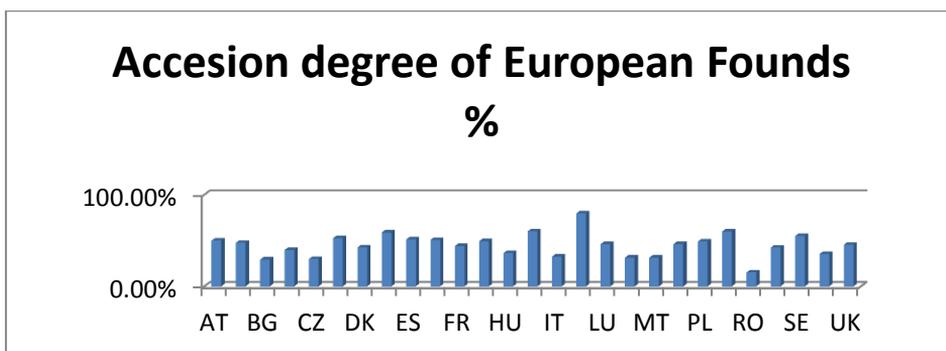
The amounts for agriculture and rural development in the period 2007, are quite generous in terms of money spent and number of measures and projects promoted. Total funds on rural development (8,022 billion euro) are distributed to the four axes:

- the largest amount - more than 3 billion euros - (~ 45% of total) is intended to improve competitiveness in agriculture and forestry,
- 25% for land management and environmental protection,
- 27.5% - ie nearly 2 billion euros for the diversification of economic activities.
- approximately 2.5% of the amount will be allocated Leader, which will support rural development projects developed by local communities in public-private partnership.

In terms of financial allocations through European funds, concluded that Romania ranks 9 with an amount of 19.21 billion.



Poland is the State that during 2007 - 2013 has allocated the largest amount, which reached a level of 67.18 billion euro, opposite the Luxembourg with an allocation of only 50.49 million. The European funds are on average across the EU, more than 44.87% of the funds for 2007-2013. A number of countries, both "old" states and the "new" EU countries had higher rates of access, especially in countries with the most efficient structure.



Thus, 15 of the 27 EU Member States (in June 2013) had a degree of accessing European funds (calculated as the ratio between the EC interim payments and the amounts earmarked for the period 2007 -2013) that exceeds the EU average (44.87%). Romania is the last place to payments made for selected projects (15.23%) and Bulgaria in last place with 29.25%. Unfortunately, the rate of access of EU funds in the EU Member States is not in line with the needs of countries. As shown, all countries with a high level of development recorded the highest percentage. This is due to the experience gained by these countries and not least administrative capacity that they have.

Table 5. *Accession degree of European Funds for all member states in June 2013*

Statul Membru		Total Alocari 2007-2013 (mln. Euro)	Total plati intermediare ale CE pana la 01.06.2013 (mln. euro)	Rata absorbție %
Austria	AT	1,204.48	601.60	49.95%
Belgium	BE	2,063.50	982.50	47.61%
Bulgaria	BG	6,673.63	1,952.30	29.25%
Cyprus	CY	612.43	243.10	39.69%
Czech Republic	CZ	26,526.38	7,925.30	29.88%
Germany	DE	25,488.62	13,407.20	52.60%
Denmark	DK	509.58	216.30	42.45%
Estonia	EE	3,403.46	2,002.80	58.85%
Spain	ES	34,657.73	17,735.60	51.17%
Finland	FI	1,595.97	808.50	50.66%
France	FR	13,449.22	5,909.00	43.94%
Greece	GR	20,210.26	9,950.40	49.23%
Hungary	HU	24,921.15	9,044.20	36.29%
Ireland	IE	750.72	450.80	60.05%
Italy	IT	27,957.85	9,091.60	32.52%
Latvia	LT	4,530.45	3,606.70	79.61%
Luxembourg	LU	50.49	23.30	46.15%
Lithuania	LV	6,775.49	2,127.00	31.39%
Malta	MT	840.12	263.40	31.35%
Netherlands	NL	1,660.00	766.70	46.19%
Poland	PL	67,185.55	32,931.00	49.02%
Portugal	PT	21,411.56	12,847.00	60.00%
Romania	RO	19,213.04	2,927.10	15.23%
Slovenia	SI	4,101.05	1738.6	42.39%
Sweden	SE	1,626.09	895.60	55.08%
Slovakia	SK	11,498.33	4,067.10	35.37%
United Kingdom	UK	9,890.94	4,494.40	45.44%
	Total	338,808.09	147,009.10	

Source: *data from European Commission*

Conclusions

Analysis of the current situation of the agricultural sector in Romania indicates the need to accelerate restructuring and modernization of agriculture, rural development and fisheries given their economic and social importance for ensuring integrated and sustainable economic development of rural areas. Considering the Romanian agro-food sector needs to adapt to EU requirements, the promotion of economically efficient and viable economic and social context of the period after accession, it sets the main directions for the development of this sector.

Community policy on rural development, although autonomous, is addressed in an integrated overall development concept includes all the social and economic life of the facilities. Gradually, rural development policy covers not only deprived areas, but the entire European rural space. As is known, the European Union member states have full freedom to choose rural development policies suitable existing socio-economic conditions in these countries, policies that are consistent with the Common Agricultural Policy.

In conclusion, we can say that Romania is the beneficiary of a generous financial scenario for Agriculture and Rural Development (and not only), the allocated amounts being over 11 million Euro, representing approximately 35% of the total EU funds allocated to our country for the period 2007-2013 (at about 32 billion euros). It is however very important to follow the allocation and efficient use of these funds to ensure a sustainable balanced development of the Romanian rural space. Given the current state of agriculture and rural areas, and the interdependence of them, Romania is mandatory to apply a multifunctional model of agricultural and rural development for the next programming period (2014 - 2020) in order to contribute to sustainable and balanced development of the rural area.

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FINANCING THE PROJECTS OF FOREST REPRODUCTION: UKRAINE AND INTERNATIONAL EXPERIENCE

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Abstract

No economic, social, cultural and other achievements are worth if the natural resources are treated carelessly. Forests are extremely important natural resource. In the paper have been used qualitative methods (interviews, discussion and written documents). Natural resources are exhausted and environmental condition sometimes cannot be restored. In this context, forests act as a source of natural resources and environmental restoration element of the environment. Part of the territory of Ukraine is occupied by forests, over the past two decades, is over 16%. For their preservation and enhancement substantial financial resources are required as well. The goal of this research is the evaluation of financing of forestry in Ukraine, the study of foreign experience in raising funds for the development of the forestry sector. Ukraine's Government does not have sufficient financial resources for investment in fixed assets of forestry. In this context, the experience of Latin American countries where the forest area is the largest could be interesting.

Key words: *forest resources, funding, reproduction, financial instruments.*

Introduction

Forests of Ukraine in its purpose and location serve predominantly as water protection, safety, hygiene, health and other functions and provide the needs of society in forest resources.

The special features of forests and forestry in Ukraine include:

- relatively low average forest cover of the country;
- growth of forests in different natural zones (Woodlands, Forest-

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steppe, steppe, Ukrainian Carpathians and Mountainous Crimea), containing substantial differences in forest vegetation conditions, forest management practices, the use of forest resources and useful properties of wood;

- primarily ecological importance of forests and their high proportion (up to 50%) with limited forest regime;

- high percentage of protected forests (15.8%), which tends to growth;

- the situation of fixing forests for numerous permanent forest users was historically formed (for forests are provided for permanent use of enterprises, institutions and organizations of dozens ministries and departments);

- significant increase in forests is observed in the zone of contamination;

- half of the forests of Ukraine are artificially created and require intensive care [2].

The total area of forests in Ukraine is 10.4 million hectares, of which 9.6 million hectares are covered with forests. Wooded area of the country is 15.9%. Over 50 years forest area increased by 21% and timber stock almost tripled [7].

At the present stage in the industry there is a following situation: organizational and management structure, formed during the previous administration regulated economic system, despite the radical economic reforms of recent decades in the country, has not experienced positive changes; reform of forest-resource relations is unreasonably restrained; economic factors and levers (price, profit, profitability, efficiency, rent, motivation, ownership, etc.) are introduced into forest resource production at insufficiently high market-oriented levels; there is no investment activity as to increase of forest resources, development of agro-landscape units, upgrading of processes of forest cultivation and use of forest resources [3].

The issue of financing the reproduction of forest resources was revealed in the works of such scholars and practitioners: M. Jacobson, M. Polyakov, Y. Tunytsya, G. Kupalova and others. The goal of this research is the evaluation of financing of forestry in Ukraine, the study of foreign experience in raising funds for the development of the forestry sector. The amount of mandatory payments for the use of forest resources is estimated.

Estimation of the financial resources intended to reproduce the forest

The global need for funding for sustainable forest management is estimated to be between USD 70 and USD 160 billion per year. Globally, resources remain insufficient to address all seven thematic elements of SFM (Sustainable forest management) in a balanced way, as defined in the forest instrument. Most countries are unable to raise adequate public funds for the forest sector, and re-investment of revenues in forest management has been minimal [5].

Forests contribute approximately USD 468 billion or 1% of global gross value added to GDP, 10 achieved through an annual investment in the forest sector of USD 64 billion. Of this, approximately 28% is spent on forest management and the rest is invested in forest product processing and trade. Forests provide development opportunities at many scales; however, the most common allocation of public and private financial resources is in large-scale commercial timber production in investments in pulp and paper and plantation development. At local and community levels, forests also provide an essential source of cash income. In many countries, non-wood forest products (NWFPs) – fruits, nuts, honey, mushrooms, bush meat, plant products, medicine, aromatic products and exudates like lacquer – play important roles in local economies and livelihoods, and are important exports [5].

In December 2007 the General Assembly adopted the non-legally binding instrument on all types of forests (the forest instrument), which includes its four global objectives on forests (GOFs) [4]:

Global objective 1. Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;

Global objective 2. Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people;

Global objective 3. Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests;

Global objective 4. Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management.

Sources of forest financing that fall within the public national category include flows from general government revenue as well as revenue from state-owned forests. The status and type and level of funding to forests varies among countries, as do funding structures and supported activities [5].

National public financing is the major source for forestry activities in many countries, and generally comes from government budgetary allocations to official forestry institutions/bodies as well as revenues generated from state-owned forests.

Unfortunately most countries are unable to raise adequate domestic public funds for the forest sector. In some regions like Africa this is partly due to low levels of economic growth and lower prioritization of the forest sector in national policy, resulting in smaller budget allocations. In some countries with extensive commercially valuable forests, these resources have been treated as quick sources of revenue but with minimal re-investment into their management [5].

The public-sector contribution (as investor, regulator and facilitator) plays an important role because it is often the only source of funding for forestry activities focused on social and environmental benefits. With close to 80% of world's forests publicly owned, funds garnered through political means can also provide an important leveraging function that can boost private sector investments [5].

The 2008 report of the AGF categorized forest financing sources based on type (public or private) and scale (domestic or international). Public sources include general government revenue, revenue from state-owned forests, and bilateral as well as multilateral funding. Private sources include communities, non-governmental organizations (NGOs) and the forest industry, and may operate at national or international scales. This categorization will be used throughout this study (see Table 1), although the available information and data vary from one category to another, and different sources can be used in combination with one another.

Table 1. *Forest Financing Sources by Type and Scale*

Financing sources		Domestic	International
Public	Governments	Investments by national and local governments through subsidies, soft loans, non-monetary incentives, direct investment.	Bilateral ODA (grants, recoverable grants, concessional loans, etc.) Multilateral ODA institutions: IDA, GEF, ITTO, FAO, UNEP, UNDP, GM, regional development banks (grants, investment lending, investment guarantees) Multilateral targeted programmes: PROFOR, FLEG, CGIAR, BPF, NFP (grants, co-financing) Multilateral financial institutions: IFC, IBRD, regional developments banks
	Forest industry Financial institutions and institutional investors Philanthropic Conservation NGOs (selffinancing) Other NGOs and civil society organizations (CSOs) (selffinancing)	Direct investments (incl. SMEs) Short and long term credit Portfolio investment Targeted credits Insurance and re-insurance Financial support to national NGOs and targeted beneficiary groups Financial support to national NGOs and targeted beneficiaries (project funding) Financial support to national CSOs and targeted beneficiaries (project funding)	Foreign direct investment (FDI) Short and long term credit Portfolio investment Export credits Guarantee instruments Insurance and re-insurance Financial support to international NGOs and targeted beneficiary groups Financial support to international NGOs (programme/project funding) Twinning arrangements Financial support to international CSOs (programme/project funding) Twinning arrangements

Sources: *Adopted, Moura Costa et al. 1999, Sander, pers. comm., author's elaboration.*

State financial resources for financing the projects on forest reproduction, coming from the following sources; however, those incomes generated do not necessarily return directly to forest management and conservation efforts:

a. Fees and taxes collected for: (1) the allocation of land, forests and contracts to harvest timber and plant and animal wildlife, or on the circulation of such harvested wood, and (2) payments for licenses and

- stamp duty for the transporting, processing and marketing of wood, as well as stampage from stateowned forests;*
- b. Taxes and charges (value added tax (VAT), export duties, social charges, etc.);*
- c. Imposition of fines, confiscation and damages for infringements of the law;*
- d. Sale of plants and plant material from nurseries and other forest products;*
- e. Issuing of tour operators' licenses to harvest and market plant and animal wildlife;*
- f. Entrance fees paid by visitors to protected natural areas.*

Proceeding from forest resource issues, there is a need to justify targets and priorities to modernize all structures of forestry industry and to its removal from the crisis, in the hierarchy of which the significant role is played by the financial and economic transformation. These priorities include the following.

In the sphere of financial, economic and investment areas:

- implementation of an effective mechanism for pay-forest, which should be based on relevant regulations and limits, based on the concept of economic rent assessment of forest resources;
- capitalization of the various components of the forest - wood, resources of non-wood origin (mushrooms, berries, fruits, medicinal and industrial raw materials), as well as social and environmental utilities of forest ecosystems, which are currently outside the scope of economic relations and unable to generate financial income;
- development of asset securitization, which are social and ecological functions of the forest, that on the basis of the creation of securities in the financial markets can also be a source of income in forest resource area;
- clear specification of ownership of forest land (arrays), forest resources and the creation of appropriate limits and protective mechanisms in order to avoid their unreasonable use, including social and environmental functions as assets and inseparable from the basic components of the forest sectors, social sphere and other residents who do not participate in the results of their reproduction, protection and conservation;

- financial recovery of the industry, the implementation of their obligations to the budget, resources suppliers and unprofitable organizations on the basis of the development and effective implementation of measures to restore the solvency of the industry and the removal of receivables due to internal opportunities;

- creation of corporate associations of forest resource areas and networks of innovation and technological clusters with forest use in economic, social and environmental purposes based on the spread of common and more effective use of forest plantations of different forms of ownership;

- involvement in economic turnover value estimated on the basis of rent and counted as part of the national wealth forest land capital, including social and environmental functions of forests as intangible assets whose characteristics and value may exceed the assessment of forest resources;

- change in the structure of ownership of forest lands, including small areas of forest that are concentrated within the agricultural land based on which it is impossible to organize an effective forest management, proper protection and conservation of forest resources;

- introduction of effective market-based mechanism for pay-forest, which should be based on reasonable standards and limits of the use of forest resources, effective organizational and economic forms of public-private partnerships in this area, and rational method of allocating of payments from forest use between state, regional institutions and enterprises of the industry that are directly associated with the production, protection and reproduction of forest resources [3].

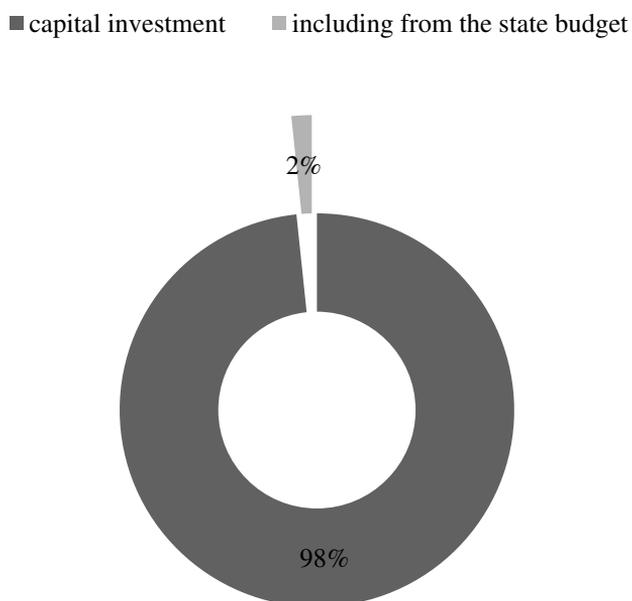
National Forestry is almost completely state-owned [6]. Unfortunately there is no separate statistics on ownership in forestry in open access. For article writing statistical data on the site of the State Statistics Service of Ukraine were used.

Ukraine, under the Kyoto Protocol, undertook to carry out its decisions regarding increasing afforestation as a major factor in the accumulation of phytomass of forest stands that are important depositors of carbon and mitigating climate change. Studies show that for this there are opportunities and reserves. Based on the regulatory assessment of forest phytomass increase in average 7.1 million tons of carbon are annually deposited, and on condition of bringing afforestation to the optimal level, this figure will be nearly 9.9 million tons. This amount of sequestration of carbon or carbon dioxide (CO₂), which is the main greenhouse gas of

technogenicorigin, is not considered a constant parameter. With the increase in forest area, improving their species composition, age structure and, consequently, higher rates of planting deposit amount of carbon dioxide will adequately increase [1].

Taking into account that the majority of forests in Ukraine are state owned, financing of their reproduction takes place at the expense of state enterprises or government funds. Thus, according to Figure 1 on only 2% of capital investment in forestry is financed from the state budget.

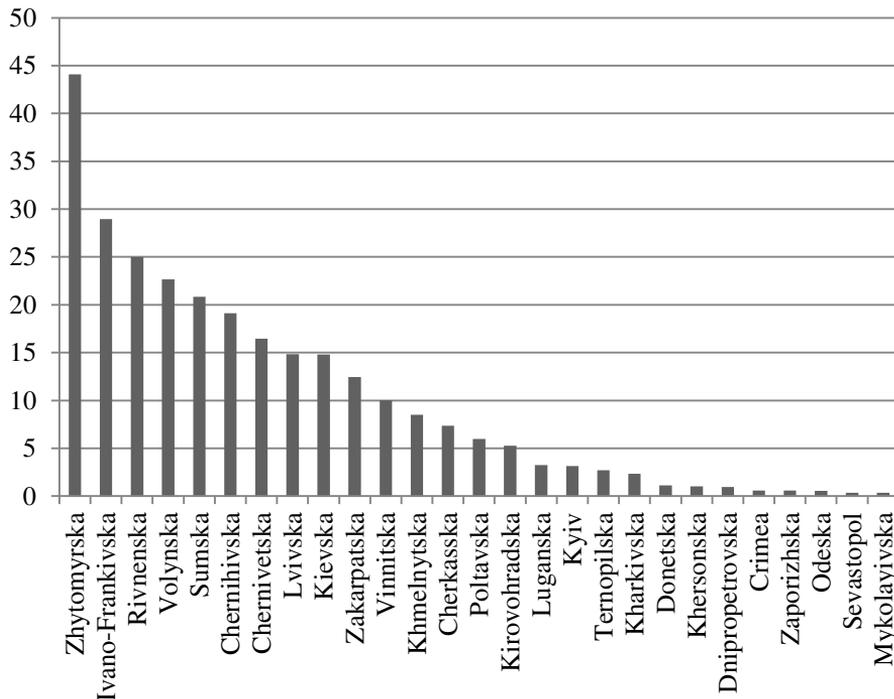
Figure 1. *Structure of capital investments in forestry and related services by source of financing in 2012*



Source: *author's development based on the data of State Statistics Service of Ukraine, www.ukrstat.gov.ua*

The total capital investment in forestry in 2012 is 273.3 million UAH. The volume of capital investments by region shows that leaders are those areas in which there is the largest area of forest and forest-occupied area. The area with the largest forest area relative to the total in the region is the western and central regions of Ukraine. Zhytomyr region is the undisputed leader in terms of capital investment in forestry.

Figure 2. Capital investment in forestry and related services by region in 2012, million UAH



Source: Calculated based on the data of State Statistics Service of Ukraine, www.ukrstat.gov.ua

The volume of forest products by region shows that Zhytomyr region as a leader. Taking into account that statistics is carried out at the place of registration of business entities, the leaders in terms of forest products may not be those areas where the activities are actually carried out.

Comparing the share of investment in forestry and related services in the total investment in fixed assets it can be attested that their share is quite insignificant, as it is less than 0.1% (Table 2).

Herewith, the share of investment in agriculture is more than 7% in 2012, and there is a trend of its growth during the 2005-2012. The share of forestry investment in agriculture structure is about 1% and tends to decrease during 2005-2012. Forestry capital investments in 2012 are 201.7 million, however, during 2009-2012, have not reached pre-crisis levels.

Table 2. *The share of fixed investment by sector for 2005-2011, %*

	2005	2006	2007	2008	2009	2010	2011
Investments in fixed assets, total	100	100	100	100	100	100	100
The share of agriculture, hunting and forestry	5.4	5.8	5.1	7.2	6.2	7.1	7.6
including the Forestry and related services	0.1	0.1	0.1	0.1	0.1	0.1	0.1
The share of forestry and related services in investment in fixed assets of agricultural	2.2	1.6	1.9	1.2	0.9	1.0	1.1

Source: *Calculated based on the data of Ukraine in figures in 2012 Statistical Yearbook, www.ukrstat.gov.ua*

The main source of funds for investment in fixed assets of forestry enterprises are funds of public enterprises, which in turn are the main payers of the fee for special use of forest resources. The specified fee may be directed to the reproduction of forest resources of the state. The volume of revenue collection for the special use of forest resources exceed the amount of fixed capital investment of forestry enterprises.

In the structure of fees for special use of natural resources, the fee for special use of forest resources for years 2007-2011 is about 2%, while the dynamics to reduce its share is observed (Table 2).

In absolute terms, the amount of the fee for special use of natural resources exceeds the investment in fixed assets of forestry. This may indicate a low investment attractiveness of forestry and ineffective management of forestry sector. Taking into account that almost all forest enterprises are state-owned their investment attractiveness is almost impossible to estimate. Therefore, lack of investment resources in forestry can be explained, more likely, by ineffective financial and economic activities.

Table 3. *Dynamics and share of the fee for special use of forest resources in the structure of tax revenues of the Consolidated Budget of Ukraine for 2007-2011*

		2007	2008	2009	2010	2011 p.
Fees and charges for special use of natural resources	mln. hrn	5948.23	9291.98	11230.65	12709.50	14826.41
	%	3.7%	4.1%	5.4%	5.4%	4.4%
The fee for special use forest resources	mln. hrn	173.08	213.26	213.26	219.33	269.46
	%	2.9%	2.3%	1.9%	1.7%	1.8%

Source: *Calculated based on the data of State Treasury Service of Ukraine, <http://www.treasury.gov.ua/main/uk/index>*

Despite the low level of investment in forestry of Ukraine, the volume of investment in some of these countries is significant. In this context, it is worth considering the experience of Latin America.

Financing of forestry may occur due to multiple sources, including:

- *funds of the central and local budgets;*
- *income from the sale of products and services of forestry;*
- *private sector investment;*
- *financial assistance from international organizations.*

In most countries, the private sector is the main investor in forestry and its share has increased significantly in recent years. Today, it is believed that 80-90% of investments in forestry is funded by private sector. There is a tendency to an increase in investments from various funds that specialize in "green" investments. In addition, payments for special use of forest resources are becoming more common, which may increase investment in the reproduction of forest resources.

The public sector plays an important role in financing investment activities of forestry, and affects both directly and indirectly on the amount of investment income in forestry from all the above sources. First, the government directly finances investment in forestry.

Second, the government can encourage private sector investment in forestry by establishing tax incentives, grants and concessional loans. Third, the state is responsible for implementing policies to stimulate private investment.

Some Latin American countries use innovative mechanisms of financing forestry, including the following: allocation of certain taxes for their intended use for the purposes of forestry (Brazil); public-private partnerships and tax sharing mechanism.

Overseas development assistance (ODA) is an important source of financing for small woodland owners and management of forest resources in general.

Official Development Assistance typically supports capacity building, technology improvement, infrastructure development, environmental conservation and the removal of structural barriers, as well as the provision of technical assistance and other resources to catalyze development. For example, the Slovak Republic has, as a donor country, designed programming to develop forest reproductive materials, and also has promoted capacity building for SFM.

ODA flows are generally in the form of debt, grant or technical assistance and have two main channels: bilateral, from the donor agency to the recipient, and multilateral, which refers to those funds coming through international agencies that raise their resources from their stakeholders, including their member states and/or donor agencies and international financial markets [5].

It is still commonly accepted today as in 2008, that aside from ODA, forest financing is heavily reliant on internal cash flows and therefore is a predominantly domestic phenomenon in many countries, since lending and equity capital are difficult to access.

As was the case in 2008, the available information on national flows for forest financing continues to be more limited than that of external sources. Domestic sources of funding, which include national public sources, bank loans and other private sources, are similarly difficult to track due to differences in reporting and analyses as well as varying national priorities placed on domestic forest resources [5].

National forest programmes offer one step in streamlining forest management and priorities, but at this point few analyses exist on aggregate national trends in forest financing [5].

Financial resources are often insufficient to properly manage vast forest areas. Those forest areas not used for production are rarely self-financing, and subsidies and/or direct action by governments are required to manage these areas properly. Inefficient use of the existing resources has further exacerbated these problems.

It has been estimated that globally the required funding for sustainable forest management is between USD 70 and USD 160 billion per year. Estimates of the amounts required to halve deforestation alone range from USD 20 to USD 40 billion per annum by 2020. Between USD 4 and USD 7 billion per annum would be needed by 2015 to reduce deforestation by 25% [5].

These are only estimates but they are useful in highlighting the fact that the funding available for forests from all sources falls far short of even the most conservative estimated needs. This is especially true if we go beyond the carbon value of forests and consider financing all seven thematic elements of SFM, and financing SFM as defined in the forest instrument.

The lack of forest finance also stems from countries' inability to quantify and capture the full revenue-generating potential of forests and the considerable forest-related financing flows in other sectors. Continued effort is needed to ensure that the full value of forests is recognized and integrated into the work of various conventions, international organizations and countries.

There is a lack of reliable data on forest funding. The lack of information is a major barrier to improved understanding of the true costs associated with the management of all types of forests and the potential for forests to contribute to local, national and regional development. Appropriate guidelines and templates should be also developed to help countries to report more clearly on forest financing. This also requires strengthening technical and technological capacities of countries.

In relation to global forest finance, good forest governance and law enforcement are important factors. Funding associated with forest law enforcement and trade remains relatively limited. There remains a general lack of awareness among legislators and policy makers about the role of forest law enforcement and governance in national development, resulting in a lack of political will to support the sector. Poor governance and limited law enforcement are likely to make the forest sector less attractive to investments by the private sector by posing unacceptable levels of risk. In many countries, clear policies for allocating public funding to forests are lacking, and when policies exist these are weak and unreliable, resulting in significant gaps between estimated resource needs and actual funding allocated. In many cases the limited allocation of budget resources to the forest sector can be attributed – at least in part – to the sector’s failure to make a convincing case for an increased share of resources. Expenditures on forests are largely pegged at a holding or maintenance level and do not provide for forest development, conservation and management.

There is also a strong need for improving the capacity of different stakeholders and for promoting technology cooperation at different levels. This will strengthen the ability of various stakeholders to take advantage of the existing opportunities for forest financing.

There are several key barriers that hinder access to and mobilization of additional financing for forests from all sources. An inadequate enabling environment is generally considered to be the primary underlying obstacle to the mobilization of finance. Such enabling conditions are necessary for both private investment and public sector funding, in particular for attracting external funding. The elements include (1) policy and legislative frameworks, (2) knowledge, (3) national capacity development and institutions and (4) markets and private sector mechanisms and instruments.

A high level of technical and technological capacity and knowledge is a critical component of enabling environments. Communication and financial capacities are also essential to the ability to articulate the importance of forests to those outside the sector, and particularly to those in the business and finance sectors. In many countries however, sufficient capacities are lacking in a range of categories. This may result in a low level of priority given to forests by national level governments, funders and others due to a lack of understanding about the significant contribution of forests to achieving sustainable development.

The forest sector is not widely understood as being relevant to achieving sustainable development goals despite forests' integral role in safeguarding overall landscape multifunctionality. The forest sector in some countries continues to struggle with developing and implementing coherent strategies for sector planning, leading to forest policy priorities that are poorly aligned with other sector's priorities and broader sustainable development strategies. Significant forest governance and legality challenges continue to undermine financing mobilization efforts due to donor and investor concerns about insecure tenure, illegal activities and a variety of other risk factors. A lack of effective public sector laws, such as those providing tax incentives or clarifying forest tenure and safeguarding the resource access rights of local people, can discourage private sector investment and may drive unsustainable forest management practices. Additionally, if existing legal mechanisms are poorly designed, implemented and/or enforced, this can also act as a barrier to forest financing.

Local and sub-national forest stakeholders are a critical element in determining the health and condition of forests and the resources therein, yet they are frequently unable to access and secure the financing needed for SFM, enterprise development and capacity building activities. Problems associated with eligibility, extensive procedural requirements and coordination of priorities to access to external resources can create barriers to forest financing. There is no single solution that can eliminate all the existing barriers. Instead, a multipronged approach is needed that focuses on (1) undertaking a thorough examination of the needs and contexts of an area and its people, (2) developing a 'long view' strategy that is context appropriate and politically viable, and (3) continuing and improving step-by-step actions to establish a strong enabling environment within countries, regions and at the global level. Today, many investors are interested not only in the financial result of their investment, but also in the environmental effects. Indicated interest leads to a number of attempts to stimulate private sector investment in ecosystem services. An example is the creation of the Brazilian environmental and social stock exchange [4]. These countries use a broad range of financial mechanisms to promote sustainable forest management.

Conclusions

Estimated amount of financial resources directed to investments in fixed assets of forestry compared to other industries is insignificant. Their share for the analyzed period is less than 0.1% in absolute terms they represent 200 million UAH in 2012. This low amount of financial resources directed to fixed

investment in forestry can be explained by the virtual absence of private property in forest occupied areas. In its turn, the state does not have sufficient financial resources for investment in fixed assets of forestry. In this context, the experience of Latin American countries where the forest area is the largest, could be interesting. These countries encourage private forest management, thus increasing the amount of financial resources for investment in forestry, actively attract international financial assistance, introducing tax incentives for private forest managers and so on.

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HUNTING TOURISM IN THE FUNCTION OF RURAL DEVELOPMENT OF GORNJE PODUNAVLJE

Risto Prentović¹, Jadranka Delić²

Abstract

Gornje Podunavlje, a microregion in northwest Serbia, which covers the territory of the city of Sombor and municipality of Apatin, is mostly rural area. Besides the fact that it has significant natural and anthropogenic resources, this region has not achieved the corresponding economic, and above all, rural development. Tourism, including hunting tourism can represent a considerable factor in rural development of this destination within which there is, among all, a Special Nature Reserve "Gornje Podunavlje" as a protected area. The generating function of tourism, and especially hunting tourism, is possible to accomplish if and only if the full correlation, in other words integration of relevant special kinds of tourism in this area (rural, cultural, nautical, spa, eco, fishing, and, especially, hunting) along with harmonizing with other industries (agriculture, forestry, waterpower engineering) is actualised. The topic of this research is overviewing the place, the role and potential of hunting tourism for the purpose of rural development of Gornje Podunavlje.

Key words: *rural development, hunting tourism, Gornje Podunavlje, Serbia*

Introduction

Rural region is an area whose basic physical and geographical feature is primarily using the terrain for agricultural production and forestry. Rural region includes people, land and other resources in the open natural areas and rural settlements which are out of direct economic influence of the main public urban centers. By the rule, rural areas have rather rich ecosystems and relatively preserved biodiversity. Adding numerous physical-geographical and climate

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benefits, it provides favourable conditions for the development of agriculture, forestry, waterpower engineering and industries tangent to them.

Rural development can be defined as the functioning of the assemblage of interrelated industries and other activities, which, besides the primary agricultural production, also includes processing industry, forestry, hunting, fishing, waterpower engineering, commerce, tourism, trades, and numerous activities related to spacial arrangement.

In recent decades what is a significant factor in industrial and other ventures in rural areas is tourism, including its special branch - hunting tourism, especially in regions with relatively preserved biodiversity.

Gornje Podunavlje is a microregion in northwest Serbia, it ranges over the territory of Sombor City and the municipality of Apatin. It is mostly the rural region, but it is also one of potentially the most versatile tourist destinations in Voivodina and the most prestigious destinations for hunting tourism in Serbia. This region ranges over 1,527.56 km², out of which the city of Sombor covers 1,178 km², and the municipality of Apatin covers 349.56km².

With its pedagogic, hydrographic and climate features, forests, ponds, marshes, agricultural land and specific ecological features it is so complete and indivisible, yet at the same time its natural authenticity and biological diversity are potentially endangered.

That is why in this part of the region, the appointed social authority (Serbian Government) declared and constituted protected natural area under the name Special Nature Reserve "Gornje Podunavlje".

In the region of Gornje Podunavlje, according to archeological and other resources, there are also relatively numerous human settlements. A special constitution of natural-geographical and cultural values of this region is suitable for various kinds of tourism, that is rural, cultural, spa, nautical, sport and recreation, eco, ethno, excursion, events, fishing and hunting tourism. The topic of this work is the overview of the place, role and potential of the hunting tourism for planning the rural development of Gornje Podunavlje.

Empirical material covered with this research consists of written material (scientific and expert literature, laws and other regulations, plan documents, as well as other relevant documentation of industrial subjects and subjects of local

communities of Gornje Podunavlje) and factography (collected on terrain through systematic observation and survey).

For data processing, analysis and discussion, the following methods have been used: systematic observation, analysis (of the literature and factographic contents), interviewing competent individuals on terrain and statistical method (descriptive statistics).

Tourism – Geographical Position of Gornje Podunavlje

The region of Gornje Podunavlje is situated in the northwest of Voivodina. It borders Hungary in the North, Croatia in the west, the territory of the province of Odzaci in the South, the territory of Subotica City in the Northwest, the province of Backa Topola in the East, and the province of Kula in the southeast. The border to Croatia is the river Danube. Along its left river bank (from 1367 km to 1433 km) there lays a special ecological unity, Special Nature Reserve “Gornje Podunavlje”.

The only limiting factor in communicational optimalization of Gornje Podunavlje is a relative distance from the closest airport (“Nikola Tesla”) in Surcin of about 150 km. Nevertheless, this fact taken into account, it can be concluded that tourism-geographical position of Gornje Podunavlje is very favourable.

Natural geographical features of Gornje Podunavlje

Natural geographical conditions in Gornje Podunavlje³ are based on geomorphological and geological features, climate conditions, hydrological characteristics, the soil, flora and fauna.

The Relief of Gornje Podunavlje lays on loess plateaus, loess terraces, alluvial plains and sands (fluvial-eolian lowland of the Subotica Sands).

The soil of Gornje Podunavlje consists of chernozem, alluvial land, meadow black soil, marsh black soil, marsh gley soil of solonchak and solonetz. The soil is predominantly fertile and suitable for almost all kinds of agriculture, forestry, and industries tangent to them.

³This issue is discussed in more detail in: Bukurov (1975): *Fizičko-geografski problemi Bačke*, Serbian Academy of Sciences and Arts, Belgrade, book 43, p 209.

The Climate of Gornje Podunavlje is a steppe-continental with its typical lower average temperature in July and higher average temperatures in January i.e. oscillations in the air temperature are smaller than in other parts of Voivodina. The air temperature ranges from -1.6°C in January to 21.1°C in July. Average temperature during the vegetation period is about 18°C . The average annual insolation is about 2,010 hours. The most common winds in this region are North and Northwest winds, and then those who blow from South and Southwest. The region of Gornje Podunavlje has about 600 mm atmospheric residue per year. Most precipitation falls in summer and then in spring. The region of Gornje Podunavlje is characterised by plenty of shallow underground *waters* and with the presence of multitude of underground various hydrologic objects.

The Danube is the main water accumulation of this region, and most changes of hydrologic and biogeographic character are directly related to the changes in water level of this big river. Flood water and high water level have a huge impact on flora and fauna in this region, and these hydrologic phenomena are most common during the vegetation period and they represent a limiting factor of maintenance and recovery of vegetation. For land animals they can even have proportions of a catastrophe.

Except the Danube, in Gornje Podunavlje significant object are: canals (Danube-Tisa-Danube and others) and numerous river branches, lakes and ponds.

In the region of Gornje Podunavlje there are numerous kinds of *flora and fauna*⁴. Rich flora consists of about 1000 plant species which form 51 plant communities. The flora and vegetation represent good conditions for the existence of a lot of animal species: fauna of insects, fish, amphibians, reptiles, birds and mammals. From the perspective of hunting tourism, what is especially significant is the presence of about 280 species (or about 80 % of total fauna of birds in Serbia)⁵ and almost 30 species sorted into 5 genera and 11 families⁶.

⁴This topic is discussed in: Delić Jadranka (2010): Turistička valorizacija lovnih prostora u Specijalnom rezervatu „Gornje Podunavlje“ (master's thesis), Faculty of Sciences, Novi Sad, p 137; Stojanović Vladimir (2002): Specijalni rezervat prirode „Gornje Podunavlje“, Faculty of Sciences, Novi Sad, p 96; Bugarčić Pavle (1994): Flora i fauna pp 68-76 in Bogdanović Živan (ed.), Municipality of Apatin, Faculty of Sciences, Novi Sad, p 221; Miljković Ljupče (1996): Biljni i životinjski svet, pp 55-56 in: Đurić Jovan, Municipality of Sombor, Faculty of Sciences, Novi Sad, p 246.

⁵Bird species interesting for hunting: pheasant, wild ducks, wild geese, quail, turtledove, collared dove, the grey partridge and Euroasian woodcock.

⁶Mammal species interesting for hunting: European deer, wild boar, roe deer, beasts (fox, jackal and hare).

Protected area, Special Nature Reserve „Gornje Podunavlje“, as a tourist destination

A part of the territory of Gornje Podunavlje, located along with the left river bank of the Danube, covering the area of 19,605 ha, which includes numerous meanders, still waters, canals, in particular, water, marsh, meadow and forest ecosystems which were formed in the process of immediate influence of the river⁷, rich in various natural values, because of real risks of potential degradation, it has a status of a protected good. By the Law of Serbian Government („Službeni glasnik RS“ br. 45/2001 i 107/2009) it was declared to be a Special Nature Reserve „Gornje Podunavlje“. It is the only larger complex of marsh forests in the upper part of the Danube river in Serbia, so the most dominant elements in this area are “forest elements with 48.8% share, while agricultural areas and areas for other purposes share 7,7%⁸.

The importance of this protected natural good of crucial significance is emphasized by the facts that it also represents:

IBA area – in the register of international regions of significance for birds;

IPA area – botanically significant region in Serbia;

The area protected by the Ramsar Convention (the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) since 2008.

In 1998 it was included in the project by UNESKO EURONATUR with 11,506 ha, to declare a biosphere reserve „Drava-Mura-Dunav“ which would include natural goods along these rivers in 5 countries. Nomination for future biosphere reserve was given in September 2013.

Population and settlements of Gornje Podunavlje

According to the census in 2011, there are **116,469** people who live in this area and who belong to over 20 ethnical groups (mostly Serbs, Croatians, Bunjevci, Šokaci, etc). Most of them (over 50 %) belong to orthodox, and then (about 30%) to catholic religion. The main demographic characteristics of the population in Gornje Podunavlje are: negative population growth, very unfavourable age structure with an average age over 40, increased number of households with less than 3 members and increased number of households with people of old age.

⁷Vladimir Stojanović (2002), op.cit. p 11

⁸Vladimir Stojanović (2002), op.cit. P 12

Besides municipalities, Sombor and Apatin, in the region of Gornje Podunavlje there are 70 settlements, which were mostly, like other Voivodina settlements, built by plan of rectangle or square base and latticed structure. A lot of settlements in this area at the same time stand out of this standard model because of the specific relief, hydrography and vegetation. Residential, public-administrative, sacral, cultural-artistic and other objects in these settlements are characterised by different architectural styles. From the famous Serbian-Byzantine style, through Baroque, secession, old village architecture shown in the house gables, decorated crosses and sculptures, to the ancient thatch houses which still (though there are only few of them) remained in this region.

Industry of Gornje Podunavlje

Physionomy of the industry of Gornje Podunavlje is predominantly determined not only by industrial-geographical and socio-geographical characteristics, but also by the structure of the soil used in this area, which is presented in the table 1 which shows that the largest part of the land in Gornje Podunavlje is agricultural land. This circumstance determines that there are the following industries here: agriculture (crop farming, cattle feeding, a little less pomiculture and viticulture), food industry and shipbuilding. To a lesser extent there are also tourism (where hunting and spa tourism are occupying a dominant place, which will be shown in the text below, and significant assumption for the development of cultural, eco, nautical and fishing tourism), commerce, trades, traffic services, etc.

In the region of Special Nature Reserve “Gornje Podunavlje” the dominant industries are forestry, hunting and fishing. This protected area, is managed by Public Enterprise (PE) “Vojvodinasume” through Lumber Camp “Sombor”.

Table 1. *Structure of the use of the land in Gornje Podunavlje (in percents)*

Local community	Surface [*] in km ²	Forests ^{**} and forest land	Agricultural ^{**} land	Barren ^{**} land	Built ^{***} land
Sombor	1.178,00	5,02	86,78	8,20	6,62
Apatin	349,56	14,53	71,27	14,20	6,57
∑ (Gornje Podunavlje)	1.527,56	6,56	83,23	9,56	6,51

Sources: ^{*} *Monography municipality of Sombor and Apatin,* ^{**} *Republic geodesic institute, Office for the Cadastre of Immovables of Apatin municipality and Sombor city,* ^{***} *Public Enterprise The Institute for Urbanism of Voivodina – spacial plans of Apatin municipality and Sombor City*

Potentials of hunting tourism

“Hunting tourism represents moving and active sojourn of tourists hunters in a specific ambience – hunting ground, as a part of healthy natural environment for the purpose of hunting (shooting, catching, observing, photographing and video-recording) of the game, which satisfies their strong motive (primary hobby activity which is for someone even a passion). At the same time these tourists hunters, besides the reimbursement for the shot game (trophies, meat, leather, etc.) also pay for other accompanying services by the valid pricelists⁹.

The area of Gornje Podunavlje represents the most prestigious tourist hunting destinations in Voivodina and wider in Serbia. Hunting has been present here since the human settlements. The beginning of organised and legally regulated hunting dates back in the early 80-ties in XIX century, when State Hunting Society was formed in Hungarian Empire (1881) and the hunting law was passed (1883)¹⁰. Since then there have been more intensive game breeding (especially deer) and its use in the form of hunting earning. This region has been famous for its quality and high -frequency game for a long time. For example, in today's hunting ground “Kozara” in Backi Monostor, a deer capitalac was killed in 1946 and estimated with 248,55 CIC points, being the world champion until 1968, and until 1970 it shared the first place in this class of trophies in the world. The beginning of hunting tourism in our country is associated with the very hunting ground of Gornje Podunavlje. According to the newspaper “Lovac”, number 5, in 1952, at the beginning of September that year, the hunting grounds of Apatin and Bezdan (now within SNR “Gornje Podunavlje”) were visited by nine Swiss hunters who shot 11 deer, whose 9 trophies were in medals (2 silver and 7 bronze). The shot deer and the organisation of hunting was charged with 11,400 RSD. After that, hunting tourism has intensely developed in this area, reaching its peak immediately before the disintegration of Yugoslavia (in 1990).

In the last decade of XX century there has been a sudden fall in traffic of hunting tourism, which was a consequence of war, sanctions by the international community and general industrial breakdown in the country. A gradual recovery of hunting tourism in this region (as well as in the whole Serbia) started in the first decade of this century. Besides certain positive shifts the level reached is not even nearly close to that from so called “golden age” of hunting tourism (period

⁹Prentović Risto (2008): *Etika lovnog turizma*, Faculty of Sciences, Novi Sad, p 198

¹⁰This is discussed in more detail in: Prentović Risto (2005), *Lovni turizam*, Faculty of Sciences, Novi Sad, p 204.

1980-1990). Nevertheless, today hunting tourism destination of Bačka Gornje Podunavlje represents the most perspective hunting ground in Serbia and it can be compared to the prestigious hunting tourism destinations both in the immediate and in wide environment. Hunting grounds in Gornje Podunavlje are: “Kozara”, Backi Monostor” and “Apatinski rit” which are managed by Lumber Camp Sombor, as well as “Zapadna Backa”, Sombor and “Kruskovac”, Apatin, which are managed by hunting association from Sombor and Apatin¹¹. In addition there are also two more hunting grounds in fishponds (Svilojevo and Kolut), but they are not used for tourist hunting.

Hunting ground “Kozara”, Backi Monostor

Hunting ground “Kozara” is located in the area between the river Danube and its old offshoots. It occupies the area from 1,407 km to 1,432 km of the Danube. Vegetation of the hunting ground includes: water vegetation, marshy meadows, meadows and pasture flora communities and forest communities (the communities of marshy, soft and hard forests).

In tourism hunting there are the main cultivated species of game: deer and wild boar. Lodging for tourists is provided in a luxury hunting lodge “Strbac”. Among hunting services there are: individual and group hunting, hunting 'pogonom' and hunting with the use of carriage. Hunting ground is enclosed and it occupies 11,764 ha.

Hunting ground “Apatinski rit”, Apatin

Hunting ground “Apatinski rit” is like the hunting ground “Kozara” located beside the left river bank of the Danube, and occupies the area from 1,367 to 1,400 km of the Danube river. The vegetation of the hunting ground includes: water vegetation, marshy meadows, meadow and pasture flora as well as forest communities. What is also offered for tourist hunting in this hunting ground includes the main cultivated game species namely deer and wild boar. Lodging for the tourists is provided in the luxury lodge „Mesarske livade“. This hunting ground offers the same hunting services as in the hunting ground „Kozara“. This hunting ground is enclosed and occupies 6,579 ha.

¹¹Conditions until the reorganisation of the hunting areas and hunting grounds which has been recently made, but the users of the hunting ground still have not issued management planning documents.

Hunting ground “Zapadna Backa”, Sombor

The hunting ground “Zapadna Backa” is located in the territory of the Sombor City, away from populated places and the area which belongs to the Special Nature Reserve “Gornje Podunavlje”. The vegetation in the hunting ground includes mostly agricultural crops, meadow flora that is original vegetation and other. Tourist offer is complementary to the mentioned hunting grounds and includes: roe deer, hare, pheasant, the grey partridge, quail, turtledove, collared dove and wood pigeon. Lodging for the tourist hunters is possible in the hotel “Internacion” in Sombor or in domestic accomodation in rural areas which are close to the hunting area of this ground. In addition to individual roe deer hunting, all standard methods of hunting small game are offered. The hunting ground is open and occupies the area of 112,781 ha.

Hunting ground “Kruskovac”, Apatin

Hunting ground “Kruskovac” is located in the territory of the municipality of Sombor, away from the populated places and the region which belongs to Special Nature Reserve “Gornje Podunavlje”. Vegetation of the hunting ground mostly consists of agricultural crops, and on the non-cultivated land there are grasses, bushes and rare groves. Tourist offer of the game is similar to the one in the hunting ground “Zapadna Backa”, adding mallard. Lodging for the tourist hunters is possible in the accomodation of the Spa Junakovic in the pansion of the catering object “Palas” in Apatin and in domestic accomodation in rural areas within the hunting ground and here are offered the same methods for hunting as in the hunting ground “Zapadna Backa”. The hunting ground is open and occupies 28,812 ha. Table 2 shows the offer of game for commercial shooting in the hunting grounds of Gornje Podunavlje.

Hunting tourism destination Gornje Podunavlje is characterised not only by various species of wildlife attractive for hunting, but also by predators (fox, shakal) which are also species interesting for hunting. However, according to the results shown in Table 2, some of the species interesting for hunting are not (the grey partridge¹², predators), and some are not enough (roe deer and birds in the

¹²In recent decades the grey partridge is seriously endangered in all hunting grounds in Voivodina, and in Gornje Podunavlje as well. The main reason for this is habitat disappearance and intensive use of mechanisation and chemisation in agricultural production. For that reason, this attractive hunting species has not been hunted for about the last twenty years, but in the hunting grounds of Gornje Podunavlje it is cultivated and protected, in order to avoid its total depopulation.

enclosed hunting grounds¹³) present in the tourist hunting offer in the hunting grounds of Gornje Podunavlje.

Generally speaking, according to the estimation of the competent, birds are not present enough in the offer for commercial shooting in so called open hunting grounds (“Zapadna Backa” and “Kruskovac”), and conditions for a wider tourist offer exist. This is especially the case when the pheasant is concerned, as for the pheasant there are suitable conditions within artificial production.

Table 2. Offer of the game for commercial (tourist) shooting in the hunting grounds of Gornje Podunavlje

Ord. Numb.	Hunt-ing ground	Species of game – , head								
		Deer	Roe deer	Wild boar	Hare	Pheasant	Quail	Turtledove, collared dove, pigeons	Wild geese	Divlje patke
1.	“Apatinski rit”	45	-	130	-	-	-	-	-	-
2.	“Kozara”	150	-	210	-	-	-	-	-	-
3.	“Kruskovac”	-	32	5	175	505	3.000	1.273	-	300
4.	“Zapadna Backa”	-	50	-	200	500	1.000	2.000	-	-
Total		195	82	345	375	1.005	4.000	3.373	-	300

Sources: Documentation of the users of the hunting ground

A little less offer than the possibilities are is in the case of tourist offer of the hare, whose populations have been endangered in recent years (because of unfavourable weather conditions and overpopulation of jackals). In the last 10 years, what is also less is the tourist offer of the deer in the enclosed hunting grounds. The main reason for that is the perennial pathogen impact of a fluke, which had a huge effect on the reducing of the quantity and quality of the most attractive game in the region of Gornje Podunavlje¹⁴.

¹³In the enclosed hunting grounds „Apatinski rit“ and „Kozara“, the roe deer, which hardly tolerates boundaries, is grown as a secondary species, but is not offered for commercial shooting, because, according to the authorities from the orders of users of these hunting grounds, it is not attractive for hunting because of its lower trophy value than the one from the open hunting grounds. As far as the absence of bird species from the tourist offer is concerned (especially waterfowl), it is rather problematic to decide, and the most probable reasons for the dilemma about it are insufficient lodging capacity on the one hand, and on the other hand, the orientation of the management of these hunting grounds towards the most profitable species of large game (deer and wild boar).

¹⁴This is along with other topics discussed in: Delić Jadranka and Prentović Risto(2012): *Lovni turizam i zaštita prirode u Specijalnom rezervatu prirode “Gornje Podunavlje”*, The Proceedings from the international scientific conference of hunting and tourist hunting in Žagubica, the Organiser of the conference Department of Geography,

Lodging capacities are sufficient and good quality only in the hunting grounds “Apatinski rit” and “Kozara” and they correspond in the hunting seasons with the total offer that is to say potential number of tourist hunters. Furthermore, In the periods of closed season for the deer there is the evidence of unused capacity in the hunting lodges “Mesarske livade” and “Kozara”, so they can be offered to tourists of other interests (before all ecotourism etc.), but also to the tourist hunters who can hunt other game within that period, for which there is the hunting season during that period (e.g. trophy roe deer hunting in spring, birds in summer, etc.) in the neighbouring hunting grounds. This advantage should be seriously taken into account when making yearly plans for hunting management and booking accommodation. The more this is so, as other two users of the hunting grounds from this area do not have any more suitable accommodation capacities. Although there are above mentioned disadvantages that is to say the unused potential, the fact is that the current tourist hunting offer in the attractive hunting areas, with its communication availability and with possibility for supplementation of this offer with complementary tourist values (about which there is the text below) enables satisfying the affinity of various categories of tourist hunters. This is of course possible within the limits of nowadays tourist hunting resources. Quality and quantity of tourist hunting services can be significantly increased, and it will lead to the increased profit as well, by the means of integration that is more intensive correlation with the total economic and social resources of this region, and especially with other special modes of tourism (before all with the potentials of rural, cultural, eco, spa, nautical, etc. tourism).

Potentials of the rural tourism

Rural regions are attractive for the tourists who prefer activities such as: taking part in the agricultural work, recreation and rest in the nature, educational programmes in the nature, participating in the cultural offer of the village, events with eco, ethno, gastro and other content, etc.) All these and other activities of the tourists in the rural areas are considered as *rural tourism*.¹⁵

Tourism and Catering at the Faculty of Sciences, Novi Sad and Hunting Association “Jovan Šerbanović”, Žagubica, pp 130-143.

¹⁵This is discussed in detail in *Turizam i održivi razvoj*, by Stojanović Vladimir et al. (2011): Faculty of Sciences, Novi Sad, p 260; Todorović Marina and Štetić Snežana (2009): *Ruralni turizam*, Faculty of Geography at the Belgrade University, Belgrade, p 159; Lazić et al. op.cit. p 103; Cvijanović Drago et al. (2011): “*Stanje i perspektive razvoja ruralnog turizma u Republici Srbiji*“, theme proceedings „Mediteranki dani

According to the facts from the tourist organisations of the city of Sombor and the municipality of Apatin, it is evident that the organised rural tourism has not begun to live yet, though this destination has got significant potentials including farms¹⁶, ethno houses¹⁷, workshops of the old trades¹⁸, etc. The Sombor Tourist organisation has recently undertaken activity for enlivening the rural tourism. It has demanded certain funds from the city authorities for the subvention of the farm owners and houses for tourist accomodation. According to the statements of this tourist organisation, the funds have been approved. In addition, this organisation has established precise evidence about the contents (objects, events, etc.) which are significant for rural, ethno, eco and cultural tourism, which is not the case with the authorities responsible for tourism in the municipality of Apatin. The researches by Prentovic et al.¹⁹ point out a high correlation between hunting and rural tourism. It is based on the fact that hunting regions (hunting grounds) are completely located in the rural areas; so for catering the clients for both kinds of tourism the region can offer catering objects with services for both hunting tourists and for rural tourists. Interconnectedness between these two types of tourism is also reflected in the domain of tourist demand in such a way that one significant number of hunting tourists prefer to have a sojourn with other individuals (members of family, business partners, business escort) who are not hunting fans, but they are interested in visiting new and unknown areas and getting new experiences and knowledge. Closely connected to rural tourism, and for the purpose of rural development there is also **cultural tourism** (within which there are also ethno-facilities, mentioned above earlier). There are numerous cultural facilities (cultural-historical objects, artworks, events, etc.) in Gornje Podunavlje which represent potential motives for tourist movements, and they can all be categorised into: archeological sites, monuments and pieces of art, spacial cultural-historical units, memorable places, folk heritage, cultural events and cultural institutions²⁰. These facilities potentially represent significant

Trebinje 2011 Turizam i ruralni razvoj-savremene tendencije, problemi i mogućnosti razvoja“, VI international scientific conference, 07-08 October 2011, Trebinje, pp 11-21.

¹⁶These are primarily Dida Hornjakov Farm and Art Farm „Višinka“ on the territory of the city of Sombor.

¹⁷Ethno-houses: „Jelena“-Bezdan, „Mali Bodrog“-Bački Monoštor, „Kuveljić“-Bački Monoštor, ethno-house of the family Rajčanji in Čonoplja, ethno-house of the Varga family in Telečka village and others.

¹⁸Numerous workshops of old trades are presented on the website of the Sombor tourist organisation - http://www.visitsombor.org/rs/ponuda/stari_zanati/

¹⁹Prentović Risto (2008):*Korelacija lovnog i ruralnog turizma u Vojvodini*, Proceedings of the Department of Geography, Tourism and Catering, Faculty of Sciences, Novi Sad, pp 110-121

²⁰More detailed presentation of cultural goods in Gornje Podunavlje is given in: Prentović Risto, Golubović Vidoje, Kovačević Milutin (2012): *Correlation Between*

complementary tourist values for a lot of visitors of this region, and also for those who prefer ethno, eco and other facilities that is activities in rural areas. Thus, for example, the studies of Prentovic, Golubovic and Kovacevic which have been presented in the work mentioned showed that one statistically important part of tourists that is individuals accompanying them who visit the hunting grounds of Gornje Podunavlje also prefer cultural facilities of this region.

Rural regions, such as Gornje Podunavlje, is characterised by the activities which move fans of **ecotourism** into action²¹. This type of tourism is, by the rule, taking place in “ecologically the most sensitive areas”²², and is based on the protection of the environment and all its potentials. That Gornje Podunavlje is ecologically sensitive area is showed by the fact that a part of its territory is declared protected, that is Special Nature Reserve. This Special Nature Reserve is one of 121 protected areas in the Autonomous Province of Voivodina and is one of 25 which have been estimated to have potential for constituting a tourist destination or ecotourism locality²³. In addition to that, in a small number of special nature reserves in Voivodina including Gornje Podunavlje, their potential for the purpose of ecotourism is only partially used²⁴. Basic activities of ecotourism in nowadays special nature reserves, including Gornje Podunavlje, are “birdwatching, sailing, nature research and volunteer camps. Potential is of far wider range and it should be based on the movements of the objects and institutions of the visitors' centers”²⁵.

Though ecotourism in Gornje Podunavlje has not achieved some significant results, the competent estimate that it has some chances for development. This is of course under the condition that ecotourism is integrated not only in the

Hunting and Cultural Tourism in Bačka Upper Danube Basin, Proceedings from the international scientific congress on the topic of Danube Strategy-Strategic Significance for Serbia, Institute of International Politics and Economics, Belgrade, pp 304-320.

²¹Ecotourism is discussed in more detail in: Stojanović Vladimir(2011): *Turizam I održivi razvoj*, Faculty of Sciences, p 260.

²²Stojanović Vladimir(2011), op.cit.

²³Constatation of the study as a result of the scientific project which was realised by the project team of the department of Geography, Tourism and Catering at the Faculty of Sciences in Novi Sad and which was ordered in 2010 by Provincial Secretariat for Environmental Protection and Sustainable Development of Autonomous Province of Voivodina.

²⁴Provincial Secretariat for Urbanism, okrajinski sekretarijat za urbanizam, building and environment protection (2011): *Životna sredina u Autonomnoj Pokrajini Vojvodini*, Novi Sad, page 368.

²⁵The same source, op.cit.

activities for nature protection, but also in all industries, especially touristic ones, and within rural tourism. In this region, ecotourism can establish special correlative connections with hunting and especially with tourist hunting. It would be particularly visible in the domain of visitor centres development, observing and recording the wildlife, as well as growing and protection of wildlife. Natural-geographic conditions of the region of Gornje Podunavlje offer favourable conditions for three more special forms of tourism: nautical, fishing and spa tourism. These forms of tourism are potentially in correlation with various industries, as well as with other special forms of tourism, and particularly with rural and hunting tourism. A common feature of these special forms of tourism is that water is a necessary factor for their functioning.

The Danube river, which represents natural western boundary of Gornje Podunavlje, is sailable throughout its part which tangents this region and as such it is the backbone of the traffic in the Pan-European Corridor 7. It is also the backbone of the **nautical tourism** (tourism on water), which represents a significant potential for the development of certain regions, including Gornje Podunavlje. In this region, as is generally the case in Europe, the river traffic is “hardly ever used as a means of transport of tourists for a holiday, but has primarily recreational, entertaining and similar character and is often used for organising group ship excursions and other similar travels²⁶. Aside from official port docks in recent time the centers of nautical tourism are becoming special docks – marines, with specific dock objects and winter resorts. Means of navigation in the function of river nautical tourism are: “yachts, scooters and many other types of motorboats or sailing boats that is their combinations, and also special smaller sport boats, e.g. powerboat, etc²⁷.

Recent building of the international marine in Apatin is the beginning of nautical tourism development in the region of Gornje Podunavlje and which includes: sailing by larger or smaller means of navigation along the Danube, its tributaries and canal network, sports and recreational activities on water, events (sporting, cultural and other), sport fishing, complementary tourist values (various natural and cultural heritage) and specialized gastronomical offer of the coastal area (e.g. Fish taverns, restaurants, etc.)²⁸ Although nautical tourism is still at the embryo stage, it has its perspective in the region of Gornje Podunavlje, and particularly in correlation that is to say integration with other industries, rural and other

²⁶Lazić Lazar and Košić Kristina (2007): Turistička geografija, Faculty of Sciences, Novi Sad, p 127.

²⁷Lazić Lazar and Košić Kristina (2007) op.cit.

²⁸Brzak Marija (2012): Mogućnosti za razvoj nautičkog turizma u opštini Apatin (graduation paper), Faculty of Sciences, Novi Sad, p 108.

forms of tourism, including hunting tourism (where in excursions by suitable means of navigation, fans of hunting, nature and wildlife can also visit those hunting areas which are often inaccessible through land communication). What has similar potential correlation with nautical tourism, and in the function of rural development of Gornje Podunavlje is **fishing tourism**. This is because the Danube and its tributaries, like mentioned above “are extremely rich with various kinds of fish - catfish, carp, perch, strelac and small fish”²⁹, so the richness of this region with fish fauna is “the basis for development of the sporting fishing and related tourist activities.”³⁰ In that context there has been a famous traditional event (since 1963) called “Apatinske ribarske večeri” (Apatin fishing nights) with the competitive activities (“Zlatna ribica” the words meaning golden fish) and cuisine activities (“Zlatni kotlić” meaning golden pot) of international character.

The sources of thermomineral water (streamed from the first artesian well in 1913), which has various possibilities for balneotherapy, is situated in the municipality of Apatin immediately near Prigrevica settlement. In 1929, there has been established a spa healing center which was later renovated (in 1976, 1983 and 2000), so that after several decades this rehabilitation and recreation center would become internationally well-known and as such, one of the most reputable destinations of **spa tourism** in Voivodina³¹. Its healing-therapeutic, sports and recreational and receptive (68 double bed rooms B category, a number of apartments, restaurant facilities, etc.) capacities and conference room which can be used for education, represent significant complementary values for other special forms of tourism including hunting tourism. These facilities therefore represent potentially significant factor of the rural development in the region of Gornje Podunavlje.

Conclusion

Gornje Podunavlje, as a predominantly rural area, has respectable natural-geographic, communicational, anthropogenic and other resources for further economic and total development. The character of these resources offers especially favourable conditions for intensive rural development. The main assumption is correlation, integration and harmonising the current and potential

²⁹Tomić Pavle (1994): *Privreda* in: Bogdanović Živan, Municipality of Apatin, Faculty of Sciences pp 118-173.

³⁰Tomić Pavle, op. cit.

³¹This is discussed in more detail in: Laškov I. Miroslava (1982): *Banjski turizam SAP Vojvodine*, Faculty of Sciences, Novi Sad, p 190 and Assembly of AP Voivodina (2005): *Banje Vojvodine*, Novi Sad, p 244.

forms of tourism, among each other and with other industries and other activities. In that respect, among others, hunting tourism has significant potentials. In addition to the significant (above the average compared to others in the Republic and Autonomous Province of Voivodina) results which are achieved in hunting tourism of this region, the total available potentials are not used enough in the sense of: Integrated market promotion by the users of the hunting grounds and offerers of tourist hunting services for the purpose of more complete tourist hunting product; Correlation between the hunting and other special forms of tourism (rural, eco, cultural, spa, nautical, etc.) has not been realised enough ; and The correlation between hunting tourism and tourism in general with relevant industries (agricultural, forestry, waterpower engineering, food industry, traffic, etc.) has not been realised enough either. In order to intensify rural development in the region of Gornje Podunavlje it is necessary: that local government of the city of Sombor and municipality of Apatin with their tourist organisations, with the help of authorities and organisations at the level of Autonomous Province and the Republic, take certain in other words effective measures for the improvement of communal and traffic infrastructure, as well as tourist surastructure and in that way to create favourable conditions for successful tourist industry in this region, and in that way also for further development of hunting tourism; as hunting tourism itself cannot function successfully without the stronghold of complete industry and other activities in the region (in this case Gornje Podunavlje), to realise through authorities of local communities and tourist organisations, the stronger correlation and integration of all relevant subjects of this destination on projecting, planning, operationalisation and promotion of complete tourist product in which the tourist hunting product would make a fundamental correlative link and framework and in that way represent recognisable brand of this region; realising these assumptions, the tourist hunting destination Gornje Podunavlje will represent, far more than so far, the most productive region of the hunting tourism in our country, for which *condition sine qua non* various kinds of game and attractive hunting areas. These are all the conditions for turning the hunting tourism in this region into one of the important factors of its rural development. Ultimately, it will enable realisation of significant income, and therefore also opening of the new working places and employment.

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PROSPECTS FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT OF UKRAINE

Ruslana Mamchur¹

Abstract

Unfortunately, the main problems facing the world at the beginning of 2012, remained unresolved. Among them are the decrease in global economic growth and employment, high levels of government debt in some countries and the need to reorient the national economy of others from external to internal growth sources, the vulnerability of the financial system. Among the new challenges requiring greater attention from the international community, should be highlighted the complications caused by protectionism and nationalism to multilateral cooperation and economic integration, and increased competition for the most important natural resources (especially energy, food and water). In the current context of the global financial crisis, donor countries and international organizations progressively reduce the cost of solving the traditional problems of global development, such as pollution and poverty. The increase in threats in corresponding areas may eventually have extremely dangerous consequences for the entire world community. Feature of economic and social development of Ukraine today is a high degree of impact of global instability on domestic economic processes. Analysis assumptions and patterns of development risks in Ukraine that led to the recent economic crisis provides grounds for concluding that achieving real sustainability of the national anti-crisis economy is possible only on the basis of a consistent reform of key areas of economic and social life.

Key words: *socio-economic development, economic growth, global economy*

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Introduction

In order to ensure stable social and economic development, Ukraine has to enhance searching for internal reserves, to accelerate the modernization of production and increase its competitiveness; it is necessary to accelerate structural reforms in the national economy and at the same time to answer the new challenges generated by the global economic crisis. The nearest period will be a significant challenge for Ukraine, an important test of reform and development policies.

The situation in Ukraine's economy requires active modernization of real economy, energy saving technology, growth of productivity; strengthen in the competitive position of domestic producers through the introduction of investment and innovative development model.

An important course of modernization of Ukraine's economy real sector is reforming agricultural production towards support for agricultural production, the formation of the legislative framework for the introduction of market circulation of agricultural land, and land cadastre developing.

The research has mainly theoretical character. The methods that were used are characteristic of economic and legal sciences. The given research is based on general scientific methodology. During the process of research there were used system analysis and synthesis, monographic, abstract, logical, economically-mathematic, and computational methods of scientific research.

In the first part of the paper was investigated the main problems and prospects for the economic development of countries, despite the fact that the feature of economic and social development of Ukraine today is a high degree of impact of global instability on domestic economic processes. Later in the article were researched prospects for economic development of Ukraine, in particular, the basic path of economic reforms taking place now in Ukraine. In view of the fact that Ukraine is an agricultural country considerable attention in the article is paid to the development of agriculture in Ukraine, analyzed the dynamics of agricultural production for 2008-2012, identified reasons for the fall in output in 2012 and the ways of reforming Ukraine's agriculture.

The main problems and prospects of global economic development

Experts estimate that global economic growth in 2012 was lower than it was previously projected, and the risks assessed at the end of the year were higher than at the end of 2011 and at the first quarter of 2012. One of the main reasons for this phenomenon was more extensive than it was expected decline in world trade.

The weakness of financial institutions and state policies of individual countries aimed at curbing lending activity in order to remain inflation at a safe level became the factors that did not allow to realize the inner potential growth in full. According to forecasts of the World Bank, they are expected rather unfavorable indicators in the global economy in 2013: total world GDP growth by 2.4 %, in Euro zone it is expected a decline by 0.1%, in the United States of America - an increase by 1.9%.

The main problems of global economic development, the Euro zone crisis settling and restoring sustainable growth of the U.S. economy, were not fully solved in 2012. Whereas at the beginning of the year there was a higher economic activity than it was expected in the U.S., starting with the second quarter it took place growth retardation, and dynamics of the labor market and consumption did not leave the hope of improvement. Unsettled problems of the U.S. public debt remain a significant limiting factor for sustainable economic growth.

Euro zone crisis has not only stopped, but moved from the periphery to the center, covering Italy, Spain, undermining attitudes of France and even Germany. The plans for the creation of a fiscal union are not fully realized. There still remain doubts concerning the ability of the European Central Bank and the European Stabilization Mechanism (EFSF/ESM) to overcome the Euro zone financial problems in the case of the worst scenario.

Against the background of intensified economic problems, there gathered pace political conflicts between the individual EU members. Imperfection of coordination decision procedure and control over their execution significantly complicates important economic reforms in the EU. Still remain some controversy concerning the future of the Euro zone and of the EU as a whole, which include, in particular, the prospect of their collapse. The conservative government of Great Britain announced the ability to hold a referendum on staying in the EU.

Impossibility of economic growth external stimuli use has forced several countries to fall back on the use of protectionist measures to protect the domestic market. Thus, while state procurement more and more countries favored their domestic products, even if they were higher in price than their foreign analogues.

Among the undesirable tendencies' there should also be mentioned increasing imbalances in the global economy, particularly in terms of growth large amounts of public debt by some countries and getting significant surplus of external accounts by others, as well as increase of their foreign exchange.

The last ones (China, Germany, Netherlands, Switzerland) are increasingly criticized by the international community, as their contribution to overcoming the global economic crisis should become refocusing from the external to the internal market and the corresponding expansion of domestic demand.

During 2012 the unemployment level (especially among youth) continued to increase in many countries. This together with the intentions of governments of several European countries to carry out reforms in some areas aimed at reducing public spending led to increased protests. In particular, demonstrations and strikes took place in such countries as Greece, Spain, Italy, Portugal, Germany, Belgium, United Kingdom, Romania, and Bulgaria throughout the year.

It is natural that in 2012 there was a decline in economic growth in developing countries. In terms of significant drop in external demand and efforts of national governments to keep the financial system under the control, these countries failed to ensure effective policy aimed at maintaining high rates of growth from domestic sources.

In particular, in China it was decided to stick to a tight monetary policy to prevent the formation of "bubbles" in the real estate market. The similar policy of deterrence the interest rates and lending for the sake of maintaining the safe level of inflation was used in India and Brazil in 2012. All these together with a decrease in foreign business activity did not contribute to the development of the domestic market.

According to experts, an optimistic outlook for 2013 foresees a slight increase in the global economy, the rate of which will be lower than it

was previously considered. However, in the absence of the effect of the measures applied by the governing bodies of EU and the U.S. to improve the situation in the financial sector, the recession may deepen [1].

Features of economic development of Ukraine

The peculiarity of economic and social development of Ukraine today is a high degree of global instability impact on domestic economic processes. Analysis of assumptions and patterns of risk development in Ukraine, led to the recent economic crisis, provides grounds for concluding that achieving real sustainability of the national anti-crisis economy is possible only on the basis of a consistent reform of economic and social life key areas.

The policy of modernization, still focused on institutional changes and preparing legal framework for necessary reforms, must be focused on more drastic structural changes now. Export orientation and low technology increasingly allow failures due to the instability of traditional foreign markets.

We need new fillips for domestic reinvestment of industries with high added value, active implementation of import substitution policy, changes in the structure of export for the benefit of products with high refining and application of new technology solutions. Economic reforms have to lay the foundations of a new national economic development model that meets the peculiarities of post-crisis world competitive challenges.

Continuing and deepening of global recession causes significant risks to Ukraine as an export-oriented country with an open economy. World low investment activity and still not attractive domestic investment climate do not allow relying on overcoming the problems in the financial sector of Ukraine using foreign investment.

Besides, in terms of a high level of uncertainty in the global economic system there may occur complications in the field of international cooperation of Ukraine, including the context of improving the efficiency of interaction with regional interstate entities.

Ukraine started phased modernization of the real economy. It has accelerated the technological upgrade of basic industries. It is actively implemented the policy of diversification of energy supply and energy

efficiency. Ukraine has greatly reduced dependency on gas imports, created preconditions for increasing the volume of domestic energy resource production, including unconventional ones. It was started active work towards reforming transport infrastructure, including rail and air transport, development of economic complex.

Sales tax reform contributed to the simplification of administrative procedures for taxpayers. It is consistently reducing the tax burden on business. They are reduced income tax rates, expand the practice of automatic reimbursement of value added tax and improve the simplified system of taxation, accounting and reporting for small businesses.

Ukraine ranked the sixth place among the countries of Europe and Central Asia for the greatest improves of the tax system over the last year. The International experts of the World Bank and the International Finance Corporation highly appreciated the introduction of electronic data reporting and tax for medium and large enterprises into Ukraine's tax system. Thus, earlier there used to be 135 tax payments and fees for the average enterprise for servicing of which there were spent 657 hours per year; as of June 1, 2012 the number of payments dropped to 28, and the cost of time - down to 491 hours per year.

Using public funding and promotion of specific economic programs and projects, it is necessary to support domestic producers, to help exporters to implement the policy of import substitution. In terms of crisis and demand reduction, it is essential to accelerate the process of production assets renewal, to stimulate technological innovation and the introduction of energy saving technologies. This is the only way to increase the competitiveness of the domestic economy.

Specific approaches and orientations of restoring dynamic growth policy are provided by the program of economic development enhance. In its basis is the revival of the real economy through the implementation of import substitution policies, promotion of high-tech industries, creating new workplaces.

In 2012, the economic dynamics in Ukraine slowed down under the influence of the world economic depression. In the first and second quarters the GDP growth was 2.2% and 3% respectively, when compared to the corresponding quarters of 2011, the third and the fourth quarters showed the opposite result - the decline in real GDP by 1.3% and 2.5%

respectively, when compared to the corresponding period in 2011. As a result, annual growth was only 0.2% compared to 5.2% of GDP in 2011 [2].

Economic growth in 2011 was provided primarily by industrial sectors. In 2012 the situation changed - GDP growth was formed primarily by the sectors of transport and trade, due to the preparation and holding of Euro 2012, as well as to meeting the population's growing effective demand.

The negative contribution was made by agriculture, manufacturing, building and financial activities. In the first quarter, the main economic growth engines were trade and transport. Accelerating in the second quarter was achieved primarily by development of agriculture, real estate transactions and trade.

In 2012, a marked slowdown in economic growth was accompanied by a significant decrease in the dynamics of investment. According to the 2012 results, there were invested only 8.3% more of capital investment than in 2011. Thus, the share of gross capital formation in GDP remains very small. In 2012 it was 18.8%. Such GDP distribution to the advantage of consumption creates a threat to the future of expanded economic reproduction and reform implementation.

Unfavorable external economic environment was one of the main factors that held back the economic growth in Ukraine. Slower export industries are reflected in the development of the real sector of the economy.

Increased risks of the "second wave" of global financial and economic crisis, expectation of deterioration in world market conjunction necessitate recognition among the basic priorities of socio-economic development of Ukraine for the period of 2013-2014, focusing on strengthening the competitiveness of regions (including by using the potential of the internal improvement of the country, strengthening the capacity of regional markets, increasing the solvency of local entities, public power capacity at the local level) while preserving the benefits of openness of the national economy. The aforesaid requires the mobilization of local resources development, optimization of processes of their use on the basis of coordination of economic interests and joint efforts of regions, state, business and public.

The growth potential of Ukrainian leading regions' economy based on expectations of favorable external conditions for products with low added value is largely depleted today. Further extensive growth of regional production, economic development on the basis of raw export orientation without deep structural and innovative developments will face in the nearest future the risks and threats, the impact of which on regional development will steadily worsen and can cause:

- further decline in production value in key sectors of regional economies (especially it concerns those regions the industrial complexes of which are deeply integrated into the global economy);
- deepening disproportionate socio-economic development and increase the number of struggling areas;
- loss of investment incentives of economic entities, deterioration of the investment climate in the region, the outflow of capital from productive sectors into trade sector, agency and financing operations;
- spreading the desire of local manufacturers to restrict foreign competition on local markets, increasing tendencies of "economic isolation" of regions;
- acceleration of processes of redeployment of local resources in favor of local administrative centers of regions that exacerbate risks of peripheral areas decline.

Features of social development of Ukraine

The year 2012 clearly demonstrated the inconsistency and variability of the modern world. Uncertain trends in the global economic recovery after the severe crisis of 2008-2009 were changed by the worsening of crisis manifestations in the leading countries of the world, and above all - on the European subcontinent. Economic problems are usually accompanied by increased levels of social tensions; and aspirations of the world countries to find optimal anti-crisis measures form complicated political tendencies.

The basis of the current Ukrainian reforms became the economic reform program for 2010-2014 "Prosperous Society, Competitive Economy, Effective State", built in view of the declared Ukraine's European orientation and goals to achieve economic stability and development [3].

The program set goal - to achieve structural modernization of the economy by solving a number of problems, in particular, by creating climate favorable for entrepreneurship and business initiatives, stabilization of public finances and formation of a stable financial system,

upgrading infrastructure and reforming housing and utilities infrastructure, improving energy security, import substitution and development of the internal market, establishment of a land market.

The success of these reforms is the key to achieving national competitiveness, providing sustainable economic growth, first of all, by increasing the efficiency and sustainability of social protection, improving the quality and accessibility of education and health care. The priority of Ukraine's Social Policy is to support families with children. Today, a large number of families experience the negative impact of the financial crisis. Most Ukrainians have limited ability to give their children high-quality education, to provide complete physical and creative development. The state support for such families should be significantly increased.

Analysis of agriculture development of Ukraine

Absolutely negative dynamics in 2012 showed agriculture. During January -June the sector had stable positive indices, but since July the situation deteriorated. In general for 2012 production declined by 4.2%. The decline in crop production was in particular connected with adverse weather conditions in winter- spring period, influenced the decrease in the yield of major crops [4]. As a result, in 2012 there were gathered 18.4 % less grains and legumes. The positive for agriculture tendency is gradual increase in livestock production, which increased by 3.9% in 2012 [5].

Table 1. *Agricultural production in Ukraine, million euros*

Index	Years				
	2008	2009	2010	2011	2012
Agricultural products	18493,9	18159,3	17879,5	21431,8	20537,1
Plant products	12502,5	11918,2	11427,0	14902,4	13691,1
Cereals	5051,4	4506,6	3819,5	5549,8	4532,8
Industrial crops	3051,3	2734,9	3030,4	3811,9	3718,7
Potatoes, vegetables and melons	3352,4	3576,7	3485,9	4304,3	4256,5
Other Products	1047,4	1100,0	1091,1	1236,5	1183,2
Livestock products	5989,6	6241,1	6452,5	6537,6	6791,0
Cattle and poultry	2452,6	2650,7	2865,8	2902,4	3063,3
Milk	2654,9	2659,3	2617,7	2582,7	2652,2
Other Products	882,1	931,0	969,0	1052,5	1075,4

Source: *calculated by the author according to the State Statistics Service of Ukraine*

An important area of modernization became agriculture reforming. It continues the preparation of a new legislative framework for the introduction of market circulation of agricultural land. In the basis of these legislative initiatives is the need to create new stimuli for investment into the development of domestic agriculture and at the same time to protect ultimately the interests and property rights of country people – the land owners. Special attention is given to investment into human capital. They are implemented the new health care system, updated technology and information base of Ukrainian education.

In 2012 there were made several significant reformation steps in agricultural sector. In order to create transparent mechanisms of land law they were passed relevant laws, simplified procedure for review and approval of land documents, including shortening down to 10 days of draft terms of land use project concerning granting of land by the executives, which, according to the Land Code of Ukraine make decisions on its approval or rejection; it was regulated the problem of sale of land under the state or municipal ownership or rights to them on land sales by auctions.

It is legally provided separation of state and municipal property. Communal lands will manage local governments. It is found Joint-Stock Company "State land bank." It is assumed that the functioning of the institution will favor access of agricultural producers to credit resources.

They were for the first time introduced government support programs not only for agricultural enterprises, but for farm economies as well. Thus, through the program "State support for the livestock industry" by the Ministry of Agrarian Policy and Food of Ukraine, funds for subsidies to farmers for the maintenance and preservation of young cattle were allocated to regions.

Besides, the state partially compensates: the cost of construction and reconstruction of livestock farms, complexes and enterprises for the production of compound animal feedstuff, the cost of purchased breeding dairy, beef and combined purpose cattle; the interest rate on loans obtained for the construction and rehabilitation of livestock and poultry farms and facilities, purchase of technical equipment and machinery, purchase of livestock and poultry; the cost of purchased equipment and machinery for the production of domestic livestock and poultry.

They were increased the opportunities of agricultural producers crediting, including the introduction of the mechanism of agricultural vouchers, which is new for Ukraine. To enhance the protection of agricultural producers' property interests it was introduced a mechanism of insurance proceeds compensation. They are widely used the mechanisms for advancing agricultural production through forward purchases to the state reserve and the Agrarian Fund.

The development of the agricultural sector is able to make a powerful impact on economic dynamics in Ukraine because of significant prospects for its capitalization and projected long-term increase in demands for major agricultural products in the world markets.

Taking this, the domestic agricultural sector can become the "locomotive" of modernization of the country, able to create a synergistic effect of the country economic development. At the same time, the situation on world food markets is able to form the long-term trend of growth of agricultural product exports from Ukraine excluding the domestic consumption, as well as the dynamic increase of food prices in the domestic market simultaneously with the rise in world prices.

The growth of external demand may cause risks of shortages of certain agricultural products in the internal market of Ukraine, and makes critical the tasks of improving the efficiency of state regulation of agricultural markets and food security insurance, increase of agricultural production on modern innovation and technological bases, and development of the agricultural sector as one which is highly efficient and competitive in the domestic and international markets, creating economic grounding for socio-economic development of the Ukrainian village.

Taking the abovementioned into consideration, the tasks of modernization in the agricultural sector on a mid-term horizon are:

- continuation of forming of legal framework for the creation of an effective mechanism of market turnover of agricultural lands;
- reorganization of state management in agriculture, formation of management staff able to manage agricultural development effectively;
- improving the competitiveness of agricultural products, bringing the level of food consumption to science-based standards;
- acceleration of technical and technological modernization of agriculture;
- creation conditions for the implementation of systems of quality and environmental safety of food;

- increasing the proportion of agricultural enterprises in production of milk, meat and other animal products;
- strengthening the capacity of agricultural producers to the effective functioning in terms of market mechanisms in management;
- developing of infrastructure facilities of the agricultural sector (roads, ports, grain elevators, vegetable and fruit storages, wholesale infrastructure, etc.);
- providing sustainable rural development, development of social infrastructure in rural areas, rural tourism and other business activities which are not related to agricultural production to increase employment and income in rural areas.

As a result of modernization processes it is expected more efficient use of the available resource potential of the agricultural sector to meet the requirements for the protection of soil and sustainable agricultural land use, completing the organizational and economic mechanisms of state regulation of agricultural land market circulation, improving the mechanisms of state support for agricultural production, the further development of cooperation in the countryside, sustainable rural development and the promotion of country people's entrepreneurial initiatives.

Conclusion

Thus, the priorities of the state policy aimed at reforming the agrarian sector of Ukraine shall be as follows:

1. Over the past five years, more than half of the leading countries in a state of financial crisis. Among the external conditions for the development of economy of Ukraine should be the following:
 - the development of the world economy will slow down in economic activity in China, and the effect of a high degree of uncertainty about the prospects for overcoming the crisis in the euro zone and address fiscal and budgetary problems the United States;
 - collapsing foreign companies investment projects given the high risk of non-target profit and the tendency withdrawal of capital from European banks Ukraine curb investment growth;
 - due to the low propensity to invest entities expected slow recovery in global demand and maintaining low metal prices , which in turn inhibit the growth of domestic exports. In addition, the trend continued reduction

of domestic production and imports will increase to a record low current account balance of payments;

- excess liquidity in the global financial system can rely on inflows of direct and portfolio investment in the country, to avoid sharp exchange rate adjustments with a gradual increase flexibility in exchange rate.

Internal conditions:

- total stagnant economy and expensive financial resources do not give reason to expect growth of the loan portfolio of the banking system. Lack of creditworthy borrowers and maintaining stringent conditions for obtaining loans will result in extension of the realizations of investment activity of enterprises;

- depreciation of fixed assets and limitations in the use of modern technology does not allow to predict sudden changes in the structure of domestic exports and a significant improvement in the competitive position in the domestic and foreign markets in the short term;

- slow adaptation of the national economy in higher prices for imported natural gas and not enough intensive processes of energy saving technologies adversely affect this profitability of industrial activities with a high dependence on gas prices;

- the accumulation of both external and domestic debt, along with the inability to pay for them without creating new debt threatening situation in the short and medium term.

Modern multidimensional crisis in Ukraine shows that the depth of the fall of the domestic economy is much higher than similar rates of most countries. This is disparity functioning of the national economy, worsening the long-term systemic contradictions:

- compensations of excess consumer demand sustained negative balance of trade;

- low-tech export dependence on the world market;

- inefficient financial system and rising external debt.

2. Further improvement of efficiency of state regulation of use, protection and restoration of agricultural land, building organizational and economic

levers of state influence on the market circulation of land. For this purpose it is planned:

- to adopt the Law of Ukraine "On transfer of agricultural lands" that defines the legal and economic principles of transfer of agricultural land, focused on protecting the interests of rural population, and establishment of preventive measures to land jobbing;

- to approve the national program of soil fertility protection, providing funds for the compensation measures undertaken by agricultural units to maintain and improve soil fertility, to provide measures for anti-erosion, conservation unproductive land, etc.;

- to accomplish an automated system of state land cadastre;

- to make an inventory of agricultural lands;

- to improve the economic mechanism of regulation of land relations, methods and indicators of normative value of agricultural land in the new methodological basis; to implement automated system of accounting of land tax payers and land lease fees;

- to adopt the Code of proper agricultural practices, adapting the European experience in developing similar regulations to the Ukraine's conditions. The Code should provide the improvement of state control over the implementation of measures for the conservation and restoration of soil fertility, improvement of their ecological state, and sanctions for the deterioration of these indices;

- to organize on a regular basis trainings, seminars and courses for executives and employees of agricultural enterprises, farmers, country people, employees of public administrations to improve their qualification knowledge of agricultural production, changes in the legal framework, system of the sector management, mechanisms of state support, the mastery of the latest scientific and technical developments, etc.

3. Implementation of proven by international practice tools to support the development of commercial agricultural production and improving the competitiveness of agriculture, support of small producers, farmers and cooperative associations. To do this it is necessary:

- to review and simplify the conditions for obtaining by agricultural producers of preferential credit due to reducing the list of required documents and transparency in decision-making;
- to expand credit cooperation systems in rural areas;

- to increase the effectiveness of public support of farm enterprises in order to create favorable conditions for the establishment of their activities, the creation and development of family farms;

- to create conditions for transformation of the largest private farms into business formations to, especially in efficient farms;

- to develop measures for implementation of subsidies and compensation payments for the production of crop and livestock products within the aggregate measures of support agreed with the World Trade Organization;

- to expand the use of domestic agricultural science, primarily through establishing effective cooperation between producers of agricultural products and research institutions for providing the use of adapted to the local conditions of high-quality selective and genetic potential, advanced forms and methods of production, forming the innovation model of agricultural development and agriculture in general.

4. The development of organic production. This area involves the implementation of the following tasks:

- to regulate legislatively the production of organic materials;
- to develop a regulatory framework for the certification of control over the production and circulation of organic agricultural and food products;
- to promote the development and implementation of innovative technologies of organic production;
- to provide training specialists in organic production;
- Establish a system of economic levers and incentives (subsidies for farmers who convert to organic production, and farmers who are already engaged in it).

5. The analysis shows that the specific national economic crisis depend not only influence the world, but also structural imbalances, underdeveloped domestic market, large domestic debt, a low level of scientific, technical and innovation activity. However, in terms of forming an effective anti-crisis policy, aimed at the transformation of the national economy towards its modernization, the use of innovative investment

models using significant internal potential can create a stable economic system of Ukraine.

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ANALYSIS OF ORGANIC AGRICULTURE AND ITS SIGNIFICANCE IN TERMS OF THE ENVIRONMENT PROTECTION IN SERBIA¹

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Abstract

Methods of organic agriculture that are already use in many countries in the world, has shown excellent results in the conservation of soil biodiversity, soil and water purification from pesticides and fertilizers. Biological control of pests, the use of natural substances in disease control, fertilizer use, such as manure and compost to increase soil fertility measures that are in accordance with the requirements of a healthy environment, and measures to allow maintenance of the ecological balance in nature. This paper seeks to address the conditions that are important for organic production and considering the natural resources and new agricultural techniques to reduce pollution by analyzing the controlled production conditions and identify measures for sustainable development of high quality food, protection of ecosystems, as well as maintaining and increasing soil fertility.

Key words: *Natural resources Serbian, sustainable development, organic farming, environmental protection*

Introduction

Agricultural production is based on natural resources, manpower and technical means of production. With the increasing population of the Earth, the natural food resources are scarce and a man is trying to influence them. New knowledge and activities of man, created pesticides,

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fertilizers to increase yields in crop production, machinery for faster and more efficient performance of agricultural practices and irrigation systems for intensive agricultural production.

However, all human activities in addition to the positive impact on increasing agricultural yields have negative consequences from the ecological point of view; such pesticides and fertilizers affect the agro ecosystem, environment and biosphere. Also, mechanized farming affect the soil pressure, which is why less absorbing rainfall, while the remaining water, which flows through the compacted soil carries with it particles of harmful substances and chemicals that pollute the immediate environment. Also irrigated land affected by a hydrothermal and soil conditions, leading to a significant of relating nutrients to the deeper layers and the increase in harmful biological agents.

Like some kind of reaction to environmental degradation, which becomes more pronounced, the deterioration of food quality and consequently a growing threat to human health, has developed an organic agriculture. Concepts „ecological", or "biological, organic agriculture" means the science and practice of systems and ways of performing plant and animal production that are contrary to your usual traditional agriculture. [10]

In Australia, the ecological (organic) agriculture has developed in one popular form named a permaculture. Such form of production takes into consideration the local culture, climate, the local samples and habits, so it offers a basic state on observation of area specific features, soil climate, flora and fauna, insolation and water, and classify them in an unique design, adjusted to specific user or users. The permaculture design is done according to a principle – care for Earth, care for humans, and reinvestments of surpluses, aiming to achieve the previous principles. In the permaculture, a man and his activities turn back to a natural matter circulation, as a part of a cyclic structure in which there is no waste and waste of energy. The permaculture principle bases on observation and application of eco-system organization in accordance with natural courses. By careful design fit and combine the plant cultures, which provide a mutual protection from pests, aiming to feed the population and to protect the agricultural land from degeneration. On the local level, the permaculture application substantially depends on some towns and municipalities management. English towns Bristol, Totnes and Stroud have most accomplished in apply of the permaculture concept. [3]

Under the above mentioned synonyms consider the systems of agricultural production in which dominate ecological principles, brought into possible harmony with ecological requirements, which means that, besides a size and a quality of a desired product, takes care also on long-term effect of the system on natural resources and environment preservation.

The permaculture association in Serbia is just initiating and it has the national WWOOF (World Wide Opportunities on Organic Farms) support, the world organization of volunteers in organic agriculture.

Production of organic products is a great chance for Serbian agriculture given the great natural resources and the fact that over 80 percent of the land in Serbia is not contaminated, which an essential prerequisite for the successful development of organic is farming. When we add to the quality of soil with high humus content, it can be concluded that all the natural conditions for the development and justification of dealing with organic production.

Also, the potential is the presence of large areas of meadows and pastures that are not used in rural areas as a result of decades of continuous decline in the number of livestock in the country. These regions are often avoided because of the underdevelopment of the chemicals and pollution that accompanies development, and the natural communities and habitats preserved. Very strong resistance of indigenous breeds to their growing without major investments in health care and treatment, and in this way obtain special quality animal products for human consumption, which does not contain residues of various antibiotics and pesticides. [1]

In recent years significantly increased interest in organic agriculture, in response the increasing environmental degradation, deterioration in the quality of food and the growing threat to public health of the human population.

Organic farming as a system takes into account environmental, economic and social aspects of agriculture at the local, national and global level. Therefore, the goal of organic agriculture is producing sufficient quantities of high - quality food to the rational use of natural resources and the environment.

One of the important aspects of organic farming is the socio-economic aspect. In fact, this kind of production requires a small investment in terms of products, materials and equipment, and thus the production can be included a large number of small producers. On the other hand, organic products are sold at higher prices that allow a fair income for producers and compensate for reduced yields and increased levels of the organic production method. The inclusion of small producers in organic production positively affecting the security of their existence at the place where they are located, and that affecting to on regional development and to on economy of the country. [11]

Steady growth in demand for organic products in the world suggests that this production method can be very profitable if properly used natural resources, knowledge and production experience.

Results and discussions

Serbia has very favourable natural conditions (soil and climate) for diversified agricultural production (as plant, as well as livestock production), it has experienced producers, top-experts and scientific workers, worldwide recognized selections of various plant products. The favourable climatic and natural conditions hasten the agriculture development. Lowland regions Vojvodina, Pomoravlje, Tamnava, Krusevac and Leskovac field are suitable for mechanized of crop and vegetable production. Mountainous and hilly regions are convenient for development of fruit, viticulture and livestock production. Hilly-mountainous area of Zlatibor, Rudnik, Stara Planina, Kopaonik and Sar Planina are suitable for development of sheep breeding, cattle breeding and forestry.

In the last two decades, in agriculture has been developed a new trend in healthy food production, based on a sustainable development concept. The organic agriculture bases on tradition, and using innovativeness and the results of scientific research, contributes to improvement of the environment and life quality. This production essence is to preserve and protect the eco-system, care for men and production of quality and healthy-safety food, as well as harmonization and proper execution of fertilization, crop rotations and protection of plants and animals with natural preparations.

In the organic production stimulate natural biological processes in which take part microorganisms, flora and fauna. In that way keeps and protects soil fertility and biodiversity, does not pollute land, air and water, while refuses from agricultural production can be used for production of highly valuable products (compost, bio-gas, etc.). [8]

Organic Farming

Scientific basis of organic farming are set 80s, based on research conducted in Europe, Japan and the United States. The primary research categories were : crop production, livestock production, horticultural production, reducing the risk of health and safety, economics and sociology, assessment and the use of basic resources and, management of pasture and woods.

The basis of all primary category represents crop production because of plant production is used to feed livestock and livestock provide organic fertilizer for plant nutrition. The investigations so scientifically developed following the most significant issues crop production and organic farming. For our production requirements of special importance: crop rotation, exchange of energy from conventional to organic farming method, green manure, cover crops, intercropping, use manure, composting, organic matter in the soil and its maintenance and its role in crop production, biological nitrogen fixation, land microbiological studies on pest control, new crops specifically for small farms, genetics and Selection of low pH and limited land fertility, machinery and equipment for organic cropping and small farms and economic and sociological evolution of the system of organic farming. [10]

The above questions are not only important for biological farming system (organic cropping), but can be, in general, relevant to all areas of plant production.

In modern processing plant production area has a special place. In conventional processing system, applicable to heavy machinery and tools, which a large number of walk consume large amounts of energy, and in addition have a negative impact on the physical and other properties of soils. Here, then, are the reasons why it is necessary to review and some changes in the processing of land for major agricultural crops. It is believed that the conventional treatment reduced gradually in order to

find a rational technology. Future solutions in streamlining the traditional treatment system will go towards reducing energy consumption and a smaller proportion to the investment. The concept of sustainable agriculture, tillage will have conservation character (above 30 % of crop residues remains on the soil surface), which will play an important role in preserving fertility and prevent degradation of land as a natural resource. [4]

It should be noted that the success in finding environmentally friendly solutions in the technology of crop production largely depend on environmentally educated people in agriculture and their involvement in the transfer of environmental knowledge and technology in agricultural practices. This is especially important if we consider our great advantage because still preserved and less polluted soil compared to developed Europe. Therefore, it is our opportunity for greater production of high-value and safe food and its export to foreign markets.

Land cultivation

In breaking in the new technologies of land cultivation must take care of conditions in which the technologies will show the best possible efficiency. A main deficiency of traditional land cultivation is insufficient efficiency, due to numerous crossings of machines and generating units (aggregates) over the land, which leads to a structure change. Researches show that optimal soil compaction is directly connected to the cultivation. In past years, a great attention was paid to reduction of cultivation, i.e. decrease of ploughing depth and reduction of number of crossings over the area. The reduced cultivation, unlike the conventional one, has series of advantages, but also imperfections. As the advantages are stated a better control of land erosion, conservation of water and land and a better efficiency of fossil fuels utilization, as non-renewable resource. The imperfections include the reduction of soil temperature during springtime, more problems regarding protection, especially from weed and decrease of herbicides efficiency. On suitable soil types (chernozem and alluvium), in optimal years, if there were previously deeply cultivated for some time, there could produce wheat, maize and soy, without a tillage. Here, for a minimal cultivation there are still many limitations for practical apply, owing to lack of appropriate mechanization and more efficient protection, primarily from weed, but also must accentuate that neither all soils are

suitable for the minimal cultivation. In our country has been done mainly on better soils, as chernozem. [2]

A need for decreasing a cost price of main products dictates a concept and cultivation system modification and new tools development. In past several decades, here strive to reduction of the existing conventional systems and adaptation of new land cultivation systems for specific crops, which would match to the specific climatic and soil conditions. The reduced cultivation systems have some advantages over the conventional, which reflect in better erosion control, preservation of soil moisture, energy and labour savings. Sometimes is necessary, in reduced systems, to leave more harvesting residues of preceding crop on soil surface and, in that case, these systems have the conservation character.

In the conservation systems with land cultivation reduction, or with its complete elimination, a direct influence of cultivation has been minimized, and harvesting residues of previous crop have been on the soil surface or directly below it. Uncultivated soil surface is less porous than regarding the cultivated soils, which results with higher moisture content, lower soil temperature, more organic matter at soil surface and greater participation of water-stable aggregates (generating units), and also higher density than conventional and less oxygen. Thanks to the harvesting residues at the soil surface, the increased moisture content due to evaporation decrease and favourable temperature regime set in motion a micro-biological activity and nitrogen mineralization, so in that way realizes faster nitrogen circulation and increases its availability. The content of nutrients is modified by ploughing layer's depth. Potassium and phosphorus are present closer to the soil surface, while calcium and magnesium wash out more. During winter, lower soil temperatures cause less nitrogen mineralization and its partly denitrification, but if we practice growing of cover crops, then they are in terms of mineral nitrogen seizing and prevention of nitrates washing out into ground waters. [12]

Fertilization

By introduction of new methods of livestock breeding gets large amounts of organic fertilizers (different types of manure), which can use rationally in crop farming, vegetable growing and viticulture. The organic fertilizers are irreplaceable when it is about land revitalization, i.e. improvement of

its physical, chemical and biological features. In the organic agriculture concepts, they are attached a great importance as well as to symbiotic and non-symbiotic nitrogen-fixers (bacterial fertilizers), since the mineral fertilizers omit.

As the organic fertilizers use: manure, compost, peat, worm fertilizer, green fertilizing, liquid manure, wood ashes, plant mixtures and other waste organic matters, originated as by-products in food technology and industry. [13]

In our country, besides the peat and the worm fertilizer produce also a mixture of peat and zeolite, as well as the organic fertilizers, originated by bio-conversion (using the micro-biological cultures) of different kinds of organic matters, from manure to a communal mud. Thereby was got a *teravita* fertilizer, by degraded cowshed manure, of high biological value (large number of useful bacteria) with high content of humus, macro and micro elements. From husks and poultry manure got an organic fertilizer *kofuna superfin*. Besides, on the market are also present the liquid organic fertilizers *teramin*, *humusin* and mix of peat and the organic fertilizers with zeolite. Regardless of which organic fertilizer uses, it has to be without harmful residues of pesticides, hormones and heavy metals, as well as without weed seeds and pests. In the organic agriculture, the fertilizers can also be from the organic production. There is necessary purity and quality of organic fertilizers, while otherwise can pollute land, water and plants.

The manure is a mixture of domestic animals' droppings and a litter. Quality of the manure depends on domestic animal species, the litter and the fertilizer age. Horse and sheep manure are more suitable for heavy and cold soils, because of higher content of solids are warmer, and also contain more nitrogen, phosphorus and potassium. The cowshed and pig manure contain more water, they are colder and more acidic, so they decompose slowly. Therefore they are more convenient for light sandy soils.

The compost is mostly used in garden, as organic fertilizer, and for making soil mixtures for vegetables and flowers growing in protected area. It is similar to manure by its content. It prepares from residues of plant and animal origin. In the organic production can add also worms in compost, while they mix and mineralize the compost by digesting the

organic matters. Today, for fast composting add mixtures of microorganisms to organic mass.

The green fertilizing is green plant mass which ploughs in. In such fertilizing method use plants which grow fast. They grow as the previous cultures, interplanned crops and subsequent cultures, and rarely during the whole year. The green fertilizer, as subsequent culture, sows in autumn: rape, mixture of hairy vetch, carnation clover and hybrid bearded danel, mixture of hairy vetch and winter barley. The green fertilizer enriches soil mainly by nitrogen from the green mass and leguminous crops by nitrogen from air thanks to activity of legume bacteria, which live on their root and do the air nitrogen fixation.

It is well known that earthworms are good indicator of soil fertility. Only in fertile and unpolluted soil live the earthworms. It is a base for using the specific compost worms for the production of the organic worm fertilizer. The worm fertilizer is rich with humus (up to 25%), poor with mineral nitrogen (1-1.7%), but contains high amounts of phosphorus (up to 240 mg per 100 g) and potassium (up to 1400 mg per 100 g), as well as important micro-elements (zinc, copper, manganese, iron). The worm fertilizer uses in mixture with soil, for growing young plants and in protected area. [12]

Plant protection

We are all aware of a fact that we live in much polluted environment, so we have become sensitive to mention of chemical preparations for plant protection. For some time “unsprayed food” is in great demand. In the organic agriculture are forbidden all synthetic pesticides and herbicides. For plant protection are mostly used plant preparations and the most often preventively. There uses an allelopathic effect of other plants, too, their excretions drive away pests from crops. A fact that the environment in which we grow some culture is, at the same time, a habitat of numerous other organisms, of which are many useful; chemical preparations which use are as much harmful for them, as for the pests.

The International Federation of Organic Agriculture Movements (IFOAM) has given the standards according to which can produce the organic food.

The matter which uses in the organic agriculture must not be harmful or to have a negative effect to the environment. The matter must not increase unacceptable pollution of surface or ground waters, air and soil. All phases in its production have to be controlled and features which must be taken into consideration are: degradability, an acute toxicity towards other (non-target) organisms, a long-term chronic toxicity, chemical synthesized products and heavy metals.

All matters which use have to be degradable to CO₂, H₂O and/or on their mineral forms. Those matters with high acute toxicity to other organisms must have half-decomposition life of five days. Natural substances, which are not marked as toxic must not be degradable in limited period.

When a matter has relatively high acute toxicity for non-target organisms, there is inevitable to use it constrainedly. Measures which undertake have to provide such organisms' survival. There should be determined maximum allowed application doses. If there is no possibility for such measures application, use of that matter must not be allowed. The matter, which accumulates in organisms or systems of organisms, and the one which has, or is suspected to have, mutagenic or cancerous characteristics, must not be used.

The matter should not contain the harmful amount of chemicals, made by a man. Chemically synthesized products can be accepted only if they are equal to natural. [13]

Organic farming in the world and in Serbia

Organic production in the world is becoming more prevalent and economically significant, and about the importance of this type of production is the fact that today is conducted in 140 countries, at 32.2 million acres, on 633 891 farms, totaling 0.7 percent of the agricultural land on the planet and that its value exceeds \$ 25 billion. World sales of organic production is increasing annually by 15%. The most important organic food markets are the U.S., Canada, Europe and Japan. In Europe, the largest consumers of organic food are: Germany, Great Britain, Italy and France. World sales of organic production is increasing annually by 15%. The most important organic food markets are the U.S., Canada, Europe and Japan. In Europe, the largest consumers of organic food are: Germany, Great Britain, Italy and France.

According to the 2011th The countries with the largest organic areas are Australia , which has 11.8 million ha, Argentina with 3.1 million hectares, 2.3 million hectares of China and the United States with 1.6 million acres. However, the number of farms and the ratio of area of arable land under organic crops in comparison with a conventional, is the largest in Europe. The percentage ratio of the areas of organic production in the surface states, gives a completely different picture with regard to the fact that the top 10 countries represented only European countries and Liechtenstein (26.4%), Austria (12.9%) and Switzerland (10.27 %). The largest area of organic production system in Europe, in Italy, Germany and the UK, and these countries are the most important sector of organic production. About 6% of arable land in organic production system in most European countries. More pronounced tendency of development of organic agriculture in the countries of Central and Eastern Europe such as the Czech Republic, Slovakia and Poland.

Some countries regard the primacy of certain products. For example, the largest producer of organic citrus fruits is Italy, Mexiko is largest producer of organic coffee and the largest producer of cocoa is Dominican Republic. Italy, Spain and France are the leaders in the production of organic grapes, while the largest producers of organic olive are Spain and Tunisia. Climate, historical heritage and the state support the organic sector to create the conditions of a country are the leaders of a specific organic production. [7].

In the period since 2007 – 2011th, the trade of organic products has grown from 23 to 40 billion dollars. And if there is an increased selling prices of organic products are still high at an average of 15% to 30 % compared to the products obtained by conventional production methods. Demand for organic food in the period since 2001. - 2011th in the U.S. has increased by 15-20 % .

Germany is one of the countries with a long tradition and high reputation in organic production, and is one of the leading producers of organic food, as well as one of the largest markets in the world with an annual turnover of around 3.9 billion euros. Consequently, the company offers over 1,800 organic products designated 35,000, Bio, organic certification, which is the official state symbol in Germany since 2001.

The country with the highest share of organic products in the market, compared to other products, Switzerland is 4.5%, which in addition has the highest consumption of organic products per capita (100 Euro per individual). [7]

The EU Member States, despite significant local production and further demonstrate the need for imports of organic products. Serbia can take advantage of the chance and invest significant amounts of organic products in the international market. Area under organic production in Serbia in the 2012th increased by nearly 30 % compared to the 2011., and an increase in organic livestock production complete. Taking into account all these unused natural opportunities that Serbia has, at the same time and the huge increase in demand for these products in most of the world markets, which can not meet their needs from their own production, there is a possibility that the trend of increasing size to continue in the coming years.

Organic agricultural production in our country is still in the development stage. Due to the potential offered by the natural resources of our country, the establishment of this type of production is a step forward not only in terms of rural development, environmental protection and improvement of human health, but also from the standpoint of economic prosperity. [1]

In July 2009th was done in the draft National Action Plan for the development of organic agriculture which defines the activities for the development of organic agriculture in the Republic of Serbia for the period since 2010. - 2015. [9]. The law's aims of : obtaining products with documented procedures production, sustainable socio- economic rural development, consumer protection, placing the label that clearly indicates the ways and methods for production of organic products, the protection of natural resources from pollution, long-term maintain and increase soil fertility, biodiversity conservation. [14]

The new law introduces some innovations, especially when it comes to certification. He confides separate certification organizations, and the Ministry of Agriculture authorizes to do the job, keep a register of organic production, certification bodies inspect and proposes measures for the development of organic agriculture. With us, in accordance with the Law on Organic Production, a certified organic product is marked "organic

product" code by the authorized organizations and national character. Appearance on national character provides the Minister. [9]

In Serbia, currently organic production is an area of about 829,000 ha, whether it be on products that have been certified or who are in the process of obtaining certification for organic production, arable land used for organic production occupies an area of 11,000 ha. There are around 150 certified producers and about 160 in the conversion process. Currently in Serbia, this type of farming deals with about 3,000 farms, which indicates that the job of a population of 9,000 people. The 2011th, The total area under organic production amounted to 6294.61 ha.

According to the above Table 1, the structure of land by type of crop production in the 2012th year is the most common fruit production with 46.36 %, followed by crop production with 41.31 %. Meadows and pastures occupy 7.57 % until vegetables are grown on 4.77 % of organic surfaces. [6]

Table 1. *Structure of the categories of crop production in 2012*

	Organic vegetable production in 2012th			
	Areas in conversion (ha)	Areas with organic status (ha)	Total, (ha)	% of total arable area
Crop production	1734,39	2.850,43	4584.82	41,31
Fruit production	1091,19	4054	5145.19	46.36
Vegetable production	233	296,5	529.5	4.77
Pastures and meadows	818,97	20,83	839.8	7.57
Total	3877,55	7222,26	11099.31	100

Source: *Organic Farming in Serbia 2013th National Association for organic production, Serbia Organica, Belgrade*

Perennial species are grown to about 46.7 %, and one- on about 46 % of the total area under organic production, the remaining 7.3% are meadows and pastures. Of perennial species dominate apples, plums and berries, particularly raspberries. Of the annual species are the main cereals, soybeans and vegetables. Despite the fact that the berries are the main export species, manufacturers are opting for other species such as apples and plums. Apple surface with organic status amounted to 1177.55

hectares, while the conversion is 6.02 ha, which means that a total of 1183.57 ha. Surfaces with organic status of plum amounts 1188.56 ha area in conversion amount 39.48 ha for a total of 1228.04 ha. Also, there is a significant increase in the areas under the one species (Table 2.).

Table 2. Areas according to a type of organic plant production in 2012

Category	Plant production	Areas with organic status (ha)	Areas in conversion period (ha)	Total areas (ha)
Perennial fruit sorts	Apple	1,177.55	6.02	1183.57
	Raspberry	550	142.46	692.46
	Strawberry	41.42	11.54	52.96
	Plum	1188.56	39.48	1228.04
	Sour cherry	409.94	26.38	436.32
	Other	686.53	865.31	1551.84
Totally for category		4.054	1091.19	5145.19
Annual plant sorts	Maize	280.37	539.33	819.7
	Wheat	284.66	281.72	566.38
	Soy	104.53	39,5	144,03
Total		669.56	860,55	1530,11
	Vegetables	296.5	233	529,5
Other crop sorts		2181.47	873.74	3055.21
Totally for category		3,147.53	1.967,29	5,114.82
Pastures		20.83	818.97	839.7

Source: *Organic Farming in Serbia 2013th National Association for organic production, Serbia Organica, Belgrade*

The main objective of organic farms is the sustainability. It is important that a balanced relationship between crop and livestock production provide enough food to feed domestic animals or livestock to provide manure. On the average, 1 ha of crop production should be suspended 1-2 heads of cattle (depending on the type and intensity of production). [11]

Organic methods of animal husbandry conditions and provide a way of keeping animals, the type and quality of facilities, free movement of animals and the cultivation of the optimum density. Animals are fed organic food and provides the list of allowed nutrients. The Animal Health greatest attention is

paid to prevention, which includes all measures of hygiene. [12] On average about 90 % of feed domestic animals not used for their operations and products, but they returned in the form of liquid and solid excreta - organic fertilizers, without which no sustainable land. In organic farming, farm animals must be provided with suitable conditions for breeding, including their welfare and their health in accordance with the type and race. [5] According to test results, the Research Institute of Organic Agriculture, from Switzerland, in Germany, in the most organic livestock are bred sheep (8%), beef cattle breeds (3.2%) , and dairy cattle breeds (2.3) while only 1 % of poultry and pigs grown in an organic system. From organic animal products the highest consumption of organic milk, which is more widespread in supermarkets in most countries of the European Union. For now, the biggest production of organic milk in Denmark and is 15%. [7] In Serbia, according to Table 3. The structure of organic livestock production is as follows: organic status occupies most flocks which include sheep, goats and pigs (983 animals), while the number of sheep in conversion is still 3404 heads. Followed by poultry (chickens, geese, ducks, turkeys, guinea fowls), bee hives and the least number of animals in the herd which include cattle, buffaloes, horses and donkeys, which has in the conversion in 2164 and 230 head of cattle in the organic status. In Serbia, according to the test more than 4,000 farmers involved in organic production. The total value of organic production in Serbia can not be precisely determined due to the lack of clear empirical data.

Table 3. *The structure of organic livestock production (2012).*

	Organic livestock production 2012th the conversion period	
	Conversion period- Number of livestock, poultry birds, beehives hives	Organic status Number of livestock poultry birds, beehives hives
Herds (cattle, buffaloes, horses, donkeys)	2164	230
Flocks (sheep, goats, pigs)	3404	983
Poultry (chickens, geese, ducks, turkeys, guinea fowls)	4276	3600
Beehives	2610	4394

Source: *Organic Farming in Serbia 2013th National Association for organic production, Serbia Organica, Belgrade*

The interest in organic farming, which is also reflected in the market for organic products in the last ten years has increased three times. Despite the current difficulties, organic farming is moving towards alignment with the needs of market development and conservation of the environment and to reduce the quantity at the expense of food, while favoring agricultural techniques that optimal use of natural resources (recycled biomass and energy) and minimize waste matter. [11]

Conclusions

A basic characteristic of organic production is the production of highly valuable and healthy-safe food, as well as preservation and protection of the environment, by which ensure “clear” soil, water and air. Besides the existing difficulties is worth investing in such production form, for several reasons. That is to say, the organic production is a profitable agricultural production, export program is competitive, very important factor of sustainable development, and considering that it is work-intensive production makes better opportunities for employment, and also the opportunities for foreign capital investments in our market and connections at the regional level. The organic products can use for development of eco-tourism and, in that way, accelerate development and revitalization of rural areas and revival of traditional rural values.

Considering the state of eco-systems preservation almost on the entire territory of the Republic of Serbia, as well as its territory's diversity, we can conclude that there are great potentials for development of the organic production. The potentials must not be only a statement, considering to tendencies on the modern market, but surely must be put into operation. Benefits would be mutual, as for producers, as well as for consumers, not only in Serbia, but on the international market, while Serbia will quickly involve in modern courses of agricultural production and position as an important producer of organic products.

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RELATIONSHIP BETWEEN TOURISM AND SUSTAINABLE DEVELOPMENT OF RURAL AREAS IN THE DANUBE REGION

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Abstract

The Danube as the most important river in Europe and one of the Pan-European corridors represents the opportunity for better positioning of the Danube Region in Serbia in the domestic and international tourism market. This paper will point out the relationship between tourism and rural areas as well as significant involvement of tourism in the sustainable development of rural areas in the Danube Region in Serbia. Special attention will be drawn to the natural resources that are located within rural areas, as well as their diversity in the Danube region. It creates an opportunity to the development of sustainable agriculture to use the potential for revitalization of rural areas, more efficient placement of agricultural products and the involvement of local population in tourism trends on the side of tourism offer. The features of the Danube Region in Serbia afford the rural area to be engaged in various forms of tourist traffic, from classic rural tourism through gastro-tourism and wine tours, spa and mountain tourism to hunting, fishing and nautical tourism. Such potential in a relatively small area should be used to ensure a permanent and sustainable development and revitalization of languishing rural areas within the region.

Key words: *the Danube region, rural area, tourism, sustainable development, Serbia, the Danube*

Introduction

Although the capitals of Serbia and the Autonomous Province of Vojvodina are located in the Danube Region (Belgrade and Novi Sad), along with several settlements with city status (Sombor, Sremska

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Mitrovica, Zrenjanin, Pančevo, Smederevo and Požarevac) it can not be denied that this area has a predominantly rural character. As such, it has a significant arable land that also belongs to the territory of those cities. Besides already partially or fully developed urban tourist centres in the Danube region (Belgrade and Novi Sad), the focus of the future development should be put on sustainable development of rural areas that should, to a certain extent, also be encouraged through sustainable tourism development there. The reason for this is that the Danube Region has specific attributes for tourism development in rural areas, i.e. it has a favorable combination of various natural and socio-cultural environment (preserved environment, rich biodiversity, local community with its culture, heritage and gastronomy).³ In addition, with over 200 000 households and more than 2 million beds in rural tourism⁴, Europe has long passed the first stage of the development of rural tourism and greatly faces the challenges of the next phase, which along with the increasing competition, the need for the integration within rural areas and building partnerships between stakeholders in rural tourism⁵ also brings an increasing shortage of high-quality preserved spaces. The Danube Region possesses such high-quality and well-preserved natural areas (which will be spoken about more in the paper later) to be used as a competitive advantage in the future tourism market approach.

Within the Danube Region special attention should be directed to the importance of interconnections and relationships of sustainable agriculture, sustainable rural development and sustainable development of tourism, which will be partly indicated in this paper. The implementation of ecological, i.e. sustainable agriculture aims at preventing land degradation and toxicity, at introducing economic viability and social equity through satisfaction and worthiness of all community members involved into the process.⁶ Also, agro-biodiversity management based not only on the conservation of wild relatives of cultural crops, preservation of traditional and endangered plant species, preservation of traditional and

³Šimičević D., Štetić S. (2011): Uloga održivog razvoja u upravljanju destinacijama ruralnog turizma, 6. Međunarodni simpozijum o lovstvu i održivom korišćenju biodiverziteta, Žagubica 2011, pp. 242-253.

⁴Štetić S. (2007): Posebni oblici turizma, Author, Belgrade, p. 115

⁵Štetić S., Šimičević D., Ćurčić N. (2013): Specifični oblici turizma, Author, Belgrade, p. 186

⁶Cvijanović D., Cvijanović G i Puškarić A. (2011): Marketing i ekološka poljoprivreda, Insitut za ekonomiku poljoprivrede, Belgrade, pp. 344-345.

animal species compatible with wild biodiversity, but also on unbred species and species that support agro-ecosystems and agro-biodiversity are closely related to sustainable agriculture and sustainable rural development.⁷ With such a sustainable agriculture application and agro-biodiversity management in the Danube Region a stable basis for further sustainable rural development can be provided, while at the same time the inputs are given that are used in the development of tourism within these rural areas. Close integration of these segments can provide a stable and long-term development of rural areas of the Danube Region, which will rely on their compatibility and synergy. Thus the concept of long-term sustainable development of rural areas and rural tourism is ensured, based on the sound and preserved environment, healthy food and water production.⁸ Another relationship of sustainable agriculture, rural development and sustainable tourism development in rural areas stems from the requirements of rural tourism for agricultural products specific to a certain area which supports the identity of the area as an element of compatible economic development.⁹ Such an integrated approach to sustainable development of rural areas in the Danube Region fulfills the main objectives of the EU Strategy for the Danube Region, namely:¹⁰

- Connection and communication - including transportation, navigation, transport infrastructure and energetics;
- Environmental protection – through the prevention of risks and sustainable use of natural resources;
- Socio-economic and institutional development;
- Strengthening regional cooperation.

The Danube Region – basic characteristics of the area and population

The Danube Region in Serbia and the territory that it covers can be observed in broad and narrow sense. The cities and municipalities that are directly on the left and right banks of the Danube flow through Serbia

⁷Šimičević D., Štetić S. (2011): Uloga održivog razvoja u upravljanju destinacijama ruralnog turizma, 6. Međunarodni simpozijum o lovstvu i održivom korišćenju biodiverziteta, Žagubica 2011, pp. 242-253.

⁸Vujović S., Jovanović S. i Milanović M. (2011): Razvojni aspekti seoskog turizma, Tematski zbornik VI. Međunarodnog naučnog skupa "Mediterranski dani Trebinje 2011 – Turizam i ruralni razvoj", Trebinje 2011, pp. 22-33.

⁹Štetić S., Šimičević D. (2011): Poljoprivreda kao preduslov održivog razvoja ruralnog turizma dunavskog regiona, Economics of Agriculture, Special issue 1, pp. 397-408.

¹⁰<http://www.mfa.gov.rs/sr/index.php/spoljna-politika/eu/regionalna-saradnja/eusdr>

could be considered as the narrower area of the Danube Region. However, such a narrowly observed area is inadequate from a territorial, economic, cultural and demographic point of view because it represents only a small piece of territory that is directly related to the Danube banks. Therefore, the Danube Region in Serbia should be observed as a wider geographical area that corresponds to the territories of administrative territories that rely on the banks of the Danube, as well as territories of the city of Belgrade as separate territorial units in Serbia. Thus defined area of the Danube Region covers eight administrative regions (West Bačka, South Bačka, Srem, Central Banat, South Banat, Podunavski, Braničevo and Bor) and the City of Belgrade. This area covers 29329 km², or even 33% of the territory of the Republic of Serbia. The area, the percentage of agricultural land and settlements within the administrative areas belonging to the Danube Region is given in Table 1.

Table 1. *The size and share of agricultural land and settlements of the Danube Region administrative districts in Serbia in 2011*

Administrative District	Area in km ²	Share of agricultural land in %	Number of settlements
City of Belgrade	3226	67,2	157
West Bačka	2488	84,1	37
South Bačka	4015	81,2	77
Srem	3485	73,6	109
Central Banat	3257	87,2	55
South Banat	4246	79,9	94
Podunavski	1250	83,6	59
Braničevo	3855	62,4	189
Bor	3507	48,4	90

Source: *Municipalities and Regions in the Republic of Serbia, 2012, Republic Statistical Office, www.stat.gov.rs*

Based on the data in Table 1 it can be concluded that the Danube Region in Serbia is predominantly rural in its character as the share of agricultural land in the total area by districts ranges from 67% to 87%, and only in the Bor District it is less than 50% (48.4%). The Bor District has a lower percentage of the total agricultural land primarily because of the terrain morphology, i.e. the predominantly mountainous character of this area. Most of the Danube Region consists of plains with elevations up to 200 m, but only the Srem District, the City of Belgrade and the Bor District have a mountainous relief with the largest altitude of 539 m on Fruska Gora in Srem District.

According to the presented data, the Danube region cannot be viewed as a single, complete environment, but as a polymorphic and multifunctional space that provides a variety of opportunities concerned with sustainable agriculture and sustainable development of tourism in rural areas. For the purposes of sustainable development of the area and the development of tourism in it, ethnic diversity of the people who live there should be mentioned. This brings along a range of cultural forms and products of both, material as well as immaterial heritage. In this case, we primarily think on gastronomy as part of the immaterial heritage. Table 2 shows the national structure of the districts in the Danube region.

Table 2. *Ethnic structure of the population of the Danube Region in Serbia in 2011*

Administrative District	Total population	Serbs	Hungarians	Bunjevci	Croats	Roma	Vlachs	Others
City of Belgrade	1659440	1505448	1810	172	7752	27325	182	116751
West Bačka	188807	122848	17576	2162	10879	3018	12	35330
South Bačka	615371	445270	47850	368	10022	10482	14	101365
Srem	312278	265272	3789	21	8758	5488	8	28942
Central Banat	187667	134264	23550	33	796	7267	7	21750
South Banat	293730	208462	13194	30	1512	8025	123	62384
Podunavski	199395	188641	159	3	256	3312	17	7007
Braničevo	183625	155255	108	5	189	4629	13238	10201
Bor	124992	97239	47	3	179	2244	13313	11967

Source: *Municipalities and Regions in the Republic of Serbia, 2012, Republic Statistical Office, www.stat.gov.rs*

With more than 20 ethnic communities the Danube region has the potential to exploit ethnic diversity for the further sustainable development of rural areas through preservation of their authenticity and socio-economic development through their inclusion in the tourist offer of this region. Multi-ethnicity as a wealth of local communities supports the attractiveness of tourists' introduction through familiarization with various customs and traditions. On the side of tourism offer it makes breadth in creating a variety of activities within the programmes of tourists' stays.¹¹ According to the latest census of 2011, the average age of the population within the Danube Region in Serbia is about 41 years,

¹¹Vuković, P., Cecić N., Cvijanović D. (2007): Sustainable tourism development of rural areas in Serbia, *Economics of Agriculture* 54 (3), pp. 369-379.)

which is in line with the national average, but with more numerous female than male population. All these factors of the area and population in the Danube Region suggest that further development of this area may be based on the above mentioned assumptions about the complementary development of sustainable agriculture and rural tourism, which should affect the sustainable rural development of the Danube Region. Natural potential, accommodation facilities and tourist flows in the Danube Region, as well as a proposal of the directions for the development of tourism within these rural areas will be presented in the next section.

Natural potential for tourism development in the Danube Region

Tourism resources with their components affect the attractiveness of motifs and selection of tourism destinations. Attractiveness depending on their shape can act on a broader or narrower area. Accordingly, we can talk about creating primary or secondary tourist destinations. First of all, this is affected by the quality of space and its personnel for tourists' needs. Natural and anthropogenic motives that are situated in the observed area together with the development of the material basis for tourism affect the creation of tourist destinations with more or less quality for tourism activities.

Tourist trends caused by natural attractions are more and more important. Environmental pollution has affected a redistribution of tourist movements towards ecological areas, and has thus provided an opportunity for the development of those countries that do not have any access to the sea. The Danube Region, which covers a third of the territory of the Republic of Serbia, abounds in natural resources that can be used in the development of tourism in the rural areas. Besides the Danube as a dominant natural motif around which total agricultural, manufacturing, transport, tourism and other activities of economic entities and population are concentrated, special attention should be directed towards protected areas located in this territory. The reason for this lies in their orientation towards the Danube and relatively easy connection and inclusion in tourist offer on one side and their location within a highly rural area on the other side. Two basic laws on the conservation of nature in the Republic of Serbia are the Law on Environment Protection and the Law on Nature Conservation. These laws regulate the integral system of protection and conservation of the environment, nature, biological, geological and landscape diversity as part

of the environment.¹² According to the Law on Nature Protection, the protected natural resources involve protected areas, protected species and protected mobile natural documents. From the aspect of this paper, special attention is drawn to protected areas that represent relatively vast geographical areas that can be valorized through tourism affecting the overall attractiveness of rural areas in the Danube region at the same time. According to this law the protected areas include:

- Strict Nature Reserve,
- Special Nature Reserve,
- National Park,
- Monument of Nature,
- Protected Habitat
- Outstanding Landscape (Landscape of exceptional characteristics), and
- Park of Nature.

The most important elements for the development of different forms of tourism and overall sustainable development of the area are national parks and special nature reserves which are the most spacious and integrally protected areas. The National Park, Fruška Gora as the oldest and the Iron Gate as the most spacious national park in Serbia can be the drivers of tourist development of the Danube Region. Both national parks are directly related to the Danube flow as a major water corridor in Europe. Fruška Gora National Park is excellently positioned between Belgrade and Novi Sad, which affects the increased excursion potential, while the Iron Gate has somewhat worse peripheral position in relation to major tourist flows through Serbia. Moreover, with the development of tourism destinations such as Silver Lake and with the development of planned tourism projects within and at the entrance to the national park such as the setup of Lepenski Vir site and planned organization of Golubac Fortress site, together with the existing anthropogenic and natural motifs of excellence, more significant valorization of space of this national park will be enabled.

¹²Zakon o zaštiti životne sredine - www.pzzp.rs/uploadimage/07zzzs%202009.pdf;
Zakon o zaštiti prirode – www.pzzp.rs/uploadimage/05z%20o%20zastiti%20prirode%2010.pdf

Table 3. *Protected areas of the Danube region in Serbia (excluding monuments of nature)*

Administrative District	Protected area – type and number					
	Strict Nature Reserve	Specialized Nature Reserve	National Park	Protected Habitat	Outstanding Landscape	Nature Park
City of Belgrade					2	
West Bačka		1				
South Bačka		3				4
Srem	5	2	1			
Central Banat		2			1	1
South Banat		2			1	1
Podunavski						
Bраниčevo			1*			
Bor			1*			

* *Iron Gate National Park, which extends onto two administrative districts*

Source: *Register of Protected Areas in Vojvodina* - www.pzzp.rs; www.srbija.travel/priroda/predeli-izuzetnih-odlika/

The Danube, with its 588 km length through Serbia, which is the longest navigable river in our country, with 25% of the total length of navigable waterways, has the highest natural potential for overall sustainable development of the Danube Region.¹³ In addition to the international waterway, parts of the local waters are designated for sports, recreation and leisure. Therefore, sailing is not permitted in these areas. The connection between the Danube with the canals of Danube-Tisa-Danube hydrosystem creates a unique offer in the Danube Region, which also affects the interconnection of local communities and overall rural development.¹⁴ Along with the navigable parts of the Sava, Tisa, Begej and Velika Morava, over 1,700 km of navigable waterways make up navigable network of Serbia that is almost entirely located within the area of the Danube Region defined above.

¹³ Štetić S. (2007): *Posebni oblici turizma*, Author, Belgrade, p. 71.

¹⁴ Štetić S., Šimičević D., Stevanović S. (2012): *Valorization of Serbian Waterways and Possibilities for Regional Cooperation in the Development of Danube Region Tourism, Danube Strategy – Strategic Significance for Serbia*, Institute of International Politics and Economics, Belgrade, pp. 290-303.

Thus, this region of Serbia has the most significant potential for the development of certain forms of tourism such as nautical tourism, which can be used in creating multifunctional rural area and in strengthening local, regional and national economies.

Table 4. *Spas of the Danube Region*

Administrative District	Spa	Characteristics of the spa
City of Belgrade	Selters Spa	Hyperthermal alkaline-muriatic carbon-acid mineral water used for diseases of the locomotor system, for different types of rheumatic diseases, post-traumatic conditions, respiratory system, peripheral vascular and nervous system diseases
West Bačka	Junaković	Alkaline-muriatic bromine-iodine hypotherma used as an additional tool in the treatment of various forms of rheumatism, post-traumatic conditions, consequences of injuries and certain gynecological diseases
	Bezdan	Hypotherma of hydrocarbon sodium type used in the treatment of degenerative rheumatism, injuries of spine, locomotor apparatus and central and peripheral nervous system
South Bačka	Novi Sad Spa	Muriatic-iodine hypotherma used as an aid in the treatment of rheumatic diseases, neurovascular brain damages, peripheral circulation disorders, post-injury conditions, some dermatological diseases
	Bečej Spa	Alkaline-muriatic acid hypotherma used in the treatment of diseases of stomach, liver, spleen, rheumatism, sciatica, female genital organs, paralysis, neurasthenia
Srem	Vrdnik	Sodium-magnesium-hydrocarbonate-sulfide hypotherma used in various forms of rheumatism, post-traumatic conditions and consequences of injuries
	Slankamen	Salt iodine hypotherma used for hemiplegic disease
Central Banat	Rusanda	Alkaline-muriatic and saline-bromine water used for various forms of rheumatism, post-traumatic conditions and effects of injuries and some gynecological diseases
South Banat	-	-
Podunavski	Palanački kiseljak	It is used for general recovery of the body, damages of locomotor apparatus, rheumatism, post-traumatic conditions, peripheral nervous system damages, heart and blood vessels damages, diseases of urinary and digestive tract
Braničevo	-	-
Bor	Brestovac Spa	Sulfurous hypertherma used to treat rheumatism, neuralgia, gout, anemia and atherosclerosis

Source: S. Štetić (2008): *Tourism Geography, The College of Tourism, Belgrade*, pp. 232-245, www.udruzenjebanja.co.rs

As for hydrological tourist potential, the region also has a thermo-mineral springs and spas that have a long tradition, but not so good market position, i.e. currently we can speak about their local and regional significance. When combined with other natural resources they should be strongly positioned at least in the domestic tourism market. Serbia has a number of thermo-mineral springs at its disposal – the estimation is between 600 and 1,000 – most of which is neither tapped (captured) nor known to the general public. It is said that there are about 350 thermo-mineral springs only in the territory of Vojvodina.¹⁵ Considering the wealth of these springs, a small number of them is developed and included in tourist flows in the Danube Region – only 10 spas. Besides being predominantly oriented to the domestic tourism market and in the need for investment in scientific-technical achievements and modern accommodation capacities and ancillary facilities, it can be estimated that the accompanying natural, cultural and historical elements of the environment are preserved and this can also be said for the spas of the Danube Region.

The aforementioned natural resources should be used in the overall sustainable development of the Danube Region through greater involvement in tourist flows and stronger connection with the community. The wealth of natural potential present in this area provides a multimodal approach to the development of tourism through the development of different forms of tourism movements that will rely on the rural character of the space. By doing so the best overall sustainable development of the area will be enabled.

Characteristics of the former tourism development in the Danube Region

Taking into consideration previous characteristics of tourism development in the Danube Region, we will discuss tourist traffic, accommodation facilities and cluster associating, which is very important for further development of the entire region.

Considering the number of tourist arrivals in the Danube region, a notable decrease in the number of domestic tourists was noticed, which was halved in the period from 2003 to 2011. The largest decline of 350 000

¹⁵ Štetić S. (2008): Turistička geografija, The College of Tourism, Belgrade, p. 233.

arrivals was recorded in Belgrade, but all other areas also recorded a drop in arrivals of domestic tourists except Srem District where a slight increase was recorded and Braničevo District where the number of domestic tourist arrivals was maintained almost at the same level. The reasons for this phenomenon should be sought in several factors, from the decline of overall domestic economic activity and overall purchasing power of the domestic population to the opening of borders and visa-free regime for travelling abroad. Due to the nature of this paper we will not go further into the analysis of the reasons, we will only ascertain the trends that are currently present. This number of domestic tourist visits is in accordance with the conditions present in the territory of the whole republic.

On the other hand, the number of foreign tourist arrivals in the Danube Region has more than doubled and in the observed period it rose to 290 000 arrivals. Again, the greatest increase in the number of foreign tourist arrivals was recorded not only in Belgrade, but also in all other areas within this region. The reasons for such a trend can be found in opening the borders to Europe, which opened "a new" destination that foreign tourists wanted to explore, as well as in increasing presence of foreign companies in the domestic market, thus increasing the need for business travels. Exactly, that is why the highest growth was recorded in Belgrade and South Bačka District where Novi Sad is situated, which are also two most important centres of business tourism in Serbia.

However, accommodation capacities in traditional facilities specific to a particular area and private houses arranged for the reception of guests as well as camps are more significant for the development of rural areas in the region. Thus, farmsteads as traditional agricultural properties adapted to the needs of modern tourists and visitors are typical for parts of the region located within Vojvodina, as well as ethno houses, cardas and ethnic villages, while rural households included in tourist offer are typical in parts of the regions in Central Serbia. The number of these specific accommodation and catering facilities is constantly increasing, which is good for the overall development of rural areas.

Regarding accommodation facilities within the Danube Region, we can distinguish several types of accommodation, from hotels, motels, guest houses and lodgings to the forms of accommodation that are more closely related to the environment and space that tourists visit.

Hotel accommodation facilities are mainly concentrated in the largest cities, so that hotels in Belgrade and Novi Sad make up more than 70% of the total number of hotels in the region. More than 54% of all the hotels in the Danube Region are situated in Belgrade alone (www.datourway.eu). Apart from Belgrade and Novi Sad hotels are also located in other urban centres such as Vršac, Zrenjanin, Kladovo, etc. Besides cities hotel facilities that are to some extent restored and enlarged are located in spas in this region.

Table 5. *Tourist arrivals in the Danube Region from 2003 to 2011 (in 000)*

Administrative District	2003		2005		2007		2009		2011	
	D	F	D	F	D	F	D	F	D	F
City of Belgrade	514	214	397,7	277	328,5	435,9	232,4	369,6	178,7	440,3
West Bačka	18	2,4	16	4	19,6	6	13,6	5,1	11,8	4,3
South Bačka	65,1	26,5	50,7	32,7	61,7	54,8	52,7	50,7	53,2	69
Srem	18,5	3,7	23,7	8,2	27,9	9,3	30,1	6,7	21,4	5,7
Central Banat	20,2	3,6	24,5	4,9	11,2	3,4	15	6,3	12,2	7,5
South Banat	18,7	4,4	18,2	5,5	18,7	5,2	18,5	6,9	16	6
Podunavski	24,3	3,2	20,1	3,5	23,2	7,8	21,8	12,6	11,8	6,1
Bраниčevo	20,9	1,5	24,9	2,2	29,5	1,9	25,4	3,2	21,5	3,1
Bor	72,2	2,5	64,9	4,3	65,7	5,5	56,7	6,2	59,6	9,7
Total for the Danube Region	771,9	261,8	640,7	342,3	586	529,8	466,2	467,3	386,2	551,7
% out of the total number in Serbia	46,5	77,2	41,7	75,7	36,39	76,1	33,9	72,4	29,6	72,2

D – domestic tourists, F – foreign tourists

Source: *National Bureau of Statistics, Municipalities in Serbia 2004 – 2010, and Municipalities and regions in Serbia in 2012 – www.stat.gov.rs*

It is interesting to point out that in the Danube region there is a number of agricultural and tourism clusters. Cluster associating of different holders of offer within agriculture and tourism should strengthen the position of cluster members, but it should also provide further development of the region.

It is especially convenient that both, agro and tourism clusters are being developed side by side whose oncoming can facilitate the development of complex offer in the tourism market. The communication within a cluster is as important as the communication among clusters, especially because they territorially overlap, so that their intercluster coordination would give even better results.

Table 6. *Agro and tourism clusters in the Danube region*

The name of the cluster	The type of the cluster	The number of cluster members	The reason for establishing a cluster
Homolje Agro Cluster	Agro cluster	-	Homolje Agro Cluster gathers together agricultural producers and processors, mushroom farmers, beekeepers, tourism enterprises and organizations, scientific institutions, etc., in order to strengthen the production and supply of agricultural products and the performance in domestic and foreign market
POLUKS – Cluster of Serbian Food Producers	Agro cluster	27	The cluster of food producers focused on business operations effectiveness and efficiency strengthening the members through joint marketing, market performance and encouraging innovativeness
Istar 21 The Danube Tourism Cluster Novi Sad	Tourism cluster	21	The cluster of tourism industry and institutions interested in tourism development in the area of the Danube Basin. It focuses on the development of tourism in the entire Danube Basin in Serbia
Fund Cluster of Vojvodina Wellness Tourism	Tourism and health cluster	82	It is aimed at linking health, wellness and tourism enterprises, local self-governments, scientific and educational institutions in order to strengthen and develop different types and forms of health tourism in Vojvodina
Association for the Development of Business, M.I.C.E. and Event Tourism	Tourism cluster	14	The cluster of tourism industry and institutions interested in developing business and event tourism on Vojvodina territory
Tourism Cluster Srem	Tourism cluster	23	The aim of the cluster is to develop inbound tourism in Srem through the development of ethno-, eco-, rural, hunting, event and other forms of tourism by strengthening small and medium-sized enterprises
Sombor Farmsteads Cluster	Tourism cluster	31	It is directed towards the development of sustainable agriculture, rural tourism and traditional agricultural households

Source: www.pks.rs, www.klasteri.mfp.gov.rs, www.spaklaster.rs

On the basis of insight into clusters in Table 6 it can be concluded that there are many similarities between them, and that it should be used in intercluster cooperation. They are directed towards sustainable tourism based on strengthening rural areas and it is good that they pertain to refer to sustainable agriculture, involvement of local communities and connection of economic, scientific and educational institutions. These clusters are aimed at enhancing the tourism product and the potential of inbound tourism through the development of several different forms of tourism.

Specific forms of tourism in the Danube Region - guidelines for future development

The recent development of tourism in the Danube Region has been based on only two destinations – Belgrade and Novi Sad. Thus, Belgrade and South Bačka District, where Novi Sad is located, have absorbed nearly 80% of total tourist arrivals in the region and over 90% of foreign tourists. The rest of the Danube Region has been neglected, which particularly refers to rural areas.

Future development of tourism within the region should be based on the exploitation of rural areas potential. They are in direct contact with the preservation of nature and its protected parts, and in modern tourism this is treated as a basic resource for sustainable development of tourism and the entire region. So far, these aspects have been largely neglected and are not fully utilized neither in the domestic nor foreign market. Of course, the region also has a significant anthropogenic resources that date back from the earliest periods of human civilization in this territory (Lepenski Vir, Starčevo and Vinča culture), throughout the Roman period (Roman road, Tabula Traiana, Roman bridge), medieval fortifications, Turkish domination, up to the liberation of Serbia and modern development. Material traces of human presence in this region present in continuation for over 7000 years are an unavoidable resource for the tourism development. In addition, intangible heritage is another essential part of the entire heritage of the region.

By activating the existing resources, including sustainable agriculture, future development of tourism in the Danube Region can be diversified, i.e. it can have multiple forms that will be in accordance with the principles of sustainable development and thus they will ensure tourism development of largely neglected rural areas so far. According to the possibilities, principles of sustainability and profitability special attention should be given to the development of:

- Ecotourism - which will be based on the development of tourism in national parks and special nature reserves being careful not to disturb their ecological stability;
- Nautical tourism – in this case the Danube makes the backbone of the development, but special emphasis should be placed on the channels of the Danube-Tisa-Danube system and the Danube tributaries together with building sustainable capacities for receiving nautical tourists (mini marinas and services necessary for

the current maintenance of vessels), smaller accommodation capacities and hospitality network;

- Hunting tourism – hunting has a long tradition in the Danube Region, with numerous active hunting societies and hunting grounds, which should be used in the enhanced development of hunting tourism, but paying attention to the carrying capacity of hunting tourism;
- Cultural Tourism – numerous and diverse cultural and historical heritage together with the intangible heritage of many ethnic communities in this area is an excellent base for this tourism development form;
- Gastro tourism – a special emphasis in tourism offer should be placed on both, the development of wine routes with the presentation of authentic dishes specific to certain parts of the Danube Region, as well as on classic offer of hospitality facilities;
- School and excursion tourism – the wealth of heritage and preserved landscapes make an ideal combination for educational tours and excursions;
- Recreation tourism and same-day trips – the vicinity of large urban centres, easy accessibility, with courts and grounds for a variety of water and land sports are the ideal conditions for the development of these forms of tourism;
- Event tourism – some events in the Danube Region (such as Vršac Grape Ball and Karlovac Grape Harvest) have a long tradition, while others (EXIT) have a large number of visitors, which should be used in the further development of event tourism based on culture, gastronomy, sports, music, etc.;
- Ethno tourism;
- Residential Tourism;
- Sports Tourism;
- Adventure Tourism...

It can be noticed that rural tourism as a specific form of tourism is omitted in the preceding division. The reason for this is that all these forms of tourism can be developed within rural areas in the Danube Region and thus in a broader sense they represent an integral part of rural tourism. However, rural or agro tourism should also be mentioned, which, in the traditional, narrower sense, is seen as tourists' stay in the country using accommodation and food services either in village households or in renovated and new facilities for their reception such as farmsteads, ethno villages and camps. The development of

these forms of tourism in accordance with the principles of sustainability should affect the overall sustainable development of rural areas in the Danube Region.

Conclusion

Based on the analysis of the Danube Region in Serbia and its potential for the involvement in tourism flows several important conclusions can be drawn. First, it is an area that occupies a third of the territory of the Republic of Serbia, and thus it represents a significant part of it. Part of that area is Pannonian and Central European and is characterized by a developed agricultural production, significant areas that are protected parts of nature, and the largest part of it is rural. Unlike the rest of Serbia, the villages in these rural areas are systematically arranged, and in addition, there are also farmsteads as special agricultural households characteristic for this part of the country.

National, cultural and natural diversity of this part of the Danube Region are its main advantages in its performance on tourism market. The second part of this region belongs to Central Serbia and the Balkan Peninsula, which is largely characterized by mountainous terrain and slightly more traditional forms of agriculture and livestock breeding. Exactly, the traditional agriculture and traditional agricultural products, specific ethnic area, heritage and culture should be the backbone of tourism and overall sustainable development of this part of the Danube Region. It is also characterized by rural areas with villages that slowly die off, thus imposing a need for their revitalization, and precisely sustainable agriculture with sustainable tourism should be one of the pillars of this revitalization.

Another important conclusion is that the awareness of local communities in the Danube Region on the need to strengthen their offer is awakened in all aspects with the reliance on agriculture and tourism. This is also demonstrated through cluster associating. The Danube as the holder of recognizability of the region in broader frameworks involved in international cooperation projects, sustainable development, transport and tourism provides the basis for future sustainable development of the whole area.

Precisely, owing to the diversity of space, its multifunctional role, major urban tourist centres Belgrade and Novi Sad, multiculturalism, preservation of natural areas and the environment, heritage, and of course the Danube, it is possible to simultaneously develop different forms of tourism in the Danube

Region. In particular, it must be stressed that most of these forms of tourism can be developed within the rural areas, which may affect the future sustainable development of rural areas. It may be concluded that, besides Belgrade and Novi Sad as the leading tourist destinations in Serbia, in the future tourism development in the Danube Region we should insist on rural areas that currently represent underused potential.

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CONTRIBUTION OF ECONOMIC VALUATION TO ENVIRONMENTAL PROTECTION¹

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Abstract

Since the mainstreaming of the concept of economic valuation, there's been an intensive debate concerning its appropriateness, i.e. whether it is purely academic exercise or it serves a concrete purpose. In the paper the necessity of the use of economic valuation, both in terms of policy-making and in the process of environmental management decision-making has been analyzed. Based on the available literature, the authors gave an overview of the areas in which it is possible to apply the results of the economic valuation, as well as examples in the form of specific non-market valuation studies, in which economic valuation influence the final outcome in direct, indirect way or by altering debate.

Key words: *economic/nonmarket valuation, trade-off, environment, valuation techniques*

Introduction

Prevailing socio-economic doctrine in the post-war period rested on belief that limitless economic growth was possible. Believing that it has managed to put the problem of unemployment, to the certain level, under control, economics turned its attention, in the 1950s and 1960s to the issues of economic growth. However, in an attempt to put this phenomenon under control, very important fact – that one of the key inputs essential to the production process was limited in supply – was omitted. Problems of permanent increase of population, combined with rising per capita income,

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were not harmonized with limited natural resources, i.e. the question of the sustainability of the growth process wasn't adequately addressed. Constant rise of demand for environmental goods (driven by rise of per capita income) and the fact that private sector, regardless to all the efforts, couldn't provide them, resulted in their relative scarcity. That further meant that there was a role for public sector regulation. Adequate regulation and environmental protection in general, required answering several crucial questions, such as: *How much to protect it? What should be paid in protecting it? What methods to use in protecting it?* The basis for provision of scientifically credible answers to these demanding and complex questions can be found within neoclassical economy, more precisely within new welfare economics (Markandya and Richardson, 1992).

Welfare economic or „*the economics of economic policy*“, as it's called by English economist and Nobel Prize winner John Hicks (1939:696), as pointed out by Just et al. (2004), focuses on optimal use of resources in order to achieve maximum well-being for both the individuals and the society as a whole. The concept of economic valuation has been developed within this branch of normative economics during the second half of the XX century, mostly as a result of addressed shortcomings of standard economic science. The roots of contemporary notions of economic value, as emphasized by Parks and Gowdy (2012), can be found within Western belief system. One of the characteristics of this system is mechanistic point of view, according to which the state represents „*an instrument created by individuals for the purpose of better achieving their individual goals.*“ (Rosen and Gayer, 2011:4) The importance of an individual in Western societies is supported by two sufficiently widely accepted ethical assumptions that provide the foundations for a large part of applied welfare economics and policy evaluation: 1) *the welfare status must be judged solely by the members of society and 2) the notion that society is better off if any member of society is made better off without making anyone else worse off.* (Just et al., 2004: 3) It is obvious that one anthropocentric concept, focused on an individual and its well-being, has been offered as a partial solution for a general problem, i.e. efficient protection of the environment. In spite of its utilitarian character (although not in purely “Bentham's” sense) and, at first look, incompatible relations (between personal interest and preserved environment), concept of economic valuation has widely been used in the field of environmental protection. Generally speaking, the main point of

this concept can be explained by Myer`s and Reichert`s (1997) statement: „*We don`t protect what we don`t value.*“⁴

With the expansion of scientific papers, reports and economic valuation manuals, in the world in the last two decades, there`s been an intensive debate about practical achievements and influences of this concept, in terms of policy design and environmental management decision-making. Accordingly, in this paper we will rely on available literature and studies in this field in order to illustrate actual and practical scope of economic valuation in the field of environmental protection. Firstly, we will describe the essence of economic valuation concept, then the directions of its development (through environmental and ecological economics), areas in which its results can be used and the main techniques available to researchers. In the last chapter of this paper the major studies and researches that have made specific, practical impact, will be presented.

The main features of economic valuation

To clarify some of the main issues considering economic valuation we will use a definition of economics given by Nobel Prize winner Joseph Stiglitz and his colleague Carl Walsh: „*Economics studies how individuals, firms, government, and other organizations within our society make **choices**, and how these choices determine society`s use of its resources.*“ (Stiglitz and Walsh, 2005:6). In order to explain how choices are made and how they affect the use of society`s resources, the authors have offered five concepts: *trade-offs, incentives, exchange, information and distribution*. To clarify the phenomenon of economic valuation, of the crucial importance is the principle of *trade-offs*⁵. The fact that we are, as individuals and as society as a whole, faced with choices in everyday life, leads us to the necessity of making trade-offs, i.e. to get more of one thing we have to give up on something else. Every choice involves trade-off and „*we are forced to make trade-offs because of scarcity [of resources].*“ (Stiglitz and Walsh, 2005:7)

Switching to the field of environmental protection we could say that the fact that we live in the world of scarce resources forces us to constantly make choices considering the management of human impact on natural systems. Greater use of a specific environmental service or greater

⁴ Different opinions on this subject can be found in (Vatn and Bromley, 1994).

⁵ The synonyms for trade-off in Serbian language are *compromise or settlement*.

protection of a specific natural system results in less of something else⁶ (Freeman, 2003:1). It is obvious that the trade-offs are inevitable and something we must accept (Freeman, 2003) (Stiglitz and Walsh, 2005). According to Freeman (1999), the trade-offs that people make as they choose one good over another reveal something about the values people place on these goods. If one of those goods has monetary value, revealed values represent actual monetary values, and precisely money is the most common numeraire to express trade-off relations⁷. In order to use scarce resources as efficient as possible and in the most quality manner it is necessary to compare what is gained from an activity with what is sacrificed by undertaking that activity. The proper way to do this is to assess the net impacts of policy changes on human well-being to choose an adequate combination (in the context of contribution to human well-being) of service flows from the environment. Yet, it is very important to emphasize that *scarcity, opportunity costs and necessity for trade-offs* are considered as common characteristics of “*resource environmental systems*” (as called by Freeman) and the economic valuation process (Freeman, 2003).

The main feature of certain services and goods, which belong to resource-environmental systems, is the fact that they are directly connected to market and accordingly responsive to its forces. However, numerous service flows, mostly because of their public goods characteristics (nonrivalry, nonexcludability, externalities, etc.) are not properly regulated by markets, i.e. for those goods and services market doesn't exist. According to obvious market imperfection in terms of many public goods, and consequently failure to achieve maximum well-being, there is a need for public intervention in resource management, which requires information on the values of the nonmarket service flows that could be gained by use of economic valuation (Freeman, 2003).

Nonmarket valuation – directions of development

In the second half of the XX century, specialized economic sub-disciplines, which arrived with the new wave of modern environmentalism, started to address shortcomings in standard economic

⁶For example, more hydroelectric power means reduced recreation opportunities in the river basin and reductions of survival of some endangered species.

⁷The author points out that the main welfare (change) measures – WTP and WTA can be measured in terms of any other good that matters to the individual.

science in terms of analyses of environmental problems (Gómez-Baggethun et al., 2010). Accordingly, during the 1960s, relying on welfare economics, *environmental economics* began to evolve. The major step in terms of incorporating the environment within framework of neoclassical welfare economics, as pointed out by Parks and Gowdy (2012), was introduction of the concept of *natural capital*. The notion of natural capital was recognition that the growth potential of the economy could be seriously constrained by the limited availability of critical resources.

Academic community specialized for environmental issues gathered around *the Society of Environmental and Resource Economics (ERE)* and made a key contribution in terms of expanding the scope of analysis of orthodox neoclassical economics. That was done by developing methods to value and internalize economic impacts on the environment within the process of decision-making – e.g. through extended CBA. The major argument underlying this economic sub-discipline was the fact that neoclassical economics largely neglected economic contribution of nature by restricting the scope of its analysis to those environmental goods and services for which price existed. From the perspective of environmental economics, nonmarketed ecosystem services were considered as positive externalities which, if valued in monetary terms, could be more explicitly included in decision-making processes. In order to correct obvious market failure, environmental economics literature during 1960s has managed to make a crucial contribution by developing the range of methods to value external environmental costs and benefits. At the same time, in order to capture the complete picture of economic value of the environment, different types of economic value, mostly neglected by conventional markets, were identified. In such a way, thanks to John Krutilla's paper published in 1967, the economic value was divided in two components – i.e. *use and nonuse value* (Rodić and Kostić, 2011). To elicit different types of values the entire range of valuation techniques based on people's preferences was developed (Gómez-Baggethun et al., 2010).

The story of *ecological economics* begins in the late 1980s, i.e. in 1987 when *the International Society for Ecological Economics*, together with its national branches in USA, Australia, New Zealand, Brazil, Canada, Europe and India, etc., was founded (Beder, 2011). However, the formal beginning of the independent action of ecological economics (whose establishment was influenced by the work of systems ecologists and heterodox economists concerned with human-nature interaction), as

pointed out by Gómez-Baggethun et al. (2010), is actually a consequence of a series of theoretical divergences within ERE in the late 1980s. According to Beder (2011), unlike environmental economists, ecological economists stand on the ground that physical limits to the material growth of economics exist and that they might have been already reached. Accordingly, the idea of *ecological footprint* and the need for its measurement has emerged in ecological economics. Within this sub-discipline the ethical and philosophical issues, such as intergenerational and intragenerational equity, and even the issue of recognition of so called non-human - intrinsic values⁸, are taken into account in an explicit manner. Generally speaking, as stated by Pearce (2002), one might say that scientists and researchers within ecological economics regard environmental problems much more serious than their colleagues within environmental economics. Accordingly, as emphasized by Gómez-Baggethun et al. (2010:1213), the environmental valuation concept called *ecosystem services*, was introduced in 1981. This concept „aimed to demonstrate how the disappearance of biodiversity directly affects ecosystem functions that underpin critical services for human well-being.“ In initial phase of development, this concept was mainly pedagogic by its nature. In the late 1990s and the early 2000s, the concept of ecosystem services, through *The Millennium Ecosystem Assessment (MA)*, becomes institutionalized, i.e. it slowly entered the policy arena and becomes a part of policy agenda. The central focus, in terms of assessment, of the MA conceptual framework, takes the issue of human well-being, while, at the same time, the fact that biodiversity and ecosystems also have intrinsic value and that people take decisions concerning ecosystems based on considerations of their own well-being, as well as intrinsic value, is also taken into account (MA, 2003). In spite of its anthropocentric character, the MA approach also emphasizes that people are dependant, not only on ecosystem services, but on its functioning, contributing that way to visibility of the role of biodiversity and ecological processes in terms of human well-being (Gómez-Baggethun et al., 2010).

At the end of this review the key question might be the one referring to the differences between these two economic sub-disciplines. It is impossible to give precise and uniformed response to this question and

⁸ Unlike instrumental value which implies that something is valued as a means to some other end or purpose, the intrinsic value is valuable in and for itself and its value is not derived from its utility.

explicitly decide what belongs to one and what to the other sub-discipline. In an attempt to define key areas in which two sub-disciplines overlap and differentiate, i.e. areas of controversy, Venkatachalam (2007) offered the following: *theoretical and methodological approach, resource treatment, economic valuation, resource scarcity and maintenance of capital stock, the role of technology, the population assumption and equity and welfare*. Two sub-disciplines, according to Gómez-Baggethun et al. (2010:1212), *overlap in the use of specific techniques to measure sustainability, evaluate policies and assist decision-making and also in the fact that many scholars working in ecological economics use the tools of neoclassical microeconomics in their practice*.

There is no doubt that concept of ecosystem services draws roots from utilitarian approach, while at the same time simplifying the development of economic valuation in the field of biodiversity conservation (Laurans et al., 2013). Also, as cited by Beder (2011:149) „*Ecological economics may be seen as ‘methodologically pluralistic’, accepting the analytical framework of neoclassical economics among others.*“

Nonmarket valuation techniques

The main differences between numerous techniques for measuring benefits of public goods⁹ are in their data needs, in their assumptions about economic agents and physical environments. Besides that, the ability to measure a specific type of benefit is also one of the differences. According to Smith and Krutilla (1982) (cited by Mitchell and Carson, 1989) these techniques can be divided in two major categories: 1) *those based on physical linkages* and 2) *those based on behavioral linkages*.

- 1) In spite of their common use in practice, techniques from this category have „fragile” theoretical basis in welfare economics. The main assumption here is that a certain type of technical relationship exists between the public good in question and the consumer. Techniques from this category are frequently referred as *damage function approach* or, when it comes to biological relationships, *the dose-response approach*.

⁹ In the book by Mitchell and Carson (1989) that represents basis of one of the most commonly used nonmarket methods – Contingent Valuation Method (CVM), nonmarket/economic valuation techniques are referred as benefit measurement techniques.

- 2) Techniques from this category originate directly from applied welfare economics. They are based on a certain type of behavioral linkage between a change in a level of public good in question and its effects.

In this paper we will focus exclusively on the techniques within the second category. Those are techniques that rely on people`s preferences and can be further divided into two major groups: *revealed preference techniques and stated preference techniques*¹⁰.

Within *revealed preference techniques/methods* statistical inferences are drawn from choices people make on actual markets. Estimation of these values involves specification of a theoretical framework. Besides that, data analyses from purchase decisions (prices paid and quantities purchase) must be conducted within that conceptual framework. From the conceptual perspective, revealed preference techniques provide estimation of Marshallian surplus (Boyle, 2003a). Within the group of revealed preference methods some authors, such as Navrud and Pruckner (1997), emphasize *household production function methods* (and within it *travel cost method*) and also a *hedonic price method/analysis*.

As Mitchell and Carson (1989) pointed out, *household production (function) method*, that belongs to the category of observed/indirect methods, is very attractive (together with other methods from this group) to economists because it is (indirectly) based on actual market behavior. The basic assumption of these methods is that consumers purchase marketed goods (which have no utility in and of themselves) which are combined with each other and at the same time with nonmarketed goods and with household inputs, for the purpose of producing goods and services which ultimately generate household utility. A variant of household production function is the *travel cost method (TCM)*. This method is, according to Mitchell and Carson (1989), commonly used to value site-specific recreation benefits. Parsons (2003), on the other hand, suggests that TC model is based on demand for use of a specific recreation site. Single-site models operate in the manner of conventional downward sloping demand functions. This means that „quantity demanded“ for a single person is represented by the number of trips taken

¹⁰ The fact that the detailed description of every technique from these two groups would require separate book, in this review only techniques/methods recommended by some authors, such as Navrud and Pruckner (1997), which are considered crucial in process of valuation of environmental goods and health impacts, will be addressed.

to a recreation site during the season, while the „price” is expressed by cost of reaching the site.

According to Hanley and Barbier (2009:98), *hedonic pricing method* identifies environmental service flows as characteristics which partly `describe` a marketed good, typically housing¹¹. This method tends to find the relationships between the levels of environmental quality and prices of marketed goods (houses). Those relationships are later used for measuring the value of changes in environmental quality.

Stated preference techniques, as pointed out by Brown (2003), rely on answers to carefully worded survey questions. Answers within those surveys, whether given in the form of monetary amounts, choices, ratings or other preference indications, are reduced to an appropriate preference model to yield a measure of value. Unlike revealed preference techniques which rely on data reflecting actual choices people make – *revealed behavior*, stated preference techniques collect data about so called *planned*, i.e. *intended behavior* of respondents. Stated preference methods, unlike revealed preference techniques, can provide estimates of Hicksian surplus (Boyle, 2003a).

One of the most commonly used nonmarket valuation techniques in practice within both stated preference and revealed preference categories is *Contingent Valuation Method – CVM*. From methodological perspective, CVM is based on survey which is used for eliciting values people place on goods, services and amenities. This method filled a huge gap by providing a way to estimate values in cases when markets don't exist and when revealed preference techniques are not applicable (Boyle, 2003b).

Besides aforementioned feature, CVM is characterized by several important advantages compared to revealed preference techniques. Advantages, such as – high level of flexibility, ability to measure both use and nonuse value (passive-use value), ability to obtain ex ante estimates, etc. – make CVM one of the most common in practice, but also one of the most controversial nonmarket valuation methods (Kostić and Rodić, 2012).

¹¹The value of a specific house may depend on many factors, such as: the number of bedrooms, whether it has a garden, etc. but also on the noise level and air quality level.

Application possibilities of economic valuation

In order to scrutinize application possibilities of the results of economic valuation we will rely on categories/areas presented in papers written by Navrud and Pruckner (1997) and Pearce and Seccombe-Hett (2000).¹² It is pretty interesting that, like about so many issues in this discipline, there`s no full consensus between authors about this question too. According to Navrud and Pruckner (1997:3), economic valuation can be used for: *project evaluation, regulatory review, natural resource damage assessment (NRDA), environmental costing and environmental accounting*. Pearce and Seccombe-Hett (2000:1419-1420) emphasize broader and somewhat different division: *CBA of Projects, CBA of policies, pricing policy, design of environmental taxes, national accounting, management tool, participatory exercise*.

The authors agree that economic valuation can be used for *evaluation of projects*. This type of use goes back to 1950s when the first valuation studies were conducted in the USA in order to deal with “intangibles,, within CBA in a more consistent and systematic manner (Navrud and Pruckner, 1997). This type of use Pearce and Seccombe-Hett (2000) call „traditional” and the most common in practice. *CBA of policies* or the area of *regulatory review* as it is called by Navrud and Pruckner (1997), was established in the USA at the beginning of 1980s when legislation has demanded that all new important regulations must be subjected to CBA (Pearce and Seccombe-Hett, 2000). The thing that makes this type of use different from evaluation of projects is the fact that attention is moved toward a new type of output. Unlike evaluation of projects, regulations aim at `changing the rules` for private production or consumption, while the output depends on the extent to which they will comply with those rules (Navrud and Pruckner, 1997). *Environmental costing* on one and *pricing policy* and *design of environmental taxes* on the other side are practically parts of one entity. The conceptual rationale for actions within this field presents the need for an efficient allocation of resources in the presence of externalities. One of the motives for use of economic valuation within the field of *national (green) accounting* is the

¹² Referring to those, such as to many other authors who dealt with issues of economic valuation, Laurans et al. (2013) managed to develop so far the most detailed typology of possible uses of economic valuation. This typology consists of three main categories and even eight subcategories.

response to critics that existing accounts can't be used for judging people's well-being unless factors, such as natural resources, are omitted.

Development of parallel structure which will include these (environmental) services along with marketed goods requires determination of shadow prices for those services when they are used in production and consumption (Navrud and Pruckner, 1997). One of the areas, cited by Navrud and Pruckner (1997) and omitted by Pearce and Secombe-Hett (2000), in which economic valuation has resulted in more concrete – (in)direct manner (especially CVM), is *natural resource damage assessment (NRDA)*. Unlike the use of CBA for regulations, the distributional issues (i.e. to whom is money directly or indirectly paid) are presented in more transparent manner. According to Navrud and Pruckner (1997:4), the concept of natural resource damage liability contributed to the shift of focus of the economic literature on nonmarket valuation in the USA.

Unlike the CBA of projects and policies/regulations whose aim of analyses is normative by its nature, the aim of NRDA analyses is exclusively of compensational character. Besides all mentioned areas of use, Pearce and Secombe-Hett (2000), emphasize two more possible uses of economic valuation. At first, economic valuation can be potentially used as a *management tool*.

This means that economic valuation indicates relative strength of WTP for different attributes of specific asset, which further means that the asset can be managed in the way which will highlight and expand those features that attract the highest WTP. Economic valuation can also serve as a *participatory exercise*. Participation of public within this process can help to ensure such a result in which the final change (in the level of provision of public good) will be acceptable by those most affected.

Directions and scope of action of economic valuation

The key question concerning economic valuation is does it represent just an intellectual, academic exercise or it has a specific purpose?

In order to illustrate specific purpose of economic valuation in environmental field, it is necessary to find the evidences that specific valuation studies, i.e. their results, were used in the process of policy decision-making, environmental management, etc. However, the problem

that frequently occurs refers to the difficulty of identifying specific effects of economic valuation¹³, which, according to Laurans et al. (2013), points to the fact that certain gap exists between ambitions in the context of use of economic valuation and its specific achievements in terms of policy decision-making. On the other hand, according to Seppelt et al. (2011: 631), the main obstacles preventing the concept of being more operational are a lack of information at scales relevant to decision-making, a limited practical knowledge of institutional decision and implementation structures and a scarcity of models that align economic incentives with conservation. The fact is also that economic valuation does not operate only *directly* (emphasizing specific management and policy issues).

According to McCollum (2003), there are many studies that exclusively contribute to the development and refinement of methods to estimate nonmarket values, which means that those studies are methodological by its nature. Studies of such a kind contribute *indirectly* to certain policy and management decisions in such a manner that they provide the technology to inform decisions and debate. That way, studies that aren't aimed at specific policy questions or management issues can affect the decision-making process by altering the policy debate. However, because these categories usually overlap, it is sometimes difficult to distinguish which study belongs to which of the above listed categories.

In the further discussion we will use some of the nonmarket valuation studies that played a particular role, cited by McCollum (2003). At the beginning we will focus on the use of nonmarket valuation in *litigation and damage assessment*, i.e. in before mentioned NRDA. The author primarily cites the study of Bishop and Heberlein (1979) in which authors compared estimates of value for goose hunting permits in Wisconsin obtained by CVM to actual cash transactions. This study was used as a basis in reaching an out-of-court settlement in a wetlands damage case. Also, in the litigation over American Trader Oil Spill in California in 1990¹⁴ state relied on existing data to estimate lost beach recreation caused by the oil spill. In this case *benefit transfer* was used to estimate lost consumer surplus value. Probably one of the best known ecological catastrophes took place in 1989 in Alaska when oil spilled from the tanker which was in property of Exxon Company. Among other things, thanks to the magnitude and location of the event, involvement of several high

¹³ The problem additionally complicates poor documentation following conducted researches.

¹⁴ Details can be found at: <http://www.dfg.ca.gov/ospr/NRDA/american-trader.aspx>

profile players (U.S. Government, State of Alaska, Exxon) and the perception of a defendants' financial strength, emphasized the importance of nonmarket valuation, especially CVM. However, the fact that this case ended with an out-of-court settlement prevented nonmarket valuation from showing all possible benefits of its use.

McCollum (2003) points out that there are pretty strong indications that nonmarket valuation was used for the purpose of informing policy and management related to natural resources. The author cites valuation study of waterfowl conducted by Hammack and Brown (1974) which was used by the American Department of Interior (DOI) in the process of appropriations for wetlands before American Congress. The process was ended successfully and some of the participants in the discussion thought that the notion of net economic value relating to waterfowl contributed significantly to such a positive result. Besides that, the author also cites a short list of studies (Donnelly et al., 1985; Loomis et al., 1985, etc.) that contributed to species and habitat management decisions and also significantly affected hunting, fishing and so called nonconsumptive wildlife use in Idaho and Montana.

Over the more than three decades, one of the most prominent users of nonmarket valuation was the *Environmental Protection Agency (EPA)*. Nonmarket valuation analyses were used in CBAs to estimate benefits of some environmental regulations. In several cases nonmarket valuation played central role in the process of adoption of some environmental regulations¹⁵.

As it was already mentioned, nonmarket valuation analyses contribute not only to decision-making process by clarifying existing trade-offs and by identifying magnitudes and directions of specific effects. These analyses can also affect the process itself. The results of these analyses can inform and sometimes change the flow of debate about a certain question. They can also identify new and relevant players or parties which can affect the process by altering it way beyond a specific decision. Nonmarket valuation can also affect the way of thinking of decision-makers by broadening the scope of their consideration of the problems they face. The illustrative example, cited by McCollum (2003), of how valuation studies altered the process by which decision making took place,

¹⁵ Details can be found in (Economic Studies Branch, 1987).

represent a series of studies conducted in Alaska over a long period of time, such as (Swanson, Thomas, and Donnelly, 1989; Peterson et al., 1992; McCollum and Miller, 1994; Miller and McCollum, 1994; Miller, Sinnott, and McCollum, 1994; Clayton and Mendelsohn, 1993; Miller and McCollum, 1997, etc.). Results of this series of studies played a crucial role in the revising policies for managing wolves and bears in Alaska in terms of suspending and designing regulations.

Concluding remarks

Inflexibility of certain principles of the old welfare economics and obvious gap and disproportion between rich and developed theory and poor and modest practice open the door to critics on one, and numerous advocates of the normative branch of economy, who continued to make efforts towards its development, on the other side. By establishing the new welfare economics – rejecting cardinality and interpersonal comparison of utility, introduction of (controversial) Hicks-Kaldor compensation principle and pointing out to the problems of measurement of welfare changes and introduction of basic measures (four Hicksian surpluses, i.e. WTP and WTA) – the conditions for practical use of the concept of economic valuation in the field of environmental protection were met. This field became the centre of interest during the 1950s particularly thanks to growing environmental problems. As purely anthropocentric, i.e. utilitarian, the concept of economic valuation created majorly for addressing the needs of people and maximizing their well-being, turned out to be useful and of high quality (although not ideal) for addressing certain issues of greater social significance. One of the key factors that influenced flourishing and enrichment of economic valuation and following techniques, was gradual introduction of other noneconomic, i.e. ethical arguments and principles to the economic valuation process (such as intra and intergenerational equity, recognition of intrinsic value of the environment, etc.).

The major problem that initiates the debate between scientists refers to the following question – do we need economic valuation and if yes what's the scope of its action? From the perspective of advocates of application of this concept in the field of environmental protection, we consider it necessary and desirable, with all its advantages and disadvantages. On the other hand, many nonmarket valuation studies, (whose results directly or indirectly entered the process of policy decision-making, management decisions or affected and altered the debate), testify about the actual scope

of action of the concept. Beside all that, the fact that reputable world institutions, such as EPA, OECD, WB, etc., argue the need and necessity of application of economic valuation also testifies the credibility of the concept. It is obvious that possibilities for application of economic valuation grow over time, i.e. the number of fields in which those results can be applied increases over time. One thing about which we could agree with the critics of this concept is that economic valuation is not sufficient in itself and that its use is very difficult to observe (Laurans et al., 2013).

In order to consider the future of nonmarket valuation we will rely on presumption (and certainly a wish) of Richard Bishop (Bishop, 2003:563), which is one of the leading researchers in the field of nonmarket valuation and a significant contributor to development of CVM, especially in the field of its validity. He emphasizes that future of nonmarket valuation is bright and that “*the quest to adequately account for environmental values in policy analysis will only expand as we and our children and grandchildren continue the struggle to balance environmental quality against other goals.*”

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PRODUCTIVITY OF OLD TYPE OF GRAINS AND GENETIC RESOURCES PRESERVATION¹

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Abstract

This paper presents the status of wheat genetic resources at the global level and in the Republic of Serbia. According to the report of the Food and Agriculture Organization of the United Nations dated 2010 the collection of wheat consists by 45 % of the total number of samples stored in gene banks around the world. In Serbia, a collection “of wheat and corn”, is also better represented comparing to other collections, with approximately 32 % of the total number of samples stored and maintained in breeding farms. In addition, the paper points out on some of the most ancient wheat species gaining more value through the use of organic farming. A review of domestic and foreign relevant literature provides an overview of the research that examines old kind of wheat productivity in different production conditions during last years. The general conclusion appoints that these types can achieve very good results in terms of production with low investment, but further work on their breeding is necessary.

Key words: *grain, genetic resources, organic farming*

Introduction

In the past, agriculture has played an important role in maintaining genetic diversity. However, due to the resulting economic and environmental change in replacement of a large number of species with a

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small number of uniform and high yielding varieties and hybrids, caused a significant loss of agro-diversity. Many species and varieties that have played an important role in human nutrition practically disappeared over the past century. Rahmann (2011) states that, during the twentieth century, approximately 75 % of plant genetic diversity is lost, mainly by farmers replacing numerous local varieties with few genetically uniform hybrids.

The loss of species diversity in the centers is causing genetic erosion and loss of genetic resources, which have a negative impact on agriculture. Yet, in 1929, the N.I. Vavilov recognized the importance of collecting genetic material in the centers of origin of certain plant species in order of its preservation for future generations. Soon, the centers and institutions were established worldwide with a mission to preserve and multiply the collected genetic material, and to create new and expand existing collections. So many species and old varieties saved from extinction enabling their subsequent direct use in the production and use of genetic material in breeding new varieties.

Organic agriculture is an ecological form of production that promotes natural processes and biodiversity. The adoption of organic farming in recent decades has been established indirectly saving species and varieties which is due to under-utilization of threatened extinction. On the other hand, the use of old varieties and landraces in organic agriculture is not only increasing the genetic divergence of cultivated plants, but it is easily establishing the stability of production and yields, which highlights the dependence of organic farming on conservation of biodiversity. Using the old species and populations is not only a goal but a necessity in the organic farming system since they are characterized by a high degree of adaptability to local agro-ecological conditions, resistance to diseases and pests, tolerance to infestation and lack of nutrients. Greater attention to these ancient species has resumed growing demand for traditional products, for which astute consumers are willing to pay a higher price, especially if labeled as organic products. Higher product prices offset yield losses that occur in organic growing conditions, and thus ensure sustainable production.

In recent years, organic production of particularly interesting species of wheat without chaff as *Triticum monococcum*, *Triticum dicoccum* and *Triticum spelta* is presented. Tests show that compared to common wheat, these types exhibit greater resistance to powdery mildew and leaf rust,

and protect the grain from the chaff attack diseases such as *Fusarium graminearum* (Konvalina et al., 2010a).

Genetic resources of grain in the World and the Republic of Serbia

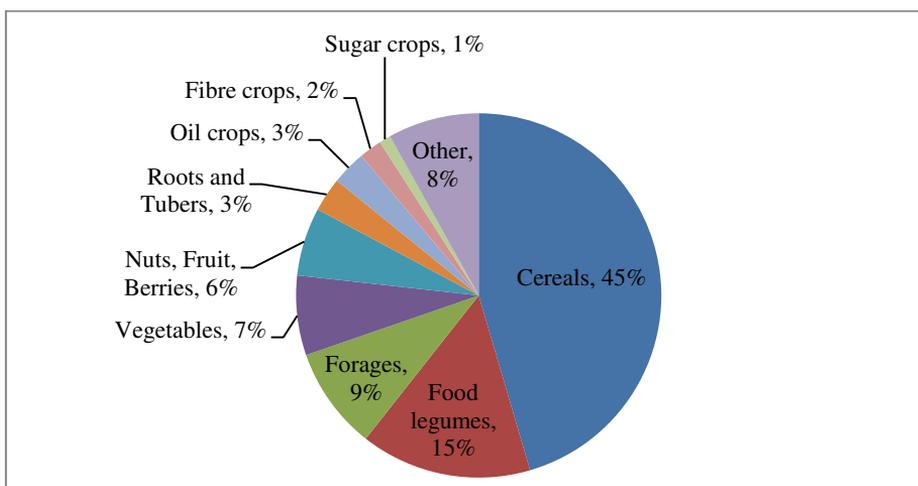
Genetic resources for food and agriculture (agro-biodiversity) are a very important components of biodiversity and the overall diversity of the plants, animals and micro-organisms genetic material, which are necessary to maintain the basic functions of agro-ecosystems (Prodanovic, 2006). Agro-biodiversity is an important part of global biodiversity, but the human diet is based on a very small number of species. Agricultural areas in the world were planted with 12 species of wheat, 23 species of field and vegetable crops, and about 35 kinds of fruit, which means that approximately 1440 million hectares is planted with no more than 70 species (Altieri, 1999). No more than 30 species of plants produces 95 % of the calories of plant origin at the global level, with only three species (rice, wheat and maize) constitute 50 % of the total (Rahmann, 2011).

Genetic diversity is a necessary basis for human life and for economic development, and therefore for policies aiming to preserve genetic resources essential component of the global economy (Roljević et al., 2011). To preserve the diversity of species that currently have great significance for nutrition and are supposed to have an economic impact in the future, a number of GenBank, in which the genetic material of different species are preserved and multiplied, were founded around the world. The aim is to preserve genetic resources for future breeding work and made them available to future generations. GenBank and *ex situ* conservation, are the most appropriate way to preserve germplasm of domesticated plants and their wild relatives, and *in situ* conservation in their natural habitat on farms for their safekeeping and use significantly easier. According to the purpose of the collection, they are classified into several groups (core collection, the active collection, core collection, gene collection).

According to the 2010 FAO report, there are 1,750 GenBank that preserve the genetic material of plants important for food and agriculture, globally. It is estimated that global *ex situ* maintains 7.4 million plant genotypes and patterns. According to the character of the material to be stored, the most common local population (44%) inbred lines (22%), modern

cultivars (17%) and wild or weed species (17%). Analysis of genetic material suggests that about 30% of plant genotypes differ (or 1,9-2,2 million samples), while the rest is doubled.

Figure 1. Percentage of different plant groups in the total number of samples at the global level



The gene banks have, as the most common, collections of cereals and legumes (Table 1). Collections of wheat covers 45 % of the samples, with the largest number of genotypes of wheat (856 168), rice (773 948), barley (466 531) and maize (327 932). Oats genotypes (130 653), genus *Aegilops* (40.926) and *Triticosecale* (37,440) are less represented in the collections of grain (FAO, 2010).

Institution, dealing with the preservation of plant genetic resources at the national level, pays more attention to collection and preservation of neglected and under-cultivated crops. Neglected crops in the past were much more cultured and had a great importance in human nutrition. However, replacement of major agricultural crops or the disappearance of the environment in which they are grown, brought faster vanishing of these species. There is a great concern for the survival of wild relatives of cultivated plants as their natural habitats are disappearing due to changes caused by man and climate. Great value of genetic resources of wild relatives is reflected in the possession of resistance or tolerance to biotic and abiotic stress and these properties are important for the adaptation of major crops to a changing environment.

However, cultivation of field crops in farms, centers of origin, plays a key role in preserving genetic diversity. Thus, the expression of genetic variation population to adapt to changing conditions of the environment and the sustainability of agricultural production is allowed.

In Serbia, the largest number of samples to be preserved *in situ* and *ex situ* collections are the "wheat and corn," a total of 8,646. *In situ* or on-farm breeding, held about 32 % of genotypes, while the remaining 68 % held in academic institutions and Genbanks. In this collection, most of the samples are those of corn (74%), followed by wheat (17.5%), barley (5.2%), oats (3%) and rye (0.5%).

Table 1. *Number of genotypes of cereals stored and grown in situ in the Republic of Serbia*

	Type of collection	Wheat	Barley	Oats	Rye
Instituts	Cultivars	200	70	10	1
	Breeds	500	100	20	5
Other	Landraces	50	10	5	5
	Relativs	50	20	10	2
Total	1.058	800	200	45	13

Source: *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture was launched at FAO (SoWPGR-2), Country report on the state of plant genetic resources for food and agriculture country report, Republic of Serbia, Headquarters, Rome on 26 October, 2010*

According to the National Report of the Republic of Serbia (2010) *in situ* are preserved and cultivated 1,058 samples of cereals, with most samples of wheat, then barley, oats and rye. The largest numbers of genotypes grown in situ are domestic varieties, while the local population and relatives of the main types of cereals can be found only on farms in marginal agricultural areas. Among the neglected cereals species in our country are *Triticum durum* and *Triticum spelta*.

The *ex situ* collections, is represented with most of the samples of old varieties and landraces, while the old cultivars are under-represented. Collected genetic material is kept in the Institute "Zemun Polje" Plant Gene Bank and the Ministry of Agriculture, Forestry and Water Management. According to estimates of the *ex situ* conservation, the collection, "wheat and corn" includes 5,888 samples.

Table 2. *Ex situ conservation of samples of grain crops in the Republic of Serbia*

	Type of collection	Wheat	Barley	Oats	Rye
Instituts	Lanraces and traditional cultivars	70	30	15	10
	Relatives	200	100	20	5
Genbanank		439	117	180	18
Total	1.204	709	247	215	33

Source: *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture was launched at FAO (SoWPGR-2), Country report on the state of plant genetic resources for food and agriculture country report, Republic of Serbia, Headquarters, Rome on 26 October, 2010*

In the total number of samples to be stored 80 % are genotypes , while 20 % are small grains genotypes. In the collection there are 325 samples of relatives of small grains, which are an important source of genetic material for future breeding work.

Given the great importance of wheat and other grains in the population nutrition, the priority of institutions involved in preservation of genetic resources in the Republic of Serbia will be collecting new samples, and their evaluation in existing collections. Regarding the current state of preservation of plant genetic resources for food and agriculture in the Republic of Serbia, Roljević et al. (2011) point out that it should work to achieve the following objectives:

- All domestic collections should use the same descriptors approved by international organizations such as the ECP/GR or IPGRI,
- Collections should have the databases available on the Internet,
- Organize the collection of new samples in the field,
- All databases should be linked with line ministries,
- Using new methods of biotechnology, particularly molecular markers, it should be given more attention in the evaluation of samples,
- Cooperation with other institutions involved in collection, and wheat germplasm, exchange of samples collection and dissemination as well as participation in all working groups ECP/GR.

Documentation system plays an important role in the management of genetic resources. Unfortunately, due to the poor economic situation in the country and research institutions engaged in germplasm collection, and crop databases are maintained at a low level.

The role of organic agriculture in conservation of genetic diversity

According to the FAO/WHO organic agriculture is a holistic system of agricultural management that promotes health ecosystems, including biological cycles and soil biological activity. Organic agriculture is based on the creation and maintenance of conditions that positively affect the health of ecosystems and encouraging natural processes instead of entering artificial inputs. Very important is the role of organic agriculture in the preservation of biodiversity and genetic resources, by promoting diversity on farms and “on farm” conservation. Since this type of production is suitable to the number of species in nature and does not reduce the production, it is also known as sustainable. By integrating the advantages of biodiversity in agricultural practices to the genetic diversity of species and varieties adapted to local ecosystems it limits the influence of biotic and abiotic stress factors on the yield and quality of crops. Therefore, breeding locally adapted varieties is not only measure of sustainability and conservation of agro-diversity, but it has to be followed by need for their use in organic farming because of the agronomic characteristics they possess.

Most of the genetic diversity of domesticated species are the traditional varieties or landraces (*Camacho Villa, 2005*). Traditional varieties are genetically diverse, locally adapted and relevant to agricultural production, especially in marginal conditions, where, because of the adaptation to unfavorable environmental conditions and tolerance to weed and nutrient deficiencies, are still a very important role in human nutrition. The diversity of the local population allows manufacturers to obtain safe and stable crop yields even in the situation when stress or disease attack, which in this case was in the peripheral parts of the crop because, thanks to the genetic heterogeneity of some genotypes to be affected by stress but not all of them. In this way, the level of infection plant diseases might be successfully controlled, and thus enable the production of healthy food without the use of synthetic pesticides. Thus the effect of compensation reached with the local population might apply lower rates of seed and be grown in a small density compared to conventional uniform sorts.

Today, there are a few different varieties of crops selected especially for organic growing technology, while, according to estimates, more than 95 % of this production is based on varieties that have created the conditions for conventional production (*Lammerts, 2011*). However, these varieties have characteristics that are very important for the conditions of low input production, such as organic. Although the properties are to be achieved by breeding for organic production, as well as a satisfactory yield, resistance to biotic and abiotic stress, quality of cooking and good organoleptic properties, does not differ from the preferences of conventional production, it is very important expression of these traits in low input systems, which is not guaranteed if the selection is done for conventional production (*Lammerts, 2011*). In addition, some features that are highly desirable in conventional agriculture can have negative consequences in the low input system. For example, the focus of most commercial wheat breeding program is to improve the yield by increasing the harvest index.

This involves the introduction of dwarf genes that affect the shortening of the tree. *Lammerts (2011)* points out the key problems that are caused by the introduction of dwarf wheat: reducing the size and depth of the root system, relying on the introduction of high levels of inorganic nitrogen for the synthesis of the corresponding protein content, reduced competitiveness against weeds and reduced resistance to the operation of protection against weeds (a thus the greater the need for herbicides), greater susceptibility to diseases such as powdery mildew, Septoria, Fusarium, reduced protein content and greater resistance to lodging.

According to *Oljača et al. (2002)*, almost all the methods that are used to increase agro-biodiversity (intensification of crop rotation , crop - pair polyculture, cover crops, establishing integrated ecological farm) are used in organic farming systems. The main objective of well-planned crop rotation is to increase biodiversity in order to fill empty niches occupied by harmful organisms and establishing community -like nature and the interactions that exist in these communities. The effect of crop rotation as a complex measure is beneficial in Multi-link: the structure of soil, water, air and thermal regime, soil biological activity, balance, organic matter content and availability of minerals, creating and maintaining a favorable structure and protecting the soil from erosion, all of which contribute to a favorable microclimate for the development of crops and increase the competitive ability of crops. Crop rotation is implemented by including additional crops products, cover crops, mixed crops and roofing.

The introduction of cover crops crop rotation is achieved by training and rational use of land resources. Growing crops in double cropping with Rides causes stress (irrigation) in the warmest part of the year, after harvest of small grains can greatly influence the overall productivity of arable land with far less investment. The stubble cropping system can complete omission of farming which decreases work and energy consumption. Besides the importance of agro-technical characteristics (increased organic matter and soil fertility) cover crops help to combat corvettes, diseases and pests.

In order to restore the ecological balance in the communities of crops it is necessary to increase their biodiversity. In natural communities, it is this feature of the stability factor, and the polyculture basis for organic agriculture that contribute to increased biodiversity. Pairing the crop represents growing two or more crops simultaneously in the same place . Increased diversity in cultivated plant communities contribute to a better redistribution and use of natural resources, increasing biomass production and yield, reduces damage from attacks of weeds, pests and diseases and provides socio-economic benefits (greater system stability, secure income, better and more varied diet). Numerous obstacles for wider use of this system of cultivation of large areas might be found in the fact that high-tech resources (agro-chemicals, varieties, mechanization) are created for growing a single plant species system.

Cover crops are a typical example of useful relationships introduction in agro/ecosystems. These are the types of crops that are grown in pure culture or as a mixture of several kinds to cover and protect the land for part of the year when the main crops are not grown, and its rapid and strong growth make constant pressure on weed populations. Cover crops can be boomed and incorporated into the soil, which is called green fertilization, or to mow and leave the surface of the soil as a living mulch. Cover crops can be grown after harvest of the main crop to the land covered by the next growing season (subsequent crop), can be seeded as the main crop during the growing season (sub crop) or sown simultaneously with the main crops (intercropping).

Productivity of old type of grain in different conditions production

In addition to biotechnical and technological advances that modern agriculture has, a need for identification of appropriate genetic resources among older varieties and local populations, both to their direct use and

potential parental lines in breeding programs for better adaptation of modern varieties is important. Exploitation of gene banks can be useful because the characteristics of crops needed for low input and organic production, such as tolerance to reduced availability of nutrients or disease resistance disappeared in the implementation to obtain high yielding varieties.

From social, cultural or economic reasons, just some species of the genus *Triticum* such as *Triticum spelta* L., *Triticum durum* L., *Triticum monococcum* L., *Triticum dicoccum* and many others are becoming more and more interesting. In the past, these species were very numerous, but demands for high productivity and the creation of modern varieties of crops pushed them into oblivion. However, now they are coming back into use and gives an image of exclusive food that are astute consumers are willing to pay a higher price than other products of modern wheat varieties. Because not of everyday use, but also because it can serve as an alternative source of dietary fiber and protein, these crops are also called alternative or underutilized species. Greater attention to these ancient species has resumed growing demand for traditional products. The old types have shown better performance in non-competitive pedo - climatic conditions, compared to modern varieties, but the key problem of lodging during their breeding (*Konvalina, 2012; Lammerts, 2011*). Besides of this type use value, it have been of invaluable importance in the preservation of plant genetic resources, and are considered as a valuable source of genetic material for further breeding of modern cultivars for its resistance to stress and disease (*Codianni, 1996; Kountroubas et al., 2012*). Most commonly it is associated with alternative systems of agriculture such as organic agricultural production.

In our climatic and soil conditions, these crops can be managed well. According to past experience of *Kovacevic et al. (2007, 2009)* who has examined alternative types of grains and have showed that they give lower yields of bread comparing to commercial *Triticum aestivum* ssp. *vulgare* (cultivar NS 40S), but the good yields are achieved with alternative species and varieties have other advantages when it comes to the purpose and quality.

Spelt (*Triticum aestivum* subsp. *Spelta*) is one of the earliest domestic types of wheat. It is suitable for cultivation in low input systems, without the use of pesticides in severe environmental conditions in marginal areas (*Bonafaccia et al., 2000*). Spelt appear in a winter and spring types, with

the winter sowing something deeper than the regular wheat, which enables a good root system development and prevents freezing. Now days it is grown primarily for the organic food market, mostly in the German-speaking world. Spelt has a significant genetic pool for breeding modern cultivars of wheat. Useful features include resistance to disease due to morphological grain characteristics, better use of nutrients in low input systems compared to modern wheat varieties and high overwintering (Kountroubas *et al.*, 2012). The tree is spelled in the middle of an empty and has thin walls, therefore, especially in older varieties (which can be up to 1.5 m high) has increased the possibility of lodging which is considered the major drawbacks of this kind.

Spelt has a variety of potential applications, depending on the genotype of the variety and processing conditions. Hulled grain spelled mostly small, with soft endosperm and high gluten content that gives it an advantage in the application of specific products (cakes and pastries). Bread made from spelled flour has a distinctive strong smell, taste great and stays fresh longer than conventional bread. It is believed, without scientific evidence that spelt has some medicinal properties and can be used in the treatment of inflammatory bowel disease system, neurodermatitis, but also in the treatment of high cholesterol in the blood.

Examining the differences in the qualitative and quantitative components of yield between spelled and common wheat at different levels of nitrogen application rates and different planting Ruegger and Winzeler (1993) concluded that the moderate nitrogen requirements spelled gives higher average yields in low input systems of cultivation. During the three-year trials Berner *et al.* (2008) discovered that spelled and wheat yields were 14 % and 18% lower in terms of reduced tillage. This and other similar tests have confirmed the benefit of growing spelled in low input systems. The lower yields in low input growing conditions compared to the conventional system can be explained by a lower availability of nitrogen in the spring and early summer, because the higher humidity and lower temperatures in the conditions of reduced tillage microbiological processes are taking place more slowly. In studies of Kovacevic *et al.* (2007, 2009) growing under conditions of organic agriculture *Triticum spelta* (4.78 t/ha) had the highest yield of the alternative types of wheat. Grown in mountainous conditions, the principles of organic farming and the use of soil enhancers and microbiological fertilizer spelled gave very satisfactory yields (Oljača *et al.*, 2011). Kountroubas *et al.* (2012) conclude that the yield of spelt in low input conditions are satisfactory

and that can be grown as an alternative crop, but also suggest that it is necessary breeding of this species against flattening which would contribute to the sustainability of its production in the future.

After conventional (*Triticum aestivum* L.), durum wheat (*Triticum turgidum* ssp. *Durum*) is the most common cultivated species of wheat. Its hard, translucent light colored seeds are mainly used to brew semolina and pasta, as well as special types of bread. The protein content and gluten quality are the key factors affecting the quality of pasta, and depend on the genotype, agro - ecological conditions and technological process (Fagnano et al., 2012). Fagnano et al. (2012) reported that the yield of durum wheat in organic farming system is lower by 21 % compared to conventional production (an average of 2.5 t/ha in organic compared to 3.2 t/ha in conventional production). Some varieties had small yield loss in organic cropping system in relation to the average yield of conventional production which highlights the importance of selecting varieties adapted to the conditions of organic farming (Fagnano et al., 2012).

Wozniak and al. (2012) reported that the productivity of durum wheat depends, more significantly, on the agro-ecological conditions, but the processing system. However, it was found that the treatment system which affects the content of crude protein and gluten content in grain, both of which have the optimal parameter values in terms of conventional compared to no tillage cultivation (Wozniak and al., 2012) . Improved productivity of durum wheat with conventional tillage (CT) as compared to direct seeding (NT) was determined in tests of Giacomo et al . (2012). These authors suggest that the yield of durum wheat in no till system was 14% lower than the yields achieved in conventional tillage at the same level of nitrogen (Giacomo et al., 2012) . On the other hand, De Vita et al. (2007) indicate a correlation processing method and amount of rainfall on the yield of durum wheat. When rainfall is less than 300 mm productivity and quality of durum wheat is higher in the case of direct treatment, while the rainfall greater than 300 mm is suitable FOR conventional tillage (De Vita et al., 2007). Examining the yield components of three types of chaff wheat (*Triticum monococcum* L., *Triticum dicoccum* Schubler and *Triticum spelta* L.) in comparison with durum wheat (*Triticum durum* Desf. cv. *Trinakria*) Codianni et al. (1996) it might be reported that the durum wheat give 16.1% , 37.6% and 69.5% higher yields compared to dicoccum, spelt and monococcum. Among the types of chaff wheat only *Triticum dicoccum* showed similarity with durum wheat yield in parameters such as thousand seed weight, plant height and number of spikes per m² (Codianni et al., 1996).

Triticum monoccoum and *Triticum dicoccum* are the earliest cultivated forms of diploid and tetraploid wheat and their genetic relationships indicate that they originate from the southeastern part of Turkey (region rivers Euphrates and Tigris) (Stallknecht et al., 1996). Stallknecht et al. (1996) reported that in marginal conditions *T. monoccoum* yields equal to or greater than the yield of barley and common wheat, but in terms of conventional agriculture achieves lower yields compared to modern varieties of wheat. The same authors suggest that grain *T. monoccoum* contains more protein than red wheat grain (Stallknecht et al., 1996). Application of agronomic methods of production to *T. monoccoum* is necessary to adapt the later maturing and suitable for growing in areas with low rainfall, as in an area with a larger amount of moisture leads to greater flattening (Stallknecht et al., 1996). Susceptibility to the disease is not known, and can be expressed in terms of moisture in the environment (Stallknecht et al., 1996). Chaff has a very important role layer that protects the chaff wheat seed types of adverse biotic and abiotic factors.

Triticum dicoccum is suitable for cultivation in organic farming because it contributes to the improvement and expansion of agro range of plant species with higher added value (Konvalina et al., 2010a). Although in the past it played an important role in the diet of people, today are grown only in marginal conditions in the mountainous areas of Pyrenees and the Alps, in Italy, Spain, the Balkan countries, Turkey, the Caucasus, Ethiopia and India, which is well adapted and gives lower but stable yields. There was a better tolerance of this species to drought than the regular soft wheat (Konvalina et al., 2010b), higher protein content and improved tolerance to disease and the presence of weeds (Konvalina et al., 2012). However, a major drawback stands out less resistance to lodging and lower productivity classes compared to common wheat, and lower swelling power of protein and therefore *T. dicoccum* have no good baking characteristics (Konvalina et al., 2012).

Low content of iron and zinc in modern wheat cultivars necessitates the re-use of old varieties of wheat germplasm as *monoccoum Triticum*, *Triticum dicoccon* and *Triticum dicoccoides* (wild dicocum). These old wheat varieties have a higher content of iron and zinc in their grain, and the use of their genetic resources in the process of selection can fix shortcomings of modern varieties (Gomez-Becera et al., 2010).

The use of barley, as the covered or naked, is poorly represented in the human diet. The reason for the increased use of bakery products which are more suitable than wheat, barley, inferior appearance and organoleptic properties of the product of barley. On the other hand, in the form of chaff wheat forms required before using the peel grain which loses part of the aleurone layer and thus a significant part of the protein (*Bhatty, 1986*). *Bhatty (1986)* points out that the content of beta-glucans, non-starch polysaccharides which are partially soluble in water, which increases the viscosity of the feed barley makes it less suitable for the food industry. In the production of bread, wheat flour can be added to 5-10% barley flour, and seriously compromise the volume and appearance of loaves (*Bhatty, 1986*). Some studies have shown that naked form, on average, provide about 12 % lower yields than conventional forms of barley³.

In recent years, interest in the use of naked barley as alternative types of wheat in direct consumption and industrial processing has increased. Naked barley has a higher protein content comparing to regular barley (*Bhatty, 1986*) and is a rich source of soluble fiber, which belong to the group of beta-glucan (*Pržulj, 2009*). In the food industry it is suitable for the production of malt, muffins, cookies, tortillas and other (*Bhatty, 1986*). Because the content of beta-glucan barley-based products can be classified as functional foods, since this polysaccharide helps regulate blood sugar and cholesterol levels, reduces the risk of heart disease, relieves gastrointestinal problems and regulates body weight (*Pržulj, 2009*). *Pržulj (2009)* concluded that although Serbia has no tradition in the cultivation of naked barley, there can be identified genotypes satisfactory agronomic traits and yield profitable.

Although the benefits of growing neglected species grains in certified organic production are extremely big, they are still relatively poorly used. Using the old varieties and landraces in organic agriculture influences the increase in genetic divergence of cultivated plants, and facilitate the establishment of stability and production yield (*Prodanovic, 2006*). However, the main obstacles to the expansion of production of “ancient grains” is the lack of information on their agronomic requirements, therefore it is necessary to test their response to different environmental conditions (soil fertility, drought, salinity, etc.) in terms of the degree of fluctuation of yield and grain quality.

³ http://pubs.ext.vt.edu/2908/2908-1403/2908-1403_pdf.pdf pp. 10

Conclusion

The old type of grain and their local populations are of great importance for the production of organic arable land. Nutrient use efficiency, higher protein content, disease resistance, and better tolerance to weed compared to modern varieties are just some of the advantages of the old varieties. Greater attention to these ancient species has resumed growing demand for traditional products. However, apart from its value in use, these species have inestimable importance in the preservation of plant genetic resources, which are considered as a valuable source of genetic material for further breeding of modern cultivars because of its resistance to stress and disease. Because of the genetic potential of possessing old varieties and landraces have the largest collection of samples and in gene banks around the world. The introduction of organic farming and creating a market for indigenous products, is represented in a sustainable manner of agricultural biodiversity in situ conservation, especially keeping the genetic heritage of old varieties and species.

The main obstacle for the production expansion of the old type of grain is considered to be a lack of information about their agronomic requirements. Thus, growing in different environmental conditions has to determinate the fluctuation of yield and grain quality, and consequently adapt production technology supporting.

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REGIONAL ASPECTS OF SUSTAINABLE TRADE WITH AGRICULTURAL COMMODITIES IN RUSSIA

Vasily Erokhin¹

Abstract

The paper aims at overview of the main regional aspects of sustainable trade with agricultural commodities in Russia, considering its trade relations with CIS countries, EU and USA and facing the current tendencies of trade integration. The research shows that liberalization brings the real threats to the food security of Russian regions and increases dependence on foreign agricultural and food commodities. The related problems are observed in some of the Eastern Europe countries as well. The paper is concentrated on discovery of the most perspective tools to overcome the negative influences of trade liberalization for Russia and its trade partners in Eastern Europe and CIS, as well as enhancement of inter-regional trade as a key factor of sustainable economic development.

Key words: *agricultural commodities, sustainable development, regional aspects, agribusiness, trade liberalization*

Introduction

Trade with agricultural products in the last decades has become more and more globalized. The global trading system is now both freer and fairer than ever before, boosting global prosperity, making significant contribution to global economic development. Currently most of the regulatory functions on the global market of agricultural products are implemented by the World Trade Organization (WTO). This global organization unites the majority of the countries, including the main agricultural producers, exporters and importers. However, international trade with agricultural products is still rather far from full liberalization despite the progress achieved in international trade by agricultural production carried out within the framework of the WTO after many rounds of

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negotiations. Such issues as state regulation of trade, further perfection of sanitary control rules, decrease of custom duties and administration of tariff quotas on imported agricultural production would affect the character, structure, directions and dynamics of trade with agricultural products in future.

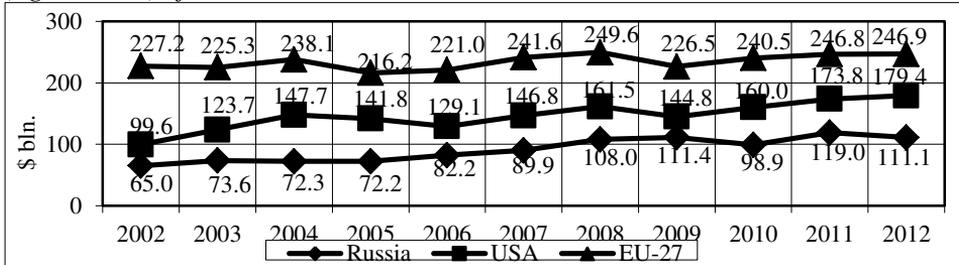
Results and Discussion

Until recently only one of the main global producers of agricultural products – Russia was not among the WTO members. Russia's accession to this global trade system in 2012 and membership of some CIS countries in WTO can change the structure and main tendencies of trade with agricultural products significantly since agriculture is supposed to be one of the most “sensitive” spheres influenced by trade agreements within CIS and Russia's accession to WTO. Many Russian experts foresee that the majority of Russian agricultural industries cannot equally compete with foreign producers. The dependence on import deliveries is critically high. Local agricultural and food products cannot identify customer in foreign and local Russian markets. Russian experts anticipate the decrease of the share of local agricultural producers on the internal market which, in turn, will affect the employment in related industries. Food processing industries, especially meat and dairy, are expected to be the most impacted (*Erokhin, 2011; Ivolga, 2011*).

Additionally, trade integration can bring not only damages, but also advantages. Along with a wide range of disadvantages to Russian agriculture resulted from Russia's accession to the WTO, many experts reasonably observe a series of opportunities, especially in the sphere of agricultural export. Russia is a traditional exporter of agricultural products to CIS, EU and USA, and WTO membership can provide easier access to foreign markets for Russian agricultural producers. Trade integration is also a process actively developed nowadays among Russia, Belarus and Kazakhstan (agreement on customs union) and among Russia and Ukraine – the second biggest CIS agricultural producer. These processes, supported by Russia's membership in WTO, will influence significantly the character of international trade with agricultural products in the region

Agriculture counts for little in the Russia's GDP (about 3-4% in 2002-2012). In 2012 the volume of Russia's GDP (agriculture) exceeded \$111 bln, which is almost half as much as EU-27's volume (VLANT, 2012) (see Figure 1).

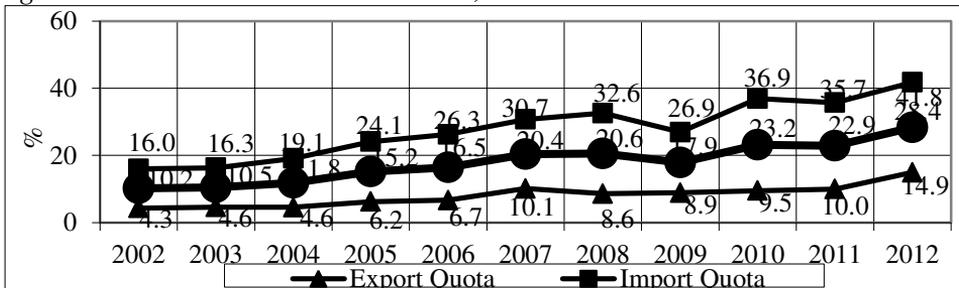
Figure 1. Russia's GDP (agriculture) in comparison with the GDPs (agriculture) of EU-27 and USA in 2002-2012, \$ bln.



Source: authors' calculation according to OECD (OECD, 2011a,b)

Comparing to other industries of the Russia's economy (oil and gas production, mining, etc.) agriculture plays second fiddle (in case we consider the volume of the value added and the share in total export). Share of agriculture in the Russia's export is small – only 1.5%. However, this industry is of great importance for Russia in the context of employment of rural people (over 10% of population is engaged in agricultural employment), as well as the overall structural sustainability of the country. Main crops produced in Russia (acreage rate) are wheat, barley, sunflower, oats, potatoes and rye. Wheat dominates in the crop rotation system (21.9% of Russia's arable land in 2012, 26.6 mln ha). In 2012 Russia produced 11.2% of world's barley, 5.9% of wheat, 4% of milk and dairy products, 3% of sugar, and 3% of poultry. Although Russia's share in world's oil-plants production is low (only 2%), in 2012 it produced over 20% of world's volume of sunflower oil. In the past decade the country increased production of soybeans (VLANT, 2012). Regardless of such high volumes of domestic agricultural production, Russia is a true net-importer of agricultural commodities. Moreover, its dependency on the import deliveries increases. To assess it we have calculated Import, Export and Foreign Trade quotas (see Figure 2).

Figure 2. Export, import and foreign trade quotas of Russia's trade of agricultural commodities in 2002-2012, %.



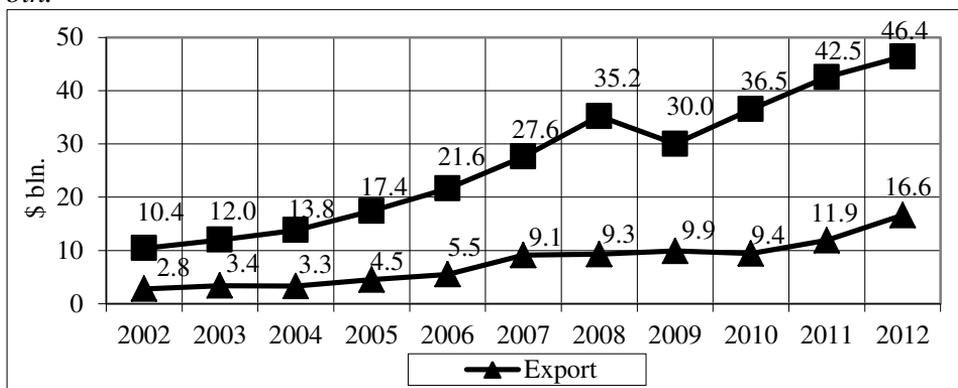
Source: authors' calculation according to OECD (OECD, 2011a,b)

Import and Export quotas show the share of import and export in GDP correspondingly, while the Foreign Trade quota results in a common importance of external trade activities for the domestic economy. Import Quota (agriculture) in Russia exceeds 41% in 2012.

Figure 2 shows that over 41% of Russia’s agricultural GDP is produced by means of import, which confirms a very high dependency (average EU and USA levels are around 20% (FAO, 2012d)). Export Quota (agriculture) grows as well, but it still remains incomparably low (only 14.9% in 2012). Russia’s export of agricultural commodities resulted in \$16.6 bln in 2012, while import reached \$46.4 bln (passive trade balance of \$29.8 bln) (Nilson, 2011).

Passive trade balance was a consistent trend of Russia’s foreign trade with agricultural commodities over the recent 10 years (see Figure 3).

Figure 3. *Export and import of agricultural products in Russia in 2002-2012, \$ bln.*



Source: *authors’ calculation according to OECD (OECD, 2011a,b)*

The largest Russia’s import items in 2002-2012 were meat, milk, dairy products, beverages and sugar. Beef, pig meat and poultry altogether made up over 19% of Russia’s agricultural import in 2012; beverages (alcoholic and non-alcoholic) – 6.3%, cheese – 5.1%, tobacco – 4.2% (VLANT, 2012).

Import deliveries of meat (beef, pig-meat and poultry combined) increased fourfold over a period of 2002-2012, while beverages and cheese – almost fivefold, sugar – threefold (see Table 1).

Table 1. *Import of selected agricultural commodities to Russia in 2002-2012, \$ bln.*

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012 to 2002, %
Beef	0.42	0.48	0.42	0.57	0.93	1.03	1.96	1.63	1.63	1.73	1.82	433.4
Beverages	0.24	0.37	0.52	0.72	0.71	1.13	1.28	0.81	1.05	1.11	1.13	471.3
Pig meat	0.68	0.65	0.63	0.82	1.40	1.64	2.20	1.91	1.92	1.98	2.03	300.0
Milk	0.01	0.03	0.05	0.06	0.02	0.05	0.06	0.04	0.24	0.32	0.36	3566.8
Tobacco	0.66	0.68	0.70	0.82	0.77	0.94	1.04	1.08	1.08	1.09	1.11	168.7
Sugar and honey	0.05	0.06	0.08	0.06	0.07	0.09	0.06	0.08	0.12	0.13	0.14	284.7
Poultry	0.81	0.69	0.66	0.84	0.91	1.04	1.32	1.07	0.84	1.05	1.08	133.0
Cheese	0.23	0.36	0.42	0.61	0.54	0.78	0.99	0.83	1.26	1.31	1.34	570.3

Source: *authors' calculation according to FAOSTAT (FAOSTAT, 2013)*

Russia's agricultural export is more homogenous than import. It is essentially made up of wheat, sunflower oil and barley. Since 2000 Russia was amongst the world's top wheat exporters with over 14% share of world wheat market (5th world position after USA, Australia, Canada and EU-27) (Nilson, 2011). World trade of wheat in 2012 grew up on 11% in comparison with 2011 (the maximum growth among the considered goods), and in absolute expression it amounts to 14 million ton (only trade of iron ore increased more considerably). Considerable growth of trade with wheat was promoted by big crops in Russia and CIS countries (in Russia and Ukraine long-term maxima of wheat gathering were fixed in 2008-2012).

In 2008-2012 wheat provided the one third of the total volume of Russia's agricultural and food export and became the most important crop in relation of both export earnings and farmers' incomes. Wheat is easy to produce and demand for it is growing, but such a high dependency of one crop is a serious threat for sustainability of Russia's agriculture. In case of bad harvest or world market failure domestic farmers would lose their money and the government would be hardly able to compensate such a high losses. Alongside wheat, Russia is one of the leading barley suppliers with over 16% of world's barley market share in 2012. Sunflower oil is becoming the constituent export item for Russia (VLANT, 2012). Its export volume increased 12-fold over a period of 2002-2012s (up to \$0.51 bln in 2012) (see Table 2).

Table 2. *Export of selected agricultural commodities from Russia in 2002-2012, \$ bln.*

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012 to 2002, %
Wheat	0.77	0.78	0.54	1.13	1.37	3.61	2.86	2.75	2.07	1.98	2.13	275.5
Sunflower oil	0.04	0.05	0.09	0.19	0.39	0.47	0.68	0.58	0.38	0.44	0.51	1270.6
Tobacco	0.04	0.05	0.05	0.09	0.08	0.10	0.15	0.14	0.10	0.11	0.13	311.3
Beverages	0.08	0.09	0.07	0.10	0.15	0.22	0.25	0.22	0.22	0.21	0.25	320.6
Barley	0.21	0.30	0.11	0.20	0.16	0.42	0.32	0.44	0.20	0.25	0.28	130.6
Milk	0.03	0.03	0.04	0.05	0.05	0.05	0.07	0.05	0.03	0.05	0.06	216.8
Sunflower cake	0.01	0.02	0.05	0.05	0.05	0.12	0.11	0.11	0.11	0.12	0.11	1462.4
Sugar and honey	0.05	0.03	0.04	0.04	0.07	0.12	0.03	0.06	0.02	0.03	0.04	80.8

Source: *authors' calculation according to FAOSTAT (FAOSTAT, 2013)*

Russia's main export destinations are Asia, Middle East and EU. China is the biggest consumer of Russian agricultural and food commodities with a share of 34.4% in Russia's agricultural export in 2012 (FAO, 2012b). Its share was even higher in 2005-2008, but China rapidly develops its domestic agricultural production and consequently cuts down the deliveries from Russia (Ministry of Agriculture of the People's Republic of China, 2012). Second biggest consumer of Russia's agricultural commodities (primarily grain) is Turkey (13.7% in Russia's export in 2012). Turkey is becoming the important trade partner for Russia, supplying its fruits and vegetables and consuming Russia's wheat, sunflower oil and barley.

Table 3. *Top-10 importers of agricultural commodities from Russia in 2002-2012*

#	Country	2002		2005		2008		2012	
		volume, \$ mln	share, %						
1	China	906.6	32.4	2290.1	50.9	4665.9	50.2	3404.3	34.4
2	Turkey	302.0	10.8	241.3	5.4	1468.4	15.8	1356.8	13.7
3	Korea	220.7	7.9	538.4	12.0	383.7	4.1	341.4	3.4
4	Finland	582.3	20.8	792.4	17.6	1261.0	13.6	326.1	3.3
5	Italy	41.5	1.5	85.5	1.9	410.8	4.4	222.8	2.3
6	India	48.4	1.7	7.5	0.2	121.0	1.3	148.9	1.5
7	Saudi Arabia	8.0	0.3	61.8	1.4	90.3	1.0	140.7	1.4
8	Indonesia	8.9	0.3	0.4	0.0	45.3	0.5	111.7	1.1
9	Germany	375.2	13.4	139.3	3.1	203.7	2.2	102.9	1.0
10	USA	109.1	3.9	63.8	1.4	87.7	0.9	62.1	0.6

Source: *authors' calculation according to FAOSTAT (FAOSTAT, 2013)*

List of the top-10 Russia's suppliers includes countries of Latin America, Europe and Asia. It is more diversified than the list of consumers, since no country has any superiority (Nilson, 2011). The biggest supplier is Turkey with only 4% of total Russia's agricultural import, but its volume of deliveries grows rapidly – from \$71.1 mln in 2002 up to \$1212.8 mln in 2012 (see Table 4).

Table 4. *Top-10 exporters of agricultural commodities to Russia in 2002-2012*

#	Country	2002		2005		2008		2012	
		volume, \$ mln	share, %						
1	Turkey	71.1	0.7	479.5	2.8	952.7	2.7	1212.8	4.0
2	Netherlands	94.9	0.9	242.1	1.4	870.9	2.5	1102.7	3.7
3	Brazil	5.7	0.1	171.8	1.0	605.5	1.7	867.3	2.9
4	Poland	73.4	0.7	399.2	2.3	255.6	0.7	788.6	2.6
5	Norway	0.9	0.1	154.4	0.9	369.8	1.1	621.2	2.1
6	Argentina	14.1	0.1	225.5	1.3	413.8	1.2	582.2	1.9
7	China	47.9	0.5	280.5	1.6	709.9	2.0	515.3	1.7
8	France	25.6	0.2	164.0	0.9	396.2	1.1	471.0	1.6
9	USA	101.4	1.0	115.7	0.7	226.4	0.6	451.8	1.5
10	India	429.3	4.1	317.4	1.8	347.9	1.0	429.7	1.4

Source: *authors' calculation according to FAOSTAT (FAOSTAT, 2013)*

However, in spite of the recent successes and solid positions on a number of world agricultural markets, there are still many problems in Russia's agriculture. They are both "hereditary deceases" of the Soviet past and problems encountered during the transition period of 1990-2000. Such problems are especially severe for the Russia's agriculture and rural territories.

In 2012 Russia joined the WTO. As we have already outlined, trade integration could bring both advantages and treats. In order to assess the probable influenced of Russia's accession to WTO we have to analyze the principal obligations undertaken by the country and see how their introduction may affect the domestic agricultural production and Russia's foreign trade with agricultural commodities. Member obligations in agriculture are different from the standard ones, usually undertaken by other accessing countries. According to the standard approach each accessing country "binds" the aggregate volume of support that distorts trade on the level of a three year period preceding the accession. This volume is a subject of reduction during a short period after accession. The allowed level of support for Russia is \$9 bln, which is twice as much as the level permitted according to the standard rules. The allowed level will be decreased gradually, and after 2018 it will be "bound" on the existing level. Russia

confirmed that after WTO accession (as well as of today) the export agricultural subsidies would not be implemented.

According to the Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences (Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences, 2013), the average weighted rate for agricultural and food commodities in Russia will be lessened by a third (from 15.6% to 11.3% by the end of the transition period). The major changes will take place in 11 commodity groups (see Table 5).

Table 5. *Changes in tariffs for agricultural commodities introduced by the Protocol on the Russia's accession to WTO*

Item	WTO tariff rate, %	Common Customs Tariff rate, %
Pigs	5.0	40.0
Pork (fresh, chilled or frozen):		
non-quota pork	65.0	75.0
quota pork	0.0	15.0
Edible bypass	15.0	25.0
Other meat and edible meat bypass	15.0	25.0
Milk and concentrated cream	15.0	25.0
Milk whey	15.0	38.0
Cheeses and curd cheese	9.5	19.0
Tea with flavor additives	12.5	20.0
Rice	10.0	29.0
Palm oil	3.0	0.4 Euro/kg
Sausages	9.0	25.0

Source: *Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences, 2013*

The major negative consequences are expected for the Russia's pork market that would be influenced by three factors:

1. decrease of the pigs tariff rate from current 40% to only 5%;
2. decrease of the frozen pork tariff rate (non-quota) from current 75% to 65%; and from current 15% to 0% for quota deliveries;
3. changes in tariff rate quota regime.

Tariff rate quotas had been excluded from the Russia-WTO agricultural agreement, although they proved their effectiveness as protective measures on the Russia's domestic meat market. Consequently Russia loses its capability to decrease meat quotas; they are fixed on the 2013 level. Moreover, quotas for pork will be repealed altogether after 2020. They will be replaced by the flat

tariff rate (25%) which will damage the competitiveness of domestic meat industry. Membership in WTO will obviously limit the opportunities in independent regulation of the external economic activity. Particularly, bound import tariffs will limit the maneuverability and flexibility of state custom and tariff regulations. The economic conditions of agricultural production will get worsened because of the low competitiveness of Russian production caused by the lack of the production factors of high quality, as well as by the weak interaction between agriculture and the rest of industries. It will become harder and more difficult for the state to protect domestic farmers, and the access of the foreign food commodities on the Russia's domestic market will become easier because of the lower import custom tariffs. This may lead to the decrease in the national production.

However, the "secret" of foreign farmers' success on the Russian market is not in the high quality of their products only. Agriculture is one of the most protected and "closed" industries. The main method of protection is to provide a huge volume of subsidies to domestic producers. Annual agricultural expenses of WTO member states exceeds dozens of millions US dollars. Most of this money they spend on the measures that distort trade and production. Obviously, this affects the global agricultural market negatively, leads to overproduction and landslide of prices.

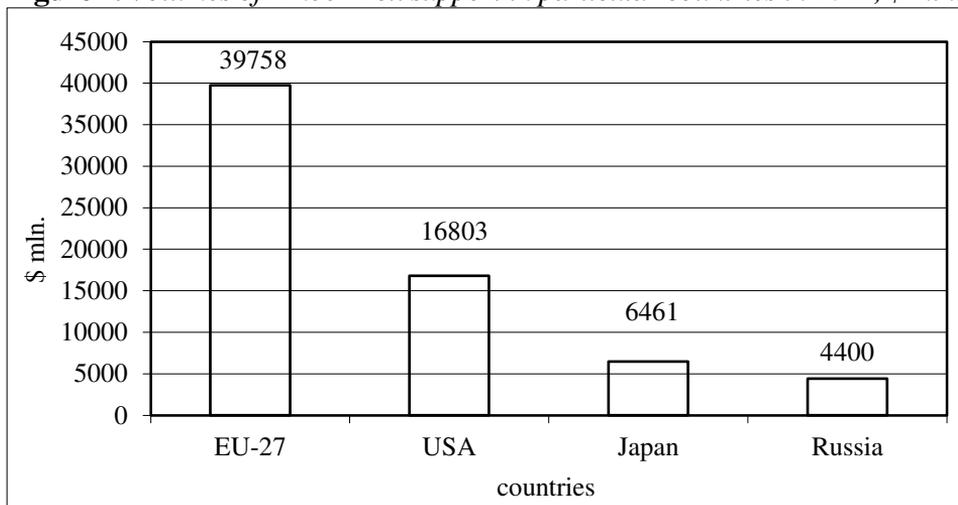
The importance of state support of agriculture cannot be overstated. Such measures undertaken as much as possible by most every country distort the character of international trade of agricultural products. Developed countries, primarily USA and EU, lay emphasis on implementation of a wide range of tools that affect competitiveness of domestic farmers and character of international trade directly and indirectly (FAO, 2012a). Such policies support effective elimination of prices disparity and increase of farmers' incomes.

Currently almost all-global volume of agricultural support is distributed between EU producers (39%), USA (36%) and Japan (15%). These countries provide more than 90% of total volume of subsidies worldwide. The share of state support in GDP of agriculture is 36% in EU, 37% in Japan and 39% in USA.

Russia fails to support its domestic agriculture proportionally with USA, EU and other developed states. Volumes of domestic support gained by farmers in Russia are 10-fold lower than in developed states. Being the world's biggest country and having the largest farming areas, Russia provides the state support of domestic agriculture which is lower than in Japan, one of the world's smallest countries without any substantial agricultural potential and opportunities to

develop its domestic agricultural production (Figure 4). Moreover, affiliation with WTO will limit Russia's capabilities to regulate its foreign trade activities. Particularly binding of import custom tariffs restricts flexibility of state administration of custom tariff measures.

Figure 4. *Volumes of Amber Box support in particular countries in 2012, \$ mln.*



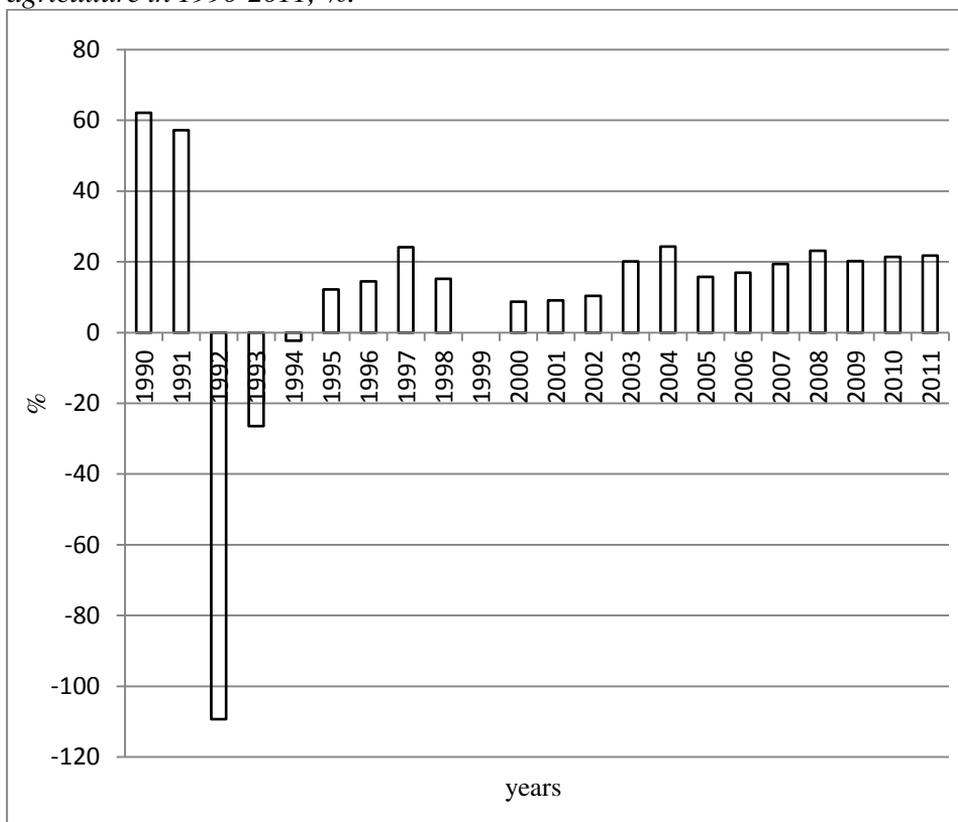
Source: *Erokhin, 2012; Ivolga, 2012*

When accessing the WTO, Russia announced \$9.9 bln as the maximum level of support of domestic agriculture in 2012 (and its gradual reduction to \$4.4 bln by 2018). However, the problem is that Russia does not spend even a half of this maximum, and no alterations are in view. This stipulates the low competitiveness of domestic agricultural and food commodities in comparison with USA and EU farmers. As the case stands, the certain problems for domestic producers would present themselves as the market gets liberal.

Starting from 1990 Russia's agrarian and trade policy had a true character of transition period, affected by the general economic transfer from administrative economy of Soviet past to market economy.

Rapid market liberalization and total absence of state support of agriculture of the early 1990s were replaced by the internal development policy, protectionist import barriers and export subsidies of the late 1990s, and then – import substitution and provision of food security in 2000s (Erokhin, 2011; Ivolga, 2011). The drastic reduction of state support of agriculture in the early 1990s can be illustrated by the dynamics of the Producer Support Estimate (PSE) share in total revenues of Russia's agriculture (Figure 5).

Figure 5. *Producer Support Estimate (PSE) share in total revenues of Russia's agriculture in 1990-2011, %.*



Source: *OECD, 2011a*

After the collapse of the early 1990s there was some kind of recovery of support in 1995-1997. Financial crisis of 1998 put the support back and only after 2000 it began to grow. In 2011 PSE in Russia reached 21.7% which was more than the OECD average (18.8%) (*Erokhin, 2012; Ivolga, 2012*).

Remarkable fact is that PSE growth in Russia contradicts the situation in the OECD states where PSE decreases over the recent years. The bulk of support in Russia is provided through the customs tariff regulations. Before WTO accession access to the domestic agricultural market was provided with high tariff rates and high import quotas for meat (the major import item).

About 62% of all Russia's import of agricultural and food commodities are administered by the tariff which rate is greater than or equal to 10% (Table 6).

Table 6. *Distribution of import tariffs for agricultural and food commodities in Russia in 2012, %.*

Distribution	No duties	0 ≤ 5	5 ≤ 10	10 ≤ 15	15 ≤ 25	25 ≤ 50	50 ≤ 100	> 100
For the number of tariffs	7.8	34.8	8.2	31.8	10.5	3.5	2.9	0.3
For the import value	9.9	22.3	6.1	28.7	18.9	8.2	5.9	0.1

Source: (FAO, 2012c)

The highest import tariffs are set for animal products, including meat. Tariff quotas are implemented as well that provides the biggest support to such “sensitive” industries of Russia’s agriculture as beef, pork and poultry production by means of the state trade policy. Tariff quotas for beef in Russia grew since 2005. On the contrary, tariff quotas for poultry decreased almost fourfold during 2008-2012. Custom tariff regulations are implemented in plant production as well. Being one of the world’s largest grain exporters, Russia introduced the embargo on grain export (for 1 year in 2010-2011) because of drought and grain shortage on the domestic market. Along with such emergency prohibitive measures the export tariffs are applied for the particular commodities (Erokhin, 2012; Ivolga, 2012).

In most cases non-quota protection of EU and US domestic food markets exceeds 100% (FAO, 2012d), while, for example, Russia implements 20-30% rates, which is not an essential barrier for foreign farmers subsidized by their governments. Consequently, it is questionable if Russia would definitely benefit from trade liberalization and get an easier access of its agricultural commodities to the domestic markets of developed countries. To succeed on such markets Russia has to undertake essential efforts to secure an exclusive competitive advantage.

Table 7. *Tariffs for non-quota deliveries of agricultural commodities to EU, USA and Russia’s domestic markets, %.*

Agricultural commodity	Russia	EU	USA
Milk and dairy products	19	163	126
Vegetables, fruits and live plants	36	161	132
Sugar and confectioneries	68	118	79
Vegetable oil	24	94	164

Source: *Research Institute of Agricultural Economics of the Russian Academy of Agricultural Sciences, 2013*

In the midterm Russia will not have to cut its domestic aggregate support rapidly since its obligations exceed the current volume of support until 2015. However, starting from 2015 it will become necessary to correct the trade policy in order to decrease the volume of state support to the agreed \$4.4 bln annually (Erokhin, 2012; Ivolga, 2012).

Such situation is more or less common for the majority of developing countries. Russia is a relatively wealthy country, but it cannot afford itself to support domestic farmers proportionally with developed countries anyway. Russia along with Ukraine has one of the lowest volumes of support among CIS and Eastern Europe countries. Thus, the nominal support index for Russia in 2000-2012 was 12%, while the average level for transition economies is 18%, including Poland – 15%, Turkey – 24%, Romania – 45% (Erokhin, 2012; Ivolga, 2012). To be noticed is that state support of agriculture in Russia was increased in 2007-2010, but even taking subsidies into account the average profit in most of the agricultural industries was not sufficient for the extended reproduction. This kind of reproduction is possible only when profitability of plant and animal production exceeds 30% (15-20% of profitability for short-run production of pork, poultry and eggs and inflation below 10%).

Global demand for agricultural and food commodities is under-elastic. Food and agricultural products are essential commodities; that is why developed countries aim at assurance of their food security by means of domestic production (except, perhaps, Japan) and saturate domestic markets with high-quality own-produced food commodities. To entry those markets foreign producers have to have some substantial competitive advantage. This is usually not the case of developing countries, which do not have sufficient resources to support their farmers and deliver such competitive advantages to their products. Consumers in developed countries already have all necessary food commodities of required quality; there is no reason to expect any essential growth of market capacity. Moreover, there are high custom barriers (either tariffs or sanitary regulations) on the way of foreign agricultural commodities (Josling *et al.*, 2010).

Principles of competition and fair self-regulation of global agricultural market, which underlie WTO activities, seem too hard for developing countries, particularly in the conditions of high state support of domestic agricultural complexes by developed countries, distorting fair competition (Liapis, 2011).

However, for Russia the situation is not so unpromising. Alongside with such serious apprehensions there are quite realistic effects of agricultural trade liberalization. *De jure* Russia was granted with a light regime of access to

foreign markets when accessing WTO and participating in trade and economic integration. But one can benefit here not so much by an expansion to the developed countries' markets as by getting more predictable operation regime on traditional markets, i.e. expansion of trade between CIS and other traditional Russia's trade partners.

Development of Russia's domestic market might have been another significant effect of agricultural trade liberalization owing to:

1. growth of assortment, improvement of quality and accessibility of food commodities for consumers;
2. enter of domestic farmers into competition for customers;
3. development of infrastructure of production, processing, storage and transportation of agricultural commodities, as well as rural territories by means of refocusing of state support on Green Box measures;
4. broaden income opportunities for rural people.

According to Ivan Ushachev (Ushachev, 2012), annual losses of Russia's agriculture as a result of WTO accession will be around \$4 bln because of the easier access of foreign farmers to Russia's domestic market and shrinkage of external market for Russian food and agricultural exporters.

According to Ernst & Young, Russian School of Economics and Centre for Economic and Financial Research (Tarasov, 2012), annual addition of Russia's GDP in consequence of WTO accession will be 0.41% (with the gradual tariffs reduction during 5 years). After the final tariffs reduction it will reach 0.96%.

According to the World Bank (Tarasov, 2012), Russia's accession to WTO will result in the annual GDP growth of 3.3%, however the consequences for agriculture will be mostly negative. The volume of agricultural production will go down on 3% by the end of the transition period, while import of agricultural and food commodities will go up on 11% and Russia's export will go down on 6%.

According to the Russian Union of Industrialists and Entrepreneurs (Tarasov, 2012), the consequences of Russia's involvement into international trade liberalization will be negative (Table 8).

Table 8. *Main consequences of the Russia's accession to WTO for agriculture*

Industry / activity	Losses / benefits from WTO accession, \$ mln
Pork production	- 670.0
Beef production	- 560.0
Poultry production	- 560.0
Sugar production	- 830.0
Milk production	- 970.0
Agricultural production, total	- 3600.0
Export of agricultural commodities, total	- 966.0
Import of agricultural commodities, total	+ 5104.0

Source: *Tarasov, 2012*

According to the Russian Academy of Agricultural Sciences (Ushachev, 2012), Russia's accession to WTO may slow down the growth of agricultural production from 21% to only 14% in comparison to the one planned by the State Development Programme, which equals to \$33 bln of losses during the transition period (\$4.2 bln annually).

Conclusions

Russia's accession to WTO and involvement into international trade liberalization bring the real threats to the food security and increase the country's dependence on foreign agricultural and food commodities. Foreign farmers get the access to the Russia's domestic market with the excess volume of food and agricultural commodities produced in their countries, while Russian farmers are not capable to compete with them because of their lower effectiveness. In order to provide its food security in the conditions of trade liberalization Russia needs the visible and qualitative state support of the most desirable and sensitive industries of domestic agriculture, as well as maximization of trade effects in the WTO framework.

Obviously, trade integration does not bring any single-valued consequences for any country. The assessment of its effects becomes even more complicated when we consider them in the context of the concurrent integration processes. Thus, along with WTO accession Russia became of the initiators of integration processes among the former Soviet countries. The Customs Union of Russia, Kazakhstan and Belarus was established in 2010; in 2011 these three countries annulled the custom control against each other. The given customs union serves to become the regional alternative of CIS in the very sphere of trade and to enhance the interstate trade in the region. In spite of the judgmental forecasts

about Russia's agriculture after the country's accession to WTO, more negative than positive, there is a range of opportunities to protect the domestic market and to support domestic farmers. The major thing to be done by the Russian government in the sphere of agriculture is to find new opportunities to enhance the long-term growth and competitiveness of this industry by dint of the measures which less distort trade, in relation to the WTO obligations.

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COMMUNITY GARDENING AND URBAN PERMACULTURE DESIGN

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Abstract

Urban agriculture, especially intensive commercial production of fresh food reduces food miles, contributes to employment and growth of urban economy. However, intensive agriculture also suffers from numerous ecological risks related to soil, water, air, climate, biodiversity and landscape. Faced with various developments, citizens occupied with new lifestyle's trends toward healthy food and closer contact with nature seek for revival and strengthening of extensive forms of urban agriculture, such as community gardening, especially organic, based on permaculture design principles. In the paper, the authors analyzed trends in community gardening in Europe, particularly in light of their role in the application of permaculture design in the development of smart cities, as well as the possibilities of their establishment and development in the City of Belgrade.

Key words: *urban agriculture, community gardens, organic farming, ecological gardening, permaculture design.*

Introduction

Urban agriculture has an important role in sustainable urban development. Different production systems represent urban agriculture – from low input production systems in agricultural enclaves within and close to the build-up city to intensive production of fresh food products for city green markets, processing and retail chains (meat, milk, fruits, and vegetables) on large commercial farms in peri-urban area.

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The positive externalities of urban and peri-urban agriculture and its basic perspectives can generally be observed and reflected primarily through the fact that this specific kind of agriculture provides safety food, reduces food miles and increases incomes (Živanović Miljković et al., 2012). Still, intensive agriculture also suffers from numerous ecological risks related to soil, water, air, climate, biodiversity and landscape (Popović, 2009; Popović et al., 2012).

Due to various environmental crises in urban areas, citizens are occupied with new lifestyle's trends for healthy food and environment and closer contact with nature. Thereby, they seek for revival and strengthening of extensive forms of urban agriculture, such as community gardening, especially organic, based on permaculture design principles. That principles seek to enable people to become more self-reliant and to relieve social injustices and ecological degradation (Veteto and Lockyer, 2008), as well as to emphasize designing sustainable agricultural systems.

Community gardening – concepts and experiences

In a broader context, **community garden** includes a plot of land subdividing in a few or up to several hundreds of subplots (allotments) assigned to individuals for non-commercial gardening (*allotment gardening*) and/or single, large piece of land gardened collectively by a group of people (*community gardening in the narrow sense*) (MacNair, 2002).

The development of the *allotment gardening* in Europe is connected with the period of urbanization and industrialization during 19th and early 20th century, and its significance related to food security became particularly evident during the first and second world war (so-called "victory gardens"). Increased interest in green economy from the 1970s revived demand for allotment gardens which have turned into recreational areas with a number of important environmental, economic and social advantages, although improved access to fresh, healthy (and culturally appropriate) foods should not be neglected, especially for vulnerable social groups (immigrants, unemployed, single parent families, etc.). Individual gardeners are usually organized in a non-profit allotment association interacting with related allotment associations on municipal, regional, national and international levels. The association leases the land, provided with basic infrastructure, by public or private owners, and takes over the administration of the allotment garden by elected board and/or appointed officials.

The gardeners participate in the adoption of common rights and duties by-laws and have to pay small (below market price) rent and membership fee to the association. According to UK Allotments Act (1950) local authorities are required to maintain an adequate provision of land to be subdivided into allotments for individual residents at such rent "as a tenant may reasonably be expected to pay", and the Resolution of the 32nd congress of the Office International du Coin de Terre et des Jardins Familiaux – the most important representative of national allotment and leisure garden federations at European level (Lausanne, 2000) – at a "socially acceptable rent". In this regard, financial support to allotment garden movement is essential, and has to be legally regulated and guaranteed (Office International, 2000a).

Allotments tend to be clustered around the built-up area and, due to their accessibility both in terms of location and in terms of rent; there is usually a long waiting list for membership (*Figure 1*).

Figure 1. *A typical German allotment scheme*



Source: *Bundesverband der Gartenfreunde e.V., (2000) in Drescher, (2001).*

The *community gardening in the narrow sense* is recent phenomenon in comparing with allotment gardening. It relates to collectively cultivating a plot of land by a group of people. Such gardens are usually found on derelict or vacant municipal land or abandoned land of private owners in

a build-up area, and managed by local community members, usually organized in non-profit organization², and wholly or partially budgetary supported. One of the best known projects of this kind is *Princess gardens* (2009), at Moritzplatz in multiethnic Kreuzberg district in Berlin, which has been described as "a kind of miniature utopia, a place where a new style of urban living can emerge, where people can work together, relax, communicate and enjoy locally produced vegetables"³ (*Figure 2*).

Figure 2. *Princess garden at Moritzplatz in Berlin Kreuzberg*



Source: <http://prinzessinnengarten.net/about/>

The non-profit company *Nomadic Green* has leased a site in Berlin/ Kreuzberg and has managed it. The garden is open to the public and provides a space for people to work in the garden, receiving as compensation the possibility to buy organic vegetables and herbs at lower prices than in the local markets, visit the restaurant and enjoy community dinner, based on ingredients from the garden. Everything is grown organically, on transportable vegetable plots, gardeners bring the seeds from trips to their home countries, make their own compost, while bee colonies, situated in the garden, take care of pollination. The *Princess garden*, with its numerous projects and workshops, could become a 'take-away food' model for the cities of the future (Mizani, 2011).

² There is also community gardens managed by other non-profit organization such as churches or other private landowners as well as by city parks departments, schools or universities.

³ <http://prinzessinnengarten.net/about/>

Organic and ecological community gardening

The requirements for conversion to organic production of vegetables, fruits, flowers and herbs within urban agriculture, including community gardens, strengthen throughout Europe. Organic production can be a significant source of income for vulnerable social groups and growing number of newcomers in the suburban areas (Filipović et al., 2013).

An interesting concept of **organic farming** on the allotments, known as *Selbsternte* (self-harvest) is established in Vienna 1987 and further developed during 1990s and in the early 2000s⁴ not only as a concept but also as a trademark for a consultancy office, which provides *Selbsternte* trade label and technical assistance to farmers involved in the project.

The concept of *Selbsternte* is based on the following: participating organic farmers prepare a parcel of arable land, owned or rented by a third party (tillage, fertilization and fencing and irrigation infrastructure) and sow or plant rows with 18-23 species. In the mid-May, the plot is divided into subplots of 20-80 m² that contain 2-6 m of every sown species, and then rented to self-harvesters for one vegetation period. Self-harvesters may plant additional species, respecting the already implemented production system. The rent depends of the subplot size and of the additional management offered by the farmer (irrigation, weeding, winter storage of harvested products, etc.). Farmers pay a license fee to *Selbsternte* Company for using trade label and consulting services.

The concept allows improved interaction between organic farmers and consumers, but its main significance lies in the fact that these subplots can be considered as *small experimental stations where self-harvesters merge traditional horticultural techniques with urban ideas of permaculture, sustainable land use and participatory farming, contributing to the improvement of urban agriculture and organic farming* (Vogl et al., 2004).

The Office International du Coin de Terre et des Jardins Familiaux promotes **ecological gardening**. According to Cushing and Brown

⁴ In 2002 there are 15 *Selbsternte* plots in Vienna and neighboring cities with 861 subplots of a total area of 68,740 m² managed by 12 organic farmers and 861 registered self-harvesters. The University of Kassel-Witzenhausen and city authorities of Munich, Germany also started the concept (Vogl et al., 2004).

(2005), ecological gardening goes beyond organics into a deeper ecology of gardening to understanding *the big environmental picture that our small gardens are a part of, and gardening in a way that maximizes the garden's positive contribution to the well-being of that wider environment. It means seeing our garden as a piece of the global landscape that interacts constantly with the ecology both within and beyond our fence lines.*

The question of how to transform a garden into a perfectly balanced ecosystem (including plant choices, climate, water, soil types, insects, soil biota, etc.), enters into the domain of **permaculture design** of which will be discussed in more detail in one of the later sections.

Community gardening – benefits and challenges

According to Vienna survey (Vogl et al., 2004) the self-harvesters were between 30 and 50 years old, have a family and high education level. Most of them helped in the home garden or on the farm of their parents or grandparents at some period of their lives. Some other analysis from Germany and Canada point the rising share of elderly people and immigrants in community gardens (Drescher, 2001, Wakefield et al., 2007). Other vulnerable social groups such as unemployed, single parents and disabled also have benefits of gardening engagement.

The main **benefits** of community gardening (Office International du Coin de Terre, 2000 and 2000a; Vogl et al., 2004; Wakefield et al., 2007) can be summarizing as follows:

- **Health benefits**
- *Improved nutrition* – the community gardens enable better access to fresh and culturally appropriated food to gardener families. These vegetables and fruit are usually organic, tasty, harvested at the good moment and not transported over long distances and made ripened artificially.
- *Improved physical and mental health* – the gardening help keep people, especially elderly people, physically and mentally active while provide relaxation to employed people after everyday business. Gardeners are more balanced and content, learn patience and have an improved sense of well-being.
- **Economic benefits**

- *Reduction of household food costs* – substituting store-bought food with garden grown products in the most cases means significant cost saving, especially for organically produced fruit and vegetables. This is of great importance for the low-income families, immigrants and unemployed.
- *Contribution to sustainable urban food security system* – although community gardening is no substitute for social programs for urban poor, it can significantly contribute to their food security.
- *Increased demand for inputs* – garden tools, seeds, and other production inputs may contribute to the growth of this production and trade sectors.
- ***Ecological benefits***
 - *Soil and water protection* - sustainable, ecological gardening, based on organic and permaculture production techniques (crop rotation, mulching, composting, natural plant protection, etc.) improves soil fertility and protects groundwater.
 - *Biodiversity preservation and improvement* - growing rare and local species and old varieties of fruit, vegetables and herbs as well as using biological pest control in the production process gardeners contribute to preservation and improvement of agro- and total biodiversity in urban areas⁵.
 - *Reduced food miles* - contribute to reducing traffic costs and fuel consumption and improve urban climate.
 - *Green infrastructure maintenance* - the gardeners care community gardens as part of urban green belts enabling the authorities to care for other green spaces.
- ***Social benefits***
 - *Exchange of experiences, education and training* - gardens are meeting places for people of different generations, culture, skills and social backgrounds, improving tolerance, solidarity and community cohesion. The garden management organizations give special attention to children animation and education.
 - *Community mobilization* - gardening often serves as a starting point for broader discussion and mobilization for other important community issues.

⁵ According to Naturschutzbund Deutschland (NABU), in 2011 as the year of the common redbird, the highest population density of this bird species, frequently used by scientists as a parameter to determine the official sustainability indicator for biodiversity, was determined in allotment gardens with 2.2 pairs per ten hectares (Office International, 2011).

➤ **Scientific benefits**

- *Experimental work and outcomes* - as it mentioned earlier, small-scale gardening enables experiments (new species and varieties, pest repellent, mixed cropping, sowing dates, etc.) with the outcomes that potentially can contribute to the improvement of sustainable and climate-smart agriculture in general.

Low technical skills, contamination of soil and air and poor infrastructure are **constraining factors** for the engagement in community gardening. Public support of garden associations to financing advisory services, soil quality analysis and infrastructure facilities are necessary. However, land competition i.e. access to land for renting and security of land tenure remains a **major challenge** for existence and development of community gardening. As Groening (1996) noted, where municipalities had no strategy for the acquisition of municipal real estate, conflicts with allotment associations tended to become harsh, and sometimes lead to organized political protest⁶.

In the Resolution (2000), the International Office call for protection of existing allotment garden sites throughout Europe, including allocation of land for future needs, by their integration in the town planning schemes or by other legal acts, regardless of their size⁷.

Poor access to officially designated allotments may leads to unregulated production of unsafe food on abandoned land, contaminated by past uses. Urban planners and local authorities have a decisive role in avoiding such consequences by identifying zones for community gardening and related infrastructure building (irrigation facilities, etc.) and by protecting tenure rights on such land.

In order to meet new challenges related to sustainable urban design, urban planners are increasingly turning to a holistic approach such as *permaculture*. Community gardens are an important element of the urban permaculture design.

⁶ Kishler (2012) points out to a valuable democratic potentials of community gardening, connects them to the Occupy movement and advocates their role as one of the most powerful responses to developing sane and well-balanced societies.

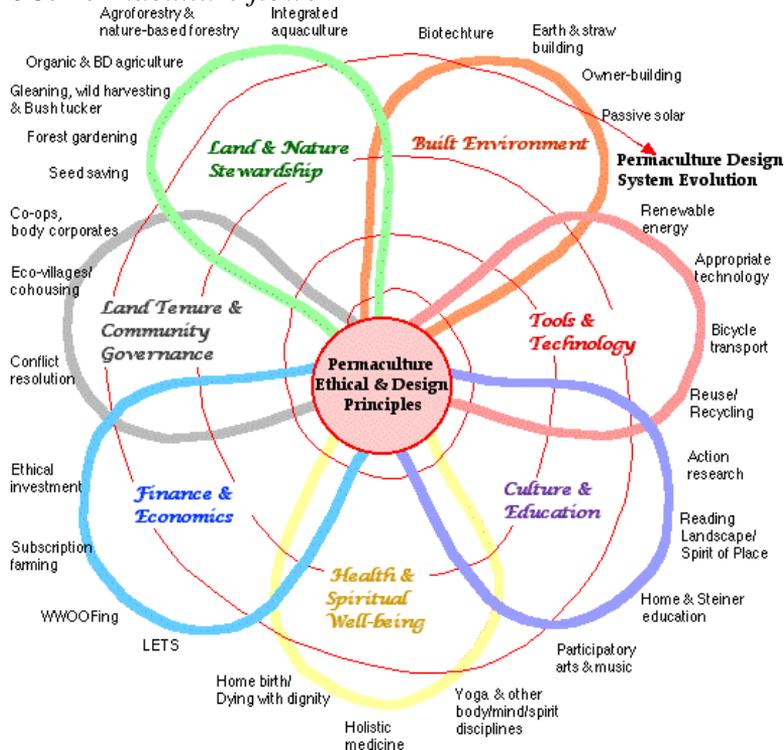
⁷ Land used for allotment gardens in Berlin has been reduced by almost 50% after the World War II due to favoring of the city development and despite the fact that these areas are defined by and integrated into urban planning (Drescher, 2001).

Urban permaculture design

Permaculture is a holistic approach to landscape planning and human culture that conceptualizes prodigious wisdom with modern technology (Kvarda and Mihatsch, 2012).

Starting with ethic and design principles focused on land and nature stewardships, the concept of *permanent agriculture* evolved into wider, more radical concept of *permanent culture* that means the overall cultural shift to sustainable and decent human life. This implies significant changes in the way the people provide not only food but also housing, transportation, energy, economic gains, social connections, education and health and spiritual wellbeing (*Figure 3*).

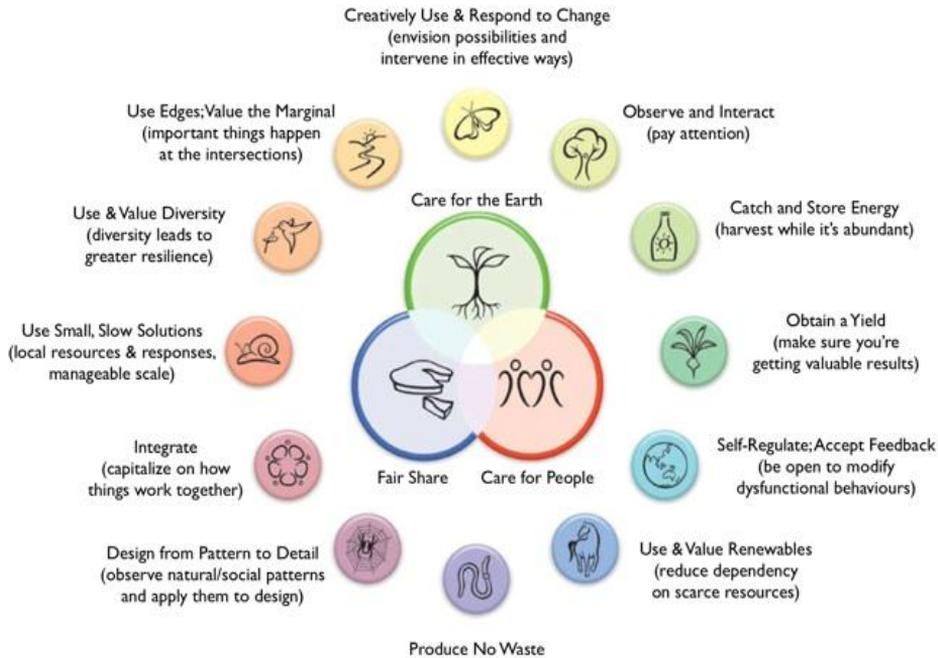
Figure 3. *Permaculture flower*



Source: Holmgren, (2002).

According to Holmgren (2002), three foundational ethical principles – *Earth Care*, *People Care* and *Fair Shares* – guide the appropriate use of the following key permaculture design principles (*Figure 4*).

Figure 4. *Permaculture ethical and design principles*



Source: <http://manifoldinc.com/permaculture/>

Above-mentioned principles are universal, but strategies and methods of their application in practice are site-specific, adjusted to local resource, skills and tradition, and specific outcomes projected from the each individual permaculture system/place, ranging from balconies and urban yards to farms, eco-ethno villages and beyond.

Urban permaculture design implies any form of design that minimizes resource depletion, preserves water cycles and protects soil, establishes community gardens, and fosters urban metabolism (Kvarda and Mihatsch, 2012).

As we noted earlier, **community gardening**, including vertical house greening, roof gardens, etc., has significant role in modern city planning, especially for city quarters greening. Environmental benefits and social inclusion as the main results of citizens' engagement in this form of multifunctional land use make important contributions to environmental aspect of *smart cities* concept⁸.

⁸ A Smart City is a city well performing in a forward-looking way in the following six characteristics: smart economy, smart people, smart governance, smart mobility, smart

The permaculture design project for emerging Seestadt Aspern (*Aspern Urban Lakeside*) city quarter in Vienna's 22nd municipal district for approximately 20,000 inhabitants is very instructive (*Figure 5*).

Figure 5. *Seestadt Aspern Master Plan - Overall Urbanistic Structure*



Source: Vienna City Administration. *District Planning and Land Use. Aspern Airfield Master Plan, 2008.*

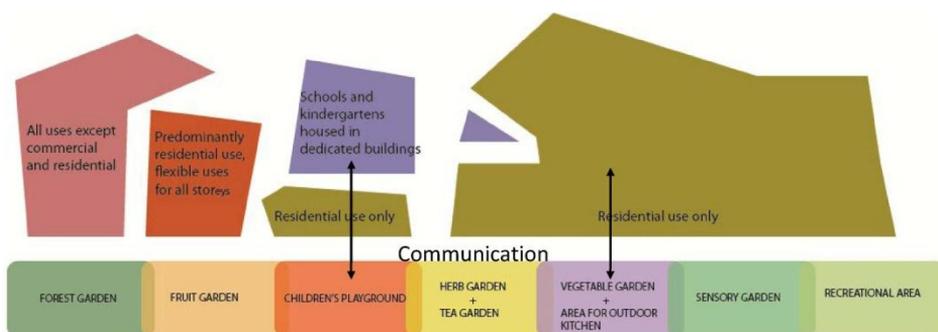
The main intention of Seestadt Aspern Permaculture Design Course⁹ was to create a sustainable system of small thematic community gardens based on permaculture design principles, with mixture of forest trees, vegetable, fruit, spice and herbs (*Figure 6*).

Together with the nearby recreational areas, particularly children's playgrounds, these gardens will form functional green infrastructure connected to the nearby agricultural region of the Marchfeld.

environment and smart living, and these characteristics are built on the "smart" combination of endowments and activities of self-decisive, independent and aware citizens (Giffinger et al., 2007).

⁹ Socrates Erasmus Intensive programme for a Permaculture Design Course, organized in the Seestadt Aspern in Vienna (2012) by the Institute of Soil Science at BOKU in cooperation with the Academia Danubiana and participation of students from the Danube and Western European countries, including Serbia, representatives from the City municipality of Vienna and other local stakeholders (Academia Danubiana, 2012).

Figure 6. *Seestadt Aspern thematic gardens' zone area*



Source: *Milošević-Štukl et al., 2012.*

Community gardening in the City of Belgrade – Possibilities and Experiences –

The home gardens in Belgrade have a long tradition. Fruit trees of traditional varieties and carefully cherished garden beds of vegetables, spice and aromatic herbs and flowers, for centuries represented an inevitable subject of family home backyards of old Belgrade¹⁰. Mass apartment construction in the period of socialism not favored existing of gardens in scope of the block settlements, so preferences for growing the vegetables and flowers the wealthy citizens could satisfy in the backyards of their weekend houses, which were built in ecological oasis in the peri-urban area. Crisis 1990s was reflected on Belgrade home gardens in two ways. On the one hand, precious green oasis, backyards and home gardens, along with family houses, disappeared under the wave of illegal and uncontrolled apartment building construction. On the other side, people faced with lack of money, illegally occupied area of urban construction land that were not put to use, and transformed it into small allotments, where they grow basic vegetables without soil quality control and basic infrastructure requirements. The obtained products of suspicious quality and safety often were placed on improvised street stalls nearby.

After difficult years of the crisis, the comprehension about the benefits of engaging in the establishment and cherishing of own little oasis of health,

¹⁰ Master plan of Belgrade 2021 (Official Gazette of the City of Belgrade, No. 27/2003, 25/2005, 63/2009) especially stressed the importance of home gardens in blocks of individual housing formed in the city central zone and the need to valorize these areas by making specific decision for their protection by the city government.

peace, recreation, socializing and enjoying the flavors and aromas of fresh fruit, vegetables, medicinal and spice herbs and flowers had been remained¹¹. Today, almost 15 years later, planted vegetables in some housing blocks of New Belgrade and on several other locations in the city (Blok 45, Veliko ratno ostrvo, Žarkovo...) still can be seen¹².

The priorities have changed over time. Socio-economic reasons are still actual for the certain categories of the population, but among the stakeholders there are the young and educated, employed people, which are willing to devote their spare time to provide healthy food and habits to their family and children, spending time with nature and neighbors in a productive and creative way. In order to provide adequate infrastructure and safety of investments in the community gardening, it is essential to regulate the issue of land tenure. This is no easy task, regarding the strong land competition and the numerous unresolved land tenure issues in the City of Belgrade (Tomić et al., 2009; Popović and Živanović Miljković, 2013). Community gardens are not legally regulated. The Master Plan of Belgrade 2021, in the section on the concept of agricultural development, prescribes a "program for the establishment of allotment gardens, divided into small plots for several years' use by individuals in scope of the agricultural and rural enclaves around the city center and the other predominantly residential areas". In accordance with rational and appropriate use of agricultural land, the Strategy of Agricultural Development of the City of Belgrade (2009) pleads for leasing free of charge the small plots owned by the state to "small and low-income family farms"¹³. The results on operationalization and implementation of these commitments have not been registered so far¹⁴.

¹¹ See more in Cvijanović et al. (2005) and Popović and Savić (2008) about the natural and infrastructural conditions and experiences in the organization of labor-intensive production of spices, medical and aromatic herbs and flowers in small holdings, and their implications to unemployment reduction and social inclusion.

¹² It is estimated that the illegal allotment gardens cover an area of about 100 hectares and usually are handled by retirees for health and economic reasons (Vrbavac, 2013; Eko Kuće, 2013).

¹³ Which should involve all interested citizens in the context of community gardening.

¹⁴ According to Aleksandra Tilinger from the Urban Institute of Belgrade "the City does not have answers to the questions of how, where and what the garden does it needs". It is necessary to determine needs for the land, to define the criteria, to conduct the spatial analysis in terms of planning documents and ownership status, to define the ways of funding and informing the citizens. The initiative could come from interested citizens associations and institutions, such as schools, hospitals and social institutions, (Eko Kuće, 2013).

Having in mind above-mentioned European experiences, the available land, natural conditions and structure of the potential participants in the programmes for community gardens of the city of Belgrade, for discussion and further development we suggest organizational models of community gardens with following prevailing benefits:

a) *Community gardens on squares, devastated urban pockets and public green areas in the build-up city, as well as on the properties of schools, kindergartens, student camps and churches.*

Community garden in this sense would imply a plot (fixed or transportable) of land with fruit, vegetable, spices, herbs and flowers cultivated collectively by a group of people, with the active involvement of scientific institutions and advisory services in workshops devoted to the organic farming and permaculture design¹⁵. Exchange of experiences, education and training and landscape improvement will be the main benefits of this garden type.

b) *Community / allotment gardens in housing blocks of close type (community gardens) and housing blocks of open type (community and/or allotment gardens).*

A range of small thematic gardens on the inner housing block/ city quarter or on its edges will be realized as a part of wider multidisciplinary permaculture design project of living in the related housing block, with dominant health-recreative, ecological (biodiversity improvement, green infrastructure) and social benefits (community cohesion and mobilization).

c) *Allotment gardens clustered around the built-up area, available to the interested citizens, as well as in social housing settlements and in social protection institutions.*

Allotment gardens in this case has primarily health and economical-social functions – the improvement of food, health and family budget for the poor and marginal social groups.

At the end of September 2013, WWOOF Serbia and Belgrade flower festival¹⁶ opened the debate on the future of community gardens in Belgrade with representatives of the city government (Secretariat for Environmental

¹⁵ Those gardens have special importance for the children in pre-school and primary school age, which learn about the concepts of healthy food, caring for nature and quality of life improvement by common action in the local community (see the results of two-decade lasting project "Children bio-gardens" managed by retired professor Branka Lazić, PhD, Faculty of Agriculture, Novi Sad (Mitrović, 2011).

¹⁶ Those two organizations are the founders of the first community garden in Belgrade, an area of 6 hectares, divided into 12 parcels of 50 m² in which organic vegetable production occurs, based on the principles of permaculture (project "Baštalište" in Slanci settlement started in the season 2012/13).

Protection of the City of Belgrade) and the Urban Institute of Belgrade. On this occasion it was emphasized the need to *develop a strategy of development of sustainable community gardens, the institutionalization of developing models and their operationalization through the system of urban planning.*

Conclusions

Numerous positive and promising experiences, both theoretical and applied, could give an input for developing community gardens based on permaculture design concept. Multifunctional land use in permaculture manner provides many environmental benefits, social inclusion and economy benefits. In the City of Belgrade land competition is the major challenge for existing and development of community gardening. Thereby, urban planning documents have a decisive role in *avoiding spatial conflicts* by *integrating* community gardening issues into plans and *regulating* land tenure rights as well as by *initiating* the guidelines for defining the criteria for estimating the real citizens' needs for existing such land inside the City, which are undoubtedly great.

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THE COMPOSTING OF PLANT RESIDUES ORIGINATING FROM THE PRODUCTION OF MEDICINAL PLANTS¹

Vladimir Filipović², Vladan Ugrenović³

Abstract

As the areas under grown and collected medicinal, aromatic and spice plants (MASP) continues to increase, in addition to the processing and storage capacities, it is necessary to properly provide the storage, treatment and disposal of the waste that is generated that way. According to the national and EU legislation on waste management, the producer is obliged to properly store, treat and dispose of generated bio-waste. The great variety in the number of plant species of the grown and collected MASP, different collecting terms, different parts of plants used for medicinal purposes are just some of the benefits afforded by engaging in this activity, by which, in addition to the main produce, a producer, can provide an additional source of income. By the composting of the waste occurring in the production of MASP, a versatile final product is created, which, through its “healing” effect, affects the profitability of production, as well as the fertility and structure of the soil where MASP are grown and collected.

Key words: medicinal, aromatic and spice plants (MASP), production, waste, composting, compost.

Introduction

In the sector of the production and collection of medicinal, aromatic and spice plants (MASP), during the processing, a significant amount of bio-waste is generated, which has been, in the practice so far, buried in

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landfills and other unallocated spaces, particularly together with inorganic waste and/or contaminated hazardous matter (*Amir et al., 2005; Brändli et al., 2007; Cai et al., 2007*). The most dreadful, or, perhaps, the saddest, is the fact that a large portion of that waste was incinerated, without turning it into some kind of exploitable energy. Therefore, the current lack of full scientific certainty cannot be a reason for not taking measures to prevent the loss of thousands of tons of this sort of waste, as well as the reason "for giving tacit approval" for the further degradation of the environment.

Unfortunately, instead of that, organic waste recycling is at the very beginning in this country, although, according to the Waste Management Strategy for the period 2010-2019, the goals were defined that act preventively towards the reduction of the formation of new waste, as well as a large number of principles that are consistent with the principles of effective EU documents.⁴

The European Union Landfill Directive prohibiting the disposal of biodegradable waste in landfills encourages the composting and other methods of the treatment of biodegradable waste as a very convenient way to reduce the amount of bio-waste that has been landfilled so far.⁵

Some authors (*Fuhrmann et al., 2005; Heinonen-Tanski & van Wijk Sijbesma 2005; Kayhanian et al., 2007*) emphasise that the composting is a process by which the natural conditions of decomposition of organic matter are stimulated, and the expenditures are considerably lower than those when the incineration of waste is carried out (*Demirbas, 2011; Marshall, 2011*).

As described above, starting with the year 2009, each waste producer is obliged to care of the reduction of the generating of waste, of the development of products which are recyclable, of the development of the markets for the re-use and recycling of their products. Thus, according to the effective Law on Waste Management, this type of waste must be

⁴ The Government of the Republic of Serbia (2010): The National Waste Management Strategy for the period 2010-2019, the Official Gazette of the Republic of Serbia No. 29/2010.

⁵ The Council of the European Union (1999): the Directive 1999/31/EC on the landfill of waste of 26 April. The Official Journal of the European Communities, L 182, 1-19

properly disposed of, which implies a way that does not endanger human health and the environment.⁶

By the development of cleaner technologies such as composting, a by-product or waste resulting from the process of production and processing of medicinal plants will be exploited again and recycled. As the end product of composting, compost is created, which is, in addition to the primary use as an organic fertiliser, also used as an enhancer of soil structure, of the raw material for the production of substrates, and as mulch (*Filipović, 2012*).

Compost is an organic fertiliser and soil enhancer formed by the controlled bio-oxidant decomposition of various mixtures consisting primarily of different plant residues, which are sometimes mixed with organic fertilizers and/or animal residues, and it contains limited quantities of mineral matter. Composting is recommended in organic farming as a management tool for controlling weeds, pests and diseases. The incineration of organic materials is not allowed in organic farming, i.e. all organic waste from a farm has to be composted and returned back into soil in the form of compost (*Filipović & Ugrenović, 2012*).

Mature compost must be hygienically correct and odour-free, with minimal amounts of pathogenic microorganisms or weed seeds. Most states have ordinances on the quality of the compost, by which, the work on the production of quality compost is greatly facilitated (*Siebert & Amlinger, 2011*). The significant indicators of the quality of compost are its nutritive value, stability and maturity (*Brinton et al., 2012*).

The benefits of compost are manifold: highly valuable organic fertiliser is obtained, which is, apart from its primary use as an organic fertiliser, used as enhancer of the structure and agrochemical characteristic of soil, of raw materials for the production of substrates, and as mulch.

So far, the role of MASP as waste suitable for composting has not been much explored, which is making the goal – obtaining high-quality compost – somewhat difficult. In the research of Inam-ul-Haq et al. (2010), particular medicinal plants were applied which possessed the

⁶ The Government of the Republic of Serbia (2010): the Law on Waste Management, the Official Gazette of the Republic of Serbia, No. 36/2009 and 88/2010.

antimicrobial effect that was favourable for the compost used in the production of mushrooms.

The aim of this paper is to present the possibilities of composting and release and solving the issue of biological waste generated as a by-product of plant residues in the process of the production and processing of medicinal, aromatic and spice plants.

The current situation in the sector of medicinal, aromatic and spice plants on the level of the Republic of Serbia

According to the information from the Group of the producers of medicinal, aromatic and spice plants of the Chamber of Commerce of Serbia, in the year 2012, 1.337 hectares were under grown plants (2011 = 1.419 hectares). If we add to it a part of the area under spice plants listed as vegetables and a part of those areas on which the production is for foreign customers, it is about 20.000 hectares at best.

In the year 2012, the total foreign exchange trading in MASP was valued at 22.9 million dollars, of which, the export of these products amounted to 15.2 million dollars, and the import 7.7 million dollars. In the same period of the year 2011, the foreign trade was valued at 25.7 million dollars in the total weight of 6,500 tons. Of these, from Serbia, about 5.000 tons of MASP were exported, worth 19.8 million dollars. During the same period, 1.500 tons of MASP were imported, worth 5.9 million dollars.

The capacity of processing and placement by the enterprises in Serbia, according to a survey conducted by some associates of the Institute for Medicinal Plant Research “*Dr Josif Pančić*” from Belgrade, amounts to about 7.000-8.000 tons per year. If we add the capacities and requirements of other enterprises involved only in exporting, we can see that the demand for medicinal plants is high, and, by the estimates from surveys, it is over 10.000 tons per year (*Turudija-Živanović, 2010*). Based on the survey of several major enterprises, the conclusion was reached that the capacities for processing are two to three times greater than the amount produced plants. In this way, a twofold harm is produced: firstly, the producers of MASP do not earn more and do not expand their production; secondly, the processors do not use their capacities, and pay for transport and customs in case they buy in foreign markets (Albania, Bulgaria, etc). When it comes to the placement, none of the producers,

processors or exporters said they could not place produced plants in national or international trade markets.

At this point, we will mention only some of the companies whose principal activities are the production, purchase, processing and sale of MASP: “Fructus” – Bačka Palanka, “Macval“ – Novi Sad, “Herba” – Belgrade, “Adonis” – Soko Banja, “Zdravac” – Svrlijig, “Bilje Borča” – Borča, “Kirka Corporation” – Belgrade, “Melisa Farm” – Novi Sad, “Betula” – Žitkovac and the Institute for Medicinal Plant Research “Dr Josif Pančić” – Belgrade. The listed companies have different certificates for the implementation of internationally accredited standards (ISO, HACCP, Organic, etc), which greatly contributes to MASP produced this way in meeting high requirements for continued quality of this type of produce.

In Vojvodina, the most commonly grown are: chamomile, peppermint, marigold, lemon balm, coriander, lavender, white and black mustard, valerian, fennel, parsley, basil, caraway, dill, tarragon, marshmallow, celery, thyme and sage. In the mountainous part of this country, the following are plantated: marigold, lemon balm, arnica, lavender, gentian, centaury, St. John’s wort and others. According to the experience to date, the most collected are: yarrow, St. John’s wort, thyme, nettle, horsetail and many others that can be found in this area. The most wanted wild medicinal plants, beside the above mentioned, include: centaury, marshmallow, lemon balm, primrose, white hawthorn, gentian, juniper, linden, wild marjoram, heather, elder, sea fennel, bearberry, ramsons, wild rose or dog rose.

If the listed enterprises, apart from the primary activities, introduce composting as a possible treatment of the generated waste, they can contribute to a faster economic development and environmental progress of the MASP sector, as well as of the wider community.

Approximate amounts of MASP as a basis for composting

The largest amounts of MASP are used for the production of different types of phytopreparations. Herbal drug preparations are products derived from plant materials using specific technological procedures: distillation, straining, extraction, fractional distillation or rectification, concentration, purification, drying (dehydration) and others. Essential oils, extracts,

tinctures, herbal juice and fatty oil also belong to herbal drug preparation (Ph.Jug. V, Ph.Eur. VII).⁷

In the production and processing of MASP into the semi-final and final products different parts of the plant are used: rhizome (*rhizoma*), root (*radix*), tuber (*tuber*), bulb (*bulbus*), bark (*cortex*), leaf (*folium*), above-ground mass (*herba*), flower (*flos*), fruit (*fructus*), seed (*semen*) and more. As only one part is used from some plant varieties (e.g. roots only from soapwort – *Saponaria officinalis* L., or, tubers only from Jerusalem artichoke – *Helianthus tuberosus* L.), there remains a significant part of the fresh/processed mass which is treated as waste (Table 1).

Table 1. *The approximate residue of fresh/processed mass of various medicinal, aromatic and spice plants suitable for composting*

(t ha⁻¹)*

ordinal number	plant variety	common English name	total yield of fresh mass per hectare (t ha ⁻¹)	% of waste	approximate residue of fresh/processed mass suitable for composting (t ha ⁻¹)	note
1	<i>Achillea millefolium</i> L.	Yarrow	12 total above-ground biomass	30	9	

⁷ *** (2000) Ph. Jug. V. Pharmacopoea jugoslavica. State Institute for Protection and Health Promotion, Editio quinta, Belgrade.

*** (2011): European pharmacopoeia. Edition 7.0. European Directorate for the Quality of Medicines & HealthCare 7 allée, Strasbourg.

2	<i>Agrimonia eupatoria</i> L.	Agrimony	18-20 total above- ground biomass	40	8	
3	<i>Althaea officinalis</i> L.	Marshmallow	20 root + 20 total above- ground biomass	50	20	
4	<i>Anethum graveolens</i> L.	Dill	9.2 total above- ground biomass	80	7.36	1 st year of production
5	<i>Angelica archangelica</i> L.	Angelica	4 root + 6-7 total above- ground biomass	80	8	1 st year of production
6	<i>Apium graveolens</i> L.	Celery	4 root + 6-7 total above- ground biomass	80	8	
7	<i>Arctium lappa</i> L.	Burdock	6-7 root + 20 total above- ground biomass	65	17.55	
8	<i>Arnica montana</i> L.	Arnica	2.5-3.0 flower	30	0.3	waste generated in processing

9	<i>Artemisia absinthium</i> L.	Wormwood	12-15 total above- ground biomass	30	1.3	waste generated in processing
10	<i>Calendula officinalis</i> L.	Pot marigold	4.5-5.0 flower + 6 total above- ground biomass	55	6.05	
11	<i>Carum carvi</i> L.	Caraway	0.8-1.2 fruit + 9.2 total above- ground biomass	80	8.32	2 nd and furhter years of production
12	<i>Chamomilla recutita</i> (L) Rauch	Chamomile	4.0-4.5 flower + 12 total above- ground biomass	75	12.4	
13	<i>Chenopodium quinoa</i> Willd.	Quinoa	0.8-1.0 grain + 2.2 total above- ground biomass	75	2.4	
14	<i>Cichorium intybus</i> L.	Chicory	6.5 + 2.5 total above- ground biomass	5	0.4	waste generated in processing
15	<i>Cnicus benedictus</i> L.	Blessed thistle	4.0 total above- ground biomass	15	0.2	waste generated in processing

16	<i>Coriandrum sativum</i> L.	Coriander	1.5 Fruit + 9.5 total above-ground biomass	90	9.9	
17	<i>Cynara scolymus</i> L.	Globe artichoke	35 leaf	15	0.75	waste generated in processing
18	<i>Echinacea angustifolia</i> DC.	Narrow-leaved purple coneflower	5-6 total above-ground biomass	80	4.8	if immersion is performed = 100% waste
19	<i>Echinacea purpurea</i> (L) Moench.	Eastern purple coneflower	6-7 total above-ground biomass	80	5.6	if immersion is performed = 100% waste
20	<i>Fagopyrum esculentum</i> Moench.	Buckwheat	12 total above-ground biomass	65	7.8	
21	<i>Foeniculum vulgare</i> Mill.	Fennel	1.0-1.5 fruit + 18 total above-ground biomass	90	17.6	
22	<i>Gentiana lutea</i> L.	Yellow gentian	8 root + 4 total above-ground biomass	33	4	starting with 5 th year of production

23	<i>Geranium macrorrhizum</i> L.	Bigroot Geranium	4 total above-ground biomass	20	0.8	waste generated in processing
24	<i>Glycyrrhiza glabra</i> L.	Licorice	5-6 root + 14 total above-ground biomass	70	14	1 st year of production
25	<i>Helichrysum arenarium</i> (L.) Moench.	Dwarf Everlasting	4.0-4.5 flower	10	0.1	waste generated in processing
26	<i>Helianthus tuberosus</i> L.	Jerusalem artichoke	8.5 tuber + 50 total above-ground biomass	85	50	
27	<i>Herniaria glabra</i> L.	Smooth Rupturewort	3.5-4.0 total above-ground biomass	10	0.1	waste generated in processing
28	<i>Hypericum perforatum</i> L.	St.John's wort	15 total above-ground biomass	100	15	if immersion is performed = 100% waste
29	<i>Hyssopus officinalis</i> L.	Hyssop	7-9 ukupna nadzemna biomasa	15	0,3	waste generated in processing

30	<i>Inula helenium</i> L.	Elecampane	5-6 root + 30 total above- ground biomass	85	30	
31	<i>Iris germanica</i> L.	German Iris	4.5-5.0 root + 3 total above- ground biomass	37	3	1 st year of production
32	<i>Lavandula officinalis</i> Ehrh.	Lavender	4 total above- ground biomass	30	1.2	waste generated in ovary processing
33	<i>Leonurus cardiaca</i> L.	Yellow sweet clover	14-15 total above- ground biomass	10	0.5	waste generated in processing
34	<i>Levisticum officinale</i> Koch.	Lovage	6-7 Root + 12 total above- ground biomass	60	13.2	waste generated in production and processing
35	<i>Linum usitatisimum</i> L.	Linseed	0.8-1.2 seed + 5.0-5.5 total above- ground biomass	82	5.5	
36	<i>Malva sylvestris mauritanica</i> L.	Mauritian Mallow	8 total above- ground biomass	40	3.2	waste generated in production and processing

37	<i>Marubium vulgare</i> L.	White Horehound	6 total above-ground biomass	6	0.12	waste generated in processing
38	<i>Majorana hortensis</i> Moench	Marjoram	4 total above-ground biomass	10	0.2	waste generated in processing
39	<i>Melissa officinalis</i> L.	Lemon balm	12-15 total above-ground biomass	50	1.5	waste generated in leaf processing
40	<i>Mentha piperita</i> L.	Peppermint	12-15 total above-ground biomass	50	1.5	waste generated in leaf processing
41	<i>Ocimum basilicum</i> L.	Basil	10-12 total above-ground biomass	10	0.22	waste generated in herba processing
42	<i>Oenothera biennis</i> L.	Evening Primrose	0.8-1.2 grain + 8.5-9.0 total above-ground biomass	90	9.2	
43	<i>Origanum heracleoticum</i> L.	Greek oregano	6.5-7.0 total above-ground biomass	10	0.2	waste generated in herba processing and grinding
44	<i>Origanum vulgare</i> L.	Oregano	12 total above-ground biomass	35	1.4	waste generated in herba processing and grinding

45	<i>Petroselinum sativum</i> Hoffm.	Parsley	10-12 total above-ground biomass	35	4.2	In the 1 st year, the waste is minimal; in the 2 nd year, it is for oil extraction
46	<i>Pimpinella anisum</i> L.	Anise	0.8-1.2 fruit + 4.0-5.0 total above-ground biomass	80	5	
47	<i>Rheum palmatum</i> L.	Rhubarb	16 Rhizome + 8-10 total above-ground biomass	38	10	starting with 3 rd year of production
48	<i>Rosmarinus officinalis</i> L.	Rosemary	8-9 branch + 8-9 leaf	50	1.8	waste generated in processing
49	<i>Saponaria officinalis</i> L.	Soapwort	6-7 root + 12-15 total above-ground biomass	70	15	
50	<i>Salvia officinalis</i> L.	Sage	10 branch + 10 leaf	50	2	waste generated in processing
51	<i>Salvia sclarea</i> L.	Clary sage	12-14 total above-ground biomass +	95	14	

			0.75-0.8 flower			
52	<i>Satureja montana</i> L.	Winter savory	12 total above-ground biomass	12	0.48	waste generated in herba processing
53	<i>Satureja hortensis</i> L.	Summer savory	3.5-4.0 total above-ground biomass	10	0.1	waste generated in herba processing
54	<i>Silybum marianum</i> Gaertn.	Milk thistle	15 total above-ground biomass + 1.2-1.3 grain	92	15	
55	<i>Sinapis alba</i> L.	White mustard	7-8 total above-ground biomass + 1.5-2.0 grain	80	8	
56	<i>Symphytum officinale</i> L.	Comfrey	6-7 root + 6 total above-ground biomass	50	6	
57	<i>Tanacetum parthenium</i> L. Schultz-Bip.	Feverfew	7.0-8.0 flower + 7.0-8.0 total above-ground biomass	50	8	
58	<i>Taraxacum officinale</i> Web.	Dandelion	4.0-5.0 root + 10-12 total above-ground biomass	10	0.4	waste generated in processing

59	<i>Thymus vulgaris</i> L.	Thyme	6-7 leaf + 6-7 total above-ground biomass	50	1	waste generated in herba processing
60	<i>Trigonella foenum graecum</i> L.	Fenugreek	0.8-1.2 grain + 4.5-5.0 total above-ground biomass	80	5	
61	<i>Urtica dioica</i> L.	Nettle	12 total above-ground biomass	100	12	if immersion is performed = 100% waste
62	<i>Valeriana officinalis</i> L.	Valerian	4 root + 10-12 total above-ground biomass	100	16	if immersion is performed = 100% waste
average				51,77	7,02	

Source: *The presented data were obtained from the production and experimental plots of the Institute for Medicinal Plant Research "Dr Josif Pančić" from Belgrade, located in Pančevo.*

From the presented table, the presence can be seen of the waste of different origin. A part of the waste is generated on the very plot, which is, so-called agronomic waste, whereas another part is generated in the processing. Depending on the type of processing, different types of processing waste occur (the waste generated in the production of teas, by extraction, or so). Thus, there are many plant species which, in one type of processing, give less, and in another type of processing, more waste. The examples of St. John's wort, nettle, marigold and valerian are just

some of the existing ones. For these species, in the table, the kind of treatment is given for which the particular MASP is used with the highest percentage.

The example of St. John's wort: in the course of the preparation of St. John's wort oil, in sunflower or olive oil, the aboveground mass of St. John's wort (*Hyperici herba*) is immersed, which stays in the sun for 40 days. After the fortieth day, the oil is strained, and, what remains is “oiled herb”. This type of MASP waste, due to the increased oil content, will degrade more slowly during composting. According to Manios et al. (2006), oil degradation and slow “burning” of composting materials contributed to the oxygen depletion.

If we take that the average residue of fresh/processed mass per plant species is suitable for the composting of 7.02 t ha^{-1} , and multiply that only with the surface under which this species of plants is grown (approximately, about 2,500 hectares), we get a total of about 18,025 t. If this amount of composted, we get an average of 2.4 t ha^{-1} or $2,400 \text{ kg ha}^{-1}$ of compost, which, if multiplied with the market price of compost of 13 Serbian dinars (RSD) per kg^{-1} , we get the sum of 31,200 RSD or 271.33€ (euros) per hectare.⁸

This means that, Republic of Serbia “loses” 78 million RSD or 678,323€ (euros) annually. This amount may be lower or higher depending on the sowing structure and the needs of the MASP processing industry. In addition to the main product, by composting, we get a by-product by which, the income per hectare is significantly increased. In all, this figure is much higher if we add to it the estimated amount that occurs as a by-product from the production and processing of MASP originating from spontaneous flora.

The beginning of biological treatment of MASP waste as in the example of the Institute for Medicinal Plant Research “Dr Josif Pančić”, Belgrade

In keeping with the current regulations on waste management and environmental protection, in the course of the year 2013, at the location of the production facility of the Institute for Medicinal Plant Research “Dr

⁸ The official middle exchange rate of the National Bank of Serbia for the day 15.09.2013: 1€ = 114.9895 RSD

Josif Pančić” in Pančevo, the activities began aimed at the storage, treatment and disposal of biological waste generated in the production and processing of medicinal plants (Filipović et al., 2013). By the preparation and production of a number of specific documents, the status of this sort of waste is resolved and the conditions are made for its systemic solving and for environmental protection. Given the favorable agrochemical properties of plant waste, by the building composting facilities, conditions will be provided for the process of biological waste treatment, i.e. composting, so that the production of potentially highly valuable organic fertiliser – compost – can be expected.

Conclusion

In the process of production and processing of MASP, substantial amounts of biowaste of different physical and chemical properties are obtained as waste. In the past period, on the territory of the Republic of Serbia, this waste was inadequately treated, which, annually, made the loss of about 680,000€ (euros) just from the biowaste generated in the planting and growing of MASP. The first steps towards a potential biological treatment, i.e. composting of this sort of waste, have been taken on the location of the production part of the Institute for Medicinal Plant Research “*Dr Josif Pančić*” in Pančevo, where a composting site has been built, and whose primary purpose is the production of high-quality compost.

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III SECTION

THE CONSTRUCTION OF AGRO- REGIONAL IDENTITY THROUGH INSTITUTIONAL REFORM

INSTITUTIONAL REFORM AS A DETERMINANT OF RURAL DEVELOPMENT OF BOSNIA AND HERCEGOVINA

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Abstract

For Bosnia and Herzegovina we can say that it is a rural country, given that more than a half of its population live in rural areas which cover about 80% of the country. Having in mind this fact, it is evident that rural policy - agriculture and rural economy, have the strategic importance for B&H and its further development. Institutional reforms of the rural development policy of B&H are the first step in the process of rural economy improvement, but also a precondition of the overall sustainable development of the country. The main objective of this work is to point out the role and problems of reforming rural development policy of Bosnia and Herzegovina in the contemporary socio-economic and political environment.

Key words: *reform, rural areas, EU integrations, rural policy, EU funds*

Introduction

In Bosnia and Herzegovina about 2,37 millions of inhabitants live in rural areas, which is about 61% of the overall country population. In these areas, the percentage of the population living under the poverty limit is significantly larger than in the urban areas. The majority of the rural population is engaged in agricultural production. In addition to that, the structure of the municipality rural areas is very different in the economic, social and demografic terms, due to many differences in the natural characteristics (Mediterranean and sub-Mediterranean mountainous region), due to changes in population, economic structure, infrastructure, and so on. Therefore, it is necessary to reform the rural policies in order to strengthen the economy of rural areas. Institutional reforms, rural

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economy development, strengthening of basic social functions and processes in the country, preventing further migration from rural areas, environmental protection and conservation of natural resources and cultural heritage in the rural parts of Bosnia and Herzegovina, are priority objectives of the reform of B&H in this area. The importance and necessity of the reform of rural policy of B&H is indicated also by initiated processes of Bosnia and Herzegovina integration into EU and rural development policy of the Union.

Rural policy in the European Union

Rural development has a significant role in EU, because more than 55% of the population live in rural areas that cover about 91% of the EU territory. By the definition of the European Commission, rural region represents territorial entity with coherent economic and social structure of diversified activities. Applying OECD region typology on the European Union example, we obtain data according to which rural regions cover about 55% of EU territory, significantly rural regions about 37%, and 8% of the EU territory could be considered predominantly urban areas. [5]

EU rural policy for the period of 2007-2013 has three main objectives, represented through so called axis, and one horizontal axis – LEADER approach. Axis 1 contains measures to strengthen the competitiveness of agriculture and forestry. Axis 2 includes measures for the conservation and protection of the environment and the countryside. Axis 3 includes measures for improving quality of life in rural areas, as well as measures for stimulating diversification of rural economy. [6]

Contemporary EU development policy focuses on local development in the service of rural development, emphasizing rural areas, regions and their mutual coordination and harmonization. „Starting from the idea of equalizing the development of all the regions, by territorial and decentralized approach, EU defines following rural development principles:

1. *Decentralization*
2. *Development of local communities;*
3. *Development through designed regional development concept;*
4. *Development through principle of sustainable development;*
5. *Integrational and multi-sector development;*
6. *Development through public-private partnerships and horizontal connecting" [2, p. 87]*

The European Commission has established a fund for rural development for the period of 2007-2013. with a budget of 88.75 billion Euros. This budget should enable the fulfillment of the predicted objectives of rural development policy, allow innovation and diversification outside traditional agribusiness in rural areas, respond to society's expectations for establishing competitive and environmentally sustainable agriculture, forestry and food sector in rural areas of the EU. Basic rules of managing the rural development policy in this period are presented in the regulation n. 1689/2005. Within this regulation, rural development policy in the period of 2007-2013 focuses on:

1. *Increasing competitiveness in agriculture and forestry sector,*
2. *Improving the environment and countryside and*
3. *Increasing quality of life in rural areas and encouraging diversity in rural economies.*

In order to solve problems of rural area in the EU in service of their development, a significant role has a SARD concept – Sustainable agricultural and rural development. SARD include managing and conservation of natural resources and directing technological and institutional changes towards reaching and continuous meeting the needs of present and future generations. Sustainable rural development is the base for economic development acceleration, of each area, by direct influence on environment improvement and standard of population. In that way, a sustainable agricultural and rural development will enable preservation of land, water, plant and animal resources, without harming environment, where this technical-technological development is (ecologically) applicable, socially acceptable and economically viable.

Institutional reforms of rural policy of Bosnia and Hercegovina

Rural policy- agriculture and rural economy, have a strategic importance for Bosnia and Herzegovina and its further development. Institutional reforms of the rural development policy of B&H are carried out in line with the objectives and needs for joining the EU. Namely, signing the Stabilisation and Association Agreement Bosnia and Herzegovina has entered the first phase of the process of stabilisation and association which brings number of requirements, and one of the first of them is a requirement of institutional reform in order to harmonize domestic legislation with EU legislation.

All three administrative units (FB&H, RS, BD B&H) support agriculture and rural development of B&H, also, in FB&H, Cantons also have the support. These three administrative units create independent strategic documents, legal and regulation acts by which is regulated the support to farmers in B&H. Such approach results in a completely non-harmonized support at the state level.

Incentives and support to agriculture in Bosnia and Herzegovina have to be harmonized at the state level, regardless of the entity governments responsible for their implementation, in order to avoid creating uneven situation among farmers and unfair competition within B&H that would prevent development of the sector on existing resources.

A significant part of the authorities related to the agricultural sector and rural development at the national level are within the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (B&H MFTER). Besides the activities of foreign trade and international politics, MFTER B&H is responsible for defining policies, coordinating activities and harmonizing plans of the entity bodies and institutions, at the international level in the areas of development and use of natural resources, energy, environment protection, tourism and agriculture.

Within MFTER as a separate unit, there is an Agriculture, Food, Forestry and Rural Development Section, responsible for establishing framework for the development of sector strategies, policies, programs and measures, as well as their implementation in order to harmonize agricultural and rural development in the entire country.

Besides MFTER B&H at the state level specific responsibilities in this area have Ministry of Finance and Treasury and Directorate for European Integrations (DEI). Ministry of Finance and Treasury through Sector of financing programs and projects of EU support, that is, Central Financing and Contracting Unit for programs and projects of EU support perform tasks related to finance, procurement contracting, payment, monitoring and supervision of all programs and projects of EU support in B&H, including those in agriculture and rural development. DEI is the key operational partner of European Commission in the process of stabilization and association, coordinates all governmental authorities in Bosnia and Herzegovina on issues related to European integration strategy and policy, the harmonization of laws and coordination in all fields.

At B&H level, there are other agencies, institutes and directorates whose activities are directly or indirectly related to the domain of agriculture, such as: the Agency for Market Surveillance, Agency of Statistics, the Intellectual Property Institute, the Institute for Accreditation and Standardization Institute.

Entity ministries are competent in carrying out policies and law enforcement of entity government authorities, in overseeing regulation enforcement and decision making. „Entity ministries of agriculture are responsible for managing natural resources for agricultural development, food industry and related activities in the area of plant production, livestock breeding, rural development, fishing and hunting, protection and use of agricultural land, food industry, animal feed production, water management, veterinary and phytosanitary protection, public health and protection and forestry”. [1, p. 2-3]

Harmonization of legislation and building appropriate institutions, therefore, represent the basic prerequisites of the EU integration. Agriculture and rural development bring a harmonization plan in three chapters:

1. *market and direct payments regulation, rural development policy, financing of the Common Agricultural Policy and the issue of forming a payment agency, quality policy and organic farming;*
2. *regulation of food safety area, veterinary and phytosanitary policy;*
3. *harmonization plan in the area of fishing* [4, p. 64]

The first and also the most important step in this direction was adoption of the Law on Agriculture, Food in Rural Development of B&H, which was published in the Official Gazette No. 50/08. The main objective of this law is harmonization of sector policies and strategies in order to ease and accelerate European integration of B&H. The law defines the goals, principles and mechanisms for the development of policies and strategies, structures and responsibilities at all levels of government, their roles and relationships, monitoring and evaluation mechanisms, as well as administrative inspections. According to Law, general sector objectives in B&H are:

- *activation of unused natural and human resources, the development of a sustainable, competitive and dynamic sector of agriculture, forestry and food;*

- *increasing the level of meeting the population needs with their own food and replacing food import with domestic production for which there are natural and other conditions to reduce the trade deficit of agricultural and food products;*
- *ensuring alignment and integration of the sector into the EU and global markets;*
- *encouraging diversity of economic activities, increase of employment and general conditions for making profit and improvement of quality of life in rural areas;*
- *ensuring access and availability of high-quality, affordable and safe food;*
- *ensuring rational use and protection of natural resources and biodiversity;*
- *providing adequate standard of living and contributing to the stability of agricultural income and food security of the population which as much as possible is provided by competitive domestic agricultural products [2, p. 14]*

The measures of rural policy development are divided in:

- *measures for increasing competitiveness,*
- *measures for rural environment protection and*
- *measures for activity diversification in the rural areas and measures for the improvement of quality of life in the rural areas.*

Objectives and measures of the Law represent a framework for the development and implementation of all sector regulations, programs and measures undertaken at all levels of government in B&H, and detailed support measures and mechanisms for their implementation are determined by sector strategies of agriculture, food and rural development in B&H and by action plans. [2, p. 15]

To ensure establishing and strengthening of uniform procedure in the incentive payment system in the agriculture, food and rural development in the entities and BD B&H and ensure their consistency, transparency and coordination, by gradual adjustment of these systems in B&H with those of the EU, the Law predicts the establishment of the sector for payment harmonization and coordination. The sector is established by the decision of the Council of Ministers and represents a transitional body that will enable a harmonization of the basic payment system.

In order to support the implementation of the rural development measures and agricultural policies and programs nationwide, the Law predicts creating mechanisms for coordination and promotion of private and public advisory services, initiates a gradual development of cost-effective and efficient system of reference laboratories and other testing bodies, in accordance with the needs of B&H and the ability to meet obligations towards national, international and EU agreements, and coordination of accreditation of laboratories. The Law also predicts the implementation of the Monitoring and evaluation system for the Agriculture, food and rural development sector whose responsibility is monitoring the implementation of policies, strategies, programs and measures in the agriculture, food and rural development sector as well as evaluation of their impact in terms of social, financial and economic effectiveness and efficiency, so as their contribution to the overall objectives of the sector.

In line with the above mentioned needs and objectives, the Bases for realization of rural development policy of Bosnia and Herzegovina are determined by Strategic plan of rural development of B&H for agricultural, food and rural development harmonization of 2008-2011 adopted by MFTER with the support of EC. This plan is the base for directing all plans and programs of rural development prepared at all levels of government involved in rural development in B&H which under these elements are valid in the EU. Operational program of B&H for agricultural, food and rural development harmonization of 2008-2011 was adopted by the CM B&H and represents a detailed action plan for the implementation of Strategic plan. In order to achieve the defined goals and Strategic Plan, the implementation focuses on six priority areas:

- 1. Establish a demanding functional institutional capacity, coordination and implementation mechanisms at all levels,*
 - 2. Increase the quality and safety of domestic products with a competitive advantage in the production, processing and trade,*
 - 3. Support primary production with measures of direct support to agricultural holdings aimed to their gradual equalizing between the entities and with the mechanisms of the EU,*
 - 4. Increase the competitiveness of agri-food sector in B&H through indirect measures of support for production, processing and trade,*
 - 5. Protect the rural environment of B&H through the support agri-environmental programs, and*
 - 6. Extend rural activities and improve quality of life in rural areas*
- [2, p. 16-17]

The rural policy of Bosnia and Herzegovina in the process of EU integrations

The reform of rural policy of B&H is implemented in the direction of a gradual approaching of the domestic model of agrarian policy to the solutions of Common agrarian policy of European Union (CAP EU). CAP EU is a complex system of regulations, budget support and direct public interventions. The objectives of CAP are primarily related to the provision of income of the rural population, markets stabilization and raising the productivity and competitiveness of the food. CAP is implemented within two main pillars of measures:

- *the first pillar – direct payments and market interventions, and*
- *the second pillar – defines policy of rural development.*

The process of integration into the CAP consists of harmonization of legislation, building and strengthening institutions and policy reform. The common agrarian policy is based on regulations and the candidate country has to be prepared, upon joining, to implement the entire legislation in the specific area. Payment System, a system of information and administrative control and other institutions must be fully built, which requires significant administrative, financial and personnel changes. The policy of the accessing countries must be gradually adjusted to the principles and requires of the CAP, which implies the reform of the policies and budget strengthening of support to agriculture. [2, p. 11-12]

However, in the process of undertaking these prescribed measures, efforts should be made that the rural reform policy in Bosnia and Herzegovina is implemented in the full sense, not just as a copy of measures. The largest extent of support through measures of rural support goes through Axis 1 - improving competitiveness. Thus, through this axis in the last three years in B&H it was paid from 30 milion in 2009, which was the smallest allocation, to 43,2 milion in 2008. After the fall in 2009, the support again experienced the growth so in 2010 it was 39,2 mil. KM, i.e. 23,7% of the total budget. The largest part of support refers to modernization of agricultural holdings. The other measures within this axis had far lower levels of support.

- Axis 2 – improving the environment and countryside has had the smallest amount of support through analyzed period. Thus the support through group of measures that are classified in this axis ranged from 2,5 million KM in 2008 when it was the largest,

while in 2010 it was 0,8 million KM. The measures from this axis had negative tendency in the observed three-year period and are intended for different types of payment that have character of agri-environmental or other payments – care for environment and sustainable resources management.

- Axis 3 – improvement of living conditions in rural areas and diversification of rural economy is the second largest by budgetary allocations for the measures of rural development in B&H. The largest amount of support was recorded in 2010 of up to 19,9 milion KM, which is four times bigger than in previous years (in 2008 – 6 million KM and in 2009 5,9 million KM). The largest part was allocated for rural infrastructure in RS in 2010. Investing in rural infrastructure is a measure with the largest support within Axis 3, while in other measures participates the measure of diversification of rural economy.
- Axis 4 consists of Leader initiative and other measures of rural development. Allocations under this axis ranged from 0,9 million KM in 2008 up to 1,6 million KM in 2010. The largest part of support consisted of „other“ measures of rural support. Leader initiative which is part of this Axis of rural support of B&H is not yet developed in true sense and for the first time funds were allocated in 2010 in FB&H.

In the rural areas of B&H which cover about 81% of the entire territory, live about 61% of the population. „Current statistical data show that agricultural land in Bosnia occupies 2,500,000 ha or 50% of its total territory, of which, excluding state grasslands of poor quality of some 350,000 hectares, potentially usable is only about 2.177 million hectares of land. Land productivity is low, and reasons are mostly related to natural conditions, while also the population contributes to the permanent loss of agricultural land because it is settled in the areas with quality land that is being used for non-agricultural purposes. More alarmingly, the 20.000 hectares is covered by various waste materials, so-called „technogenic desert“. Of course, a huge problem is 17.000 minefields covering or impede access to 15% of agricultural and 20% of the forest areas.“ [1]

Many expert point out that strong rural economy and strong rural communities have the crucial importance for future social, political and economic stability of the country as well as for the prosperity of B&H. This means that rural economy has a number of tasks which are of great

importance for the development of the entire B&H and agribusiness development:

- ◆ *to strengthen the domestic market, by reducing the imbalance in trade with food.*
- ◆ *to provide income generating opportunities in agriculture sector,*
- ◆ *to provide adequate amounts of healthy food at competitive prices.*

According to statistical data in 2004, 17,8% of population (or approximately 681.000) lived under the general poverty line. Out of total number of poor people in B&H, 51% live in Republic of Srpska, and 49% live in Federation of B&H. In Republic of Srpska 21% of total population is poor, and in Federation 15%. The percentage of population below the general poverty line is significantly higher in rural (18%) and mixed (23%) areas than in urban communities where it is (11%). Poor population is the most prevalent in smaller communities, in those that have had serious consequences caused by war. In Republic of Srpska the poverty percentage is significantly visible in non-urban areas, in Federation is approximately the same: 16% of poor population live in non-urban, and 15% in urban areas. [7] The level of life standard in rural areas is affected by several elements: infrastructure, access to education and health institutions (6% of children from rural areas attends such institutions, compared to 15% of children living in the city).

Financing rural development in Bosnia and Herzegovina

B&H policy in the sector of agriculture, food and rural support in the recent years, as discussed, develops in line with objectives and needs required for preparation and joining the EU. The realization of SAA requires fundamental changes in the society which can be achieved only by active involvement and engagement of all factors in agricultural sector of B&H. Strategy and plans for membership in EU include progressive steps to harmonize and integrate laws, institutions and practise with those of Union. This is the greatest challenge in the sector due to the volume of legislation and necessary institutional capacity, and the fact that the Common Agricultural Policy of the EU itself is undergoing significant reform and change. However, the key policy objectives of the sector are directed to meeting the requirements in terms of establishing the necessary structures and administrative procedures so that B&H is able to take pre-accession assistance. The instrument for pre-accession assistance - IPA, was established in 2006 and its financial value in six-

years budget period (2007-2013) is 11,468 billion euros. IPA 2007-2013 is focused on two main priorities. These are:

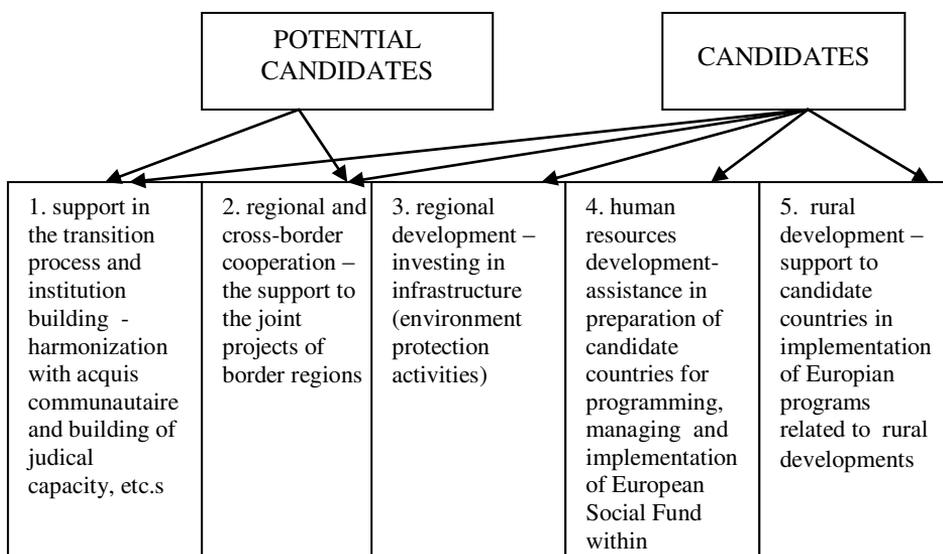
1. Assistance to countries in fulfilling political, economical, and criteria related to adopting EU *acquis communautaire* as well as building administrative capacity and strengthening system of justice, and
2. Assistance to countries in the preparation process for using structural and cohesion EU funds after the accession to the European Union [3]

IPA beneficiaries are divided into two categories:

- 1) candidate countries for EU membership (Turkey, Montenegro and Macedonia);
- 2) the potential candidate countries for EU membership (Republic of Serbia, Bosnia and Herzegovina i Albania).

The main requirement for using all five IPA components is that the country has a candidate status and an established decentralized fund managing system. The instrument for pre-accession assistance contains five components, as shown in the following table.

Table 1. IPA components



Source: *The Regional Development Strategy of the Republic of Serbia for the period 2007-2012.*

Acceding countries have no opportunities nor rights to access funds for agriculture, but they have a possibility of using pre-accession funds for rural development. Since Bosnia and Herzegovina is in the process of European integrations, the county will use the first two of the five components. About 10% of the entire amount of IPA funds planned for the period of 2007-2013 will be implemented through IPA Regional aspect – through so-called Multi-beneficiary IPA. Support through Multi-beneficiary IPA should contribute to achieving three key objectives:

1. *fulfillment the criteria from Copenhagen*
2. *harmonization with EU acquis communautaire and*
3. *promotion of dialogue of civil society between countries of the Western Balkans, Turkey and EU.*

The main areas of support through Multi-beneficiary IPA are: regional cooperation; infrastructure development, justice and internal affairs; internal market; the reform of public administration; democratic stability; education, youth and research; market economy; nuclear safety and radioactive waste treatment and temporary administrative institutions and reserve assets. [3]

Taking into account the analysis of the situation in agriculture and its potential, as well as the specific needs of rural areas, measures of the agricultural policy in the rural areas are primarily aimed at raising the competitiveness in the agricultural and processing industry sector. Besides, they follow the need to strengthen the economic and social position of rural areas both through increase of income of agricultural producers as well as through increase of opportunities of employment of rural population outside agriculture. Special attention is paid to the sustainable management of natural resources, environmental protection and biodiversity conservation. Program of agricultural policy consists of five main groups of measures:

1. *Measures of market-pricing policies;*
2. *Measures of rural development policy;*
3. *Support to general services in agriculture;*
4. *Social transfers to rural population;*
5. *Technical and administrative support to Program implementation.*

The choice of measures by groups and importance of certain groups in terms of the amount of funds reflects the goal-oriented balance between chosen priorities. [4, p. 72]

Project of agriculture and rural development of Bosnia and Herzegovina

In order to implement planned progress of B&H in the agriculture and rural development, it has been prepared, approved and in the process of realization are several key projects. The project of agriculture and rural development (funded by the World Bank loan) effective from 26.02.2008. The goal of the Project of agriculture and rural development is to credit support B&H in the process of strengthening capacity of institutions at the state and entity level in providing effective and efficient agricultural services and support programs, as well as providing a significant contribution to B&H to become eligible for funding support within the IPA-RD. The project supports the development of the agricultural information system, as well as building institutional capacities in agriculture and rural sector, including strengthening veterinary medicine at the state level, the safety of food, phyto-sanitary services, capacities of agricultural inspection, as well as agricultural service activities. Besides, the project supports the development of enhanced programs of support of agriculture and development of rural areas in line with EU IPARD, including the strengthening of program of development of planning and coordination of rural areas, secure payment system of the development of rural areas, as well as increase of investment grants for target needs and areas.

The implementation of project is planned for the period from 01.10.2007. to 31.12.2001. The project is funded by the IDA credit in the total sum of 21 million US dollars. The loan repayment period is 20 years with a grace period of 10 years. Indebtedness by loan funds is accepted by entity governments in the ratio 52% Government of FB&H and 48% Government of Republic of Srpska. In addition, the participation of B&H in this project is 9,19 million of US dollars, while grant funds received from SIDA amount to 6 million US dollars. Therefore, the total amount of project funds, loan, grant and local contribution amounts to 36,19 million US dollars. [2, p. 23]

Projects financed from EU funds

Through the first component of IPA program for 2007 two projects are programmed in the area of agriculture, food safety and rural development:

1. *Strengthening and harmonization of B&H information system for the agricultural and rural development – Project value 1,5 million Euros*
2. *Capacity strengthening for programming rural development – Project value 1 million Euros.*

Creation of these projects is nominated by the Department of agriculture, food, forestry and rural development of MFTEO B&H. Complex institutional and political environment, including significant delay of ratification of the Framework Agreement for IPA and Financial agreement IPA 2007, as well as difficulties in appointing the National coordinator for IPA, delayed the beginning of IPA implementation. Implementation of the mentioned projects started only in September 2009, practically with one year delay in implementation.

Department of agriculture, food, forestry and rural development of MFTEO B&H, in order to prepare i.e. create structures and capacity to manage funds within the IPA rural development program, through the process of programming IPA 2008 nominated the project:

- *Capacity building in agricultural policy and preparation of B&H for access to rural development program (IPA-RD) – Value of the program is 2,5 million euros with co-financing by B&H in the amount of 411.000 euros.*

In Sarajevo in 2010 was launched a beginning of a project financed by EU „Strengthening and harmonization of information systems in the agricultural and rural sector". The goal of this project is to respond on immediate needs of B&H with reliable agricultural data for rural economy and agricultural sectors in line with EU standards. In order to realize this goal, the project will work to develop capacities of the relevant institutional partners in B&H, including Department of agriculture, food, forestry and rural development of MFTEO B&H, Agency for Statistics B&H, as well as administrative bodies of the Federation of B&H, Republic of Srpska and Brčko District. EU finances this project by Instrument for Pre-Accession Assistance (IPA) for the year 2007. The value of the project is 1.280.500 euros, and it is implemented by a consortium led by the company Cardno Agrisystems. Additional 200.000 Euros is reserved for the purchase of computer equipment necessary for the implementation of pilot activities on data collection.

During two years, the project will also realize pilot projects for data collection through agricultural census, accounting on agricultural holdings and field collection of statistical data in order to establish reliable basic agricultural statistics on areas under crops and orchards and production at the state level, in line with European statistical system for agriculture, it was reported from the Public Relations Department of the EU Delegation in B&H.

ACoRD – Alliance for Common Rural Development is a project funded by EU within „Program for the support of civil society 2012“. The project is implemented by ACED – Agency for cooperation, education and development as a leading organization, in cooperation with local partner organizations REDAH, Nešto Više, LAG Una-Sana, and European partner ELARD – European association LEADER for rural development. The project is supported by Sweden organization WE EFFECT. ACoRD aims to:

- 1. support establishing the Network for rural development of Bosnia and Herzegovina through strategic and strong partnership between key stakeholders in rural development of the country;*
- 2. strengthen the capacity of civil society organizations that will be the members of Network for rural development of B&H and*
- 3. include non-governmental sector in building and promoting mechanisms for larger citizen participation in the process of reform and harmonization of public sector and regulations, in line with the relevant EU policy in the area of rural development.*

One of the first activities of the project is conference on rural development in B&H held on 28th May 2013 in Sarajevo. It is predicted that the implementation of ACoRD project lasts until December 2014. Regardless of certain progress in the last few years, subventions and support measures to agricultural production and rural support in B&H are wide and uneven, limited to available resources and not used in a systematic and sufficiently transparent manner, so there are no expected results.

One of the preconditions of progress in this sense is also strengthening the competitiveness of manufacturers and better use and protection of available resources. In this regard, MFTR B&H has taken several important steps to overcome this situation. Thus, in 2007 technical teams for harmonization of measures for support to farmers in B&H were established, supported by EC project SESMARD – document “Plan of

harmonization of support measures to agriculture in B&H 2008-2010" – a gradual harmonization of support measures in three years period in order to harmonize support in the entire B&H in 2010.

Conclusion

A sustainable agriculture represents a key driver of rural economy development. In order that a development of agricultural production is put into development of rural areas too on the territory of Bosnia and Herzegovina, it is necessary to accomplish institutional reforms of state rural policy and respect basic „game rules“ valid in this sector in the countries of Region and EU. When analyzing current data in the area of agricultural and rural development, we can conclude that B&H is at the beginning of a long process, whose first activity should be the development of the agribusiness competitive at the international market which will be the basis for diversification of rural economy.

Bosna and Herzegovina has started the process of European integration, which is an additional challenge for rural community and agribusiness sector. First of all, B&H has to adjust to a new legislation and new standards, which will require an extensive transfer of technology, strengthening of human resources and adequate investment policy. Bosnia and Herzegovina expects assistance form EU in order to improve agricultural sector and rural economy and harmonize it with agribusiness sector of EU by support to agribusiness sector, increase of productivity and better quality of life for producers and consumers in rural economies.

According to data about 40% of arable land is not being used, which is why is necessary to mobilize unused resources (human and natural), implement new technologies for production lines. Also, it is very important to encourage farmers to develop or encourage young people to develop business activities in this sector. All these activities should be implemented with continuing improvement of human capital and knowledge of rural population so that a service level is raised to a higher level. This way, rural economy will act multiplicatively on the agribusiness sector and other complementary activities (such as tourism and the tourist industry, trade, production of "healthy food", transport infrastructure, etc.), which is the ultimate goal of the reform of the rural development policy.

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PLANT PRODUCTION IN THE DANUBE REGION - TRENDS AND RANKING OF MUNICIPALITIES*

Blaženka Popović¹, Tamara Paunović²

Abstract

Rural areas in the Republic of Serbia cover 85% of the country, with more than half of the total population (55%). Since it is largely rural area, the promotion of rural development and diversification of economic activities represent an opportunity for development of the Danube region, and thus a chance to increase employment. In this paper, an analysis of plant production was carried out in 26 municipalities in the Danube region during the period from 2002nd to 2011th year. Based on available statistical data, the production of wheat, corn, sugar beet, sunflower, beans, potatoes, clover, alfalfa, meadows, pastures, apples, plums and grapes was analyzed, as well as tendencies in the past ten years. Development level of plant production in municipalities in the Danube region, is determined based on the I-distance, respectively, based on synthetic rank, which shows how municipalities are ranked according to the representation of plant production.

Keywords: *plant production, The Danube Region, municipalities, I-distance.*

Introduction

The Danube is the second longest and the second water - richest river in Europe, but also the longest river in the European Union. The Danube flows through the following countries (ordered from the source to mouth):

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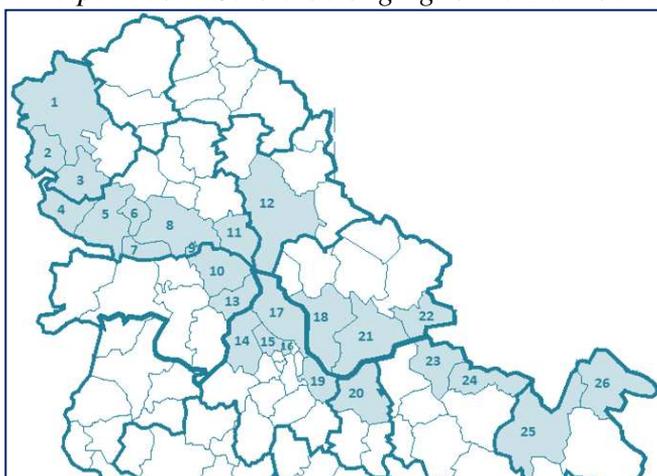
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Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Bulgaria, Romania, Moldova and Ukraine. This region is considered as a "macro region" based on a common historical heritage, common values and a common future. The States Parties to the Convention on the Protection of the Danube River (14 countries have signed the Convention in 1994) are also participating in development process of the EU Strategy for the Danube Region, which is designed to bring greater prosperity, greater security and peace for the people of the region, particularly through the strengthening of cross-border, trans-regional and trans-national cooperation and coordination. Serbia was officially included in the EU Danube Strategy, and thus includes plans to finance the economic, traffic, environmental, cultural and tourist projects of macro-region of countries in the largest European river basin (*Maletić, Popović, 2011*).

Spanning over 588 kilometers across Serbia, the Danube river is a great chance for the country. A total of 26 municipalities in Serbia (1. Sombor, 2. Apatin, 3. Odžaci, 4. Bač, 5. Bačka Palanka, 6. Bački Petrovac, 7. Beočin, 8. Novi Sad, 9. Sremski Karlovci, 10. Inđija, 11. Titel, 12. Zrenjanin, 13. Stara Pazova, 14. Zemun, 15. Novi Beograd, 16. Stari Grad, 17. Palilula, 18. Pančevo, 19. Grocka, 20. Smederevo, 21. Kovin, 22. Bela Crkva, 23. Veliko Gradište, 24. Golubac, 25. Kladovo, 26. Majdanpek) are located and directly gravitate to this basin (Figure 1).

Figure 1. *Municipalities in Serbia belonging to the Danube region*



Serbia has agrarian resources (land, climate and water) that are not used enough, and therefore, represent a significant economic potential for further development.

Plant production in the overall structure of primary agricultural production is of utmost importance, and therefore, the results within this production largely reflect the overall balance of agricultural production.

This production is characterized by a diversity of products used for human food and animal feed, but also as a raw material for industrial processing, so, it can be said that it represents the basis of the entire agriculture.

This represents a significant potential for project elaboration and project financing by the EU, which would regulate the navigable flow, construction of infrastructure facilities, cargo terminals, tourist facilities, development of economic potentials and environmental protection projects in this basin. Therefore, the great potentials of municipalities belonging to the Danube region, should not be overemphasized.

Material and methodology

The subject of this paper is plant production in 26 municipalities of the Danube region. Published reports of the Statistical Office were used as a data source ("Municipalities and Regions in the Republic of Serbia" during the period from 2002nd to 2011th). The total production of wheat, corn, sugar beet, sunflower, beans, potatoes, clover, alfalfa³, meadows⁴, pastures, apples, plums and grapes for the observed ten-year period is analyzed.

For the overall production of the observed cultures, descriptive statistics indicators are defined, and for assessing the dynamics of the observed features, chain and basic indices were used, but also the growth rate for the observed period (*Maletić, 2005*).

In order to display tendencies, linear trend equations were calculated and graphically illustrated with the trend lines that are best adapted to the original appearance of the observed time interval (*Kovačić, 1998*).

In this paper I – distance (Ivanovic, 1963) was used to form a ranking list of municipalities based on a set of selected features (sequential

³ Total yield of clover and alfalfa also included the yield of sub crops.

⁴ Total yield of hay from the meadows also included hay from fallow, neglected land and orchards.

classification). A key argument for using this method is its ability to synthesize a large number of variables into a single numerical value, which allows performing the ranking of the observed municipalities with simultaneous observation of a large number of indicators. If there are k features x_1, x_2, \dots, x_k , ranked according to the significance of the information provided on development level of the observed set $P = \{P_1, P_2, \dots, P_n\}$ (a set of countries, regions, municipalities, etc.), then the I - distance between P_i and P_j is defined by the following expression:

$$D_r^- = \sum_{i=1}^k \frac{|X_{ir} - X_i^-|}{\sigma_i} \prod_{j=1}^{i-1} (1 - r_{ij})$$

where: X_{ir} - refers to vector of specific characteristics for each municipality, X_i^- - a fictitious municipality with the most unfavorable (minimal) features value, r_{ij} - value of the correlation coefficient of the observed features (in this paper Pearson's correlation coefficient was used), σ_i - variability of features expressed in standard deviations.

Statistical data analysis and illustrations of results using tables and graphs were performed using Microsoft Excel 2007 and STATISTICA 8 for Windows (StatSoft).

Research results and discussion

Basic statistical data of empirical distributions: the average values (arithmetic mean) of the total production of basic crops, with indicators of variability (absolute and relative) are shown in Table 1.

Maize and sugar beet production have the largest share in the structure of total production, while production of beans is the least represented. The coefficients of variation are within the range from 8% - 30.21%, indicating a homogeneous data series. The greatest variability was noted in the apple production, and the total yield of meadows varied the least in the observed ten year period.

Trends of total crop production are shown in Table 2. Overall wheat production in the observed period has decreased at an average annual rate of $RG = -1.53\%$. The decrease was also observed in grape production at the average annual rate of $RG = -1.26\%$.

Table 1. *Basic statistical data of the total plant production in the Danube region*

Plant cultures	Min	Max	$\bar{x} \pm S\bar{x}$	S	Cv(%)
Wheat	356136	677083	495850.50 \pm 28363.83	89694.29	18.09
Corn	1060992	1988286	1618671.60 \pm 95019.83	300479.07	18.56
Sugar beet	651739	1405240	1152430.80 \pm 78054.19	246829.03	21.42
Sunflower	81223	138201	107306.20 \pm 5169.77	16348.24	15.24
Beans	5810	8899	7599.30 \pm 306.34	968.72	12.75
Potatoes	98680	162732	143278.70 \pm 6052.07	19138.32	13.36
Clover	21210	31405	27250.20 \pm 893.19	2824.50	10.37
Alfalfa	148965	198409	179333.70 \pm 4535.30	14341.86	8.00
Meadows	49977	79685	65367.10 \pm 2689.31	8504.36	13.01
Pastures	28362	62734	42621.90 \pm 3297.93	10428.98	24.47
Apples	19166	90099	64222.90 \pm 6135.46	19402.03	30.21
Plums	11086	30477	23261.20 \pm 1776.50	5617.79	24.15
Grapes	42814	81649	59296.40 \pm 3913.06	12374.17	20.87

Source: *Authors' calculations based on data of the Statistical Office of the Republic of Serbia.*

Other cultures have a tendency to increase in the observed ten-year period. The largest increase was recorded in the apple production ($RG = 18.76\%$), and in the plum production ($RG = 11.06\%$). Changes are calculated per year and are presented with dynamic indices (base and chain) and based on that, changing trends in total production is observed (more on indices in Table 2).

Table 2. *Dynamic indices of the total plant production in the Danube region*

Years	Wheat		Corn		Sugar beet		Sunflower		Beans		Potatoes	
	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100
2002	-	100	-	100	-	100	-	100	-	100	-	100
2003	63	63	71	71	81	81	127	127	88	88	75	75
2004	190	120	163	116	174	141	119	152	153	134	165	123
2005	72	86	108	126	109	153	82	125	99	133	95	117
2006	99	86	86	108	106	163	106	133	95	126	102	120
2007	99	85	72	78	105	171	80	107	89	113	83	99
2008	107	91	147	115	78	133	159	170	95	107	108	107
2009	100	92	101	117	117	155	80	136	105	113	109	116
2010	73	67	114	134	112	174	97	132	98	111	94	109
2011	130	87	92	123	90	157	105	138	108	120	109	118
R _G (%)	-1.53		2.29		5.12		3.68		2.02		1.91	

Source: *Authors' calculations based on data of the Statistical Office of the Republic of Serbia.*

RG (%) = rate of change of the observed time series.

(continued)

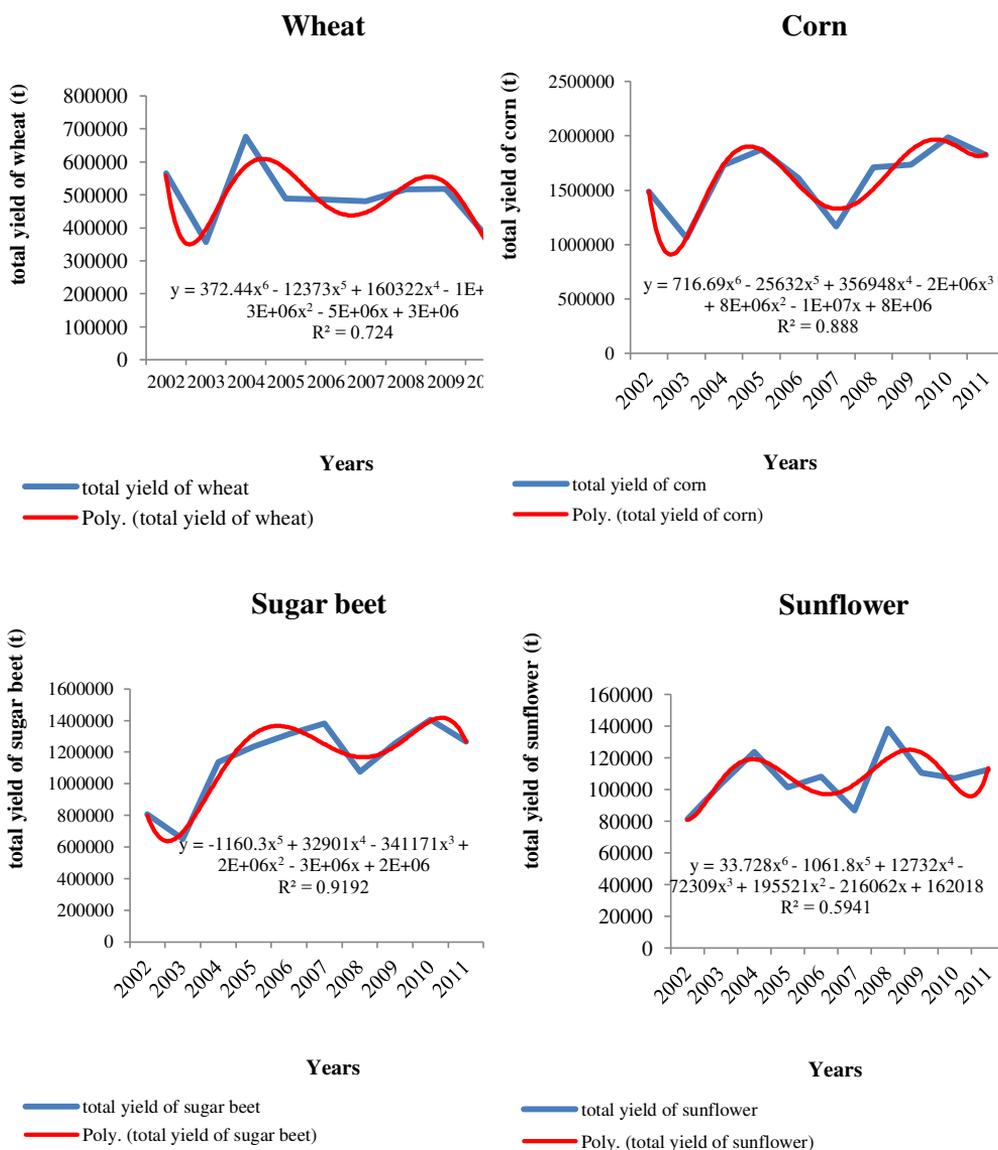
Year	Clover		Alfalfa		Meadows		Pastures		Apples		Plums		Grapes	
	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100	Li	Bi 2002=100
2002	-	100	-	100	-	100	-	100	-	100	-	100	-	100
2003	82	82	85	85	92	92	85	85	332	332	188	188	132	132
2004	134	110	133	113	137	126	119	101	82	272	116	218	107	142
2005	108	119	99	112	117	147	139	141	111	301	76	167	55	78
2006	102	122	91	102	92	135	100	141	110	330	125	209	125	98
2007	87	106	94	95	91	123	78	109	106	349	97	203	100	98
2008	99	105	109	104	99	121	109	119	107	374	123	251	115	112
2009	96	101	103	107	96	116	115	138	112	419	110	275	96	108
2010	102	102	93	99	109	126	116	160	96	404	84	231	69	75
2011	106	108	102	101	95	120	118	189	116	470	111	257	120	89
R _G (%)	0.89		0.14		2.03		7.33		18.76		11.06		-1.26	

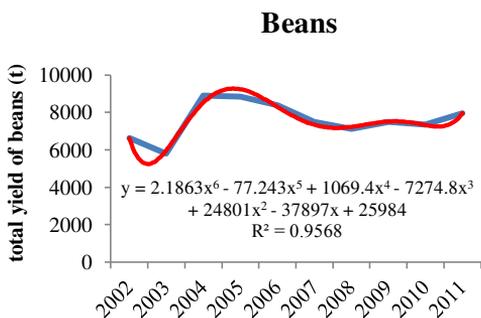
Source: Authors' calculations based on data of the Statistical Office of the Republic of Serbia.

RG (%) = rate of change of the observed time series.

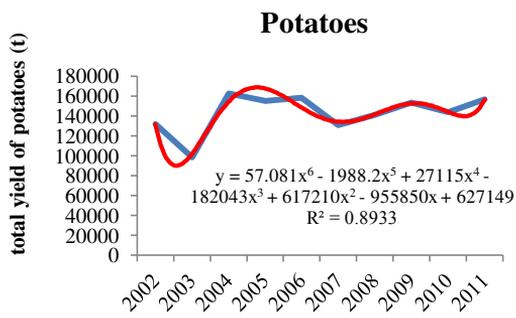
Dynamic changes of the total plant production in the Danube region during the period from 2002nd to 2011th year are shown with lines which are in the form of parabola of the fifth and the sixth degree, and illustrated the production trends in the observed ten year period with the least experimental error and the highest coefficient of agreement (Graph 1).

Graph 1. *Tendencies of the total plant production in the Danube region*

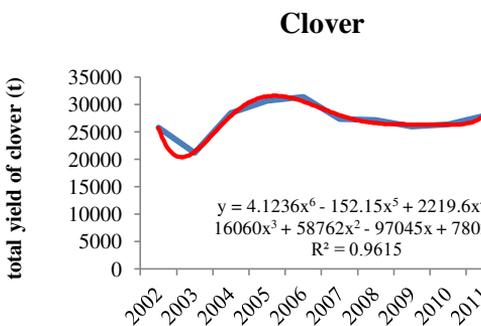




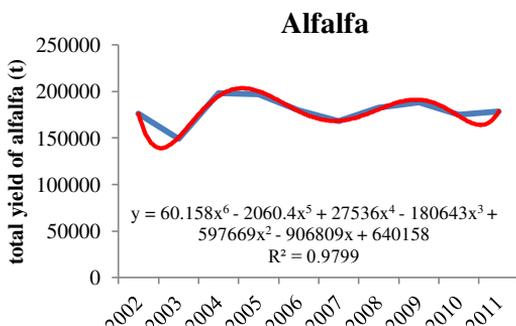
— total yield of beans
 — Poly. (total yield of beans)



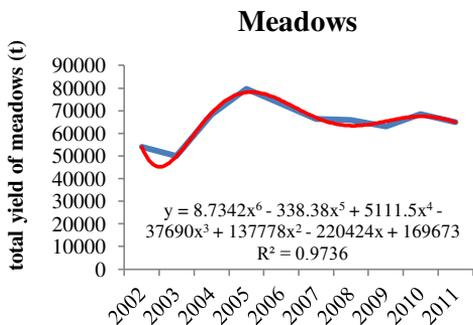
— total yield of potatoes
 — Poly. (total yield of potatoes)



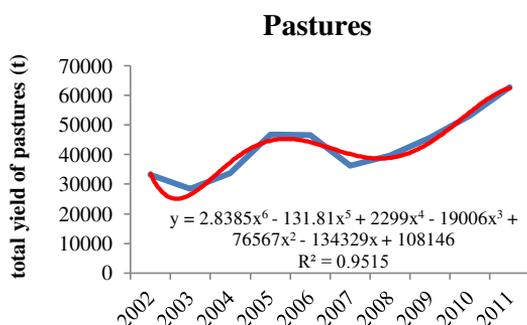
— total yield of clover
 — Poly. (total yield of clover)



— total yield of alfalfa
 — Poly. (total yield of alfalfa)



— total yield of meadows
 — Poly. (total yield of meadows)



— total yield of pastures
 — Poly. (total yield of pastures)

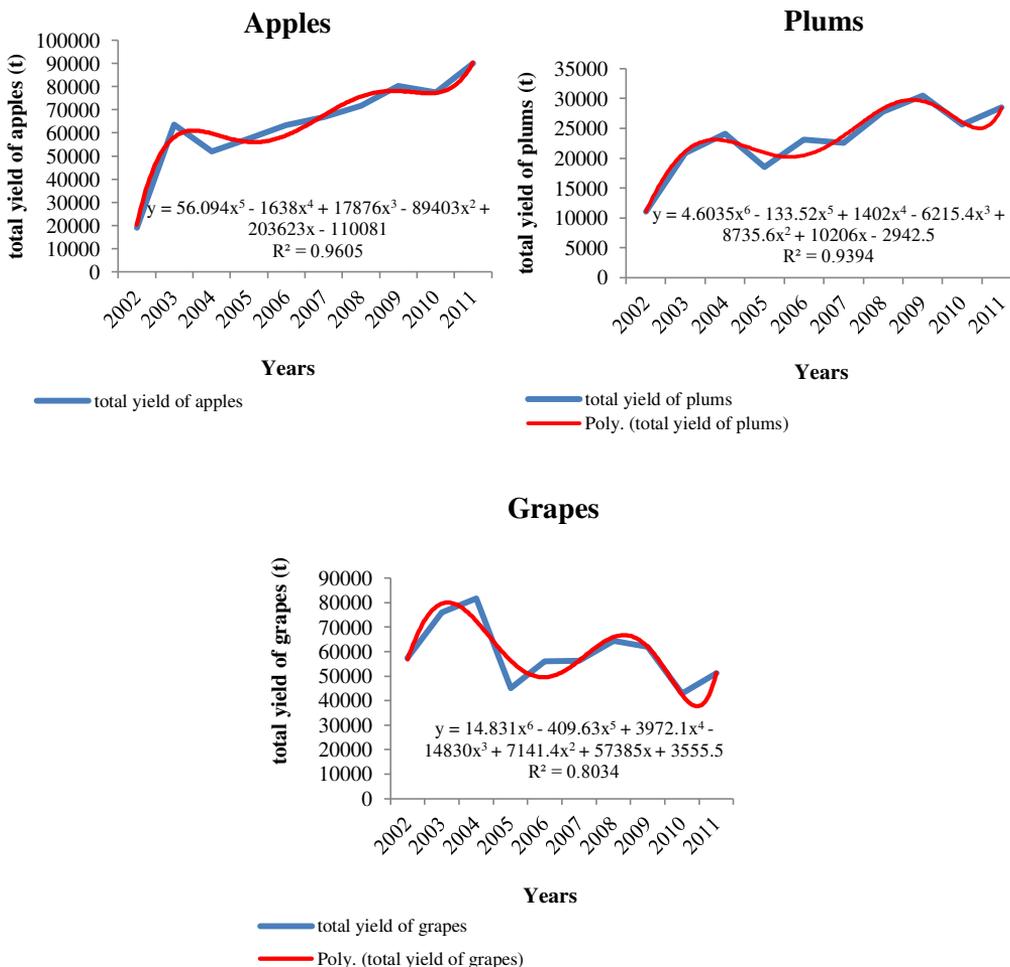


Table 3. illustrates the ranking of municipalities in the Danube region according to the average plant production in the observed ten year period. Municipalities with the largest production are marked with the rank of 1, and so on until the last one, which has rank of 26 (minimum output). Municipality of Sombor, Zrenjanin, Novi Sad, etc., are municipalities with the highest rank in plant production, and a major municipalities in fruit production are Smederevo and Grocka.

Such a ranking does not allow determining the final ranking for each municipality if all cultures are observed simultaneously. The exception is the municipality of Stari Grad, which is in the last place since it is an urban municipality without agriculture production.

Table 3. Ranking list of municipalities in the Danube region according to development level of plant production

Municipalities	Wheat	Corn	Sugar beet	Sunflower	Beans	Potatoes	Clover	Alfalfa	Meadows	Pastures	Apples	Plums	Grapes
Grocka	20	19	24	23	3	8	2	18	7	18	3	1	1
Zemun	12	18	14	15	19	17	4	13	23	24	21	19	19
Novi Beograd	25	24	19	22	25	25	23	25	25	25	25	25	25
Palilula	8	17	9	16	18	15	22	1	21	23	17	22	23
Stari Grad	26	26	26	26	26	26	26	26	26	26	26	26	26
Zrenjanin	2	3	4	1	8	5	9	2	3	1	10	8	8
Bela Crkva	15	15	18	5	23	18	3	19	10	8	2	5	9
Kovin	10	4	10	4	11	10	16	9	22	14	18	20	12
Pančevo	3	2	8	2	5	2	15	7	18	17	5	13	14
Apatin	11	12	11	13	17	19	19	16	14	2	12	6	13
Odžaci	7	9	3	12	10	7	12	6	9	6	11	16	22
Sombor	1	1	1	3	13	4	20	4	4	5	8	4	10
Bač	16	13	13	18	12	21	18	22	15	7	15	18	21
Bačka Palanka	5	5	5	10	6	3	11	8	11	13	4	12	16
Bački Petrovac	17	16	12	9	21	6	24	21	16	20	20	21	17
Beočin	23	20	20	19	22	22	17	23	12	9	14	10	6
Novi Sad	4	6	7	11	4	1	7	5	13	4	6	11	2
Sremski Karlovci	24	25	25	24	24	24	25	24	20	21	24	23	11
Titel	14	11	15	6	20	16	14	14	19	3	23	24	20
Indija	6	8	6	7	9	14	21	10	17	12	7	14	3
Stara Pazova	9	7	2	8	16	9	8	15	24	22	13	17	15
Smederevo	13	10	16	20	7	11	5	3	5	19	1	2	4
Veliko Gradište	18	14	17	14	1	12	10	12	6	11	9	3	7
Golubac	22	22	21	21	14	23	13	17	8	16	16	15	18
Kladovo	19	21	22	17	2	13	1	11	2	10	19	7	5
Majdanpek	21	23	23	25	15	20	6	20	1	15	22	9	24

In order to estimate development level and ranking of municipalities according to the level of total plant production, thirteen indicators was taken into account, each in a special way measure the level of development. Indicators should have a complementary character, in order to assess development level of each municipality in their joint observations. (Bogoslavjević, 1984).

When examining the level of development, the method that provides a common expression of different indicators must be applied. Method of I - distance fits all of these characteristics structurally, and it was used to rank municipalities in the Danube region according to the development level of plant production.

Considering that the I-distance is a method where the sequence of features is very important for the result, it is necessary to specify the feature that has the greatest significance. Corn production is considered as a major feature, and the order of the other features was determined based on the correlation matrix (Table 4).

According to the further procedure for the Ivanovich distance application, and also based on Pearson's correlation coefficient for defining the overall discriminatory effect (this ratio was used because of the low level of variability), further sequence of features is as follows: wheat, sunflower, sugar beet, potatoes, alfalfa, pasture, beans, meadows, plums, clover, apples, grapes.

Ranking list of municipalities in the Danube region, according to total yield of crop production has been formed based on the values obtained using the I-distance (Table 5).

Based on the formed ranking list of municipalities it is possible to make several conclusions. First, it is evident that the top-ranked municipalities are those with developed crop production.

Sombor as the highest ranking municipality is the municipality with the highest production of wheat, corn, sugar beet, the third in the production of sunflower, and fourth in the production of potatoes, alfalfa, hay from the meadows and plums (see Table 3).

Then, followed by municipalities of Zrenjanin, Pančevo, Novi Sad and Bačka Palanka - also municipalities with highly developed crop production. Zrenjanin is a leading municipality in the production of sunflower and hay from the pasture, the second in production of wheat and alfalfa, the third in corn production, and so on. Pančevo, Novi Sad and Bačka Palanka are also highly ranked in the production of major crops.

Table 4. Correlation matrix

Grapes	Plums	Apples	Pastures	Meadows	Alfalfa	Clover	Potatoes	Beans	Sunflower	Sugar beet	Corn	Wheat	Cultures
												1	Wheat
											1	0.93**	Corn
										1	0.80**	0.82**	Sugar beet
									1	0.47*	0.81**	0.79**	Sunflower
								1	0.11	0.01	0.23	0.18	Beans
							1	0.46*	0.49*	0.52**	0.73**	0.68**	Potatoes
						1	0.11	0.61**	-0.07	-0.23	-0.14	-0.12	Clover
					1	0.02	0.49*	0.28	0.49*	0.45*	0.58**	0.70**	Alfalfa
				1	0.35	0.49*	0.13	0.48*	0.30	0.20	0.20	0.32	Meadows
			1	0.39	0.36	0.05	0.29	0.13	0.62**	0.23	0.43*	0.61**	Pastures
		1	-0.05	0.10	0.23	0.34	0.18	0.25	0.03	-0.10	0.08	0.03	Apples
	1	0.64**	0.22	0.54**	0.22	0.53**	0.18	0.59**	0.12	0.10	0.15	0.18	Plums
1	0.67**	0.48*	0.07	0.20	0.08	0.58**	0.24	0.57**	-0.07	-0.08	-0.01	-0.01	Grapes

*=P<0.05 **=P<0.01

The sixth and seventh ranked are the Municipality of Smederevo and Grocka, characterized by fruit and viticulture production. Municipality of Smederevo is the first in apple production, the second in plum production, and fourth in the production of grapes. Grocka is a leading municipality in the Danube region considering the production of plums and grapes, and a third in apple production.

Table 5. *Ranking of municipalities in the Danube region according to total yield of crop production*

Municipalities	I-distance	Rank	Municipalities	I-distance	Rank
Sombor	9.46	1	Apatin	2.67	14
Zrenjanin	9.13	2	Bela Crkva	2.66	15
Pančevo	7.42	3	Palilula	2.63	16
Novi Sad	6.81	4	Titel	2.40	17
Bačka Palanka	5.87	5	Bački Petrovac	2.22	18
Smederevo	5.40	6	Bač	2.14	19
Grocka	5.11	7	Majdanpek	1.65	20
Veliko Gradište	4.99	8	Zemun	1.62	21
Kladovo	4.99	9	Golubac	1.55	22
Odžaci	4.59	10	Beočin	1.34	23
Kovin	4.50	11	Sremski Karlovci	0.31	24
Indija	4.19	12	Novi Beograd	0.11	25
Stara Pazova	3.45	13	Stari Grad	0	26

On the rear of ranking list are mostly urban municipalities with a low level of crop production such as Beočin, Sremski Karlovci and Novi Beograd, as well as Belgrade municipality of Stari Grad where agricultural production is not recorded.

Conclusion

After the enlargement of the European Union with two new member states (Bulgaria and Romania) in 2007, the Danube River has become an internal EU water line. As one of the trans-European corridors (Corridor VII), the Danube River is the main waterway through the European Union territory. The Danube River Basin has about 115 million citizens of the EU.

Countries in its basin share many common resources and are connected to each other in economic, ecological and cultural terms. The Danube region can significantly contribute to improving development, given that there is a huge development potential, especially in the countries most affected by the transition since 1989, which would help to overcome regional differences in economic performance. In order to use most of these opportunities increased cooperation, planning, and joint ventures, as well as development of the crucial links in the region is needed.

Production and distribution of food are of strategic importance for the well-ordered society and for a market-oriented economy. Main direction of future development of the agro-industrial complex in municipalities of the Danube region is the optimal use and preservation of the available production capacities enhancing the scope of agricultural production, changing of production structure in favor of intensive agriculture for export, and production of finalized and high quality products.

The objective of such development direction is to satisfy domestic demand and increase considerably the export of high quality agricultural and food products. Our country has outstanding agro-ecological conditions for plant production and good export prospects, but for more significant placement to international markets, quality improvement, modernization of production technology and the introduction of European standards in production is necessary.

A favorable economic environment may lead to improvements in this area, which means more funds for development of this type of production, the incentives of agricultural policy, as well as the integration of primary production with the processing of agricultural products. Defined ranking list of municipalities in the Danube region according to development level of plant production indicates the weaknesses as well as the opportunities and directions for the future development of this production and related industrial capacity.

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POLITICAL AND INSTITUTIONAL DIMENSIONS OF REGIONAL RURAL DEVELOPMENT IN SERBIA

*Dejan Janković, Marina Novakov**

Abstract

In this paper, the authors analyze rural development in the context of the political and institutional preconditions for the realization of this process. The authors take the concept of territorial rural development and decentralization as the main theoretical and methodological framework and analyze the processes that take place in Serbia, attributing a great importance in rural development to the local governments. On the basis of the number and structure of strategic documents, their initiation and implementation, as well as the training needs of the local administration, the authors make conclusions about insufficient institutional capacity of local governments in Serbia and, in particular, the capacity in terms of activating the issue of rural development. These findings are consistent with the findings of other authors who point to the importance of the presence of institutions and their optimal quality for local and regional rural development.

Keywords: *local and regional rural development, decentralization, local (self) government*

Introduction

In order to understand society and its development it is necessary to analyse the relevant factors that may affect the rate, the course and the consequences of social changes in rural areas. The importance of regional and local rural development emerged in late 1980s in the document of the European Commission *The Future of Rural Society*, which pointed out the need of

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external support (rural development policy) to endogenous potentials of rural areas (Bogdanov and Janković 2013). Endogenous potentials and local-territorial approach to rural development in the policies of the European Union were a step forward in understanding that agricultural policies that dominated rural policies (together with other, usually separated and often uncoordinated, sectoral, measures) failed to achieve the equal results in terms of reducing poverty and inequality in different rural areas.

In the context of local rural development and issues of *how local is "local"?*, Moseley (Moseley, 2003: 8) suggests that the answer to this question greatly depends on a number of local features, “such as the population density, resource base and administrative structure ...local area should be small enough to sustain a “sense of place”, the willingness of local people to get involved and the prospect of a real integration of individual initiatives, but also large enough to afford certain economies of scale in management and service delivery and the likely availability locally of sufficient range and quality of expertise.”

The issue of regional rural development is clearly connected with the territory, which is not necessarily defined by its strict administrative demarcations. The territory is characterised by its functions, relatively similar and integrated economies, socio-cultural identity, and so on, which constitute a comparative advantage of that territory over other areas, i.e. regions (more in Bogdanov and Janković 2013). In social theory, the concept of territorial competitiveness is widely used and, apart from its economic meaning in the sense “the ability to withstand market competition”, it also refers to proving ecological, social and cultural sustainability of a certain area (Leader 1999).

Discussion of territorial, regional, rural development, "locality", highlights the need to emphasize certain preconditions for the exercise of territorial rural development. Local development embodied in the management level, both local and regional (self) government, may be exercised only if there are political and institutional conditions, natural, economic, cultural and other resources and people who are able to identify, activate and use the potentials of an area in a sustainable manner. On this hypothesis, in this paper we will analyze the possibilities of territorial rural development in Serbia, as well as the importance and potential of local governments as a relevant factor in the process of rural development. The theoretical and hypothetical framework of this analysis will be a process of regionalization and decentralization of society, as the political and institutional prerequisite of the actions of people, institutions and local (self) government in the context of rural development.

Regionalization and decentralization as important preconditions for rural development

In territorial terms, rural regions are socio-economic units that have their own structures and actors (institutions, both formal and informal social groups, potential and limitations for development) and have a relatively low population density in the smaller urban centers and rural areas around them. Development disparities and demographic state of Serbia (especially rural Serbia), characterized by migrations and population growth in a few key urban centers, the influx of population and uncontrolled creation of transition zones of suburbs and demographic passivity and emptiness of many rural areas (more in Rodić et al. 2013), indicate that these criteria are very important in the analysis of possible directions and principles of regionalization. Region, as a planning and development category (not only political and administrative), should provide a framework for: systematic development of the network of settlements, appropriate economic and spatial redistribution of economic capacities, subsidiary distribution of power and authority. It has to support local-regional initiatives and it is, at the same time, responsible for certain development activities, which are managed at the regional level. Although there are regions of different sizes (as well as local government /municipalities of various sizes), region is always considered as the optimal framework for integrated and sustainable socio-economic, demographic, cultural and environmental development of a specific territory, and the “best compromise” between fragmented local initiatives and “distant” global national plans of development (Janković, 2005; 2012a).

One of the key functions of the regionalization of society is to achieve intra and inter regional integration. Region represents an optimal framework for a response to the specific needs of people, much better than of the central government, primarily by making the political decision-making closer to citizens and their specific needs. This practically corresponds to generally proclaimed principle of subsidiarity, which is contained in the European Charter of Local Self-Government and the Declaration on regionalism, which was passed by the Assembly of European Regions and the European Constitution, Maastricht, Rome and Lisbon Treaty (which emphasizes this principle even more intensely).

Decentralization experiences of other countries suggest a number of prerequisites and the need of flexible approach to this process, which is long-term and socially specific. At the same time, as one of the prerequisites, but also a possible result of the decentralization process, one can think about the regions and the process of regionalization. Regionalization is closely

associated with the decentralization concept, but not identical, because decentralization does not necessarily mean regionalization, but may have different forms of decentralized administration. The optimal regionalization involves the process of decentralization in the form of the region, under which there are usually local governments (municipalities). The term region is rather vague and poorly defined, both in qualitative and quantitative terms. According to Tripković (Tripković 2007a: 485) under the region one should involve "... a separate, spontaneous and relatively homogeneous geographical, historical, economic and socio-cultural units, which allow their residents better way to achieve a common purpose, values and interests, that is, to successfully and fully express their specific regional identity".

An interconnection of regional and rural development is mainly related to the fact that each regional development, to a lesser or greater extent, often includes rural areas. Any development policy and policy of revitalization of rural areas, on the other hand, should be incorporated into the regional context, in terms of resources, needs and opportunities for sustainable development solutions (Janković 2012b). If isolated projects and actions of local character in a certain rural area occur, after a certain time one may question their viability and (or) complementary to a particular strategy or priorities of the medium-term or long-term development of a particular area. Achieving synergies in development as its primary objective, then, may be affected.

If rural development is trying to gain more importance in terms of regional policy, it is also necessary to stimulate optimal geographic (spatial) balanced socio-economic development. Many countries, especially countries "in transition" are faced with the problem of development disparities, often as a consequence of the concentration of economic growth and development of a small number of urban centers (for example, in Serbia, in Belgrade and Novi Sad), unevenly distributed in geographical space. Systematic stimulation of socio-economic development, through an adequate network of settlements and their complementary functions, represents the only way for accomplishment of balanced development of smaller urban centers, which perform specific functions within a specific territory (functions of macro-regional centers). In this way stimulation of socio-economic and demographic development and the maintenance of their rural hinterlands is performed, which - in this way - are able to integrate endogenous initiatives into broader development frameworks. In this context, some authors rightly point out that "rural development calls for a regional approach" (Rauch, Bartels and Engel 2001: 1). Therefore, a regional approach interests local development and macro development policies, as it enables a better

framework to design, both local and global development strategies. The national - macro frameworks - sometimes are not sufficiently sensitive to the problems and diversity of different rural areas, while local (endogenous) initiatives often lack the power and possibilities of integration into a broader development context. The same group of authors (ibid.,21) argues that regional development approaches cannot be successful unless the macro frame conditions provide the right type of incentives and unless sound sector policies are in place. "But: unless appropriate institutional arrangements or service systems are designed through regional programs, most people, and especially the poorer sections, will find it difficult to make strategic use of the incentives and of the greater room for maneuver created by improved macro policy frame conditions. Unless mechanisms for vertical and horizontal co-ordination are in place at regional level, sector programs may fail to reach the people on the ground." (ibid.).

Decentralization as a political and institutional dimension of rural development

In this section we will discuss the relationship of regional rural development and basic principles of decentralization, as well as its political and institutional point of view, the basic definition of the decentralization process and the key aspects that are prerequisites for successful decentralization. This is important because - as one of the prerequisites of a successful and effective rural development - decentralization must be adequately understood in all its aspects: fiscal, administrative (sector) and political.

In order to achieve the regional rural development it is of great importance to adapt (transform) the existing institutions and build (new) ones, strengthen their overall capacity, accountability and efficiency. Adequate "institutional architecture" enables successful social interaction of the local population in order to achieve their own development interests, in coordination with the "external" institutions and actors. The success, as understood here, is in the first place in the successful articulation, then promotion and finally, action, in order to achieve the collective interests of a certain area-region. In accordance with the principles of neo-endogenous development, development activities should be consistent with the existing development potentials and competitive advantages, whether in the economic, socio-cultural and environmental aspects.

The aforementioned institutional architecture is closely related to the possibility of regional and local institutions to act in the interests of the population they represent, *i.e.* in connection with political and institutional

dimension of territorial development. Some authors (Schejtman and Berdegué 2008: 21, 22) emphasize institutional development explicitly in defining territorial development as “a process of closely integrated productive transformation and institutional change of rural territories whose aim is the reduction of poverty and inequality. From this definition, it follows that rural territorial development rests on the simultaneous evolution of its two pillars: productive transformation and institutional change... It is through institutional development that a geographic space becomes a ‘territory’ understood as a rural space with an identity and a concerted development project it is, therefore, a social construct.”

For an explanation of local and (or) regional rural development, in which we attach great importance to local governments in Serbia (similar in Milić, Vittuari and Bogdanov 2013), it is important to clarify the current concept of *governance* today, which is derived from the concept of government, that is used to refer to the formal institutional structure and location of authoritative decision making in the modern state (Stoker 1997, according to Marsden and Murdoch 1998: 1). On the other hand, in social theory, which deals with issues of rural (and urban) development, the concept of governance focuses on the other, the new processes of governance, management, a different understanding of a number of actors and the complexity of their relationships. Woods (Woods 1998: 14, 15) notes that governance means redefining the role of local government as the sole supplier and actors responsible for system services. Zygmunt Bauman suggests a sociologically important fact: it is exactly the ability of people to participate in something that means a kind of "choice as the practice of freedom of expression" because, in his opinion, "people rebel against their living conditions and against the rules of the life game much less because they do not like the new reality as a result of these changes, but they do it because of the way it came - that is - because they came so long, and they were not asked for their opinion" (Bauman 2009 : 49).

For the successful development of local rural communities, decentralization of the society is one of the key system preconditions which can enhance local management resources/capacity. In this sense, decentralization must be seen as an important aspect of regional rural development, i.e. the political and institutional dimension of regional rural development. If the discourse of neo-endogenous rural development can be considered as a relevant (theoretical) framework in relation to this issue, the issue of decentralization in a way represents the operationalization of this thesis in political and institutional terms.

Decentralization (lat. *de i centrum*) is the differentiation of institutions and organizations within the state administration and is logically and fundamentally opposed to the concept of centralization, but also connected with the notion of democratization, privatization, de-concentration, devolution, regionalism, and the like. As a notion contrary to the concept of centralization, decentralization has an almost inherent characteristic a certain type of "desirability" in regulating social systems. Ideally conceived society should be adequately decentralized. However, these are very complex and dynamic processes for which there is no universally acceptable "recipe" and which are realized depending on the specific social context in which decentralization takes place, as well as the specifics of certain functions, which may or may not be decentralized at the level of a certain society.

Decentralization has become a kind of trend especially the mid-eighties and nineties of the previous century, when many countries and development organizations supporting decentralization processes in different countries, recommend it in order to increase the efficiency of the state apparatus, economic (fiscal) efficiency, political integration, democratization and the promotion of civil society and development of free markets to reduce state intervention. After some experience, in academic and political circles it is slowly realized that decentralization is not a "magic bullet" that solves all the problems, it is not necessary in all spheres of government, it can be a potential source of numerous problems in the functioning of society and that it represents a long-term and severe process that is socially contextualized.

The process of decentralization is defined differently. Simply put, decentralization is the transfer (part or overall) of state authorities (power and resources) from higher central, to lower levels of management. The aim is to increase the efficiency and accountability of government in order to be closer to the needs of the inhabitants of a certain territory or sector and to provide an adequate response to the problems in society that the central government is not (or not sufficiently) able to recognize and resolve. In essence it is the problem of institutionalization of an adequate balance/power relations and governance between the national and lower/local governments, *i.e.* of granting and/or limiting the power of the lower levels of government. Practically, this is an effort to "make decision-making closer to the people- to the citizens".

One of the perhaps most famous definition of decentralization is given by Rondinelli et al. (Rondinelli et al. 1981, according to Faguet 1997): „the transfer of responsibility for planning, management, and resource-raising and allocation from the central government to (a) field units of central government ministries or agencies; (b) subordinate units or levels of government; (c) semi-autonomous public authorities or corporations; (d) area-wide regional or

functional authorities; or (e) NGOs/PVOs.; Or more simply: the transfer of public authority, resources, and personnel from the national level to the sub-national jurisdiction“. According to Faguet (Faguet 1997: 4) „decentralization is understood as the devolution by central (i.e. national) government of specific functions, with all of the administrative, political and economic attributes that these entail, to local (i.e. municipal) governments which are independent of the center and sovereign within a legally delimited geographic and functional domain“. According to Milosavljevic (Milosavljević, 2005: 21, 215, 235, 240) decentralization is a "transfer of tasks by authorities to the local governments and other autonomous (non-state) institutions," and can be functional (a form of decentralization that does not lead to the creation of territorial units, but the transfer of certain functions - powers, duties and activities - from the state of a particular social group) and territorial (transfer of rights to make decisions from certain public domains from the state to the certain territorial collectivities). Territorial decentralization is also called political decentralization and means the same as local government.

These definitions reveal that decentralization refers to a number of interweaving social relations, actors and dimensions. According to Prud'homme (Prud'homme 1994: 1, 2): “Being for or against decentralization is not enough. The following should also be clear: why, when and how decentralization is to be encouraged (or discouraged); what trade-offs are involved; at what speed it should proceed; in what sectors and for what functions decentralization should be introduced first; what specific forms it should take; toward which levels of government it can most easily be implemented and what precautions or correcting measures should be introduced with it”. It is important to note that decentralization as such has its advantages and disadvantages, and that there are different forms of decentralization (de-concentration, delegation and devolution). These issues, unfortunately, cannot be elaborated in this paper.

There are several fundamental dilemmas of decentralization: what are the preconditions for successful decentralization, which are its modalities and the actors who take on the role of decentralized responsibility for their actions. Finally, generally speaking, one can discuss the advantages and disadvantages of decentralization, but each of these arguments has its strength again, only considering the clearly defined social context in which decentralization takes place. As a compulsory companion of the discussion on decentralization, systematization of pros and cons arguments is almost always present in the literature on this topic, but those arguments in this paper cannot be addressed. In the following part of the paper, we analyze some of the problems of decentralization in Serbia in relation to the potential of local governments.

Review of some of the features of local governments in Serbia

From the previous discussion, it is evident that decentralization is a long-term and tough process of negotiation, reconciliation and compromise between different stakeholders in order to create a critical mass of political will to delegate power, but also to accept it and use it in an appropriate way i.e. to institutionalize the decentralized relations. 'Transition' countries, burdened with past socialist command planning and centralized decision-making, are just crying out for greater rights and opportunities for local/regional decision-making. It seems that the political "transition elites" in Serbia took over the legacy of previous regimes, but in slightly different form, trying to establish full political and economic control of the social system often arguing with absent moments and milestones for the nation. In Serbia there is strong centralization of decision-making functions and consequences of such long-term conditions are differences in the levels of development that are the highest in Europe with an increasing trend. According to the index of developmental risk, the relationship between the most and least developed district is 1: 7 and, when we look at the lower levels, the difference is even greater - the ratio between the most and least developed district is 1: 15 (Vlada Republike Srbije, 2008).

Evolutionary history of local government in Serbia points to an important tradition which is historically based on the patriarchal family cooperative, patriarchal elders, as representatives of the families in the village parliament, then the head of the village and its functions. The history of Serbia could be roughly divided into the following key periods: the period under Turkish occupation; the period after Serbian uprisings until the middle of the twentieth century; the period of World War II until the 1990s¹, and the period after the year 2000.

In relation to the post-war communist period and the period 1990-2000 the situation is slightly better, especially in terms of formal and legal means of action of the local government (though there are still numerous problems), more recently, the process of determining the jurisdiction of the Province of Vojvodina, more manifest system formulation and funding responsibilities, international cooperation, etc..

¹ In these times there were a range of different modes of organization of government, which cannot be elaborated in this paper (more on the historical development of local government, Đordjević 2002).

In addition, there is a series of more or less favorable conditions for decentralization. On the one hand, we could talk about certain policy frameworks and legislation needed as a framework for the process of decentralization (Constitution of the Republic of Serbia, the Law on Local Self-Government and the Law on Local Government Finance, Omnibus Law and the Statute of Vojvodina). On the other hand, the process of decentralization and allowing more authority to local governments is associated with the reform of a number of other areas in the society and cannot be observed partially. Also, the existing legislation is in some respects regulated in a more detailed manner with other (for example, Law on administrative procedures, public enterprises, budget system, government, etc.).² Law on local self-government, which is applied from the beginning of 2007, created a legal basis for local government to determine, collect and control their source incomes prescribed in Article 6 of this Law (original revenues of local governments). The law provides for fiscal decentralization, which allows local governments to have significant control over the source revenues (property taxes as a revenue source, income tax - 40% of employees' residence - and an effective system of equalization). However, the fact is that only a small number of local governments have the capacity to take on these responsibilities in their hands, and many local governments in Serbia have not yet achieved this capacity. So even if there is political will (?) for fiscal decentralization (materialized in the law), due to the weak capacity of local governments it (fiscal decentralization) is not feasible, which is a rather large error in the process of decentralization.

At this point, the authors have not found a more transparent analysis of the extent to which local municipalities increased their revenues (after the passing of this Act), but also expenses due to increased responsibilities of local governments. At the same time, the right to property of local self-government is guaranteed by the new Constitution of the Republic of Serbia, but it is not closely defined. The Law on Local Self-Government property does not exist yet, but will definitely depend on political decisions and on whether the property is to be returned to local governments, how it would be returned and to what extent³.

² Extensive list of laws and strategies that are associated with the process of strengthening local government and its development, see Milosavljević 2005: 61-76; Kovacević Lepotić 2007: 3, 4.

³ The assets of local governments are virtually "nationalized" by the adoption of the Law on Assets Owned by the Republic of Serbia in 1995. This law, according to some opinion, (SKGO 2005) is the largest dam on key competences of local self-government as the Republican Property Directorate of the Republic of Serbia must approve each

The question is, then, of the extent to which Serbian society has developed appropriate concepts for decentralization, and whether they are mere political rhetoric in election campaigns. Coherent with this issue is the question of expertise and capacity of public administration at the national and especially at the regional and local level.. If a society wants proper exercise of political and fiscal decentralization (the conditions for this are qualified staff and specialists at the national level), only appropriately qualified and professional staff at the lower levels will be able to manage and use new powers (with the present control at the national level). This means that the local government has to be successfully reformed from within and as one of the key requirements of a successful decentralized system. Successful and appropriate reform from within implies capacity building (skills, motivation, access, accountability, quality and efficiency ...) of local administration and political leadership, and creation of legal framework within the jurisdiction of which they are eligible (strategic planning, plans of integrated and sustainable economic development, international development projects, attracting investments etc.). According to the comparative study of 18 developed and underdeveloped EU rural regions in the period 1980-1997 (see Terluin, Post and Sjöström 1999), in developed regions capacities of actors (knowledge, skills, attitudes), and the capacity of policy makers were significantly higher than in the underdeveloped regions. This means that in developed regions, they were able to formulate development strategies clearly and in line with the priorities and needs of the region and to better attract public and private investments for the sake of creating new jobs for local people (this is dependent on the actions of local actors, better communication as well as external links with e.g. regional and EU institutions, the relationship with investors and companies, etc.).

Municipalities and cities in Serbia have in recent years started with these reforms and efforts to create development plans, raise capacity by local governments, systematically solve priority problems and attract more foreign investments. Evaluation of the quality of strategic plans is difficult to give, but information on existence of those efforts represent an indicator of a change in this sector, particularly in association with the Standing Conference of Towns and Municipalities (SKGO), which is a very important

individual act of "disposition" that city and municipal authorities intend to take (meaning: supply and alienation, but also allowing the usage, lease, mortgage, etc.). Total estimated losses on the basis of a ten-year implementation of the Law on Assets Owned by the Republic of Serbia, in the analyzed categories, thus excluding unrealized losses on investments and other losses, amounted to EUR 1.3 billion and thousands of jobs (ibid.).

institution and partner to the Government in relation to the process of decentralization and development local governments. In collaboration with international partners, the Government of the Republic Serbia and SKGO conducted an initiative for mapping of municipal policy documents, as well as the needs of municipalities for training, with the aim of mapping the local activities in the form of a single database for analysis and as a source for interested investors. According to the data collected (in 2007 the database included 167 municipalities and cities), in the municipalities and cities of Vojvodina and Central Serbia there were around 409 different strategies and plans. Some of the key differences that make these plans are in the following aspects: the type of plan (local or inter-municipal), the area to which it relates, and the phase of the plan (if the plan is implemented, or are for some reason not yet implemented). The structure of these strategies can be seen in the following table.

Table 1. *Structure of the plans and strategies of municipalities and towns in Vojvodina and Central Serbia*

Type of plan \ Area related	Local	PHASE: In realization	Intermunicipal/ regional	PHASE: In realization
Municipal action plan	2	0	3	0
Action Plan for Children	21	8	0	0
Action Plan for Roma population	13	4	1	0
Employment Action Plan	3	0	0	0
The fight against drugs	1	1	0	0
Other	4	0	0	0
People with Disabilities	1	1	0	0
Regional Waste Strategy	0	0	8	0
Local Economic Development Strategy	42	14	11	2
Local Sustainable Development Strategy	35	8	7	1
Strategy for Agricultural Development	5	1	0	0
Strategy for Development of Sports	1	1	0	0
Tourism Development Strategy	5	2	6	2
Regional socio-economic strategy	3	0	12	3
Social Protection Strategy	35	11	6	1
Waste Management Strategy	0	0	0	0
Youth Strategy	2	0	0	0
Poverty Reduction Strategy	2	0	0	0
Environmental Strategy	40	11	35	5
Comprehensive socio-economic development plan	66	22	14	2
Urbanism	4	0	0	0
Health care	1	1	0	0

Source: *Vlada Republike Srbije. Strategija za smanjenje siromaštva (2007) – authors' elaboration.*

As can be inferred from the data, in 2007 there were a total of about 290 local and 100 inter-municipal plans. The structure of both local and inter-municipal (regional) plans, the number of municipalities, is dominated by the overall socio-economic development plans, strategies of local socio-economic and sustainable development, strategies of regional socio-economic development, strategy for the protection of the environment, social protection strategies, action plans for children, regional waste management strategy; tourism development strategy etc. The comparability of these strategies is only relatively possible based on their names, because some names were not formally exactly the same, but in terms of substance, they belong to group and are interrelated. An interesting fact is the financing of these projects: out of the total number of the existing plans and strategies, there were no funds for 123 plans and strategies, for 191 of these plans the collection of funds was in progress, and the funding was provided for only 72 plans and strategies. These data lead to the conclusion that local governments have in recent years joined the process of strategic planning which, in essence, means creating a formal framework for the development of locality or region, that is, a framework for the development of certain sectors - tourism, agriculture and the economy in general, social protection, sustainable development and environmental protection, sports etc

The number of existing documents, however, says nothing about the quality of these documents, nor can accurately guess which of the strategic documents are missing. It is understood that the key issue is related to the quality and adequacy of the existing documents and essential coverage of current problems and possible solutions in the field of local government. In regards to this, it is simply impossible to make any conclusions without a comprehensive analysis of existing plans. What certainly disappoints is the fact that for 123 plans there were no funds (30%), while almost 50% of fundraising was still in progress. This is in line with recent analysis (Milić, Vittuari and Bogdanov 2013), which concludes that local government capital in Serbia to assume the leading role in managing rural governance is still very limited, but all local governments have clearly articulated the need to strengthen the relevant capacity. There is insufficient level of organisational regulation, lacking human and technical capacity. Complexity of the issues of duties, authorisations, and limitations of national and local government institutions are key obstacles to the improvement of the institutional dimension of their capital (Ibid.).

The legitimate issue here is: how can one plan strategically, if there are no funding and resources available? Is it the wish list and "thick" descriptive strategies, which takes up most of the descriptive statistics of the current situation, with the final SWOT analysis of the problem or area? It is

probably a registration of problems and the anticipation of governmental or other funding (through the creation of formal frameworks and strategies) that will - if they exist - lead to problem solving? Analysis of the available data in 2010 shows an interesting situation regarding these documents: the largest share in initiating the creation of these documents has a local government (about 35 %), followed by international institutions, organizations, donors, governments (20%), local institutions - schools, health facilities, social welfare and so on (about 12%), ministries and national government (about 10%), SKGO (about 9%), NGOs and citizens' groups (about 8 %), others (4%). Participants and partners in the creation of strategic documents are mainly centers for social work, educational and medical institutions, NGOs, public companies, donors and others. An interesting fact is that by far the largest financier of creating these documents is local government (50%), international institutions, organizations, donors, governments (40%), the national government (about 10 %) and others. Providing funds for the implementation of these plans is, as expected, much smaller, but the structure shows mainly the means of local government (40%), international institutions (30%), national government (about 17 %) and other sources (10%). (SKGO 2010, authors' elaboration).

Although we do not reject the importance of analyzing the problems and needs of the local/regional level, we believe that the principles of strategic planning requires much more than that, especially how to realize some plans, addressing the causes and not just symptoms of some conditions. Decentralization logic dictates that those who strategically plan, must have the resources under control (which implies own property, as well!). Some of the major obstacles to strategic planning are the lack of resources and political "games", extensive and often incompetent administration with bureaucratic solutions and procedures. Otherwise, in Serbia we witness the present phenomenon of "planning" and constant demand⁴ (and expectation) of funding from the state (fiscal centers of power), donors (who are not a permanent funding support), public-private partnerships (which are still in their infancy) or loans (which is still limited for the local government due to the unregulated status of "their" property). This phenomenon is accompanied by the syndrome of dependency on the state and national measures, so-called "system blame" mindset, which redirects all the blame and responsibility for the current situation on the government, society, system, i.e. higher instances.

⁴ Rauch (Rauch 2008) notes that "people are starting to plan strategically when they have their own money." If the local government has fiscal autonomy, then it is very likely to be a "strategic" in the use of the money.

The other side of the problem concerns the capacity of local government for the decentralized control of its own development. "Capacity" means that the local government, particularly in the material sense and staff is ready to take on new responsibilities that are to be delegated. In the Ministry of Public Administration and Local Self-Government of the Republic of Serbia, there is a project to support capacity building in local government, especially in the context of European integration, regionalism and the creation of high quality and effective local administration. The analysis of existing data on the need for education of employees in local government (Vlada R. Srbije 2007), point to the conclusion that their needs are the greatest in the areas of capacity building for local-regional development and submission of project proposals, creation of strategic plans and other documents and databases (76 municipalities).

This need is related to access funds from the National Investment Plan, as well as to donor funding and the EU pre-accession funds, that is, learning about the process of European integration, regulations, and standards (26 municipalities). Related to this is also the need to increase the quality of the local population in terms of increasing the quality and efficiency of services of the local administration (47 municipalities), work on local development (43 municipalities), which implies the IT skills and knowledge of modern means of communication (40 municipalities) and foreign languages (26 municipalities) (Vlada R. Srbije 2007, authors' elaboration). These preferences of local governments are an important indicator to the government and to other stakeholders about the direction and the areas where resources be should placed in order to strengthen the capacity of local governments, so that they could be able to successfully respond to the demands of the decentralization process in the future.

Conclusions

Two key issues that are harder to implement than other issues mentioned above (especially the political will and the concept of decentralization) refer to: 1. reform and building of an adequate institutional system (in Serbia for many years systematically imploded) as the basic conditions supporting decentralization, and 2. ways of implementation of a specific plan and program of decentralization. Taking this into account, we can certainly say that the Serbian society does not meet many of the aforementioned prerequisites for decentralization. Serbia was, until recently, very centralized country, and now we face the demands and

struggle for decentralization, primarily by the Vojvodinian provincial authorities, local government and its active and dynamic leaders, through political discussions and other channels of communication, but also through organized forms of professional (civil society) pressure and cooperation with the government. However, it seems that the ruling political "elite" in Serbia do not have enough sincere political will necessary for substantial decentralization. This proves once again the excellent thesis on four fundamental social problems in Serbia: politicization, criminalization, elitization and isolation (Tripković 2007b). The aforementioned "system blame" attitude is present, particularly in rural areas, but it is also a legitimate consequence of a centralized system and the lack of legitimate power (authority) to make some creative steps towards a comprehensive social development.

Hampered initiatives eventually lead to the dependence syndrome and pervasive apathy, which is, not only economical and political, but also collective social-psychological and sociological phenomenon. This phenomenon is in sociology partly embraced by the concept of social exclusion. In the degraded state of the institutional system, it seems that only charismatic and creative local leaders (backed by strong political positions and the desire for political points) leads to the "results". These results in Serbia are often lacking, and the key problem is the lack of adequately institutionalized ways of resolving issues of social development. As long as there are a "charismatic", "capable and resourceful" political leaders ("idealized intellectual creations"), whose "resourceful" ad hoc advocacy (political connections) resolve the burning social problems, we can talk about the essential institutional weaknesses of the social system, and elitization and politicization of the overall society in Serbia. The current institutional system is burdened by politicization, corruption, and bureaucratic management, centralized system of decision-making, conflicting jurisdictions in existing measures, often low-quality staff, high costs of state administration and the like.

Having in mind the current size of the municipalities in Serbia (both in terms of the number of inhabitants, and the spatial extent of certain municipalities), it is uncertain to what extent they can provide an adequate response to the needs of citizens to be the true representative of their interests (network of local self government and local offices of the municipal authority is weak), and what is the level and quality of participation of citizens in some of "local" governments that are sizable, how "costly" is a municipal administration etc. In this context, one may

assume that the development of rural settlements in so large municipalities is hard (as these municipalities are, in fact, "region" for themselves, and not "local" government), and the municipal policies and authorities are much more concerned about municipal (generally urban) center than for the rural hinterland municipality (policy and its consequences in practice prove this point). All that is stated in relation to the importance of decentralization and effective local government is essential for the development of rural areas as a whole because, in our opinion, it largely depends on the level of decentralization of the Serbian society and thereby creation of a prerequisites to develop rural areas to prevent their demographic, economic and other degradation. Only when the regions, followed by local government take and adequate exercise over their (decentralized) function, then it is possible to fully apply the logic imposed by the aforementioned governance perspective and territorial rural development policy

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PREPARATION OF B&H INSTITUTIONS FOR THE IMPLEMENTATION OF RURAL DEVELOPMENT WITHIN CAP

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Abstract

The paper is based on research preparedness of Bosnia and Herzegovina (BiH) institutions responsible for the implementation of rural development policy to implement rural development within CAP, also it explores legal arrangement of BiH institutions working in the field of rural development. If BiH intends to join the European Union (EU), it is essential to synchronize rural development policy with the EU Common Agricultural Policy (CAP). The paper research the level of synchronization of existing rural development policies in BiH with the rural development within the CAP. In research, semi-structured interviews were used with representatives of all government institutions in charge of implementation rural development policies at the territory of BiH. Considering the findings and results, conclusions are formulated to finalize the evaluation of the preparation of B&H institutions for implementation of rural development within the CAP.

Key words: *BiH, rural development, CAP, EU*

Introduction

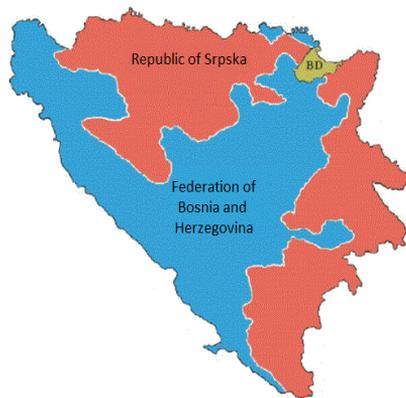
Rural development policy in BiH

Bosnia and Herzegovina (BiH) consist of two entities: Federation of Bosnia and Herzegovina (FBiH) and Republic of Srpska (RS) and Brčko District (PSBiH, 1995; PSBiH, 2009). Surface of Bosnia and Herzegovina is 5.122.612 ha, out of which FBiH covers 50,94%, RS covers 48,10% and Brčko District (BD) covers 0,96% (Federal Ministry for Physical Planning - FMPP, 2012). Territorial position of those three regions is represented on Picture 1.

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Picture 1. *Regions within BiH*



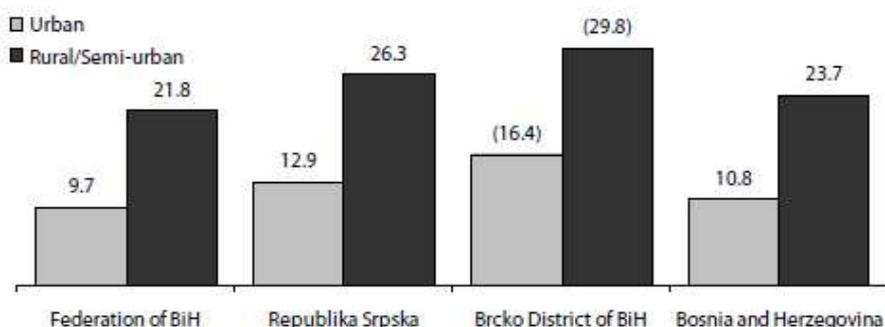
Source: *Maps of Net (2013), Authors editing.*

Rural areas are very important when taking into consideration that 81% BiH surface is rural and there live 60,8% of inhabitants of the country based on OECD criteria (Bajramovic, Ognjenovic and Nikolic, 2007; Agency for Statistics of BiH, 2007).

Rural areas in BiH are facing problems of socio-economical degradation as a consequence of failure of rural economies to compete with development of industry and tertiary sector of the economy which occurs mostly in urban areas. Nurković (2006) argue that this is long lasting process, which started in 1960s and had its culmination in war period (1992-1995) without chance to recover due to a high number of mines and other ordnance which can be found in remote rural areas.

To introduce the problem of poverty in BiH, the relative or standard poverty line was used, which is the 60% of the median monthly consumption expenditure in BiH. For 2007, it amounted to 385,71 BAM, (197,29 €), for a single adult household. Relative poverty line on Picture 2. shows that rural areas are endangered by poverty more than double than in urban areas, independent of geographical position. Furthermore, non food consumption in rural areas is lower for 33.9% comparing to urban areas and this confirms that the population in rural areas is financially less secure (AS BiH, 2007).

Picture 2. *Relative poverty by settlement type and geographical area 2007 (% values)*



Source: *Agency for Statistics of BiH, 2007.*

One of the reasons why people in rural areas are financially less secure is the low amount of job opportunities that are provided in rural areas, as compared to urban areas, and the high unemployment rate in the country. The average unemployment rate in BiH in 2011 has increased and amounted to 43.4%. Unemployment rates in BiH vary from region to region, the lowest is in predominantly urban areas in the region of Banja Luka (30.2%), the Sarajevo Canton (35.4%) and West Herzegovina Canton (35.9%), as expected due to the higher concentration of jobs in those regions (Directorate for Economic planning, 2012).

BiH has very complex administrative organization and it also applies in sector of rural development where there is no Ministry responsible at national level for implementation of legislation, so responsible are: Federal Ministry for Agriculture, Water-Management and Forestry in territory of FBiH; Ministry for Agriculture, Forestry and Water-Management of Republic of Srpska in territory of RS and Department for Agriculture of Brčko District in territory of BD of Bosnia and Herzegovina. Additionally to this government organization, there are 10 different cantons in FBiH and all of them are responsible for implementation of individual policies related to rural development through their governments.

Differences in legislations and policies between those institutions are leading to uneven geographical development, which can be observed on the base of different parameters, e.g. contribution of agriculture to GDP. In period 2005-2008, Gross Domestic Value of agricultural production in RS was 7,9%, while in FBiH it was 6,5% (Mirjanic et al., 2011).

On its way for accession to the European Union it is essential for BiH to synchronize Rural Development policy with the EU Common Agricultural Policy (CAP). In the paper is researched the level of synchronization of existing Rural Development policies in BiH with the rural development within the CAP. This process of synchronization is slowed as shown by the report of European Commission (2012, p.43): "There was little progress on alignment with European standards in the area of agriculture and rural development policy" and findings and conclusions from this research should be used to speed up the process of synchronization.

Institutions responsible for implementation of rural development policy in BiH

Bosnia and Herzegovina is a highly decentralised country with four level of governance (country, entity, cantonal and municipal). All of these levels have certain responsibilities related to rural development. Furthermore, within this sector there is no clear cooperation, coordination, transparency and exchange of information between the four levels, so some activities are repeated because of lack of proper management (Nikolić and Halilbašić, 2006).

Therefore, Nikolić and Halilbašić (2006) argue that the biggest problem in institutional framework is the lack of institutions responsible for rural development on the country level, such as: National Ministry, Paying Agency, Support Agency, Consulting committee and scientific-research council, with all different registers and data collection which those institutions would gather. As another part of the problem, they identify weak performance of country institutions: Food Safety Agency, Plant health protection office, Accreditation Agency, Net of reference labs, Competitiveness council; all of which are facing problems with a lack of human and material resources.

The Global Competitiveness Report 2010-2011 from World Economic Forum (WEF) states that the overall quality of infrastructure in BiH is on the last place on a list of 139 economies which were evaluated. Furthermore, transparency of government policy making in BiH is also the worst of all evaluated economies, and when we add to this the very high costs of agricultural policy (123 of 139), we can identify many problems related to the government institutions, including those responsible for rural development (WEF, 2010).

Considering that there is no Ministry responsible for rural development policies at national level, main institutions responsible for rural development in BiH are Federal Ministry for Agriculture, Water-Management and Forestry (FBiH); Ministry for Agriculture, Forestry and Water-Management of Republic of Srpska (RS) and Department for Agriculture of Brčko District (BD) of Bosnia and Herzegovina.

Additionally, in the entity of FBiH, there are also 10 cantonal ministries responsible for implementation of rural development policies at cantonal level. This is why, in this research, we are not talking about one policy of rural development which is uniquely implemented in BiH, but about various policies of rural development, because there are many different policies which are being currently implemented in BiH.

Pre-assessment of BiH to European Union with special attention to CAP

Bosnia and Herzegovina, as one of the Western Balkan countries, is a potential candidate country for the access to the EU, as a result of Thessaloniki European Council (Council) meeting held in June 2003 (Council, 2003).

After identification of BiH as a potential candidate country, European Commission (2003) made a report „on the preparedness of Bosnia and Herzegovina to negotiate a Stabilisation and Association Agreement with the European Union“. One of the main goals of integration into EU structures was that the country meets the obligations of the Stabilisation and Association Agreement (SAA). In this report, EC identified more effective governance and more effective public administration as priorities for action and states that "an appropriate balance of responsibilities between Entities and the State needs to be found" (European Commission, 2003, p. 40).

For Bosnia and Herzegovina, it took 5 years to meet the obligations and finally sign the Stabilisation and Association Agreement in June 2008. This agreement should serve as a background for further development of the existing cooperation and the establishment of close links of solidarity and new forms of cooperation between the EU member states, on one hand, and the Bosnia and Herzegovina as a potential candidate country, on the other hand (Council, 2008).

Besides activities related to the stabilisation, and the association of Bosnia and Herzegovina to the EU, there are a lot of other activities which EU implement to support transition, building of infrastructure and reconstruction of BiH.

Representatives of BiH agricultural sector have opposing opinions related to the entry of BiH into the EU. Some of them are afraid of the liberalisation of the market and the free competition for which domestic agriculture is not ready, while others see it as an opportunity to access the funds provided by CAP (Mirjanic et al, 2011).

One of the programmes for financial support implemented in the pre-accession period was the SAPARD program and it is now transformed in the Institutional Pre-Accession Assistance (IPA) program with five different components: Transition Assistance and Institution Building; Cross-Border Cooperation; Regional Development; Human Resources Development and Rural Development. First two components are for the potential candidate and candidate countries, while other three components are only for the candidate country, so BiH still doesn't have access to them (Council, 2006).

Another problem in BiH is that there are low capacities for creation of a rural development policy at a national level, because of the lack of coordination between country and entity levels of governments, which threatens the implementation of the legislation. In BiH, there is, still, no structure which would ensure the implementation of the 5th component of the IPA, which specially focuses on the rural development. Creation of this structure would lead to a significant increase of resources available for rural development that would contribute to improvement of the quality of life in rural areas. One of the very important steps for BiH would be getting a status of a candidate country of EU, instead of a potential candidate country which would strengthen the connection between BiH and EU and allow BiH access to more funds (Citizens for Europe, 2011).

Methodology

Characteristics of the research territory

For understanding the results of the research, it is necessary to take into consideration the diversity of rural areas in different parts of BiH, and because of this, short characteristics about each part, district, entities and cantons will be given further in methodology.

Brčko District is a part of Bosnia and Herzegovina which covers 493 square kilometres, or 1% of territory of Bosnia and Herzegovina. Around 70% (34.401ha) of total land in BD is agricultural land, while around 22% (10.873ha) are forest areas. The estimate is that around 75.000 inhabitants live in Brčko District, with population density of 152.1 inhabitants per square kilometre. According to OECD criteria of population density for diversifying rural (<150 inhabitants/square kilometre) from urban areas, Brčko District would be an urban area very close to the border of becoming rural. Government of BD is the responsible government institution for the implementation of rural development policy in Brčko District, and more specifically, the Department of Agriculture, Forestry and Water-management of Brčko District (Council of BD, 2009; Government of BD, 2013).

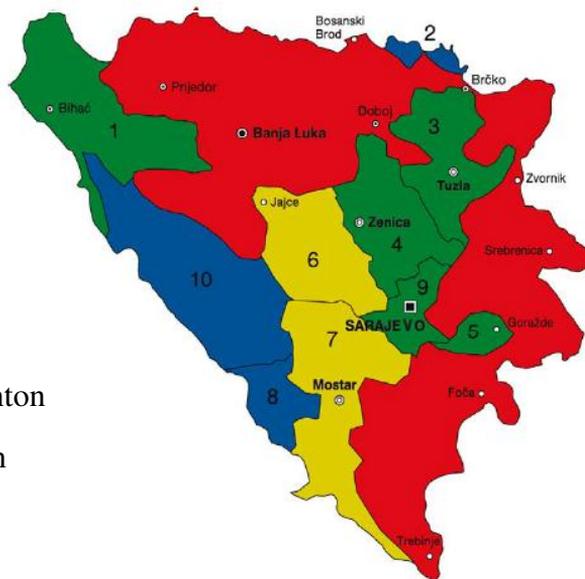
Republika Srpska is the entity in Bosnia and Herzegovina which covers the area of 24.635 square kilometres, or 48% of territory of Bosnia and Herzegovina. Around 49% of total land in Republika Srpska is agricultural land, while around 40% are forests. Estimation is that around 1.5 million of inhabitants live in Republika Srpska. Republika Srpska consists of 62 municipalities with average density of 60.1 inhabitants per square kilometre. According to OECD criteria of population density for diversifying rural (<150 inhabitants/square kilometre) from urban areas, 61 municipalities in Republika Srpska are rural. Responsible government institution for implementation of rural development policy in Republika Srpska is the Government of RS, and more specifically, the Ministry of Agriculture, Forestry and Water-management of RS (Government of RS, 2009; FMPP, 2012).

Federation of Bosnia and Herzegovina is an entity of Bosnia and Herzegovina which covers the area of 26.086 square kilometres, or 51% of territory of Bosnia and Herzegovina. Almost the whole surface of FBiH is land, while only 14 square kilometres of surface is sea. In FBiH forests are covering the area of 55.3% of total surface of FBiH. Considering that FBiH consist of 10 cantons, density of population will be also given for each of cantons independently in table 1. The responsible body for the management and control of implementation of rural development policies in FBiH is the division for rural development in Federal Ministry for Agriculture, Water-Management and Forestry (FMAWF), together with 10 cantonal ministries (FMPP, 2012; FMAWF, 2012). Size and importance of cantons is different within FBiH. Their position is represented on Picture 3, where different colours represent majority of their inhabitants. Green colour is used for Bosniak majority cantons, blue is used for Croat majority cantons, yellow

colour is used for Bosniak-Croat majority cantons, while red colour marks the entity of RS with Serb majority. As it is presented on Picture 3, cantons of FBiH are:

Picture 3. Cantons in FBiH

1. Una-Sana Canton
2. Posavina Canton
3. Tuzla Canton
4. Zenica-Doboj Canton
5. Bosnian-Podrinje Canton
6. Central Bosnia Canton
7. Herzegovina-Neretva Canton
8. West Herzegovina Canton
9. Sarajevo Canton
10. Canton 10



Source: *Transparency International, 2005.*

Table 1. Density of population

Name of the region	Density of population
Brčko District	152,1 inh/km ²
Republika Srpska	60,1 inh/km ²
Federation of Bosnia and Herzegovina	89,2 inh/km ²
Una-Sana Canton	68,6 inh/km ²
Posavina Canton	125,6 inh/km ²
Tuzla Canton	188,5 inh/km ²
Zenica-Doboj Canton	120,3 inh/km ²
Bosnian Podrinje Canton	66,4 inh/km ²
Central Bosnia Canton	80,2 inh/km ²
Herzegovina-Neretva Canton	51,8 inh/km ²
West Herzegovina Canton	61,2 inh/km ²
Sarajevo Canton	331,8 inh/km ²
Canton 10	16,5 inh/km ²

Source: *FMPP, 2012; Council of BD, 2009; Government of RS, 2009; Authors visualization, 2013.*

Methods

After the review of the literature, the qualitative research methods represented by semi-structured interviews for obtaining the primary data in the field work were used. These methods were implemented through the set of interviews with representatives of government institutions responsible for the implementation of agricultural and rural development policies in Bosnia and Herzegovina on different government levels including entity/district (RS, FBiH and BD) and cantonal level (10 cantons).

Data and information sources used in this paper consist of both primary and secondary sources. Secondary sources are recent publications related to the topic of the research and they are marked when used and presented in part „Literature“. Those secondary data sources consist of different scientific publications, but also laws and regulations related to the field of rural development policies in BiH and European Union (EU). Primary data are information received through set of interviews with representatives of government institutions.

Results of the research are based on 12 interviews conducted with representatives of entity ministries of RS and FBiH, the representative of Brčko District and 9 cantonal representatives of Una-Sana Canton, Posavina Canton, Zenica-Doboj Canton, Bosnian Podrinje Canton, Central Bosnia Canton, Herzegovina-Neretva Canton, West Herzegovina Canton, Sarajevo Canton and Canton 10. Only representative of Ministry of Agriculture, Forestry and Water-management of Tuzla Canton didn't want to participate in the research. The research is covering whole territory of BiH, and all institutions responsible for implementing rural development policies in BiH with exception of Ministry of Agriculture, Forestry and Water-management of Tuzla Canton.

Results and discussion

Preparation of B&H institutions for implementation of rural development policy within CAP

For implementation of a certain policy guidelines which are usually given through different type of strategic documents are necessary. Method of comparison was used for valorising preparation of government institutions for implementation of rural development policy within CAP.

By this comparison we came to results with which extent are those strategic documents and guidelines for rural development used by different government institutions in BiH synchronized with CAP. Moreover, self-evaluation of interviewed representatives is included.

In RS, there is a rural development strategy for this entity planned for the period between 2010 and 2015. Institution responsible for coordination and monitoring of implementation is Ministry of Agriculture, Forestry and Water-management of RS (MAFWRS). They are responsible for realization of the strategy in cooperation with 13 other institutions. Those institutions are elected because they were already dealing with similar projects related to the strategy. In the interview with the representative of MAFWRS, we came to the information that a paying agency is formed in this entity.

In FBiH there is no rural development strategy. Representative of Federal Ministry for Agriculture, Water-Management and Forestry (FMAWF) believe that such a strategy should not be made at the entity level but at a national level, while programmes and plans should be made at lower levels (entity, district and cantonal). Furthermore, national strategy for rural development is in the creation process by IPA 2008 sources. Separately from the creation of this document, FMAWF started with the creation of programmes for the rural development that takes into consideration the strategic documents of countries in the region with similar natural characteristics. If some of those programmes do not correspond to national rural development strategy, they are going to be changed according to the national rural development strategy.

A representative of FMAWF stated that a call for the creation of rural development strategy at national level is being prepared and that they already had contacts with Hungarian and French consulting agencies which are probably going to create this document. This national strategy should be created for the period between 2014 and 2020 following programming period of CAP.

Representative of FMAWF stated that they did not change anything in their employment systematization for the last 3 or 4 years and in this period IPA projects started. Usually, when funding for those projects finishes, people stop getting salary for their work and they are leaving, which is not making those projects long lasting and self-sustainable.

In the interview with the Representative of Department of Agriculture, Forestry and Water-management of Brčko District, it was noted that before the development strategy of BD for the period of 2008-2017, there was a strategy created which included rural development and was accepted by the Government of BD in 2008. This strategy did not start with implementation because it did not pass Council of BD procedure and as a main reason why it did not pass this procedure, our interviewee sees local elections which happened in 2008. New setting up of Council in 2008 decided to create a new development strategy which is being implemented at present, but doesn't include rural development and, it even consider rural areas as not important, with a need for their urbanization.

Besides strategic documents, the implementation of rural development requires that government institutions have enough human capacity responsible for rural development. Besides the entities where there are employees (experts) which are responsible for rural development employed, Brčko district and cantons don't have employees (experts) whose main activity is focused on the rural development, so this job is usually done by employees (experts) responsible for the implementation of agricultural policy as their secondary job. Also, FMAWF has a lack of employee (experts) focused on rural development, where they only have 2 permanently employed persons, and they are responsible for a job that is planned for 14 employee (experts) , with additional help from 4 temporary employee (experts) that should work on FAO projects within this institution.

The representative of FMAWF in his interview stated that the entity of FBiH is the only region in Europe which does not have advisory services for agriculture. He also pointed out that they are missing paying agency in this entity. In his opinion even people who are dealing with market oriented tools are not working properly and this task is not being done in this region as well.

All interviewed representatives of the government institutions see the need for adopting of a BiH system which would regulate rural development to the EU CAP and it is their task to create it as soon as possible.

One of the necessary adaptations is a creation of a paying agency. Not all interviewees expressed the opinions of their respected institutions, but

those who have responded had a similar idea of a creation of a paying agency on a national level, which would delegate most of their responsibilities at lower government levels. This would be a main institution for communication with authorities in the EU and it should also be responsible for all the things which they delegate to lower government levels.

On the question whether their government institution is ready for the implementation of the rural development policy as a part of CAP and if all government institutions are ready for the implementation of rural development policy as a part of CAP, self-assessment answers are given in the Table 2.

Table 2. *Overview of preparedness for implementation of CAP based on self evaluation*

Region of authority	Your institution	All institutions
Federation of BiH	Absolutely not ready	Absolutely not ready
RepublikaSrpska	Not ready, but will be in time	Not ready
Brčko District	To some extent	To some extent
Una-Sana Canton	Partially ready	Not ready
Posavina Canton	Not ready	Not ready
Zenica-Doboj Canton	Not ready	Not ready
Bosnian Podrinje Canton	Ready	They have to be
Central Bosnia Canton	Not ready	Not ready
Herzegovina-Neretva Canton	Not ready	Not ready
West Herzegovina Canton	Not ready	Not ready
Sarajevo Canton	Not ready	Not ready
Canton 10	Under certain conditions	Under certain conditions

Source: *Primary data from interviews, authors processing and visualization, 2012.*

Based on self-assessment, we can conclude that the institutions are not ready for the implementation of rural development within CAP. Most of the institutions directly identified that they are not ready. When we

excluded the opinion of the representative of the Bosnian Podrinje Canton, we can say that all the other institutions directly or indirectly confirmed that they are not fully ready for the implementation of rural development within CAP.

The representative of FMAWF emphasized that they are not ready, as well as any other government institution in BiH. The representative of MAFWRS shared the opinion that the government institutions in BiH are not ready for the implementation of rural development within CAP, but he thinks that MAFWRS is ready to some extent and will be ready in time to implement rural development as a part of CAP on territory of their authority. Same opinion is shared by the representative of Brčko District which said that its institution, just like any other government institution in BiH, is ready to a certain level, but not fully for the implementation of rural development within CAP.

Most of the cantonal representatives shared the opinion that their institution is not ready, which is linked to the FMAWF, the government institution which is above them. Only the representative of the Bosnian Podrinje Canton thinks that they are ready for the implementation of the rural development under CAP and that other government institutions do not have any more time and that they have to be ready as well. The representative of Canton 10 said that the only condition which should be fulfilled for their, and all the other institutions to get ready for the implementation of rural development policies within CAP is actually the willpower to do it. Furthermore, when asked whether there is willingness, the representative of Canton 10 said that he is not sure if there is any willingness at all at the moment.

With the signing of the Stabilisation and Association Agreement between EU member states and BiH, BiH took the responsibility of adapting their policies to the common EU policies, including CAP. Following this we confirmed in our research that the national strategy for the rural development of BiH will be made according to CAP and fully synchronized with the 2nd pillar of CAP. The programming period for CAP will be from 2014 until 2020 and, in our research, we found that the programming period of the future national rural development strategy of BiH will be between 2014 and 2020 as well. Even the national rural development strategy of BiH is not financed by EU funds it will still be fully synchronized with EU CAP.

In RS exists a rural development strategy for this entity which is planned for the period between 2010 and 2015. The Ministry of Agriculture, Forestry and Water-management of Zenica-Doboj Canton also created a cantonal strategy for the rural development of Zenica-Doboj Canton starting from 2012. This strategy was fully financed from foreign funds. Both strategies are fully synchronized with CAP.

As we could see from the research, the already existing rural development strategies in different regions were synchronized with CAP, and now we should ask another question: will these foreign consulting agencies, that are going to create the national strategy for rural development of BiH take into consideration the existing strategic documents and try to use them as a basis for the creation of a national strategy; or are they going to create a completely new strategy which is not going to take into consideration existing rural development strategic documents and is going to make all of them necessary to change.

Conclusion

The research confirmed a high level of synchronization between existing and planned rural development policies in BiH and the 2nd pillar of EU CAP. There is still no unitary rural development strategy for the whole territory of BiH, non-existence of this document leads to implementation of different strategies in different regions of the country. In this process some regions are left without any guidelines which government institution they should rely and their activities are based on. Even for the regions that have some rural development strategies, they are not implemented to the full extend, usually because of the lack of material resources for their implementation.

Rural development strategy at national level should be finished by 2014 and be fully synchronized with CAP even it is not fully supported from the EU funds. Creation of a national rural development strategy is not the only condition to make BiH government institutions ready for the implementation of CAP. Another condition are human resources responsible for the implementation of the future rural development strategy. Human resources responsible for the rural development are an even bigger problem for the government institutions, than not having the legislation on which they can base their activities. Commonly, government institutions are not having a single person responsible only for rural development. Main reasons behind the lack of human resources for rural development are lack of money to finance them, limits by work systematization and politics.

There is also a necessity for creation of Ministry at a national level responsible for agriculture and rural development and having all the responsibilities requested by DG AGRI. It was revealed through research that representatives of the existing government institutions share the opinion that this institution should mostly have the coordinating role above other institutions, while most of the tasks would stay at the entity level and Brčko District, and in the case of FBiH entity level would further delegate some of their responsibilities to cantonal levels. It is important to notice that, at the moment, they are not delegating rural development activities to cantonal levels because of the lack of legislation, which should also be provided in the future. There is also a necessity for the creation of a paying agency for agriculture and rural development at a national level as a part of the structure which is necessary for the implementation of RD policy and CAP, and at the moment the only paying agency exists only in the entity of RS.

Thus, we can come to a conclusion that the main problem is not in the synchronization of existing rural development policies in BiH with CAP, but in non-existing rural development strategies for certain regions, in the existing rural development strategies not being synchronized with each other, and there is absence of knowledge whether future national rural development strategy is going to take into consideration the existing strategies and if it will, to which extend will they be taken into consideration.

After identifying the lack of rural development strategic documents at national level, and the lack of the necessary manpower needed for the implementation of the existing and future strategic documents and a lack of institutions at a national level which would have a coordinating role in the process of the implementation of a unitary rural development policy, we can come to a conclusion that institutions of BiH are still not ready for the implementation of rural development policy within CAP.

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DISTRIBUTION EFFECTS OF AGRICULTURAL POLICY OF REPUBLIC SERBIA

Koviljko Lovre, Marinko Kresoja¹

Abstract

The primary goal is to approximate efficiency and consequences of measures and instruments, at the level that satisfy the volume and quality of statistical material, without getting into the evaluation of completeness and inter-conditionality of the governmental set of measures in some segments of the policy. In addition, the history is not of great importance; therefore, the paper will be primarily concentrated on the first decade of the 20th century, i.e. the changed political and macroeconomic conditions. The task is not very simple for two reasons. First, authors are not informed about works in the domestic literature, which, except the descriptive approach, quantitatively and analytically deal with the efficiency of measures and instruments of the Serbian agrarian policy in the recent past, in spite of the developed econometrical and statistical instruments. Therefore, authors had to rely on different statistical materials being mutually incomparable for information quality.

Key words: *Agricultural policy, Demand, Economic position, Supply, Support.*

Introduction

If we accept the usual systematization of agrarian policy measures on: a) measures of price policy regarding (prices in narrow sense, reserves, crediting of production and stocks, regulation of exchange with foreign countries); b) measures of development policy (policy of investment – including the basic agricultural infrastructure, development and application of research, stimulating the use of fundamental inputs); c) measures of adapting the agrarian structure (property relationships – including

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inheritance and property size, re-grouping of holdings, land redistribution, norms for some forms of production); and d) measures of social and fiscal policy (taxes and contribution, health and pension insurance, public welfare, make easier transfer of the agricultural population, etc.), it means that this part of the work will deal with the basic questions of the agricultural policy in Serbia in the recent past and the present, without prejudicing the physiognomy of the agricultural policy in the future. In addition, the physiognomy of the future agricultural policy is more or less known and, doubtlessly, that it will be structures based on satisfying all requirements to join the World Trade Organization and adapting to the Common Agricultural Policy of EU. It simultaneously means that this part of the work will not deal with the problems of criteria based of which some measures and instruments of the agricultural policy were determined. It is enough to note that criteria have often been mutually conflicting, primarily when relating to price policy in the narrow sense, supply policy, policy of agricultural subvention and crediting production and supply of agricultural products and foodstuffs. Especially inexplicable are the turns in the policy of developing extension services.

The evaluation of dynamic coordination of supply and demand of agricultural and food products and the economic position of agriculture in income creation and distribution are the starting point and the framework of conditions where some measures of the agrarian policy are composed, on the one side, and the ambient for the evaluation of efficiency, on the other side. Efficiency evaluations of the agrarian policy always amount to the attempt of synthesis of the bulk of analytical data. It is understandable; this work cannot pretend to give sufficient analytical support. Analytical support is created in the period of systematic researches lasting many years. Trying to synthesize, this shortage can be only partly moderated by using the experiences of countries with similar resource structure. Therefore, synthesis must be done more relying on foreign experiences than on reliable support. Awareness of these facts has exerted influence on the conception of this work.

Aggregate supply and demand of agricultural and food products

Based on statistical evidence, the coordination of agricultural supply and demand of agricultural and food products can be evaluated only approximately. In spite of the lack of evidence in statistical materials, by comparison of the growth rate of expenses of the population for food and agricultural production, it is more than obvious that aggregate supply has

exceeded demand to a certain extent in the last 12 years.² There are numerous indications that the supply of agricultural and food products exceeded demand in average in the period from 2000 to 2011. The first indication comes from interdependence of food expenses in relation to the total expenses of the population for personal spending and relative prices of agricultural and food products in retail trade. Having in mind the reliability of statistical evidences, interdependence is high, evaluated parameters are statistically significant, and autocorrelation of the residuals is considerably over the allowed limit (*Figure 1 and 2*).

It results from the cited interdependence that relative prices of agricultural and food products showed slow drop in prices, meaning that aggregate supply exceeded aggregate demand. Food expenses increase yearly per the rate of 0.72 % in average.³ Such a slow imbalance of supply and demand with relative low income elasticity of demand relating to the level of economic development (0.3% in average)⁴ and the low price elasticity of demand (-0.23%)⁵ unavoidably meant that some surplus of supply had a disproportional price effect. It finally meant parity aggravation of the economic position of agriculture. Really, relative prices of agricultural and food products in the market of personal consumption decreased per annum average rate of -0.65%.

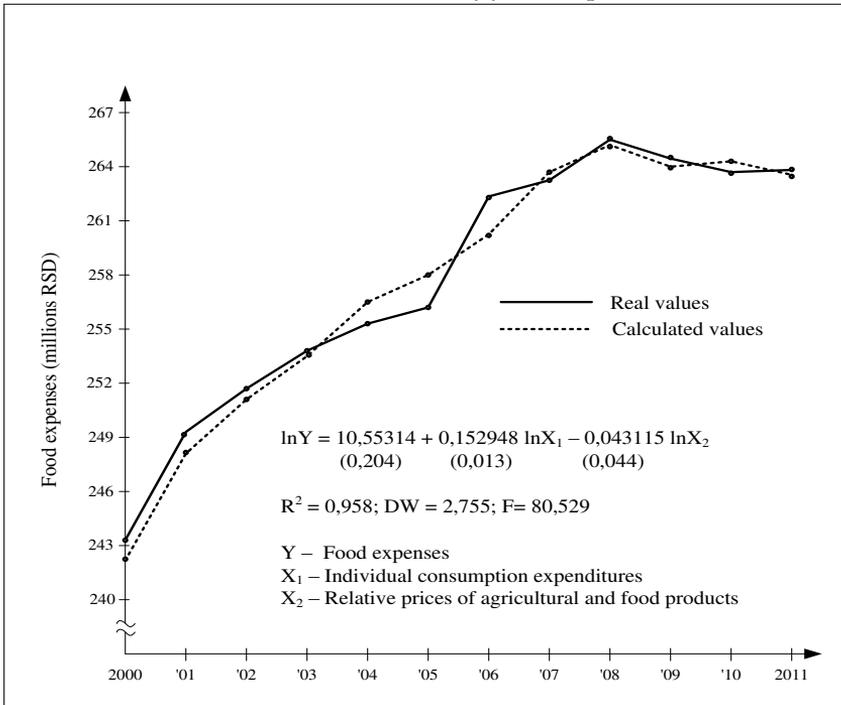
² Determination to analyze the period from 2000 to 2011 was based on changed political and macroeconomic circumstances in relation to the previous decade. First, the conclusion relates to the “opening” of the economy since 2000 relating to the completely closed economy until then. Changes of circumstances unavoidably meant the necessity of adaptation of agriculture, about which we will talk later.

³ All growth rates in this part of the text are calculated from the linear trend. High year variations of analyzed aggregates do not allow the calculation from original data.

⁴ It is important to note again that imperfectness of statistical files. From the series of data of the total expenses for personal spending and food expenses, the size of income elasticity of demand for agricultural and food products is calculated. However, part of food expenses in the total expense for personal consumption, according to the questionnaires of the population amounts to 41%. Having in mind the level of economic development, it is certainly a more real value. Based on registered values, share for food in the total expenses for personal consumption has stagnated since 2008, while the same on the questionnaire based value has increased.

⁵ The estimate of basic elasticity for food demand is done from interdependency of food expenses (constant prices in 2002) and the prices of retail agricultural and food products settled by general price index taking deflation into consideration: $\ln Y = 13.50745 - 0.22826 \ln X$; $R = -0,519$ (Y – food expenses, X – relative prices of agricultural and food products).

Figure 1. Actual and calculated values of food expenses

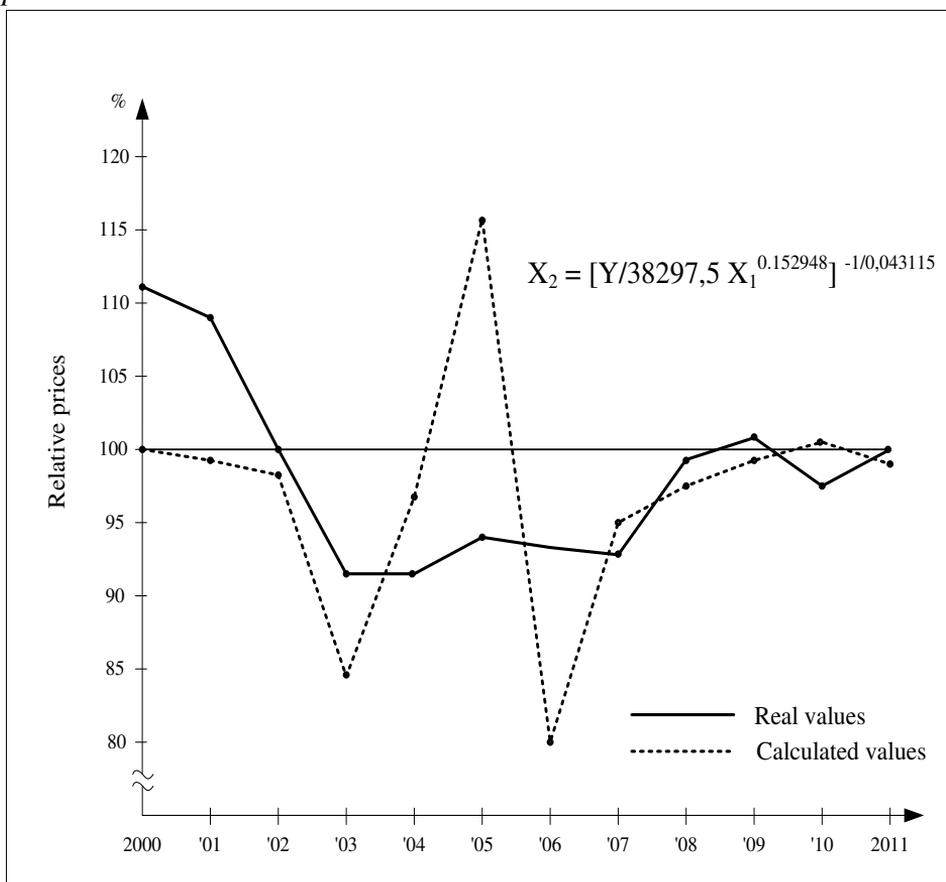


Note: Constant prices, 2002.

Second, a more reliable indication for the same conclusion comes from the estimate of combined growth rate of agriculture and food industry (food production).⁶ To make reliable the combined supply growth rate of agriculture and food production in the market of personal consumption fairly well, it would be correct to rely on input-output relationships between agriculture and industry of food production. However, data unavailability on weighted agriculture and food industry leaves only one possibility of estimating the approximating combined supply rate based on share of these sectors in the social product. It can be expected that share of agriculture in the total supply of agricultural and food products will decrease on “behalf” of food production, being the logic of development process on what almost the double growth of physical volume of food production refers in relation to the growth of the physical volume of agricultural production (1.81:0.93%).

⁶ The estimate excludes drink and tobacco industries, although it would be methodologically more correct to include these industries into the estimate. However, the change of data registration system in the statistical service has caused the only possible estimate.

Figure 2. Actual and calculated relative prices of agricultural and food products in retail trade



Note: Consumption price index = 100.

However, share of agriculture in the Gross Domestic Product stagnates, while share of food industry was reduced in the cited period. This moment we should have in mind when approximating the total food supply.⁷

⁷ The second essential methodical problem, which in the estimate of combined rate of agriculture and food policy could not be surmounted relates to the indices of the physical production volume. The indices of agricultural production growth are shown based on net final production, while the indices of physical volume of food industry are reported the “gross” basis. It means that in case of food production, the total production is reduced neither for internal reproduction nor for reproduction input from agriculture. Therefore, the combined change rate of food supply should be taken with due dose of reserve, especially during establishing connection with final consumption.

The estimate of combined supply gives the average rate for the cited period of about 1.15%.⁸ Demand growth for agricultural and food products amounted to 0.72%; it is an additional indication to draw conclusion about imbalance of aggregate supply and demand of agricultural and food products in the period from 2000 to 2011 (*Figure 3*).

Of course, the relationships of average values are only the starting point in the dynamic analysis of relations of agrarian supply and demand of agricultural and food products. The fact that characterizes the time we talk about and what specially worry us are the slowdown of agricultural production growth and the absolute fall of food production since 2007. The slowdown is obvious from the trend of production volume and more obvious from six-year movable trends. In addition, illogicality of contrary directions in the growth of agriculture and food industry has been visible after 2004, where the instability of agricultural production surpasses the instability of food production, with relatively stable growth of food expenses, and it is an additional indication of above average of price effects. According to the logic of interdependence, the relationship of year indices of agriculture growth and food industry could be approximate to the growth of food expenses. Really, interdependence is, overall, high⁹ with expressive deviations to the lower one in 2001 and 2004, and the upper in 2007. It means that in these years, there were underestimating, i.e. overestimating the growth of agriculture or food production, or both. Judging by these facts, it is about overestimation, i.e. underestimation of food industry growth because of “wavy” introduction and unsystematic registration of “new” products in the index account.

The estimate shows an unexpected high growth of food production in average in relation to the growth of agriculture of almost 2:1.¹⁰ Such a

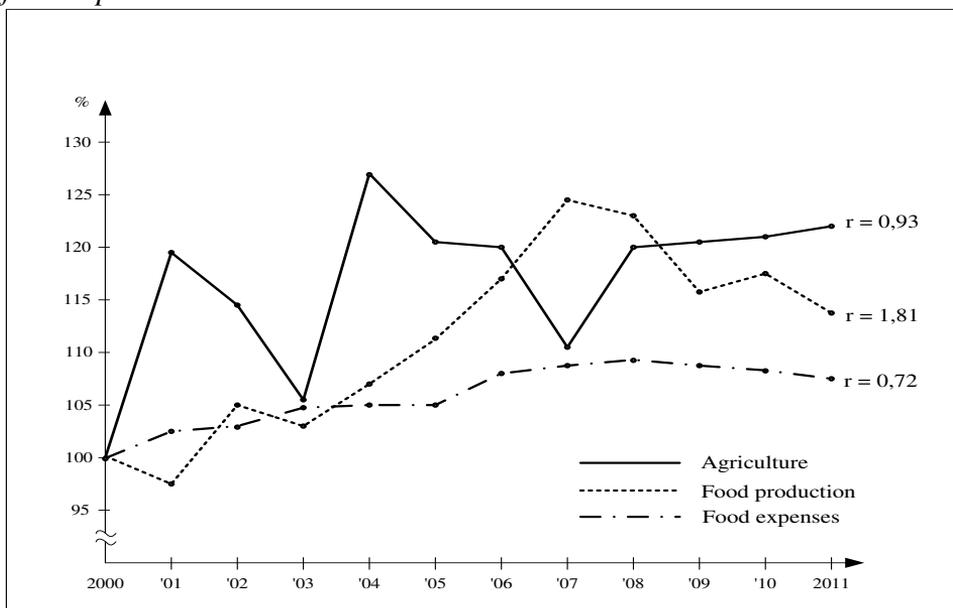
⁸ From the estimate of the combined growth rate of food supply appears that the contribution of agriculture to the growth of supply is 69.8%, and the food industry of 30.2%. (The estimate was done based on the formulae: $r_p x + r_{pi}(1-x) = r_k$; r_p – growth rate of agricultural production; r_{pi} – the growth rate of food production; r_k – the combined growth rate of supply of agricultural and food products).

⁹ The estimate in the text derives from the relationship of production volume index: agriculture and food production, food on the one side, and the growth index of food expenses, on the other side. Interdependence is expressively emphasized: $Y = 27,339 + 0,613X$; $R = 0,915$; Y – relationship of the index of production volume of food production and agriculture; X – index of food expenses in constant prices), therefore, the estimate is enough reliable.

¹⁰ The relationship of interdependence is $\ln Y = 2,754 + 0,411 \ln X$; $R = 0,350$ (Y – index of food production growth; X – index of agricultural production growth). The low level

result can be explained by two moments. First, in this period, the growth of agricultural products processing was essentially conditioned by repression of processing and finishing in households and handicrafts.

Figure 3. *Growth indices: Agricultural production, food production and food expenses*



It means that the index of food production growth was appreciably over the real supply growth of this industry in the market of personal consumption. Regarding to the fact that the growth of food production could not be possibly reduced for the growth that was caused by repression of processing in households and handicrafts, it was not possible to estimate net supply of this branch. Second, growth indices of food industry, contrary to agriculture, were not registered on net basis, but they include reproduction consumption of the branch, which, as a rule, appreciably grows faster than net final supply. These both moments are not essential for the text that follows, but only as an indication on the approximate estimate of aggregate supply and demand of agricultural and food products. This relationship predominantly determines the parity of economic position of agriculture, on the one side, and exerts influence on the physiognomy and structure of measures and instruments of agricultural policy.

of interdependence additionally confirms the illogicality of statistical registering of production volume.

The economic position of agriculture

In the paper of this character, it does not make sense to emphasize what measure the parity of economic position of some economic sectors and branches exerts influence on not only the tempo of growth but it has direct regional and social reflections, whose “specific weight” unavoidably rises together with the level of development. With this, the parity of economic position is the basic point both current and development policy.

“Agriculture is a unique example of economic sector which legally develops in the conditions of the decline of human and material resources. Relative decline of resources implies, of course, the disparity of economic position of agriculture. Looking at that in a development-historical way, the disparity of economic position of agriculture is both the “trigger” and the generator of economic development, but the generating influence falls during development”¹¹

The disparity of economic position of agriculture is an empirical fact, at least. This is the same with the tendency of narrowing initial disparity in the position of agriculture in the development period. However, although the functional connection between the level of development and disparity of the position of agriculture is not disputable, this relationship is not direct. The significant deviations appear under the influence of the whole range of influences, among which the prevailing are: proportion of initial disparity, composition of resource – in agriculture and in general, speed of economic growth, etc.

Development in the conditions of relative declining of resources supposes the degree of adaptation far above average. The process of adaptation is extremely complex; it substantially limits the preciseness of measuring proportions and tendency of economic disparity. However, the comparative analysis of disparity of economic position can be used as a reliable indicator of physiognomy and implication of agricultural policy.

Taking into consideration that the quality of records requires a necessary gradual procedure in measuring parity or relative economic position of agriculture, first there will be carried out the parity of the gross value added of agriculture.

¹¹ Dunderov, M., Trkulja, M., Gajić, M., Lovre, K., (1983), pp. 105.

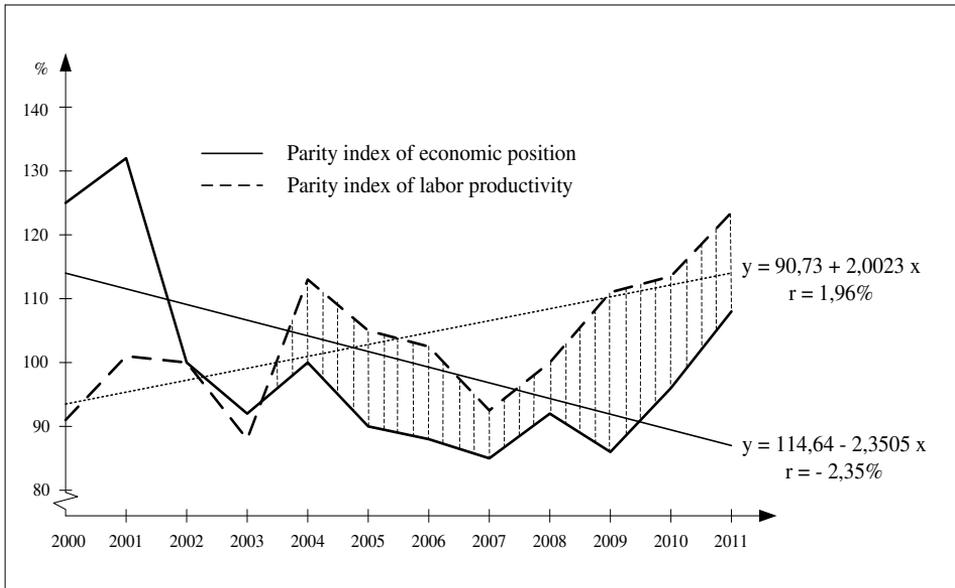
The parity of economic position is based on gross value added per active inhabitant in non-agricultural sector of agriculture in relation to the net value added per active inhabitant in the sector of agriculture – all at the current price. For the reasons already mentioned, the analysis is “located” in the period from 2000 to 2011, and the base relationship, for the same reasons, is “bound” for 2002.

The results of the estimates in Table 1 and also illustrated in Figure 4 definitely confirm the statements done based on the analysis of relationships of aggregate supply and demands of agricultural and food products. The imbalance of supply and demand had unavoidably the price effects reflected in tendentious aggravation of economic position of agriculture at the annual rate of -2.35% in average; therefore, the position of agriculture, in time average, was under the average level of non-agricultural sector. The exception is the starting years of the analysis; it is the period when the economy of Serbia “functioned” according to the model of closed economy. The graphic representation convincingly demonstrates the gradual aggravation of the position of agriculture with the degree of “opening” the economy. It proves that “closing” the economy unusually influences non-agriculture; primarily the industrial sector of the economy, i.e. agriculture is a more vital sector in irregular conditions of business.

Table 1. *Parity of economic position, labour productivity, and prices of Agriculture*

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<i>Economic position parity</i>	97,87	102,56	77,68	70,95	77,86	70,10	68,06	65,24	70,80	66,42	74,59	84,14
<i>Labour productivity parity</i>	70,60	78,97	77,68	67,42	87,10	81,66	80,28	72,77	79,10	86,80	88,73	95,98
<i>Parity of prices</i>	138,63	129,87	100,00	105,25	89,39	85,84	84,77	89,66	89,51	76,52	84,07	87,66

Figure 4. *Economic position and labor productivity parity of gross value added*



Here, it is very important to ‘isolate’ two basic influences on the parity of economic position. First, it is the influence of the parity of labor productivity, and second, it is about the influence of price parity. The parity of labor productivity derives from the same relationship as the economic position parity, but it is based on constant prices. The influence of prices derives, of course, from the relationships of economic position parity and the parity of labor productivity.

In the observed period, labor productivity in agriculture increased faster than in non-agricultural part of economic activities. The growth of labor productivity of agriculture was convincingly surpassed the same value in non-agricultural part of the economy - the growth rate of relative productivity of agriculture amounts to 1.96%. Therefore, it results that the influence of relative relationship of prices significantly reduces the influence of growth of relative labor productivity on the parity of the economic position of agriculture.¹² Such an expressively negative influence on the economic position of agriculture is not logic; neither can it be considered regular relationship with production activities in the given frameworks of economic development. According to the logic of

¹² Shaded parts in Figure 4 illustrate the changes of price influences from year to year, as well as the basic tendency.

development processes, we should expect that the growth productivity rate in non-agricultural part of the economy increases faster than in agriculture and it would cause the converse influence of price relationships. The shown relationships are characteristic in a significant upper phase of development, when for reduction of share of the agricultural population, the rate of transfer of the population in agriculture rapidly grows.¹³

Evaluation of the agrarian policy in Serbia

The previous analysis has convincingly shown that the agriculture in Serbia, after „opening“ the economy, has developed in the conditions of three mutually conditioned tendencies: 1) growth of relative labor productivity; 2) decrease of relative prices of agricultural and food products; and 3) decrease of income elasticity of demand for agricultural and food products. As for the importance of agricultural development, it is interesting to emphasize the reflection of decreasing income elasticity of demand on the volume of commercial disposal of agricultural and food products. Namely, the lower demand elasticity means that the volume of potential disposal of goods represents the basic limiting factor of growth of agricultural production, where the reflection is the final low rate of the physical production growth.¹⁴

The composition of influences of relative productivity, relative prices and income demand elasticity has caused the decrease of agricultural income per capita in relation to the same size in the non-agricultural sector. With much emphasized income and social dispersion within the agricultural sector and the extreme unfavorable property structure, the combinations of all the cited factors, unavoidably “compel” the wide specter of interventional-regulative measures. We should take into consideration that Serbia, on the average, used to be the net exporter of agricultural and food products. Namely, the position of the net exporter country requires an essential different structure of intervention measures relating to the position of the net importer, simply because price policy hardly offers the

¹³ Experience says that a sudden disparity of agriculture comes after reduction of the share of agriculture population under approximately 12% mostly primarily due to the high population transfer rate.

¹⁴ An additional factor of limiting the disposal of agricultural products represents also the reduction of the total population number. Between the last two censuses, the average annual rate of population decrease amounted to 0.47%. The population decrease and the low-income elasticity of demand are the basic factors which determined the supply of agricultural and food products.

possibility of efficient intervention. Therefore, the net exporter country is forced to support relatively high budget subventions, which is always and everywhere the measure of arbitrary income drain. Therefore, that may turn out to be useful, before a detailed quantitative analysis, to give a short review of consistency of changes in the interventional-regulative mechanism during relatively short period. This review is necessary to present the “turns” and inconsistency in the agricultural policy of Serbia (Table 2, Figure 5).

Table 2. *Periodization in the composition of measures of the agricultural policy in Serbia*

2000-2003	2004-2006	2007-2008	2009-2011
Price support for basic agricultural products; Material interventions on the market; Subventions for buying agricultural land.	Reduction of price support; Input subventions; Credit subventions Introduction of the registry of agricultural producers; Support to adapting to international standards.	Elimination of support to rural development; Elimination of measures of credit support; Support reduction to structural adaptation; Subventions to agriculture according to the principle of „area and herd payment“.	Support restrictions by paying pension insurance; Break with subventions to non-commercial farms; Intensifying conditions for „area payment“; Support reduction to structural adaptation; Reduction of investment support; Attempt to leave „area payment“ and repeated introduction of price support.

The general characteristic of the overall of the time period after 2000 relates to the process of political decision-making that has brought unstable agricultural policies and created uncertainty for agricultural producers and other participants in the production chain and food distribution. The process of policy formulation is not based on ex-ante estimation of effects of new measures and instruments, or even rigid estimation of the former policy. Too big discretion right of the Ministry, with marginal role of the Parliament, distribution and purpose of budget resources, together with political instability, have created the framework where the producers' interests is tried to be presented, and not interest of the state on the whole. In such a situation, changes in price policy and agricultural subventions have usually had the lack of stable effects on business conditions. An extreme uncertainty has been manifested in unfavorable conditions to invest in agriculture, although the measures of agricultural policy have solved some of the short-term problems.

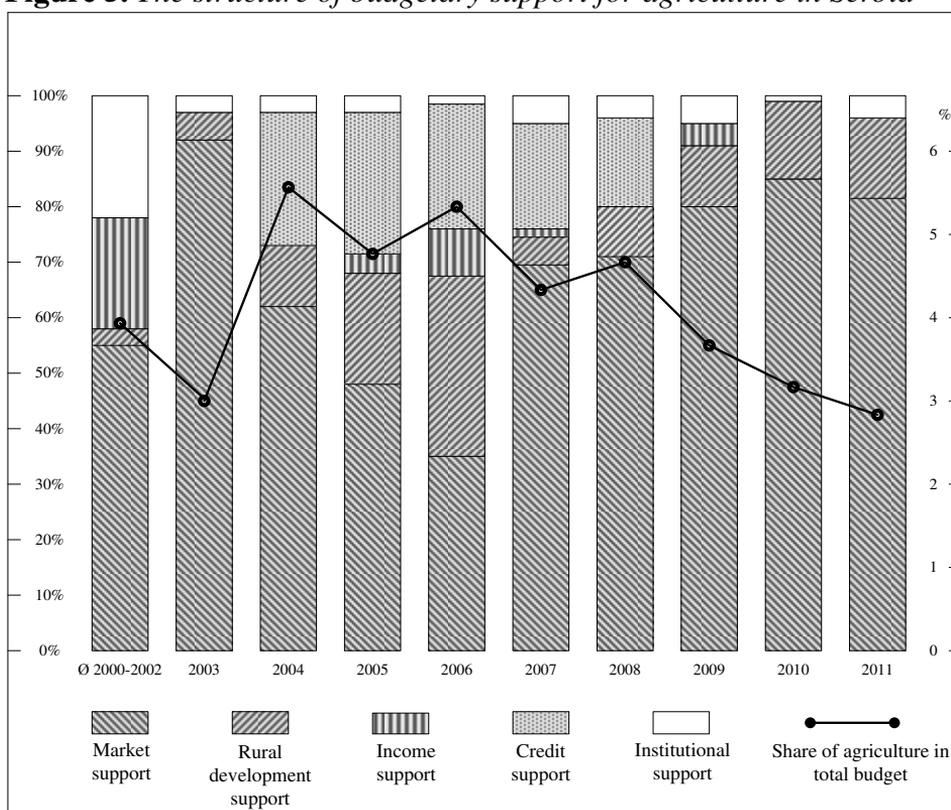
The declarative attempt to increase supply and the production efficiency of agricultural products has not been materialized in measures of the agricultural policy, well illustrated by the “turn” and inconsistency of the structure of agricultural policy measures (Table 2).¹⁵ It is indisputable that liberalization of market agricultural and food products has been literally changed, with extremely negative effects on the size of supply. Namely, in the conditions of supply surplus without the system of guaranteed or minimum prices, which would guarantee the “parity” income to producers, is not possible to exert significant influence on production size. In addition, today, the usual practice to regulate supply in the most developed countries is carrying out the policy of guaranteed prices, disregarding if they want to limit or increase supply. In essence, the guarantee mechanism for is carried out by means of two methods: 1) method of paying price differences, and 2) method of determining market price by the level of guaranty or protection.¹⁶ Without the guaranty system, the efficient work of the mechanism of material intervention on market is not possible (creation and release of reserves on the market)

¹⁵ Classification structure of the budget support to agriculture somewhat differs from the classification carried out by the group of authors: Bogdanov, N., Volk, T., Rednak, M., Erjavec, E., (2008). No doubt, this study is a pioneer attempt to systematize the budget support to agriculture based on correct methodology, and according to the methodology accepted in the Organization for Economic Co-operation and Development (OECD).

¹⁶ Today EU issues intervention prices for the majority of agricultural and food products, as the measure of super protection of producers. Intervention measures react in case if the basic protection system, usually very efficient, is endangered even for short.

and, in essence, it was the subject of arbitrary estimation of market conditions, and therefore, not enough efficient. It is necessary to say that the system of guarantee is, although requires a lot of paper work during its carrying out, very efficient in the conditions of non-elastic supply and extremely low income elasticity of demand because it primarily prevents serious disturbances on market. Serbia has determined, of course, according to the model of EU, to subsidize agriculture by paying per hectare for registered agricultural holdings up 100 ha and head of livestock (direct paying). In principle, this mechanism is not in doubt, but the desired efficiency is attained in the combination with price guarantee. Namely, if subsidizing is carried out without any combination with price policy (paying differences in price), distributive effects, which normally depends on the relationship of price elasticity of supply and demand, are less favorable for agricultural producers.

Figure 5. *The structure of budgetary support for agriculture in Serbia*



To estimate instrument efficiency of direct paying per hectare and head of livestock, it is necessary to estimate price elasticity of agriculture supply.¹⁷ Logically, because of the former cited deficiencies, the estimate of price elasticity of agricultural supply had to be based on the minimum of data. The estimate results in a very low short-term price elasticity of supply: 0.0999. No doubt, the estimated coefficients of elasticity of supply and demand definitely point to the earlier statement on the encounter of low elasticity of supply and demand and the need to “set up” combine the system of price guarantee into the mechanism of direct payment. Even more, in the conditions of surplus of supply the combination of direct paying and price guarantee, or much better target price, the paying as differences in price, fewer amounts of resources for subventions would be required in our conditions.

It has been already noted that the distribution effect primarily depends on the estimated values of elasticity of supply and demand. Taking into consideration that elasticity has a correct indication, it means that subsidies reduce product price “on the threshold” of agriculture. Price reduction of agricultural products automatically means that the whole amount of subsidies does not belong to agricultural producers, but processors and/or end users usurp part of it. Really, it appears from the

¹⁷ The estimate price elasticity of supply has already been done. See footnote 5. The method of the estimate applied in this work is adopted by Food and Agricultural Organization (FAO). The estimate is based on the functional relationship:

$$Y_t = \alpha_1 \beta \cdot P_{t-1}^{\alpha_2 \beta} \cdot Y_{t-1}^{(1-\beta)} \cdot T^{\alpha_3 \beta} \cdot U_t$$

Where the symbols represent:

Y_t - index of physical volume of agricultural production;

P_t - price index of producers of agricultural products deflationary arranged by price index of producers of industrial products;

T - time;

U - residual value.

The estimated coefficients: $\alpha_2 \beta$, $(1 - \beta)$ i $\alpha_3 \beta$ and they represent elasticity in the short run. If we want estimate elasticity in the long-run, then the short-run elasticity are divided with β . The results of the estimate:

$$6,042674 \cdot P_{t-1}^{0,099904} \cdot Y_{t-1}^{-0,441812} \cdot T^{0,097827} ; \quad = 0,557; DW = 1,9345.$$

(0,052840)(0,288262)(0,272251)(0,072601) - standard errors of the estimation.

Although the estimated parameter of price elasticity of supply has a logic indication, it is not statistically significant, but still it can be used as an orientation estimate of distributive effects of direct paying.

estimate¹⁸ that 30.4% of the amount of subvention is “usurped” by consumers and/or processors of agricultural products, while 69.6 % of subvention amount belongs to agricultural producers.

Conclusions

Without any intention of working out details, in the technical sense, the regulatory-intervention policy, the intention is to point out the most striking foundations on which a more efficient agricultural policy of Serbia would be based. Starting from the realized volume and the tempo of agricultural production growth, tendencies in demand for agricultural and food products and the experience of developed countries, it is necessary to define and develop in the long run the principles of market interventions in the conditions of sufficiency of production for every of the basic product. Thus, interventions should include minimal quantities – those, which in the given conditions, do not have the provided disposal of goods. The development of regulatory and intervention policy must be based on the principle that protection be offer to those to whom it was intended.

In close connection with protection of agricultural production is the question of defining the target price as the landmark for direct payments. In determining the target prices, we should always have in mind the character of some products and uncertainty in production, low elasticity of demand and expressed elasticity of supply. These products do exert direct influence on market stability and the stability of livestock breeding. There is the need for these products to introduce the principle of interventions when market price falls or surpass the target price for some percent. Namely, the character of these products enables to exert influence decisively, by material interventions, on the range where market prices move.

The situation essentially differs with other products (industrial crops and livestock breeding products). In essence, production is more stable, demand more elastic, but supply is not elastic, therefore, the function of interventions is essentially different. Interventions should be so outlined to have protection-stabilization character, indirect export subsidy and

¹⁸ The estimate is derived based on the pattern $\frac{dP}{dS} = \frac{-1}{1-\eta/\varepsilon}$, that P denote price, S subventions, η price elasticity of demand and ε price elasticity of supply. For mathematical proof see: Lovre, K., Zekić, S. (2011), pp. 23-29.

only exceptional and short-time subsidy of domestic demand. Intervention stated in this way can be very efficient if there is no big span between domestic and export prices. If the price span is significant, intervention can be applied if it is possible to limit efficiently production at the level of domestic demand. At both first and the second group of products, urgency of outlining instruments and principles for interventions is more than obvious. Non-existence of adequate instruments will have above average market (price) reflections in the conditions of supply surplus and deficit.

Accepted EU and WTO obligations do not give a wide space to protect domestic market from import, on the one side, and barriers on the national border and unavoidable reduction of export stimuli limit sales on the foreign market, on the other side. We can draw the conclusion from this that Serbia is right before of creating instruments, which; on the one side, will protect domestic production, on the other side, it will exert influence on the increased competitiveness on the international market of agricultural and food products.

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HUNTING LEGISLATION IN TERMS OF SERBIAN RURAL DEVELOPMENT – HISTORICAL REVIEW

Milan Počuča,¹ Sara Počuča²

Abstract

Hunting, as a significant economic activity, which realizes on the total territory of the Republic of Serbia, has been institutionally connected to water management and agricultural activity, the environment protection through common goals, interests and an unique government body, the Ministry of Forestry, Water Management and Agriculture within the Government of the Republic of Serbia. Public companies, companies, citizens' associations, hunting workers in Serbia the most often, along with the hunting activity, do also the activities connected to agricultural production, livestock breeding, forest exploitation and fishing. The rural development of Serbia and the Danube region, as significant region within the country, has been inconceivable without development of hunting activity, too. Institutional arrangements of hunting legislation surely follow total efforts of the society to provide, through a normative arrangement and adjustment and harmonization with the EU directives, the rule of law and strengthening of legal security, as basic preconditions for strong rural development of Serbia and the Danube region. On the Serbian territory, the organized hunting and the hunting legislation have more than 170 years lasting tradition.

Key words: *hunting, game, agricultural land, international document.*

Introduction

The role, significance and importance of hunting were different in some phases of mankind development. The oldest occupation, old as a man himself. A desire for hunting have remained in a way that was kept an ancient times

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instinct, when his existence had depended on strength, to defend from wild animals or to ensure food and warm clothes of hunted animal.

In ancient times, when a man had domesticated the first beast, it had been a forerunner of livestock breeding. The main activity then was hunting, he was feeding and clothing of killed game, and made arms and tools of bones.

In the middle Ages, hunting, picked up by rulers and aristocracy, had kept more and more a former character and had become an integral part of a chivalry. The middle Ages knights had considered the hunting a heroic drill. In that time, the hunting method had developed at the expense of peasant masses, which had been not allowed hunting, under the threat of increasing penalties, while in 15th and 16th Century had become a monopoly of higher social classes. A peasant had suffered damages on his crops, but anyway, along with austerity and penalties, the oppressed serf had often hunted. He had hunted out of necessity and to protect his crops.

Social-political movements at the end of 18th and during the 19th Century had led to a serfdom liberating and feudal relations clarification and regarding hunting it had been a great turn. The hunt becomes free and available to everyone. Soon had realized that, thanks to a broad freedom, had suffered the game. Then had passed the laws on hunt which protected the game, had set limitations and a right to hunt, and had settled the conflicts between hunters and farmers.³

Thanks to development of hunting regulation have come to increase of game funds, there has come to increased ecology in nature, some registrations of hunters and hunting area has been done. Incomes of the hunting tourism represent a significant financial source of local authorities and hunting societies, which manage with specific hunting areas. There is significant influence of hunting and hunting legislation to every society's rural development. Modern hunting and hunting regulations have been comprised by series of legal acts, starting from the Serbian Constitution, as the highest legal act in the country. Taking into considerations events in recent Serbian and Vojvodina history, it was necessary to determine, through development and legal regulatory rules, which regulations were not valid anymore in this

³ Paragraphs 335, 336, 808, 815 of the Serbian Civil Code were arranged a damage issue which can happen in hunting, whether on hunters or the agricultural land owners side. More detailed – Dragan Arandjelovic, (1924) *O odgovornosti za naknadu štete, clarification of chapter XXX of the Civil Code, second edition*, Izdavačka knjižarnica Napredak, Belgrade, pp. 41-42

field, which were amended and which were valid in the field of the hunting law. In this paper were comprised also the international regulations which apply on the territory of Serbia and Vojvodina.

Historical development of hunting legislation in Serbia

In ancient times in Serbia had been a lot of game. A ruler and aristocracy had many opportunities to hunt, and they had considered it as the noblest social activity. Peasants in the monastery Gracanica were obliged to hunt rabbits three days in a year. The most favoured hunt for the aristocracy was hunting quails, partridges, pigeons, mallards, herons, cranes etc. with falcons. In that time, in Serbia, were mentioned hawks, northern goshawks, but the most often falcons, as hunter-birds, which were hunted at Dalmatian and Arbanian karst and trained them hardly. Among others royal occupations in 11th Century was also mentioned a falconer and a dog keeper. A right to hunt had only the highest aristocracy.

In Turkish times, in medieval Serbia, hunting was free. During the migration due to the Turkish oppression, the country has depopulated in many places and the game has increased significantly. Later, owing to population and settling the people in mountains, and along with free hunting, useful game has started to disappear, especially the big one.

First regulations have been passed during the prince Milos Obrenovic's reign. In this period we had not noticed the existence of a unique legal act, which would regulate the hunting issue in large-scale. The passed decrees had primarily a regional character and had represented an attempt of excessive hunt reduction. The first decree had been issued in 1819. It refers to foxes and wolves hunt.⁴ Mostly, the decrees had referred to a specific game hunting prohibition, therewith the decrees, which had referred to the foxes and wolves hunt, had been motivated by damages those animals had caused to peasants. They were partly motivated also by economic interests, which the prince Milos had by exporting the games' hide (skin).

⁴ The prince Milos Obrenovic had passed a decree to the Pozega nahiyah in which he commands: „To kill foxes and wolves, and their skins to send to the prince Milos“. In 1820 the prince Milos had given a command:“Every serf must bring, besides a tribute, to a captain a wolf's skin bag and two heads of crow and other voracious birds.“ Similar decrees were passed in 1829, 1831, 1832 and 1835. The decrees mostly relate to hunting prohibition of specific game: deer, roe deer and otter.

For the first time was more comprehensive regulated the hunting issue in commandments of the prince Mihailo Obrenovic on 25th May 1840, when was arranged the closed season issue, while hunting some game was completely forbidden „because if game would be unrestrictedly hunted, all game in Serbia would be exterminated“.⁵ This legal act represents the first regulation which refers to entire Serbia. By passed edicts and commands was proven a permanent hunting prohibition for deer and roe deer from the beginning of Lent to Petrovdan. In that time appear many hunters in small provincial towns and towns, mostly military personnel and state officials, i.e. people who possessed arms, and later joined the hunt craftsmen and merchants, etc. This command was replaced with the Decree on Hunt, which was issued by the prince Aleksandar Karadjordjevic on 13th June 1853, and by which was more detailed regulated the closed season issue.

In 1860 was passed the Criminal Law, which had contained certain regulations also for the hunt, but the first Law on Hunt was passed by the Serbian National Assembly in Nis, 16th July 1898. Soon was passed also the instructions for the law application. This Law meant that right to hunt game, as a particular right regardless who owns the land, belongs to the state. Only with precise permission of the state authority could hunt, except on areas fenced off with any fence.⁶

The Law on Hunt of the Kingdom of Yugoslavia was passed on 5th December 1931.⁷ The Law was anticipated that there are the state's hunting-grounds and the hunting organizations' hunting-grounds. According to this law, the paragraph 96, anticipates a ban's decree, which has a power of law (*decree with the force of law*) for the territory of the Danube subdivision (the region ruled by a “ban”) was passed the Decree on the implementation of the law on hunting on 6th February 1935, which had the force of law.⁸

The law on Hunt of the National Republic of Serbia was passed on 12th November 1948 (*Official Gazette, no. 53-1948*), took over the concept of federal Law on Hunting Right and Game Ownership, and contained several decrees which refer to the hunting organization concept. The Law was passed according to the constitutional powers.⁹ In this law was clearly set elements of

⁵ Decree was published in Novine Serbske on 10th June 1840 in no. 24.

⁶ This Law was amended on 28th March 1904. *Srpske novine, no. 78/1904*. By this cancels a support to hunting associations.

⁷ Službene novine, no. 285/1931

⁸ *Službene novine Kraljevine Jugoslavije, no. 13/1935*

⁹ See paragraph 74, p. 3, *Constitution of the Republic of Serbia*

hunt planning, and those are: game, hunting-grounds and hunters. It was clearly determined what will hunt, where will hunt and who will hunt. The basic point of view regarding game is: to secure breeding according to a plan, if possible, of as many useful games, of which will hunt and use the growth surplus. The first time, in some legal act, had defined the hunting subject. So, the hunting subject can only be furry game and game birds of both sex.¹⁰

By this law was cancelled high rental fees, private and personal hunt lease, game was declared as national property, and the hunting-grounds mostly given to the hunting associations to manage and use, which member can be every inhabitant, except convicts.

According to the Law on Hunting, paragraph 6, was passed the Resolution on Game Division on Protected and Unprotected (*Official Gazette, no. 32-1949*). In Paris, on 18th October 1950, was signed by our country the International Convention on Bird Protection, and the Law on Convention Ratification was published in the „*Official Gazette of SFRY*“ no. 6/1973.

The next Serbian Law on Hunt from 1966 was not explaining the proprietary nature, but was determining the subjects who could hunt. In regard to the previous law, which had allowed the hunting and hunting-economic organizations to hunt, this law had allowed it also to agricultural organizations, on condition that they manage the land on which had been founded the hunting-ground. Besides the determined game classification to furry game and game birds, there makes one more classification to high and low game hunting. The Law on Hunt of the Republic of Serbia in 1966 was effective until 1973, when was passed the new Law on Hunting.¹¹ In that period were done some law alterations («*Official Gazette of RS*»no.12/1967), according to which the rights of the republic were carried over to the municipalities. This law was passed according to the Federal Basic Law on Hunting from 1965. The newest innovation of the law in 1973 were, that was determined for deer game hunting-grounds, that it cannot be smaller than 10 000 hectares, and other hunting-grounds cannot be smaller than 3 000 hectares. The water

¹⁰ By the law were explicitly enumerated furry game and game birds which considered the hunting subject. All other animal species which was not enumerated in the law was not considered as the hunting subject, therefore, they do not hunt. However, besides the enumerated game, the law had divided the game on protected and unprotected. Thereat the law states that the protected game must not chase, catch and kill during the closed season. See the paragraphs 5 and 6 of the Law on Hunting, 1948

¹¹ Serbian Hunting Law was passed on 13th June 1973, and was published in „*Official Gazette of RS*“, no. 24/1973

hunting-grounds, according to the law, cannot be smaller than 200 hectares. Also as innovation appears a trophy list, as a document, by which the trophy carries out from the hunting-ground legally. This law was in force for the territory of Serbia, without the autonomous provinces.

The new constitutional position of republics in the federation, established by passing the new Constitution in 1974, has imposed a need for passing the new Hunting Law.¹² This law was also in force for the territory of Serbia, without the autonomous provinces. One of this law's innovations is that wolf, fox, wildcat, hooded crow and magpie can be hunted throughout the year.

The Serbian Hunting Law, passed in 1976, was determined an assumption-authority of the municipality hunting inspection in hunting inspection activities and in detail was arranged a game warden's authorization. The revised text of the law on hunting can be found in the „*Official Gazette of RS*“, no. 23/1986.

The new Serbian Hunting Law,¹³ was passed by the Serbian Assembly in 1993. The basic innovation in the law was that the hunting-grounds were assigned to the hunting associations via the Serbian Hunting Association.

By passing the Constitution of the Republic of Serbia in 1990 and the Law on Hunting in 1993, the autonomous law on hunting was abolished, while this field was uniquely arranged. According to this Law on Hunting, supervision over the implementation of the law decrees, regulations and other acts, passed according to it, is under authorization of the republic ministry for hunting activities, and inspection supervision is under the authorization of the hunting inspection.

Historical development in Vojvodina and the Danube region

Since 1883, in Vojvodina was in force the Hungarian Law on Hunt, which was formally in force until 5th December 1931, when the new Law on Hunt was passed, which was mandatory applied on 15th February 1935, by passing the Decree (they called: Rule of the Hunting Associations for the Danube Subdivision (a region ruled by a „ban“)) for implementing the Hunting Law.

¹² On the sessions of both councils of the Serbian Assembly on 24th November 1976 was passed the Law on Hunting. It was published in the „*Official Gazette of RS*“ 51/76.

¹³ The declaration edict on the Serbian Hunting Law was passed on 27th May 1993, the Law was published in the *Official Gazette of RS* no. 39/93

The law was divided into eight parts: 1. General provisions, 2. Hunting-police decrees, 3. Supervision and protection of hunt, 4. Compensation for hunt and damage of game, 5. Hunting improvement, 6. Criminal provisions, 7. Transitory provisions, and 8. Concluding provisions.

In the general provisions is about the hunt right, which was connected to the land ownership right and was belong to the land owner. Furthermore lists the game which bears the brunt of the law, and divides in three categories: 1. Game protected by the closed season, 2. Unprotected game and 3. Beasts. It was given a definition of own hunting-grounds and the municipal hunting-grounds, so there was regulated a way of hunt lease. By the legal provisions was fixed also the closed season. Further in text is about the public hunt supervision, which was supervised in the ban's ruled regions by a ban (governor), and for the entire country – the minister of forests and mines.

In the fourth part states that an authorized person for hunt is obliged to pay, as hunting damage, as well as damage by game, in the regions ruled by a ban (governor). In the fifth part is primarily about the associations and the hunting associations, which must form in the regions ruled by a ban (subdivisions). The hunting associations have to be united in unions, and these ones in the Central Union. The criminal provisions at the end of the law set penalties, which can be in form of a fine or an imprisonment, or both depending on guilt.

In transitory provisions, besides a hunting card, anticipates also „permission for hunt“, issued for a country, subdivision or several subdivisions, while earned money goes to the Hunting Fund. In the concluding provisions is important that the law comes into effect in some subdivisions together with the ban's decree, which has to be adopted not later than six months from the law announcement. At the SAP Vojvodina Assembly, on 20th December 1971, was passed the Law on Hunting¹⁴, which had been in force since 1st January 1972.

The Assembly of SAP Vojvodina, on its session on 19th April 1977, was passed the Edict on proclamation of the Hunting Law of SAP Vojvodina,¹⁵ while amendments to the Law were adopted and published in the „*Official*

¹⁴ Published in the „Official Gazette of SAP Vojvodina“ no. 22/1977

¹⁵ Published in the „Official Gazette of SAP Vojvodina“ no. 11/1977

Gazette of RS“ no. 19/1989. Along with this law has been also a series of by-laws, which were previously passed and were not in conflict with the law.¹⁶

Modern hunting legislation in terms of the Danube region rural development

The Danube strategy is the EU strategy, based on six pillars, which are the basic postulates for improvement of the regions connection in traffic, energy, agriculture, information, the environment protection, strengthening of social and economic potentials of the Danube region and strengthening of rule of law and legal safety in all mentioned fields, which are divided in eleven priority fields.¹⁷

The rule of law and strengthening of the legal safety, as we have already stated, represented one of the pillars of the Danube strategy, adopted by the EU. Danube, as the most important waterway of the EU, known as the corridor 7, connecting countries in sociological and cultural way, „softens“ the borders in the best possible way, so enables even establishment of high standards in the field of safety, the environment protection and incentive of the economic, as well as the rural development.

¹⁶ Rulebook on content of hunting-economic basis (“*Official Gazette of SAP Vojvodina*” no. 11/1972); Rulebook on issuing a trophy list for game trophies («*Official Gazette of SAP Vojvodina*» no. 11/1972); Decree on defining when cats and dogs are considered rogues («*Official Gazette of SAP Vojvodina*» no.11/1972); Resolution on defining when birds are considered as song-birds or useful for agriculture and forestry («*Official Gazette of SAP Vojvodina*» no.11/1972); Decree on permanent hunting prohibition of rare game species and closed season for the protected game, published in „*Official Gazette of SAP Vojvodina* no. 8/72; 1/73; 6/74; 20/74 and 12/76“, 6. Instructions on legitimacy of hunting inspectors («*Official Gazette of SAP Vojvodina*» no. 7/1972); On the day of coming into force the Law of Hunting of SAP Vojvodina had stopped to be in force: Law on Hunting («*Official Gazette of SAP Vojvodina*» no. 22/1971; 8/1972 and 17/1974); Rulebook on contents and method of managing the hunting-ground registry («*Official Gazette of SAP Vojvodina*» no.11/1972); Amendments to the Law on Hunting of SAP Vojvodina were done in 1989. In 1989 was adopted the Constitution of Vojvodina Hunting Association, and hunting was introduced as a regular subject at the Faculty of Agriculture in Novi Sad.

¹⁷ More detailed on Danube strategy as development perspective of the Danube countries at: Bjelajac Željko, Marijana Dukić-Mijatović, Počuča Milan, (2011) *Dunav reka saradnje i afirmacije bezbednosti, zaštite životne sredine i privrednog razvoja*, The 21st International Scientific Conference ”Danube-River of Cooperation”, The Role of Civil Society in Promotion of the Danube Basin Potencial in the Light of the Strategy for Danube Region, Institute for International Policy and Economy, Belgrade, pp.43-54

The hunting tourism and the hunting legislation, as an integral part of legal and economic system of Serbia, are also in function of set goals, which aim to make conditions for the sustainable agriculture and rural development of all subjects within the Danube region. Surely the Danube strategy, adopted by the EU, strongly affirms all the tasks in the priority fields. In order to access to the EU, the Republic of Serbia, except other tasks which has to fulfill, must necessarily to build modern market structures in terms of providing an intensive and an effective competitiveness among the economic entities on the entire territory, and thereby also in the Danube region.¹⁸

The Serbian Law on Game and Hunting in 2010,¹⁹ had continued a normative practice from the previous period, through creation of normative conditions for undisturbed development of hunting activity, respecting the normative solutions in agricultural, water management and the environment protection. It is important to mention that this law has provided, through the hunting activity and hunting organization, for foreign citizens, realization of significant foreign income through the mentioned activity. The hunting tourism in terms of export is especially important taking into consideration the hunting-grounds structure and number of game²⁰ in the Danube region (territory of Vojvodina), vicinity of the EU and good road connection.²¹ Thereby „the image creation should realize complementary with creation of AP Vojvodina and Serbia image, and which are not, unfortunately, present adequately on the international tourist market.“²²

¹⁸ On analysis of achieved level of trade development of Serbia and the Danube region: Germany, Slovakia, Hungary, Croatia, Romania, Bulgaria, Moldova, Ukraine; more detailed in: Dubravka Mesaroš, *Robna razmena Srbije i podunavskih zemalja*, (2011) The 21 International Scientific Conference "Danube-River of Cooperation", The Role of Civil Society in Promotion of the Danube Basin Potential in the Light of the Strategy for Danube Region, Institute of International Policy and Economy, Belgrade, pp. 57-74

¹⁹ The current law in Serbia was published in the Official Gazette of RS no. 18-2010 on 26th March 2010

²⁰ See: Novaković V.(1996) *Lovstvo i lovni potencijali Srbije do 2050. godine*. Proceedings, Srbija-šume, development state and projection until 2050 and expected effects. PC „Srbija šume“, Belgrade

²¹ More detailed on up-to-date tourist products in upper and lower Danube region see at: Drago Cvijanović, Predrag Vuković: *Uloga marketinga u turizmu dunavskog regiona Srbije*, (2012) Institute of Agricultural Economics, Belgrade, pp.229-246

²² Vuković R., Cecić N.Ivanović L.(2008) "Sustainable Tourist Development of the National park "Fruška gora"-Serbia" Simpozionul stiicific international: "Perspective ale dezvoltarii si zonelor rurale". Universitate de stiinte agronomice si medicina veterinara Bucuresti Romania. Facultate de menagement, inginerie economica in agricultura si dezvoltare rurala. Bucuresti, May 5-6. 2008. Vol, 8/2008, pp. 469-473.

According to the law, the hunting areas in which can hunt, as a tourist activity, found on the entire territory of the Republic of Serbia. The most important reason is carrying out a unique hunting policy and adequate measures of protection, breeding and improvement of managing the hunting economy and game as a whole.²³

As many areas in Serbia, the hunting legislation has a series of laws and by-laws, which in one of its parts regulates the issues significant for this economic and social activity. Taking into consideration our direction toward the EU, it is very important to know which acts are in force now in the hunting legislation and which other laws in the field of agriculture, forestry, water management, the environment protection must be respected while doing business in the hunting tourism, the environment protection, agricultural land cultivation, agricultural products sale, etc.²⁴ The valid ratified international conventions and other accepted international agreements represent an integral part of the Republic of Serbia's legislation and are stated after the local legislation.

List of the existing legal legislation of the RS in the field of the hunting regulation

1. The Law on Game and Hunting (*Official Gazette of RS no. 18/10*, 26th March 2010);
2. The Law on Forests (*Assembly of the Republic of Serbia 2010, Official Gazette of RS, no. 30/10*);
3. The Law on Agricultural Land (*Assembly of the Republic of Serbia 2006, Official Gazette of RS, no. 62/06 and Official Gazette of RS, no. 41/09*);
4. The Law on Veterinary (*Assembly of the Republic of Serbia on 25.10.2005, Official Gazette of RS, no. 91/05*) and the Law on alterations and amendments of the Law on Veterinary on 7.5.2010. (*Official Gazette of RS no. 30/10*);
5. The Law on Tourism (*Official Gayette of RS no. 36/09*);
6. The Law on Nature Protection (*Official Gazette of RS no. 36/09*) and the Law on alterations and amendments of the Law on Nature Protection (*Official Gazette of RS no. 88/10*);

²³ See paragraph 31 of the Law on Game and Hunting of Serbia.

²⁴ On responsibility and possible damages on agricultural crops and agricultural activity generally in hunting, see more detail in: Milan Počuča, (2013) *Naknada štete u lovnom zakonodavstvu Srbije*, Proceedings: Insurance and Compensation for Damages, XVI International Scientific Meeting, Serbian Association of Damage Law, Zlatibor, pp. 282-295.

7. The Law on Firearms and Ammunition (*Official Gazette of RS no. 39/93*);
8. The Law on Animal Welfare (*Official Gazette of RS no. 41/09 on 2.6.2009*);
9. Convention on preservation of European wild flora and fauna and natural habitat (*Official Gazette of RS – International Contract no. 102/07*);
10. Forestry Development Strategy of the Republic of Serbia (*Government of the Republic of Serbia 2006*);
11. Rulebook on proclamation of some protected game closed hunting season, duration of hunting season of protected game in open and fenced areas of hunting-grounds and a polygon for game hunting, as well as protection measures and regulations of population size of permanently protected game (*Rulebook was published in „Official Gazette of RS“, no. 75/10 on 20th October 2010*)

List of existing legislative rules for hunting organizations

1. The Law on associations, gatherings and agreements published on 19.09.1931, when was passed and come into force, and was published in a regular volume of the „*Official Gazette of RS*“ no. 225/1931.
2. The Law on associations, gatherings and agreements („*Official Gazette of DFRY*“ no. 65/1945)
3. The Law on alterations and amendments of the Law on associations, gatherings and agreements on April 1st 1947
4. Edict on declaration of the Basic Law on Citizens Associations from April 4th 1965 («*Official Gazette of SFRY*» no.116/1965)
5. Edict on declaration of the Law on associations, gatherings and agreements, which establish for the territory of SFRY since July 25th 1990 («*Official Gazette of SFRY*» no. 42/1990)
6. Edict on declaration of the Law on Citizens' Associations on December 28th 1972 («*Official Gazette of SRS no. 53/1972.*).
7. The Law on Alterations and Amendments of the Law on Citizens' Associations («*Official Gazette of SRS*» no. 30/1977).
8. The Law on Social Organizations and Citizens' Associations («*Official Gazette of SRS*» no. 51/2009), on July 14th 2009

List of the republic laws of direct interest for the Serbian hunting

1. The Law on Firearms and Ammunition (*«Official Gazette of RS» no. 9/1992*). The Law was amended in part concerning the amount of fines for economic offences. The amendments and alterations of the Law were done and published in *„Official Gazette of RS“ no. 53/93, 67/93; 48/94 i 44/98*. The revised text was published in the *«Official Gazette of RS» no. 44/98*, while decrees of par. 6 post. 4 of the Law apply since January 1st 1999.
2. The Law on Nature Protection (*«Official Gazette of RS» no. 29/1988*).
3. The Law on Animal Protection From Infectious Diseases which jeopardize the whole country (*«Official Gazette of SFRJ» no. 43/1986*).

Regulations of the Ministry of Agriculture, Forestry and Water Management of the RS

- a. Decree on Game Closed Season (*«Official Gazette of RS» no. 93/1993 on 14.10.1993., no. 84/93; 22/99; 32/99; 19/02*)
- b. Rulebook on content and method of making a base for hunting-grounds, a base for hunting area and annual plan of the hunting-ground management (*«Official Gazette of RS» no. 13/1994 on 15.01.1994. and 11/95*)
- c. Rulebook on conditions under which a hunter-tourist can hunt and train hounds in the hunting-grounds on the territory of the Republic of Serbia (*«Official Gazette of RS» no. 33/1994*).
- d. Rulebook on the damage amount for illegally caught or killed game (*«Official Gazette of RS» no.13/1994, on 20.01.1994*).
- e. Rulebook on conditions and measures for human catching of stray dogs and cats (*«Official Gazette of RS» no. 29/1994 on 12.04.1994*).
- f. Rulebook on the gamekeeper's legitimacy and job uniform (*«Official Gazette of RS» no. 13/19, on 17.01.1994. and 11/95*).
- g. Rulebook on license form for large game hunting, a form, content and way of issuing the trophy list and a way of registering the trophies and issued trophy lists (*«Official Gazette of RS» no. 13/1994 on 17.01.1994. and 11/95*).
- h. Rulebook on measures for damage prevention and method for the damage determination (*„Official Gazette of RS“ no. 2/2012*)
- i. Formulars on plan and breeding of game (*«Official Gazette of RS» no. 13/1994*).

The most important domestic laws related to the hunting sector

- Constitution of the Republic of Serbia²⁵
- Law on Forests²⁶
- The Law on Environment Protection²⁷
- The Law on Integrated Prevention and Control of the Environment Pollution²⁸
- The Law on Inheritance²⁹
- The Law on Game and Hunting
- The Law on Water³⁰
- The Law on Agricultural Land³¹
- The Law on National Parks³²

The most important international acts related to the forestry and hunting sector

- Agenda 21 (1992)
- Framework UN Convention on Climatic Changes (1992)
- Biodiversity Convention (1992)
- The Convention on Air Pollution above the Limit over long distances (1979)
- The Convention on the World Cultural and Natural Heritage (1972)
- Resolution of the Ministry Conference on Forest Protection in Europe (1990, 1993, 1998, 2003)

²⁵ The Constitution of the Republic of Serbia has been adopted by the National Assembly of the Republic of Serbia at the First Special session of the NA of RS in 2006 (30th September 2006) and it has been finally adopted at the republic referendum on 28th and 29th October 2006. Published in the „Official Gazette of the RS“ no. 98/2006

²⁶ Published in the „Official Gazette of RS“ no. 30/10

²⁷ Published in the „Official Gazette of RS“ no. 135/2004, 36/2009. and 72/2009

²⁸ Published in the „Official Gazette of RS“ no. 135/2004

²⁹ The Constitution of the Republic of Serbia has been adopted by the National Assembly of the Republic of Serbia at the First Special session of the NA of RS in 2006 (30th September 2006) and it has been finally adopted at the republic referendum on 28th and 29th October 2006. Published in the „Official Gazette of the RS“ no. 98/2006

²⁹ Published in the „Official Gazette of RS“ no. 30/10

²⁹ Published in the „Official Gazette of RS“ no. 135/2004, 36/2009. and 72/2009

²⁹ Published in the „Official Gazette of RS“ no. 135/2004

1996. National Assembly of the RS had passed in 1995 the Inheritance Law, which had come into force on 5.5.1996. Published in the „Official Gazette of RS“ no. 46/95

³⁰ Published in the „Official Gazette of RS“ no. 30/10

³¹ Published in the „Official Gazette of RS“ no. 62/2006

³² Published in „Official Gazette of RS“ no. 39/93, 44/93, 53/93, 67/93, 48/94 i 101/2005.

- The Europe Council Directive no. 43/92 on natural habitat protection and wild flora and fauna habitats (1992).
- The Europe Council Directive no. 409/79 on wild birds protection (1979).
- The Europe Council Directive no. 105/99 on Forest Reproductive Material Market (1999).
- The Europe Council Directive no. 2158/92 on EU forest fire protection (1992).
- The Europe Council Directive no. 3528/86 on EU forests protection from atmospheric pollution (1986).
- The Europe Council Directive no. 1615/89 on setting up the information-communication system on European forests (1989).
- The Europe Council Directive no. 89/68 on framework law of the countries-members in timber classification (1968).
- The Europe Council Directive no. 1232/98 on statistical products classification by activities in the European Economic Community (1998).
- Nature 2000

International conventions

Of the International Conventions, inherited from the SFRY, and which refer to the hunting field, today are still valid the following:

1. Convention on marshes of international significance, especially as the habitats for wading birds, (*the convention was adopted in Ramsar – Iran on 2nd February 1971, and ratified in 1977*). This type of convention was ratified by the government, not parliament, so this one was ratified by the Federal Executive Council, and the Decree on the convention ratification was published in the *Official Gazette no. 9/1977*.

This convention aims to preserve marshes which represent the habitat of the wading birds. It obliged all signatories to mark the marshes on their territory which they include on the List of Marshes of International Significance. The convention has to be understood in a wider sense, so the convention's subject, the marsh habitats protection, directly connects not only with protection of wading birds, but with protection of marsh eco-system. It includes also the protection of water flora and wetland plants, the entire vegetation, as well as the complete fauna component of these specific habitats. During the selection for the list of marshes of international significance, the selection criteria can observe according to ecological-botanical, zoological and hydrological significance.

The convention was implemented in the republic legislation (on the environment protection and nature protection). However, must point out to a fact that the wading birds, during seasonal migrations, fly over many states boundaries, that they represent international wealth in accordance to this convention, which intervene for the marshes protection by the community harmonized with policy and actions, which point out to a logical conclusion that the state should carry out this convention's standards. Thereat must emphasize that the localities on Yugoslav territory, now Serbia, like Obedska bara (pond) and Ludosko jezero (lake) have been included on the list of marshes of international significance, while Carska bara (pond) has been included on the List of European and North-African water habitats.

2. International Convention on Birds Protection (the convention was adopted in Paris on 18th October 1950. *The Law on the convention's ratification was published in the Official Gazette of SFRY, no. 6 in 1973*).

The Convention on Birds Protection has a simple structure, import, export, transfer, trade, birds' utilization (par. 3 and 4), prohibition or limited utilization of some procedures, by which application they destroy or capture in large numbers, i.e. torture birds (par. 5), control of factors which can cause birds destruction (par. 10), birds reservations for their reproduction on land and in the water, nutrition and upbringing of offspring (paragraph 11).

The specific convention's decree point out to a sovereign state's authority, and not its constitutive elements (paragraph 3 and 5 of the convention). Thereby points out to a fact that the convention was implemented in the Law on Game and Hunting of the RS. Common to the convention and the law is to arrange protection, breeding, hunting and use of game, organization and keeping up the hunting-grounds, aiming to keep the balance between game and flora, within the nature protection. The law has a special part about game and protection. It is a list of game by which has been comprised also birds. Those lists represent a base for birds' classification in regard to a type, level and method of protection. The law regulates measures and penalties in procedures for birds' protection (permanent hunting prohibition and closed season). Especially list the game species which are not allowed to hunt during the whole year. In the laws is not regulated an issue of birds sale, protected by the convention and taking over the measures in order to limit such birds' trade.

3. The convention on the international trade by jeopardized species of wild fauna and flora (*Convention on the International Trade with Jeopardized Species of Wild Fauna and Flora, i.e. Washington Convention, was adopted at the conference in Washington from 12th February to 2nd March 1973*).

The international agreement, by which provides the international cooperation in protection of specific kinds of wild fauna and flora from an excessive exploitation, by the international turnover. Yugoslavia was not signed this convention, but it must be taken into consideration while making lists of species of international significance.

Appendix I contain a list of species which have been endangered to become exhausted under real or potential influence of trade.

Appendix II contains a list of species which, (a) although not jeopardized, can become if their turnover is not strictly limited (regulated) in a way which enables harmonization between utilization and survival, and (b) other species, which limitation of turnover is necessary because of control efficiency of species turnover by criteria under the (a).

The Appendix II contains the list of species, for which turnover limitation is interested some members, and they need the international cooperation for that.

4. The convention on European (wild) living world and natural habitats protection (or, so called, Bern Convention – Bern, 1979) is the international agreement on flora and fauna preservation in nature and their natural habitats, especially those which protection requires the international cooperation. Yugoslavia has not signed, but its species categories are helpful in determination of a list of species of international significance. The Appendix I contains the list of strictly protected plant species, which should succumb to special legal measures of protection, including the closed season and other measures of exploitation regulation, and, if necessary, a temporary or a local prohibition and regulation of turnover and breeding.

The convention on migratory species of wild animals (or abbreviated CMS, or Bonn Convention – Bonn, 23rd June 1979) is the international agreement, originated from a care for those animals species which migrate over the national jurisdiction boundaries, i.e. accepting that states should and must be the protectors of the migratory animal species, which live within their jurisdiction boundaries or cross them, i.e. preservation of the migratory wild animal species requires also mutual activity of every country within which border those species live or spend even a part of their life cycle (the convention's preamble).

The Appendix I represents the list of jeopardized migratory species for which is necessary to renew the habitats, to eliminate, compensate or reduce the negative effects or obstacles which make difficult or make impossible the migration, as well as to prevent and reduce influences which jeopardize them, including also a counteraction or extermination of already imported exotic species, catching such species prohibits, except for the science needs, artificial reproduction or survival, satisfying the needs of traditional users which live of it and in extremely timely and spatially limited cases.

The Appendix II is the list of the migratory birds' species, which protection status is unfavourable and which preservation and use require the international agreement, i.e. the species which protection status would be improved by the international agreement.

The foreign signatories occasionally adopt the agreements, by which regulates some specific issues, as, for example, the Agreements on Protection of Afro-Euro-Asian migratory waterfowls (CMS 1994. Agreements on the Conservation of Agrican-Euroasian Migratori Weterbrids, proposal, Bon UNEP/CMS Secretariat pp 56). For this agreement's realization make the international activities plans (Action Plans) for the specific issues. For example, the Activities Plan for Mallards (Anatidae) - IUCN/WRB 1994. Actioni Plans: AnatidaeIUCN, the World Conversation Union, Environmental Law Centre.³³

Conclusion

The Danube region, which, according to common values, common historical inheritance and mutual future, consists of 19 countries, of which 10 EU members and in which live more than 80 million people, is a strategic macro-region in this part of Europe.

The Danube region in Serbia represents an important and huge geographic area in which live numerous rural population. Agricultural land, the river Danube (587.4 km of watercourse in Serbia) with tributaries and many lakes and forests, economic management with hunting fund of this area and

³³ More detailed: Zečević Miodrag: (2003) *Lovno zakonodavstvo Srbije i Crne Gore i Jugoslavije, međunarodne konvencije i autonomni propisi lovačkih organizacija, 1918-2000. Serbian Hunting Association, Belgrade and Ristić A. Zoran, Milan Počuča, Miloš Beuković; (2011), Razvoj lovnog prava u Srbiji i Vojvodini*, Proceedings of the Department for Geography, Tourism and Hotel Business, University in Novi Sad, no. 40, pp.139-143

numerous game, have created a good basis for hunting tourism development in that region. The hunting tourism, as export-oriented economic branch, has been an essential part of this region's total potential. The rural development rests mainly upon the hunting tourism and supporting activities. In order to anticipate properly directions of the mentioned activities development is necessary to know and to have clear records on institutional legal and other resolutions in these fields. Application and tracking, i.e. adjustment of regulations in the field of agriculture, forestry, water management and the environment protection and hunting legislation with passed and adopted acts in international community, represents a basic task of all competent government and non-government institutions and citizens associations. Making the assumptions, through the legal legislation strengthening and the legal safety of population and investors, is a part of continuous care of all competent factors in carrying out of the Republic of Serbia strategic goals within the Danube region, and commitments in the process of Serbia's accession to the EU.

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SOME ASPECTS OF IMPROVING CENTER FOR SMALL GRAINS, KRAGUJEVAC WITHIN DISLOCATION AND TRANSFORMATION¹

Milivoje Milovanović, Kristina Luković**

Abstract

This paper deals with some aspects in the goal of solution the problem of dislocation of part of productive and the trial plots of Center to a new location, as well as part of storage and other facilities related to the production, storage and processing seeds. As part of that also it is planned solving of numerous accumulated problems related to the business transformation and upgrading, strengthening of personnel and modernization of technical capacities, leading to sustainable operation and future development of the Centre. Solving the problems related to small grains would be to benefit the wider community of Serbia, mainly from the regions of Šumadija and Central Serbia. In order to benefit also would be a whole agriculture of R.S. and of the region, since by preservation and improving this institution with 115 years of tradition will be made a significant contribution to improving the supply of seed, biodiversity and expert knowledge in the field of small grains, which would lead to a more stable future agricultural production with positive and upward trend of incomes, to improving the competitiveness of the Center and to better supply the market.

Keywords: *Center for Small Grains Kragujevac, transformation, dislocation, improving*

Introduction

The Center is unique research developmental center that performs scientific research in basic, applied and developmental research. Founder of the Centre is the Government of the Republic of Serbia, and to its formation were preceded the need to perform a kind of concentration of achieved scientific

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achievements of several generations of scholars and also to incorporate the best available scientific staff. The roots of this institution are consistent with a long and rich historical legacy and that has been known and recognized institution with their own tradition in the field of avocation and science. The beginnings of work of the Centre started at the end of the XIX century (*Popovic, 1989, Stojanovic et al. 1998*). Then set the goal of this company to "serve the education and research of every terrestrial kind" has not been changed until today, although at that time the concept of science meant "learning, training, but also testing of what is from something a better and transfer of experience in the nation". Also his objective is current today, as it is in function of long-term development of the society based on knowledge to be employed in area of agricultural production to contribute to an increase in GDP of Serbia. Results achieved so far qualify and verify the Center as one of the leading institutions in the field of biotechnology in the country.

History of Center can not be separated from the very beginnings of organized science in agriculture of Serbia. It was resulting by a displacement of the main part of the original Agricultural and chemical experimental station in Topčider, which is by the decision of the Ministry of National Economy of the Kingdom of Serbia established in Belgrade (Topčider) in May 1, 1898th, (*Popovic, 1989*). Department of fields crops and Department for plant protection, as well as parts of the National Institute for Agricultural Research have been moved from Topčider to Kragujevac in 1948th year. They were located in buildings of Lower agricultural school, Sub district agricultural station and of Nursery in Petrovac and got to use the land of those state institutions (about 480 ha). Moved part began to develop as independent Institute for Agricultural Research in Kragujevac with two-departments for Fields crops and for Plant protection. Later it was decided to form the Institute of fields crops into which they entered: the Institute for Agricultural Research in Kragujevac, under name the Department of field crops (which included the Department of plant protection), Department of forage crops from Kruševac, Institute for maize in Zemun Polje with fields Station for the selection of potatoes in Guča. In 1961st year, the Department of field crops is separated from the Institute and became an independent scientific institution-Office for small grains. The Office was organized in three scientific research departments: for selection and genetics, for cultural practices, physiology and for the protection of plants against diseases, pests and weeds. Since 1970th, by an agreement it was formed Institute for Agricultural Research with residence in Kragujevac. In its composition are entered: Office for Small Grains in Kragujevac, Office of Forage Crops in Kruševac and Institute of Vegetable Crops in Smederevska Palanka (*Stojanovic et al. 1998*).

Conditions were created in 1975th for the amendment of the Statute, and the Office for Small Grains in Kragujevac becomes Institute for small grains. Institute for Small Grains has maintained its independence as a research institute until 1991st year, when entering into the composition of the Agricultural Research Institute, SERBIA, as its part-Center for Small Grains (*Stojanovic et al. 1998*). Later, in 2006th year the decision was made by the government of Serbia to restructure the Institute for Agricultural Research, SERBIA. That same year was amended the Statute and the Center for Small Grains began independently to develop as the EC "Center for Small Grains", Ltd. Kragujevac.

In the period from 1898 to 1948th year in Topčider were created 30 or so varieties of important crop plants, often called "Topčiderka, Topčiderac etc.", which were disseminated in our country and played an important role in the production (*Popovic 1989*). After it's removing in Kragujevac from 1948th to 1960th year, on the basis of results of the experiments conducted in the fields of Serbia and in Kragujevac, the State Commission has recognized another 15-or so varieties of mainly wheat, oats, rye, barley and corn. In the period since 1960th year (when was started the recognition by the State Commission on the basis of tests in a network of micro trials under the code) at the Center for Small Grains were created further 95 varieties of small grains. All this makes to be in its tradition longer than a century, Center created about 130 new varieties of mainly small grains. Along with researches in the fields of genetics and plant breeding (*Stojanovic et al. 1998, Milovanovic et al. 2001, 2012, Milovanovic and Perisic, 2002*), were publishing the researches in the field of agricultural technology and agro ecology, pedology, agro chemistry, physiology, plant protection and application of pesticides. One part of the proceeds of the revenue structure Center provides by a service delivery and it is related to control soil fertility, control of seeds and fertilizers, flour quality control and others.

Center for Small Grains its basic research activities carry out in the area of biotechnology sciences (agriculture, crop farming). In addition to basic-theoretical researches at the Center are performing strategically, developmental and innovational researches, as well as application of research results in practice. The entire research work is carried out in crop production. In this area, the most important part of the researches refers to the creation of new varieties and hybrids of cereals, with increased potential of yield and grain quality and with increased resistance to causal agents of diseases, pests, low temperatures and other abiotic and biotic

stress growing conditions. From its recognized cultivars, the Center organizes and produces mainly on its own land, seed production of high categories (pre-basic and basic-seed old names: super elite, elite and original) for the agriculture of our country and for export. In cooperation with seed companies, Center negotiates, organizes and collects licensing (authorship) royalties for the production of basic seed and the seed of the first generation (C1) for KG varieties in the Republic of Serbia.

The present moment is characterized by a heavy burden of historical, geopolitical and financial heritage. The temptation of transition is great, and our society is facing parallel also with the post-transition processes, such as integrations, concentrations of ownership and the development of new competitive strategy. It is generally assumed that the agro-industry sector is identified as a national leader in the strategy of self-sufficiency. This sector can ensure national self-sufficiency in food products and to achieve surplus in this part of the trade balance. The development of this sector can be achieved by designing appropriate export strategies, the appropriate concept of ownership transformation, adequate investments and the adoption of legislation in the field of agriculture, coordinated and harmonized with the regulations in developed countries. In the future it is necessary that all mentioned our undoubted advantages are defined in the strategy of sustainable development of agriculture in Serbia. Bearing in mind the complexity of time that comes, the Center in Kragujevac, also in the future will have a significant position in the field of science and researches in crop production.

The mission of the Center is to reach in the field of biotechnology such a level of knowledge and potential to solve at the expert level, long-term guide and to review the needs of consumers and producers in agriculture and food industry. Such a mission is in a function of long-term development vision of our society, where knowledge is his main imperative. In this way, the Center will provide a self more important and more honorable place in the big global family of research institutions in the field of biotechnology. In order to successfully implement the said mission, in 2001st year, the Center has successfully introduced quality standard ISO 9001, which resulted in obtaining the Certificate, which is not verified through external audits last few years due to lack of interest of management.

Dominant activity of the Center for Small Grains, according to a unique classification of activities is research and experimental development on biotechnology sciences, which means more precisely: the study of genetics, physiology, agro ecology, crop management, diseases, pests and weeds of cereals and other fields crops, breeding and selection of cereals and other fields crops, the production of a high categories and processing of seeds of cereals and other fields crops, the collection and study of local and introduced varieties of cereals for the gene bank of plants, transfer and application of scientific and technological solutions and avocational and sanitary control of seed production of small grains. Center in the entire period of its existence has not changed the ownership structure, but remained the state institution of RS with 100% share in the property.

Available land and providing space for experiments and seed production

According to *Milovanovic et al. (2010, 2011a)*, on the basis of the cadastral sheet Center avails a total of 231 hectares, of which administrative exemption is not terminated for about 40 hectares, which makes the actual areas of the disposal Center should be about 191 hectares of land (according to the census lists) of which about 170 ha of arable land, while other are non-arable land on which are the buildings of the Centre (about 8 ha), while about 13 ha relates to forests, scrubs, ponds and degraded land. By exclusion of land made by the City in 2005, 2006, 2007, 2008, 2009 and 2010th years, to the Center is exempt about 61,93.74 ha + 9,27.67 ha = 71 ha, so that the Center now has only about 100 ha of arable land. By excluding the said land, Center remained without basic means of work, which had significantly negative and detrimental impact on the current losses and it will represent an important limiting factor for future work and development. Most of the arable land of mentioned 100 hectares, whom were not exempted to date, there are on the tracing in Jarušice where in adjoining 6-7 parcels Center now avail with a total of about 69 hectares (in one complex) plus 1 ha in the Lužnice village.

In 2009th year, the Center ended litigation that led to the City in order of compensation and the controversial exclusion of the said land excepted. For until today exempted the land, the Centre has not received any compensation from the City of Kragujevac, except the 30 million dinars for investments of Centre in facilities and the ameliorative measures on previously exempt parcels. These funds have been in the meantime spent

inappropriately as a result of the party leadership, which will be a problem with bringing to the culture of new areas that the Centre should obtain from the City. The City of Kragujevac is not so far provided any compensation in the form of providing adequate 71 ha of arable land, which is essential for future sustainable operation and development of Center. In this way by the party leadership and unscrupulous attitude of City and the republican authorities, the Center has systematically brought to the state of the unsustainability of present and future business.

For the future successful action of the Centre, it is necessary to ensure that it avails with at least 120 ha of arable land for the production of high seed categories. For the purposes of scientific researches in addition to these it is necessary to provide also about $15 \times 2 = 30$ ha of experimental plots (per 15 ha in the crop rotation), making a total of 150 ha of arable land. This means that the City in compensation to the Center for previously exempted land (approximately 70 hectares) and the planned exemption (about 30 ha more), should provide as a minimum compensation of at least about 80-100 ha more.

Experimental areas would be used for the purposes of breeding and genetics experiments (10 ha), breeders seed (2 ha), scientific farming and plant protection trials (3 hectares). The problem for moving to another location is Stationary, which is the trial that is on area of about 2 ha performed for about 39 years (since 1974.), on the same parcel and with the same layout. It presents the one of a small number of such experiments in the world and it examines the effects of several years of application of different amounts of mineral fertilizers on the yield and quality of different species and varieties of cereals and other field crops.

In addition, in this trial are also exploring the changes that occur in the soil under the influence of mineral nutrients, previous crop and tillage. Besides of this it is also a problem for relocation of plant protecting trial called Quarantine field (about 1 ha), which is fenced and has a companion construction. Close to this experiment was stationed a unique *in situ* collection of *Berberis* which includes 28 genotypes, which is known as a host plant fosterer for the transmission of rust diseases of cereals. In terms of the future successful work, it should be provided moving for this collection (by transplantation) and to ensure the formation of a new Quarantine field (fences, small quarantine house).

All this means that the Center should possess for needs of production of the Pre-basic seed a minimum of 120 hectares of arable land (2 x 60 ha in the crop rotation) and for the purposes of science and experiments with small grains at least 30 ha (2 x 15 ha in the rotation), which makes that the overall needs of the Center are about 150 ha of arable land (*Milovanovic 2011*). The parcel for the experiments must be close to the economy because of the daily operations and must be of high quality soil structure in one table, with good access roads on all sides. Two year crops rotation is the minimum required in each agricultural production and a legal obligation in the seed production of which in Center is carry on the Book of field. Seed production requires crop rotation and the areas for cereals in each year are about 60 hectares. Production of Pre-basic seed (super elite) occupies about 15% of the area (about 10 ha for further reproduction on the own land). Thus, for the production of elite seed (Pre-basic seed) remains about 50 hectares, which satisfies if we take into account that on this area should be produced mainly 20 to 25 varieties of holders of assortment of all species of small grains (for selling to seed companies).

On the remaining $60 + 15 = 75$ ha would be organized production of previous crops among which we should mention corn, oil rape, peas, soybeans, vetch etc., on areas of per 10-30 hectares per year. This means that for the production and experiments to the Center are necessary a total areas of about 150 ha, of which today Center on the streak of village of Lužnice and v. Jarušice owns about 70 ha. In this way, in the future dislocation of production areas, to the Center must be provided by the City of Kragujevac on said streak an additional 80 hectares. At current prices of about € 10,000 / ha it means that for this purpose should be provided around 800,000 Euros.

Improving the profitability and sustainability of production

Production on the own land, especially in the last 7-8 years, due to the exclusion of land without compensation, disabling the use of existing land, unexpert and the party management and other factors, in generally generated losses. Revenues from the production on the annual level ranged from approximately 3,000,000 up to 6,000,000 RSD, with trend of a drastic fall in the last 9-10 years, while the costs of production on the own plots were reaching 8,000,000 up to 12,000,000 RSD. Low revenues are result primarily of low yields (1-5 t/ha for cereals), as well as uncultivation of all plots of the Center (in each year 40-100 ha in rent or

completely uncultivated). Higher costs are the result of poor control and disregarding the current system of quality ISO 9001 by the management. In order to create the conditions upon occasion of dislocation of production areas and facilities, for the future sustainable business and development of the Centre should be provided:

- An additional 80 hectares of land for what would need about 800,000 Euros.
- Equipment and machinery (*Milovanovic, 2011*) which requires about 185,800 Euros.
- Facilities to be built at a new location (*Milovanovic, 2011*) and for which need a total of 578,000 Euros.
- It follows that for land, equipment and facilities for the production it is necessary a total of 1,563,800 Euros.

This would allow for a sustainable future operation and development of the Centre, since in this aspect the annual costs of production should be as follows (*Milovanovic, 2011*):

- For the salaries of personnel around 4.8 million dinars,
- For the production of about 60 ha of seed of small grains around 2,873,400.00 RSD,
- For the production of 15 ha of maize, approximately 534,000.00 RSD,
- To produce 30 ha of rape around 855,000.00 RSD,
- To produce 30 ha of pease, around 1,050,000.00 RSD,
- *Total production costs would have amounted to 10,112,400.00 RSD.*

At the same time the annual incomes from this production should be as follows:

- From the 60 hectares of high categories of seed (after finishing) about 8,164,800.00 RSD,
- From the 15 hectares of maize around 1,012,500.00 RSD.
- From the 30 hectares of mercantile rape around 2,100,000.00 din x 1.2 for seed = 2,520,000.00 RSD,
- From the 30 hectares of mercantile peas around 1,500,000.00 x 1.2 for seed = 2,250,000.00 RSD,
- *Total real annual income from production = 13,947,300.00 RSD.*

This means that this area (production), which in the past mainly generated losses, in the future could operate in a sustainable and cost effective manner.

Another option would be for production areas (except the experimental), together with facilities for the storage, processing and most of the machinery to be devoted under the contract in the franchising system, which would require the approval of the competent Ministry and Assembly of Center. In this way, the Center will be released from a dozen of employees who now work in production and would be secured the further work under the trade name and logo of the Centre. Franchise system would be likely to solve the current problems of unprofitability, incompetence, inactivity, thefts and poor results in this area of the Centre activity.

Projects and revenues from projects and services

The Center in the previous history participated in the realization and successfully completed many dozens of projects (research and innovation) funded by the Ministry of Science, Ministry of Agriculture, the Federal Ministries of the former Yugoslavia and by the Regional communities of science, some seed companies, as well as international organizations (FAO, USDA, bilateral projects), *Stojanovic et al. (1998)*. In the previous cycle of projects, the Center worked on the realization of three technological projects (one of which led), an international project and two innovation projects:

1. *The TP project. 20063 (2008 to 2010.). "Developing new technologies to improve the production of small grains." Funded by the Ministry of Science and Technological Development (Management and realization).*
2. *The SEEDNET Project (South East European Development Network on Plant Genetic Resources) (2004. -) """. Funded by SIDA (Swedish International Development Cooperation Agency) and CBM (Swedish Biodiversity Centre), Participation.*

In addition to these were carried out at the Centre 2 more innovation projects and 2 more technological projects:

3. *IP Technical and technological improvement of treatment a high categories seed of cereals.*
4. *IP Modernization of the breeding process and laboratory capacities in area of genetic and pharinological researches of small grains.*
5. *The technological project No.20097, entitled: "Study of small grains genotypes and breeding to improve yield, quality, and adaptive skills," head by Faculty of Agriculture, Lešak-K. Mitrovica (Participation).*
6. *The technological project No. 20069, titled: "Possibilities of exploitation of hilly mountainous areas of Serbia for organic crop production," Head by Faculty of Agriculture, Zemun (Participation).*

In the July 2010th, the Center submitted within the prescribed period the documents in a competition for a new technological projects of the Ministry of Science of RS in project period 2011-2014. The project is titled: "Enhancing sustainable development of production and use of small grains", and eight scientists and researchers of the Centre were engaged on it. Projected revenues of this project for the Center were to be approximately 12,236,970 RSD annually. Preliminary information suggested that the project was positively evaluated by domestic and foreign reviews so that might be expected its acceptance, which should be to ensure continuity of future project financing of the Center by the Ministry of Science. But later, during the competition, the Ministry of Science disorderly changed rules for the scoring of scientific results and did not recognized the varieties and technical solutions in the category of so-called "hard" points, which led to the end that the project unjustly received some a bad mark. Nevertheless, the eight researchers from the Centre met the criteria for participation in the projects, so that the aforementioned error was partially corrected by the shift of leadership of the Ministry of Science in March 2011th and by its attachment to the Ministry of Education. Thus, most of the Centre researchers were attached to following two projects:

7. *The project No. III 46006 entitled "Sustainable agriculture and rural development in order to realize the strategic goals of the Republic Serbia in the frame of the Danube region". This project involves the researchers with 12 months: Dr. Milivoje Milovanović and B. Sc. engineer Kristina Luković. Annual revenues of the Centre for this project are $12 \times 201,610.00 = 2,419,320.00$ RSD.*
8. *The project No. 31054, entitled "Development of new technologies for growing cereals on acid soils using contemporary biotechnology". This project involves five researchers of the Center with 12 research months each: Dr Jelena Milivojevic, Dr Mirjana Staletić, Dr Vera Rajičić, Mst. Vesna Stefanovic and B.Sc. engineer Kamenko Bratković. Revenues for this project are $12 \times 415,147.00 = 4,981,764.00$ RSD annually.*

This means that the Center now has a project financing of 7,401,084 RSD per annum, whereat it does not include the costs of material and assets for equipment by means of which one can expect an even RSD 1,600,000 a year, which accounts in total for about 9,000,000 RSD per year. In the meantime, in 2012th, the Center has received 3 more innovation projects worth 3×2 million = 6,000,000 RSD, and they are realized under the headings:

9. IP *“Improving biodiversity of small grains”*,
10. IP *“Improvement of seed quality and technological process for finishing at the Center for Small Grains”*,
11. IP *“Improving of verification and commercialization of varieties of small grains”*

Innovative projects like the above mentioned also can be planned for revenues in the future period. Unfortunately, the previous leadership of the Centre, but by September 2012th spent inappropriately most of the funds earmarked for the successful implementation of these projects, which are tolerated by the competent Ministry. Also in addition to this, until 2009th, for the RS Ministry of Agriculture the Center was performed experiments of Commission for approval of varieties of small grains, too. The total revenues from these experiments annually (single-stage) were reaching about 300,000 RSD. In the last five seasons, due to its disorganization and mismanagement Center is lost these experiments, but there is a chance to correct it since this autumn.

It should be noted that there are significant problems regarding the realization of research projects and which is particularly evident in the last 5 years. Due to the blocking of account and numerous problems the Center had fallen, as well as debts to the Ministry of Agriculture of 6.1 millions of RSD (for the costs of varieties approval), since 2010th season the said Ministry has stopped recognizing KG varieties and excluded them from the trials of Variety Commission. Also, it was suspended the process of reapproval of KG varieties. In this way, the main function of the Centre-creation of new varieties was threatened. In addition, in recent years are exhibited problems in relation to the inability sowing, late sowing or partial seeding of experiments, too. Until this was contributed mainly by a number of problems in which the Center is fallen, but we believe that the primary responsibility is bear by the incompetent and irresponsible leadership of the Center, which is unsustainable and it will lead to the sure destruction of the Centre if immediately something does not change. Since the October of 2012th year, it was deblocked this process of recognizing of new KG varieties, by signing agreement with Ministry of agriculture about reprogramming of debt payment.

Based on here mentioned, total revenues of the Centre projects on an annual basis is now generally hover around 15 millions of RSD, which is realistic to expect in the future, too. By including the Center in International projects would be expected to increase revenue for about

70% (about 10 million per year), *Milovanovic (2011)*, while by improving the equipment could be expected an increase in revenue from laboratory services of around 8.8 millions of RSD and by the Varietal Commission (Ministry of Agriculture) around 300,000 RSD per year, which means that the total annual incomes from research projects and laboratory services in the future be able to reach about 34.8 millions of RSD.

Improvement of scientific research personnel, number of employees and a vision for improving in the status of Institute

According to the List of employees with qualifications structures and workplaces, now at the Center are engaged for a total of 52 employees, of which 26 of them in scientific departments and seed production, while 17 employees are in administration (Shared Service) and 9 in production (*Milovanovic, 2011*).

Of the total number of employees at the Center, 14 of them are with a high school diploma (4 PhD, 2 masters, 5 B.Sc. Engineers of Agriculture, 1 BA. Lawyer, 1 BA. Ecc., 1 professor of Marxism). Of these only 7 professionals are involved in science (project financing), while others are present in partially as overhead. Lack of doctors (PhD) to the number 7, as well as the number of masters to 5 reflects on the inability to re-return of the status of the Institute, which had a Center for much of its long history before. Urgent measures are necessary to seem aimed at improving the situation of scientific personnel, by receiving young and promising graduates of agricultural engineers with an average mark of over 8, as well as by encouraging young professionals to advance faster. From existing staff in the next three years can be realistically planned 2 defenses of the doctoral dissertations, so that the number of PhD-s should be 6. Scientific workers were became minority in the KG Center, while relevant Ministry of science in the last 10 years in generally exhibits carelessness, discrimination and poor communication to them. This resulted in such way that administrative (overhead) and unscientific personel that is more numeral, in mentioned period realized its leading role which was retained until today in this scientific institution. In the same time, scientific workers were pushed aside, nobody ask them for something, they canot to judge about any, Ministry of science avoids communication to them. This condition is unmaintainable and it demands necessary urgent and drastic measures of changes.

For the social program reported a total of approximately 15 employees at the Centre, which express redundant or unfavorable age structure and health, which adversely affected the implementation of tasks in the past. For this purpose the funds should be ensured by the RS Government in the amount of about 9,000,000 RSD. By the implementation of mentioned social program, for the most part would be solved the issue of redundant and poor quality staff, but we think that it is necessary also to a dozen of employees, who largely present today's overhead of the Centre, to be regulated by future program redundancy and redeployment directed by the City. After eventual the dismissal or reassignment to other City public companies a total of 25 employees (including the aforementioned social program), there should be employed 10 good quality of young professionals of mentioned structure (doctors, masters, young agricultural engineers with an average of over 8, high quality and healthy workers), which along by the change in the leadership and more skilled management, could significantly contribute to the future essential improvement of personnel situation and to the successful and sustainable business. Employment of 2-5 graduated agricultural engineers, who would immediately be able to engage in projects, should be ensured the renewal and strengthening of scientific personnel and long-term sustainability of the Centre. By their involvement in the projects of the Ministry, its revenues could be increased by 80 to 150% per annum.

This way, after the social program in the Department of Science will remain enough doctors and masters (if we look at the current status of the Research and Development Center), an adequate number of technical staff, the surplus of engineers who are not involved in the projects and the lack of semi skilled workers. If we want to acquire again the status of Institute, which should be an imperative for employees, as well as for the Ministry of Science and the City of Kragujevac as future joint owners, besides the above mentioned should be received 3 more PhDs and, 3 masters. Thus strengthening these scientific personnel, income from projects and services could be more than twice the current. This means that this future Department of Science should count 19-28 employees (19 for the status of Research and Development Center and 28 for the status of the Institute). In this way, total count of employees of Center should be between of 28 (in status of Center) and 35 (in status of Institute). This should enable future sustainable action and development of Centre, as well as its progress in status of Institute, which stands for interest of broad social community.

As far as everything were retained at present personnel structure and number of employees, this should carry only to further absolutely unwanted growth of losses (about of 25 million of dinars per annum only for unearned salaries), as well as to sure destruction of this institution. Previous populist measures of preservation of unnecessary administration, drones and over numbered personnel were demonstrated such results in previous years, which resulted that in Centers debts of 110.000.000 dinars in 2013th year, majority were debts for unpaid 12-14 salaries, charges and revenues about 80 millions RSD.

The establishment of the new organization of the Department of Science

Due to the departure of a number of staff from the Centre, previous organization division at: Department of Genetics and Selection, Department of Scientific Farming, Physiology and Plant Protection, Department of Seed Production, Department of Production and Department and Joint Services and Accounting, completely misses the point. In year to date systematization, mentioned science departments were merged, which should contribute to a better organization of work, better use of labor and machines and to more successful commercialization of research results, and new formed department was renamed in the Department of Science. The remaining departments: for production, for seed production and for joint services and accounting should keep the same names, but with a significant improvement of the quality of personnel followed by necessary solution of personnel redundancies in mentioned ways (*Milovanovic, 2011*).

Revenues and costs of the Centre in the future should be necessarily monitored and posted by sources (projects-science, authorship-licenses, services, production, common costs), and thus to provide the basis for a different rewarding (salaries) of employees per organizational units and individually.

Sustainability of operation and revenues of Science

On the planned 120 ha areas (60 ha in crop rotation) can be successfully reproduced high seed categories (pre-basic: the elite and super elite and possibly basic) of 20 to 30 KG varieties of all specieses of small grains of winter and spring type, how to the Center is necessary for the subsequent successful and sustainable results in seed production at seed companies.

One needs to take into account that about 15% of the area (about 10 ha) are used for the production of super elite (breeders seed) whose seed is mainly consumed in its own production. With the remaining area (50ha), at an average yield of 4 t/ha for winter and 3 t/ha in spring small grains (which have not been the case since today because they are a lot lower), it may be really achieved an average production of elite (pre basic) seeds of about 150 to 200 tons. In this way one could get per varieties from 3 to 10 t of seed of elite (pre-basic seed), which are sufficient quantities for later reproduction in areas of 10-60 ha of basic-original seed at seed companies (basic seed per variety). With such areas can be obtained in the next year from 40 to 200 tons of seeds per variety, which is enough for the planting of 200 to 1,000 ha of seed of the first generation (C1), which is intended for producers. From those areas one can get 600 to 3,000 tons of seed of the first generation per variety, which in the presence of about 25 KG varieties in production, as well as by the correction of deficiencies often quoted in seed production and marketing, it really means the ability to realize the total amount of seed of KG varieties up to 10.000-50,000 tons. These are also sufficient quantities if they were planned with expected and possible exports to foreign markets.

Of 50,000 tons of seeds at current prices and average seed authorship of about 3 din/kg of seed, per year could be collected a total of about 150 million RSD (*Milovanovic, 2011*), which is enough for a successful and sustainable future operation and development of the Centre and a very high profitability of science, considering in regard that its planned on future revenues from projects and services can earn above 34 million per year. In this way, only of Science the annual incomes (license-fee authorship, laboratory services and projects), by the successful management in the Center could be able to move through the 184 million of RSD. Such income would enable a very cost-effective and dynamic operation and development of the Center, which would be very quickly able to restore the reputation and becomes the Institute, not only of a national but international importance.

Profitability is based on the fact that it was accounted with the future costs of the Department of Science for 19-28 employees as planned, with an average gross salary of 60,000 dinars, it seems 1,100,000-1,900,000 cost per month, or about 13-23,000,000 per year. To this should be added about 1,000,000 RSD annual costs for recognition and reapproval of varieties, about 1,000,000 RSD for the costs of raw materials and spare parts for performing the experiments, about 1,000,000 RSD for the cost of

services, electricity, phone and office supplies in and around 1,000,000 of RSD for other overhead expenses on an annual basis, which makes the total cost of the department of about 17 million to 27 million RSD annually. All this means that science already today achieved profitable operations because of projects, services and authorship it has income from 15,000,000 to 38,000,000 of RSD, in such poor conditions of inferior management. In the future, profits from the science could be as much as 2-5 times higher than the costs. This would allow very high profitability not only of science, but also of the Center.

Seed sales, income from authorship and improving the seed production

In the last 7-8 years, the production and sale of seed of the KG varieties of small grains to companies in the area of Serbia is quite varied (Tab. 1 and 2). In the period 2005/06 to 2009/10, the production has had an upward trend (*Milovanovic et al. 2011b*). Unfortunately, this trend according to PSS "Sombor" Annual Reports (2011, 2012, 2013) rapidly deteriorated in 2010/11th (about 2,701 t), in 2011/12th year (about 1,219 t) as well as in 2012/13th year (only about 1.178 t). As a result of this, also drastically are fallen incomes from charging authorship and hence sustainable operation of the Centre. This a drastic deterioration was a result of poor and unskilled work of the party or insufficient competent management (from rank of non scientific workers or administration personel), as well as of the commercial service of the Center in recent years, which has to be stopped urgently by election of new leadership from the rank of scientific workers and by sanctioning those responsible at the Centre.

Mentioned so far is the current situation of the annual revenues of authorship (the license fee) for KG varieties. By increasing the share of KG varieties of small grains in structure of sowing in our country it is possible to increase the incomes of the Centre significantly. If produced seed of varieties of KG Center reaches 10.000 to 50.000 tons instead of the current about 1.200 tons per year, it would contribute to substantial increase in income from authorship (for 8 -40 times), which at the most could contribute to a sustainable future operation and development of the Centre. These results are entirely real taking into account that the Center was reaching a similar share in the market in its previous stages (*Milovanovic et al. 2011b*), and today there are more and better

possibilities considering the number and quality of its varieties assortments. It should be noted that some species have only the KG Center such as: spring and winter oats, winter rye, spring durum, spring triticale, etc., and it has an excellent image in the market in some specieses as winter triticale, winter barley and winter wheat (*Milovanovic et al. 2011b, Milovanovic et al. 2012*). In this way, it would be realistic to the revenues of Center from licenses in such improved seed production of KG varieties, to reach in 3-6 years 30-150,000,000 RSD, annually. The Center in a period in the late nineties and early 2000-ies, already had significantly higher scope of production than at the present, but it had a significant drop which was most obvious in the last 7-8 years.

Table 1. *Realized seed (kg) of Kragujevac's varieties of small grains (2007/08-2012/13), according to DP „Agroinstitut“ Sombor (2008, 2009) and PSS „Sombor“ (2010, 2011, 2012 and 2013)*

Year	Category of seed			Totally
	Certified seed of I generation (C – 1)	Basic seed	Pre-basic seed	
2007	4.875.189	1.486.081	184.715	6.545.985
2008	4.592.265	1.136.845	198.325	5.927.435
2009	5.222.005	1.276.740	133.565	6.632.310
2010	2.126.610	527.130	47.930	2.701.670
2011	877.345	256.500	85.545	1.219.390
2012	752.230	324.440	101.965	1.178.635

Table 2. *Realized authorial increments in dinars (RSD) and realization of pre-basic seed (2007-2012.), according to Živanović-Katić et al. (2012)*

Year	Authorial increments	Pre-basic seed	Totally
2007	16.838.572,00	5.482.062,00	22.320.634,00
2008	16.922.835,00	5.498.329,00	22.421.164,00
2009	11.094.305,00	1.375.990,00	12.470.295,00
2010	6.565.821,00	1.193.781,00	7.759.602,00
2011	5.328.948,00	1.542.638,00	6.871.586,00
2012	1.520.727,00	870.812,00	2.391.539,00

The most important shortcomings that need to be removed are: improvement of the system of production, management, finishing and quality of seeds, improving marketing and advertising, promotion of the quality system etc. All this was collapsed in previous years and it is impossible to implement

without competent management, the regular payment of salaries and greater involvement of scientists and researchers of the Center in the processes. Even more significant results could be achieved in the case of promotion export of KG varieties seed and their recognition abroad.

Conclusion

Based on the above mentioned it can be summarized that science participates significantly in the provision of funds for the operation of the Center. In the future, by the planned equipping of laboratories and adaptation of space with better and more efficient organization, marketing, personnel upgrade, expansion of activities and involvement in international projects, could significantly contribute to the improvement of operations and sustainable development of the Centre. In future the total revenues only by the contribution of science and authorship (licensing) could be significantly larger than the former and to achieve up to 184 millions RSD per annum, in real terms over the next 3-6 years. In order to realize mentioned it is necessary to take the urgent initiatives to address these problems, with the implementation schedule that should provide a priority to each of these items in a timely manner in accordance with the importance and deadlines. Otherwise, the Center will fall into even worse financial and material situation.

For the realization of these objectives in the Science of Center are necessary investments in the renovation of the office space and laboratory equipment totaling approximately 99.204.500 RSD, or about 900.000 of Euros, as well as approximately 185.000 Euros for the renewal of equipment and machinery for the production, 578.000 Euros for facilities at the new location and about 90.000 Euros for the social program, which makes in total about 1.753.000 Euros. In addition, it is necessary to provide $15 \times 2 = 30$ ha of improved performance high quality land for experiments, which with the areas necessary for production (120 ha) makes a total of 150 ha. In this regard, the City of Kragujevac must provide at least 80 hectares of land to the Center if it is planned its successful and sustainable operation and development, for which shall be provided additional about 800.000 Euros. It should thereby tend to ensure that land beside the old road to Belgrade in v.Lužnice, on the old location of parcels that once used Center. Taking into account that the City of Kragujevac exempts to Center about 100 ha of arable land from its current location from Elektrošumadija to "Rakalj", all of the above would be minimal and approximate fair compensation, as the Centre would

continue its business, which would probably have been accepted of republican government. Considering these aspects there is a need to make an urgent and quality agreement between the Government of the Republic of Serbia, Centre in Kragujevac and the City authorities, as well as to take other referred emergency measures in order to repair and preserve the institution.

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A REGIONAL PURCHASING CENTER FOR SUSTAINABILITY OF THE RURAL AREA OF SREMSKA MITROVICA MUNICIPALITY¹

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Abstract

The main objective of this study is to assess potentials and opportunities for developing new programs in agriculture in order to revive the countryside, develop local economy, and thus the sustainability of local and regional rural areas. The main objective for the sector is to construct a regional agricultural purchasing center with modern facilities for storing agricultural products targeted for the Russian market; to increase the number of areas under intensive fruit crops and to increase total production with achieving high-quality fruit that meets the standards of foreign and domestic markets. The project of building a regional purchasing center for storing agricultural products is going to be defined based on the data on agricultural potential of Sremska Mitrovica and a SWOT analysis of the economy of this municipality.

Key words: *regional purchasing center, funding, agriculture, municipality of Sremska Mitrovica.*

Introduction

We are witnessing times when investment funds are a very scarce resource, when the economy is being more exposed to the external competition, export opportunities are limited and the competition on the world market is very strong. In such circumstances, rapid restoration of

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industrial capacities, which could reemploy significant manpower and be the future holders of economic and social development, is not possible. A real development opportunity for Serbia is to improve and intensify the development of primary agricultural structure and, based on it, to develop highly productive food industry and food processing industry. Therefore, agricultural resources are the primary basis for creating a new concept for the development of the Republic of Serbia, whilst the policy of reliance on agriculture and rural economy should be a permanent commitment for Serbia and its economic development policy based on decentralization and balanced economic development. A proper rural development policy can significantly contribute to more harmonious regional development, and, consequently, more harmonious total development. The role of the state in the future rural development of Serbia is directly related with the general policy of economic development - to increase the market competitiveness of economic entities. For more efficient addressing of issues in rural areas, the following three factors are necessary: human knowledge, technical and natural resources and capital.

Integrated rural development

Integrated rural development /IRR/, a model for agricultural and rural development in Serbia, is treated today as one of the youngest development branches, as “the engine” of economic and social progress, not only in transition countries but all over the world. Rural development programs in Serbia are aimed at training farmers how to use new technologies in a restructured agricultural production, which contributes to reducing of isolation of the most important regions. The experience of developed and developing countries show that the change in the economic structure of rural areas is made by encouraging the development of small and medium-sized companies in businesses related to agriculture, with finalizing and processing of agricultural products as ones of the most important⁴. Unlike the traditional industrialization, these models put emphasis on local conditions and opportunities. Due to such programs in rural economy, the residents of these areas have a chance to be engaged in other activities apart from farming, such as forestry, manufacturing, tourism and other activities aimed at keeping the rural environment - constructing of ULO storages, small processing facilities, tourist facilities and nursing homes. Fewer people

⁴ Radovanović V. (2010): *Integralni ruralni razvoj - ka skladnijem regionalnom razvoju*, Zbornik Matice srpske za društvene nauke, http://www.maticasrpska.org.rs/stariSajt/casopisi/drustvene_nauke_132.pdf

therefore do the farming, although most of the population lives in rural areas. The bottom-line of this new approach is development of businesses in and around agriculture. However, one must not forget that there is no rural development without agriculture, and development of rural communities cannot be entrusted solely to agriculture. The primary purpose of regional policy is to provide aid to poorer regions, coordinate existing regional policies of the member states, and make regional problems be considered within the other EU policies. In order to achieve this, it is necessary to organize small farms as commercial family farms /farm businesses that need to have a single, integrated, modernized and sophisticated system of procurement and sales. One model of integrated sales at a regional level would be achieved with constructing a regional agricultural purchasing center located in Kuzmin (the municipality of Sremska Mitrovica), having modern facilities for storing agricultural products for the Russian market. This model would reduce a “brain drain” from the country, since depopulation of the village with all its consequences is one of the major problems that question the future of agriculture⁵.

Characteristics of the municipality of Sremska Mitrovica

The municipality of Sremska Mitrovica is an interesting area for business due to its geographical position, available natural resources and economic potential. It is in the first place among the municipalities in the area of Mt. Fruška Gora when it comes to the scope of fruit production (23.9% of total production)⁶. The area of Sremska Mitrovica meets the environmental criteria that need to be certified in an appropriated way, whilst strategic concept of development- and export-oriented agriculture requires upgrading the quality of products and committing to further liberalization of international trade⁷. The most important economic activity in the

⁵ Tomić, V. Ljiljanić, N. (2012): *Current state and prospects of the Serbian agriculture*, Thematic proceedings, International scientific meeting: Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals' Implementation within the Danube Region” - Preservation of Rural Values. Tara, 6 – 8 December 2012, 679-694.

⁶ Univerzitet u Novom Sadu, *“Master plan održivog razvoja Fruške gore 2012-2022.”*, Naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad

⁷ Klikovac-Katnić V., Sredojević Z., Kosanović N. (2012): *Novi programi poljoprivredno-prehrambenog sektora u funkciji održivosti ruralnih područja Srbije*, Međunarodna konferencija „Uloga istraživanja u razvoju održive poljoprivrede i ruralnih područja“, Podgorica, 23-26. Maj

municipality of Sremska Mitrovica is agriculture, as the following data⁸ show:

- 74.9% of the total municipality area is agricultural land (56997 ha);
- 13.9% of the population are farmers;
- 17.4% of the total active population are farmers;
- achieves over 40% of the municipality income
- 65.3% of the total residential areas are villages (17 out of 26);
- 37.2% of the population live in rural areas (31851 out of 85605);
- The most significant potential of the area is the agricultural land - 56997 ha, or 74.9% of the total municipality area;
- According to the 2002 census there are 8858 households/farms, compared to 1991 when there were 10718 of them and 11601 in 1981. The process of reduction of agricultural households has been intensified over the past decade;
- Ownership structure is characterized by the largest portion (58.8%) of small farms of 1-3 ha size. Farm of 3-5 ha size account for 13.3% and those of 5-10 ha account for 18.6%⁹.

The area of Sremska Mitrovica is characterized by conditions favorable for fruit production. The northern part of the municipality is a mountainous area that stretches across parts of Mt Fruska Gora up from the ridge descending over the slopes to the plain of Srem, and covers an area of 238.55 km² with 10 residential areas and 9314 inhabitants. Higher locations are most suitable for growing pears and peaches, and lower for growing other fruit species. The municipality has potential for raising orchards on the area of 8594 hectares¹⁰. New private companies and cooperatives are setting up plantations of couple to hundreds of hectares, but these are relatively young plantations, so the production has still not

⁸ *Službeni list grada Sremska Mitrovica*, Godina I, broj 9, Sremska Mitrovica, 01.09.2009,

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⁹ *Prostorni plan Republike Srbije* ("Službeni glasnik RS", br. 13/96)

¹⁰ The municipality area covers 761 km² and 23 cadastral municipalities, and includes 26 villages, *Službeni list grada Sremska Mitrovica*, Godina I, broj 9, Sremska Mitrovica, 01.09.2009,

reached the scope it had before. Most of newly-built plantations have irrigation systems, some of them can be fertigated, and only few have anti-hail nets. Setting up new, mostly ULO storages¹¹, introducing technology for mass manipulation and fruit sorting machines would create the conditions for delivering high quality apples, pears and other fruit to domestic and foreign markets. The capacities of Sremska Mitrovica are a very good basis for further expansion of fruit production and for taking action to build a regional agricultural purchasing center with modern facilities for storing agricultural products for the Russian market, in order to improve existing, quite unsatisfactory competitive position of Serbian agricultural production¹². The construction of such a facility would ease farmers to market their products. At the same time, marketing of local products in one place would make goods move faster from the territory of Sremska Mitrovica. It would be a good practice of relying trade and foreign customers on the domestic, local production, which is a process that deserves support.

Development Concept Proposal

Sectoral target

The main objective of the sector is the construction of a regional agricultural purchasing center with modern facilities for storing agricultural products for the Russian market, along with the increase in the area under intensive fruit crops and the total fruit production, and achieving high quality food that meets the requirements of foreign and domestic markets. This would create conditions for increasing the income of fruit growers, reducing unemployment and population outflow from rural to urban areas.

Needs and opportunities

Increasing and diversification of demands on domestic and foreign market in terms of fresh and processed fruit, their species and varieties, as well as new final products, have been accompanied with growing

¹¹ Total number of cold storages in Serbia for fruit storage is 118, *Nacionalni program za poljoprivredu od 2010. do 2013. godine*: (2010), „Službeni glasnik Republike Srbije” br. 83/2010

¹² Kosanović, N. (2011): *Brendiranje proizvoda i područja*, "Master plan održivog razvoja Fruške gore 2012-2022.", Naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Univerzitet u Novom Sadu, Novi Sad

competitiveness. Fruit production in Serbia is competitive when it comes to exports, mostly in the primary production where minimum wages are received. Production and processing of fruit can be a very profitable business, especially when it comes to the export of fruits and fruit products. Regarding this, it is necessary, however, to take significant steps towards intensifying of fruit production, and modernization and specialization of processing facilities¹³. Economic co-operation with the Russian Federation (RF) is important when it comes to placing Serbian agricultural products to the Russian market. The Free Trade Agreement with the Russian Federation has been implemented since 2000¹⁴. Over the last few years, fruit export to Russia has significantly increased, where Serbian producers have achieved very good prices for their products¹⁵. What is in the interest of Russian customers and Serbian growers is a long-term, mutually beneficial cooperation, as evidenced by economic agreements and customs facilities. The Russian market is huge, and Moscow green market suppliers are larger buyers. Possibilities for Serbia are still potential, since current resources are far from being fully used. The Free Trade Agreement with the Russian Federation is one of the most important advantages that Serbia has in attracting foreign investment compared to other countries, since this agreement has not been signed with any other country in the world¹⁶ except for the former Soviet republics. Moreover, the economic collaboration with Russia is also important because of the Customs Union that, beside Russia, comprises Belarus and Kazakhstan, on which this special trade privilege also applies. The Serbian Chamber of Commerce is therefore in 2011 together with the Russian Chamber of Commerce drafted a project “Increasing the export trade to the market of the Customs Union - Russia, Belarus and Kazakhstan”¹⁷.

Serbia exports to Russia covers only about a quarter of Serbian imports from this country, being even smaller in the past years, regard to which one can see the need for increasing the exports to Russia compared to the

¹³ Đurić, D. (2009): *Analiza konkurentnosti voća i voćnih preradevina u svetlu spoljnotrgovinske razmene privrede Srbije*, ŠKOLA BIZNISA Naučnostručni časopis, <http://www.vps.ns.ac.rs/SB/2009/1.6.pdf>

¹⁴ Kosanović N., Pejanović R. (2010): *Konkurentnost i kvalitet hrane*, Monografija, Institut za primenu nauke u poljoprivredi, Beograd

¹⁵ In January 2011, redemption price per kilogram of apples for apple producers from Kuzmin was 50 euro cents /author's note/

¹⁶ *Sporazum o slobodnoj trgovini Srbije i Rusije*, <http://siepa.gov.rs/sr/index/sporazumi/rusija.html>

exports to EU and CEFTA countries. According to the data of the Serbian Statistic Office on foreign trade in 2009, Serbian agriculture had a surplus of 636.890.208 USD, with a positive balance in trade with EU countries (366.242.502 USD) and CEFTA countries (607.283.273 USD), and a negative balance (-335,629.258 USD) in a group “other countries”, having the total balance of 637.896.517 USD¹⁷.

In 2011, trade balance with Russia recorded a bumper figure of 3.3 billion USD, 800 million USD of exports and about 2.5 billion USD of imports. Considering the size of the Russian market and a large number of consumers with significant income, one can conclude that our export opportunities should exceed 3 billion USD, as it was in 2011. Agro-food products are products with the biggest potential for placing to the Russian market.

However, due to poor economic policies, and lack of investment in fruit production as not lucrative in a short term, many orchards have become arable land. In the area of Srem, the slopes of Mt. Fruska Gora are suitable for fruit production, where the vine has been grown for centuries, and more recently other fruit (apple, pear, plum, cherry, sweet cherry, quince, apricot, peach, hazelnut and walnut). As agricultural production is done on a lot of different farms, it is necessary to compile the export supply, what can be achieved on one place - a central warehouse from where products would be distributed to large trade/purchasing centers in Russia. Therefore, it is necessary to improve and include both large and small-scale farmers and the state. The above-mentioned warehouse would operate as a big cluster for storing fruits and other commodities.

The current situation

Middlemen from other parts of the country haphazardly purchase fruit for the Russian market that has grown on the southern hillsides and slopes of Mt. Fruska Gora. One of the storage points is a cold storage in Sid. Such disorganized and unsystematic performance has no long-term beneficial effects on fruit production in this part of Srem. Proper storage is a main factor for keeping quality of fruits, increasing their shelf-life and extending the selling period. It is estimated that each year Serbia loses 30-

¹⁷ *Spoljnotrgovinska razmena poljoprivrede Srbije u 2009.*
<http://www.mpt.gov.rs/download/Saopstenje%20za%20SITE%20MPVS.pdf>

40% of its products in different post-harvest stages¹⁸. The idea that each place/village with fruit growers should have a small cold storage partly financed by the state and partly by the fruit growers association requires complicated procedures and unreasonable lapse of time with many intermediaries. The biggest effect would be achieved if there is a sub-regional fruit growers association and a Russian buyer, and if one could define conditions that would lead to building a sub-regional purchasing center.

The conceptual part

It is necessary to build a purchasing center in the form of complex refrigerated warehouses for storing fruit. This center should be located close to traffic channels for easier transportation of goods. The best location is one close to road, rail and river traffic and the state border. The purchasing center would be multi-purpose, partly serve for domestic trade in agricultural products and the exchange through compensating activities as a transit warehouse. Lower costs of rail transport would lead to lower prices of firewood, coal, artificial fertilizers, building materials and other imported goods or goods from other parts of Serbia. On the other hand, cereal and sugar beet producers from this part of Srem would have significantly lower transportation costs and they could choose customers for their products or partial exchange. Agricultural machinery service could be organized in the center together with other services and activities to be held throughout the year.

Proposed location: Kuzmin railway station and environs. **Rationale:** The place Kuzmin is located at the crossroads to the Republic of Srpska and the Republic of Croatia when it comes to road and rail lines, and it is 18 kilometers away from the river port in Sremska Mitrovica. 12 kilometers from it is Erdevik, a place where roads branch off to the places located on the southern hillsides and slopes of Mt. Fruska Gora. Decades ago, in addition to passenger station, the Kuzmin railway station also had freight station, warehouses and storage facilities to store grain, livestock, and vegetables. The dynamics of railway traffic on the route Belgrade - Sid - Belgrade allows the smooth planning of train carts for transporting

¹⁸ Neel, S., Bonar II, H., (2009): *Strategija lanca rashlade za Srbiju*, USAID AgrobiznisProjekat, http://www.agroprofil.rs/dokumentacija/agrarna_politika_i_sporazumi/strategija_o_lancu_proizvodnje_smrznutog_voca_i_povrca_za_Srbiju.pdf

agricultural products. The land around the station is partly state-owned, but mostly it is arable land that belongs to the residents of Kuzmin.

Table 1a. *SWOT Analysis - New Programs of Agro-food Sector in Terms of Sustainability of Rural Areas in Serbia*

SWOT matrix		
	Strengths	Weaknesses
Internal factors	<ul style="list-style-type: none"> •Natural conditions and resources for agricultural production - fruit growing •Tradition and experience in fruit growing •Certain number of storage and processing facilities •Possibility for establishing plantations on large areas •Available manpower •Infrastructure and proximity to markets •Good model the development of rural areas •Rehabilitated industry and SMEs, agriculture, tourism and other tertiary businesses - holders of the economic development of the municipality •Potential for the development of agriculture in this area - natural resources such as climate, soil, relief, specific geographic location (the area of Mt. Fruska Gora with its specificities) •Position of the municipality along the Sava river. •Possibility of basing the processing industry on the processing of agricultural products (cereals, oilseeds, fruits and vegetables, meat, milk, and growing of flowers, etc.) 	<ul style="list-style-type: none"> •Inadequate utilization of potential and capacity. •Farmers are not organized. •Poor age structure of the population •Low utilization of agricultural infrastructure. •Processing industry out of the municipality center is undeveloped (a few small and medium enterprises •There are no industrial zones with equipped infrastructure facilities outside the municipal center. •Insufficient utilization of cultural and natural resources (Sirmium, monasteries Special natural resort Zasavica, the rivers Sava and Bosut, are termomineral waters) in terms of tourism •Low investment capacity of farms and the municipal loan fund for supporting agriculture.

Table 1b. *SWOT Analysis - New Programs of Agro-food Sector in Terms of Sustainability of Rural Areas in Serbia*

	Opportunities	Threats
External factors	<ul style="list-style-type: none"> •Size of the city and the municipality, and their human potential • Geo-traffic position: the proximity of the Corridor 10 (main line), and the Sava river as an international waterway, which gives great opportunities •Favorable position in the region •Agricultural land of high production value for field crops (in Srem) and vegetable crops (in Macva) •Development of the agro-food sector is correlated with the development of economic growth and increase in the living standard •Contribution to the affirmation of the municipality at the national level 	<ul style="list-style-type: none"> •Complex socio-economic situation in the country, expressed as a difficulty in adapting of agriculture to the new reality, and slow pace of transformation and creation of conditions necessary for effective development •Lack of awareness of farmers on organic, and integral production •Increasing macroeconomic risk •Low purchasing power •Loss of national identity of a product • Monopoly of retailers •Existence of the grey market •Unstable price policy •Unstable socio-economic situation in the country and the region •Multi-generational understanding of agriculture as a non-profit, secondary source of income •Unorganized purchase •Low prices of primary agricultural products •Unfair competition •High prices of raw materials •Unplanned production •Poor road infrastructure to the villages and city quarters •Old machinery •Land fragmentation •Young people leave the countryside •Small livestock resources •Fallow land •Poor primary electrification network

Source: *Based on theoretical and empirical material of the author.*

Implementation plan

The implementation plan should combine the interests of all participants in the project and give some guidelines for strengthening and collecting strategic resources for stimulating the development of the area. It would have two roles:

1. *To stimulate all participants work as one;*
2. *To attract foreign investments necessary for implementation of activities stipulated by the project.*

Measures to achieve the objectives

The measures, location, time period, costs of implementation of the measures, institution responsible for the implementation and funding sources are shown in Table 2, containing measures for achieving these objectives.

Cost of implementation

The goal of the project is to provide the required technical and financial performances in terms of quality of the project and its continuity. Certain costs of implementation are corresponding to certain time in project implementation. To plan the implementation costs one should first determine the costs of certain activities and services, labor and materials, that is, the plan of total costs should include all direct and indirect costs.

Income indicators for the local and regional community:

1. *guaranteed prices for farmers,*
2. *advance payments,*
3. *safe placement in the market,*
4. *engaging much labor,*
5. *initiating the development of other sectors of the economy, and*
6. *the development of underdeveloped areas.*

Income indicators for investors:

1. *provided quality raw material,*
2. *secure supply,*
3. *lower prices for safe prepayment and its benefits.*

Table 2. Measures to achieve the objectives

Measure	Location	Timeframe/year and month/ 1 July 2014 – 12 January 2014	Costs (Euros) € 1 = 100 RSD	Institution in charge of implementation	Source of funding
1) Preparation of project documentation	Kuzmin	1 July	50000	Project team	Foreign investors
2) Project implementation: the construction of a distribution center, construction of ULO cold storage	Kuzmin	1 August	Distribution center 900000 Cold storage 459408	Project team Contractors	Foreign investors
3) Construction of a warehouse for heating material	Kuzmin	September	100000	Contractors	Foreign investors
4) 5) Opening of distribution-purchasing center - promotion and marketing	Kuzmin	1 October 2014	5000	Project team	Foreign investors
5) Secured finance -total	For products / area covered by the action plan		1505000	Project team	Foreign investors

Source: Author's own analysis.

Operational tasks

- Work continually to increase the knowledge of farmers;
- Establish a concept of integrated and organic production;
- Establish production of certified plant material;
- Introduce the mechanization in fruit production;
- Enhance storage capacities and possibilities for fruit distribution;
- Increase marketing investments;
- Establish and strengthen farmers associations;
- Strengthen the role and responsibilities of the local government;
- Build a productive sector in rural development that will contribute to maximize growth and reduce poverty;
- Introduce a register of processors and warehouse - cold storage owners;
- Subsidize the construction of ULO cold storage, drying facilities, purchase of equipment for sorting, calibration, and cleaning of fruits;
- Support the introduction of HACCP and ISO standards;
- Harmonize fruit quality standards with the standards in the Russian Federation;
- Introduce plastic pallet boxes for harvesting as well as packaging for storing fruit - free from duties to maximize their use in Serbia;
- Encourage labeling and branding of products and thus make them recognizable on the foreign market;
- Strengthen awareness of farmers associations and their joint appearance in front of buyers;
- Establish an export association that would establish strong relations with foreign customers. Apart from SIEPA, there is no other assistance to our farmers.

Conclusion

Agriculture and the agro- food sector have traditionally played an important role in the creation of the national product, employment and exports of the Republic of Serbia. However, indicators of development of the sector are less favorable than expected and the foreign trade sector has recorded a deficit over recent years. The weak export performance could be due to the lack of competitiveness of our products.

Financing the building of a regional purchasing center can have the decisive role in the realization of the goals and priorities for agricultural and rural development. It is primarily a navigation tool of quantitative and qualitative growth of total agricultural production factors and production, but it also creates conditions for better life in the countryside. To make such a project come to life, investments are needed – from an interested buyer from Russia and the states of Serbia / the ministries relevant for railways and agriculture. Through intergovernmental contacts in 2012 funding of significant projects was announced, in terms railways and agriculture, and this would be a project that connects these two areas. In the long run, implementation of this project should lead to building of a productive sector in rural development, stable purchase, maximization of growth and reduction of poverty.

The establishment of a regional purchasing center would create conditions for increasing employment rates, increasing the attractiveness and strengthening the role and responsibilities of Sremska Mitrovica and Sid municipalities¹⁹, based on specific features that can be further developed and education and capacity building of key stakeholders in the promotion of team and mutual work and partnership. Real prospects of agricultural development lie in the combination of traditional knowledge and new possibilities given by the knowledge, modern technologies and new markets. Need for continual improvement of the process, focused on the users, and the use of creative initiatives with active participation of all stakeholders at regional and national levels, are things we should strive for. Successful rural development implies five principles:

¹⁹ According to the "Master Plan for Sustainable Development of Fruška Gora, 2012-2022 " it is planned to construct the ULO storages in Šid, Sremska Mitrovica, Irig and Ruma

- identify opportunities (potential) for diversified rural development of any community;
- establish accountability for past and future change in rural areas;
- maintain a consistent policy of poverty reduction in rural areas;
- speed up the process of decentralization of power and strengthen the role and responsibilities of the local government;
- build a productive sector in rural development that will contribute to the maximization of growth and reduction of poverty.

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THE INSTITUTIONAL FRAMEWORK FOR THE SUSTAINABLE DEVELOPMENT CONCEPT*

Radojica Sarić¹

Abstract

The sustainable development concept represents the modern developmental approach which views development as a complex system which integrates three basic development dimensions, those being the economy, the society and the environment. Besides the traditional approach to reflection on the sustainable development concept in the form of three basic development dimensions, more and more significance is being given to a newer approach which incorporates a fourth dimension in the form of an institutional component. This paper analyses the institutional framework for the sustainable development concept. The basic goal of the paper is to point out the role and significance of the institutional dimension from the aspect of equal contribution to realization of sustainability in the modern development environment.

Key words: *the sustainable development concept, institutional framework, modern development environment*

Introduction

The sustainable development concept implies the balanced development of the economy, the society and the environment, which implies that the level of welfare in future generations must not be lesser than the level of welfare in today's generations. The core of the sustainable development concept consists of intragenerational and intergenerational solidarity in the sense of better recognizing current needs and anticipating future needs. The existence of an adequate and high grade institutional framework is of great significance for the realization of the sustainable development concept.

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Besides economy, society and environment, the *institutional dimension* is the fourth dimension of the sustainable development concept. This dimension covers and connects the other three dimensions of the concept, i.e. it is complementary with the economy, the society and the environment. The sustainable development concept as a modern developmental approach has its stronghold in the institutional dimension. Consideration of the institutional framework is of crucial significance from the aspect of implementing the sustainable development concept on a global, regional, national and local level. The institutional framework for the sustainable development concept determines a solid starting point for creating adequate sector policies and development strategies on the micro and macro level. One can say that the institutional framework for the sustainable development concept includes:

1. *establishing adequate institutions;*
2. *better integration of sector policies;*
3. *introducing new regulations;*
4. *strengthening control systems;*
5. *development and coordination of public, private and voluntary partnerships and networks in the domain of reaching sustainability.*

On the global level, in the scientific and expert public, more and more attention is given to the institutional dimension of the sustainable development concept, which is becoming the leading subject in the world's summits and conferences. Moreover, in the year 2012 in the World summit on sustainable development in Rio de Janeiro (RIO +20), besides green economy in the context of sustainable development and poverty reduction, one of the key topics that were discussed was the institutional framework for sustainable development (*UNCSD, 2012*). By adopting the UN action plan for sustainable development for the 21st century, named Agenda 21, in Rio de Janeiro in 1992, the question of institutionalization of the sustainable development concept was started, and it was implied that local communities play an important role in that task.

Today there are numerous significant institutions in the world that influence the process of implementing and managing the sustainable development concept. These are specialized institutions established for the purpose of promoting the basic goals of sustainable development through appropriate legal framework in the field of economy, society and

environment (table 1). Certainly, the most important are the institutions under the auspices of the UN. On the global level, the *economic dimension* of sustainable development is the best represented in the institutional framework (*European Parliament, 2012, p. 9*) from the aspect of inclusion in different development policies and areas. The *social dimension* of the sustainable development concept is slightly less represented in the institutional framework compared to the economic dimension, while the *environmental dimension* is the least represented and the most fragmented compared to the other two dimensions.

Table 1. *Institutions and laws in global governance, according to main mandate*

	Economic Goal: Economic growth and stability	Social Goal: Social welfare and equity	Environmental Goal: Environmental protection
Institution	<ul style="list-style-type: none"> • Group of Eight/Group of Twenty • World Trade Organization • International Monetary Fund • World Bank Group • UN Conference on Trade and Development 	<ul style="list-style-type: none"> • International Labour Organization • Food and Agriculture Organization • World Health Organization • UN Education, Scientific and Cultural Organization • UN Children's Fund • UN Women 	<ul style="list-style-type: none"> • UN Environment Programme • Global Environment Facility
	<ul style="list-style-type: none"> • UN Economic and Social Council 		
	<ul style="list-style-type: none"> • Commission on Sustainable Development 		
Law (soft and hard)	<ul style="list-style-type: none"> • Uruguay Round agreements 	<ul style="list-style-type: none"> • Millennium Development Goals • Declaration on the Rights of Indigenous Peoples • Convention on the Elimination of All Forms of Discrimination Against Women 	<ul style="list-style-type: none"> • Rio Conventions • Kyoto Protocol • Other international environmental agreements
	<ul style="list-style-type: none"> • International Covenant on Economic, Social and Cultural Rights 		
	<ul style="list-style-type: none"> • Agenda 21 • Rio Declaration on Environment and Development 		

Source: IBON (2012): *IBON Primer on the United Nations Conference on Sustainable Development (Rio+20)*, p. 72, ISBN 978-971-9941-16-3, available at: <http://iboninternational.org/resources/primers/152> (accessed on September 1, 2013).

Generally speaking, for each separate country in the world, a great significance can be given to defining key topics by priority and appropriate indicators for testing and monitoring the *institutional dimension* of the sustainable development concept. According to the UN Commission on Sustainable Development, there are 9 key topics for testing the institutional dimension of the sustainable development concept on the level of a certain country (*United Nations, 2001, p. 22*):

1. *integrated decision-making;*
2. *capacity building;*
3. *science and technology;*
4. *public awareness and inform;*
5. *international conventions and cooperation;*
6. *governance/role of civic society;*
7. *institutional and legislative frameworks;*
8. *disaster preparedness;*
9. *public participation.*

In regard to appropriate indicators for monitoring the *institutional dimension* of the sustainable development concept, according to the UN Commission on Sustainable Development, there are 2 theme areas for targeting (*United Nations, 2001, p. 25*):

1. *institutional framework;*
2. *institutional capacity.*

Within the *first theme area* for targeting – *institutional framework*, there are 2 subareas:

1. *strategic implementation of sustainable development;*
2. *international cooperation.*

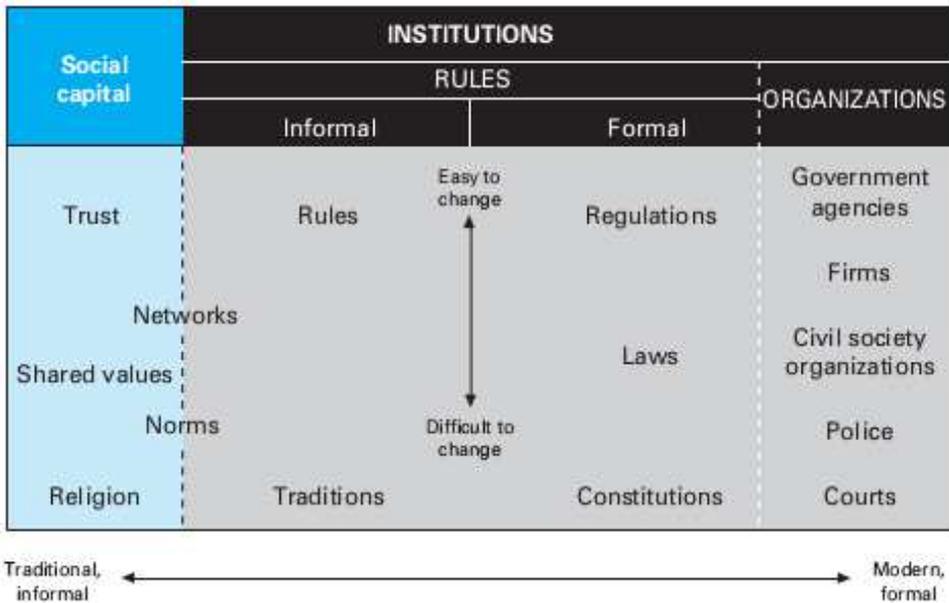
Within the *second theme area* for targeting – *institutional capacity*, there are 4 subareas:

1. *information access;*
2. *communication infrastructure;*
3. *science and technology;*
4. *disaster preparedness and response.*

The institutional framework as a motive factor in shaping the development environment

Institutions represent certain norms and rules in the function of organizing human interaction in a society. The institutional framework consists of certain rules and organizations (*figure 1*). The rules may be either informal or formal. Informal rules refer to certain norms and traditional beliefs. Formal rules refer to certain constitutively based legislative regulations. Organizations relate to different government agencies, the civil society sector etc. The rules and organizations influence the shaping of the social capital, creating trust and adequate values in the society.

Figure 1. *The institutional framework*

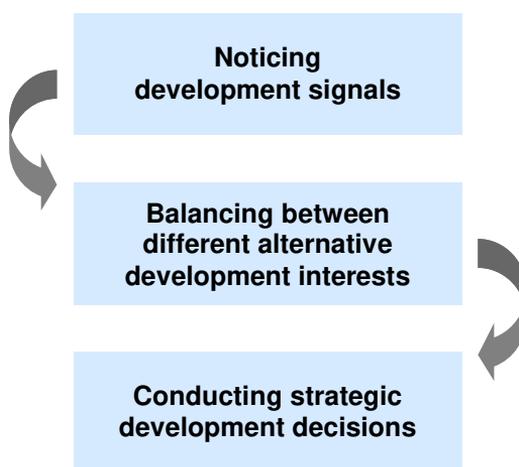


Source: World Bank (2003): *Sustainable Development in a Dynamic World Transforming Institutions, Growth, and Quality of Life*, p. 38, available at: <http://www.rrojasdatabank.info/wdr03/complete.pdf> (accessed on September 3, 2013).

In other words, the rules and organizations as integral parts of the institutional framework channel development activities together, they influence developmental behaviour, and shape the development environment through recognizing needs and solving problems from the aspect of creating an adequate level of human welfare.

The change of approach in observing the development environment requires a change of the institutional framework through adequate reforms. A high grade institutional framework can efficiently coordinate development activities and simultaneously perform several different functions, which implies noticing development signals, establishing balance between different alternative development interests and conducting strategic development decisions. Thus, the institutional mechanism relies on the relation: *noticing development signals – balancing between different alternative development interests – conducting strategic development decisions* (figure 2), which also represents a catalyst of changes in the development environment.

Figure 2. *The three important functions of the institutional mechanism*



Source: *Author's own illustration.*

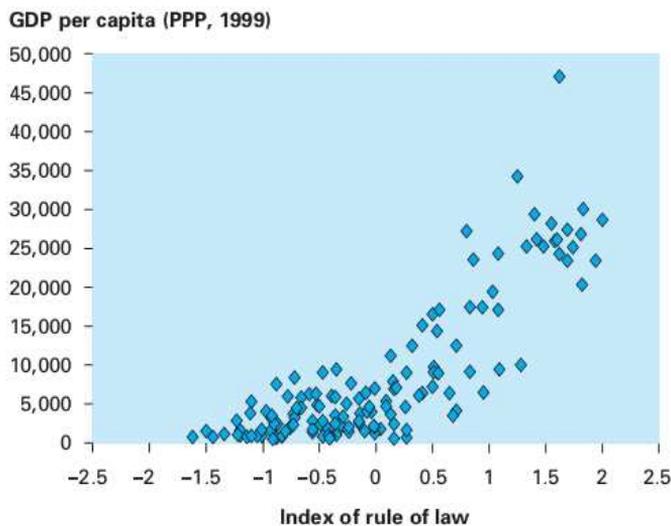
Noticing development signals refers, on one hand, to observing advantages, and on the other hand, to observing shortcomings that affect shaping the development environment. Advantages are e.g. strengths and possibilities, while shortcomings are weaknesses and threats. In order to better notice development signals, i.e. advantages and shortcomings, it is necessary to generate certain information, react to return information, invest in the human capital, and stimulate and continuously advance the economy of knowledge. *Balancing between different alternative development interests* implies avoiding and neutralizing conflict situations through application of negotiation positions and agreements. *Conducting strategic development decisions* refers to trustworthy implementation of rational, i.e. optimal solutions that are anticipated by a certain agreement.

The coordination between these three basic functions of the institutional framework as a motive factor in shaping the development environment is not a problem in itself. Rather, the problems can arise as certain barriers to building a high grade institutional framework:

1. *lack of understanding for different interest groups;*
2. *abuse of established credibility;*
3. *disregard of inclusion and participative acting.*

There is empirical evidence in the world that shows that the economic growth of a country depends on the quality of the institutional framework. In other words, there is a strong correlation between the quality of the institutional framework, measured in variables such as the rule of law, and a high level of GDP per capita (*graph 1*). The quality of the institutional framework represents a very significant determinant which influences the realization of a higher level of GDP in a country.

Graph 1. *The relationship between institutional quality and national income*



PPP = Purchasing power parity.

Note: As a measure of institutional quality, the rule of law includes considerations such as the security of property rights, or the confidence with which a group or individual can find tomorrow the fruits of what is planted or conserved today.

Source: *World Bank (2003): Sustainable Development in a Dynamic World Transforming Institutions, Growth, and Quality of Life, p. 44, available at: <http://www.rojasdatabank.info/wdr03/complete.pdf> (accessed on September 3, 2013).*

Quality improvement of the institutional framework over time is necessary from the aspect of developing, implementing, monitoring, and evaluating different sector policies and development strategies which are, namely, held by institutions. Institutions are important for the survival and duration of all values – first and foremost, the system of values found in the society and built by better education (*Đukić, 2011, p. 80*). The sustainable development concept implies the creation of a new system of values based on an intergenerational and intragenerational solidarity. Accordingly, it is necessary to create an adequate institutional framework as a sustainable system of values defined by certain legislative, normative and policy framework.

The policy dimension of the institutional framework for the sustainable development concept

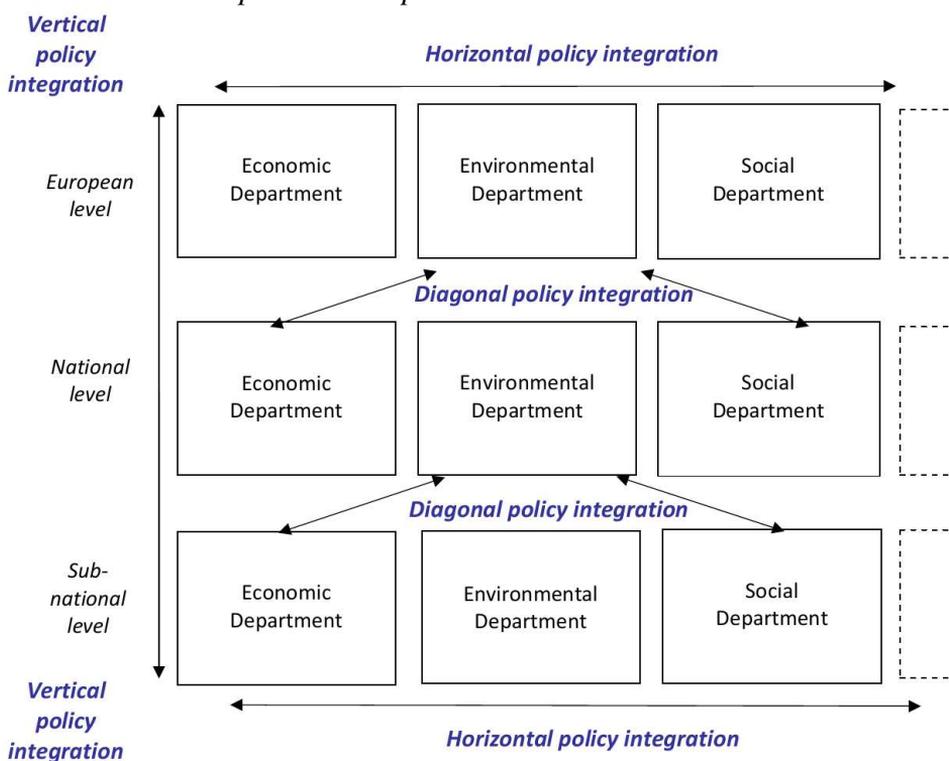
The sustainable development concept is rather complex, because it pervades three very important development areas, such as the economy, the society and the environment. Accordingly, the sustainable development concept requires certain integration of economic, social and environmental development goals. Bearing this in mind, it is necessary to create a certain institutional framework for implementing the sustainable development concept in order to ensure the coherency of sector policies and development strategies. From the aspect of the sustainable development concept, the institutional framework is a motive factor of shaping the development environment from the aspect of reaching sustainability on the micro and macro development level. The institutional framework determines, i.e. shapes the adequate framework for:

1. *implementing* the sustainable development concept on a micro and macro development level;
2. *managing* the sustainable development concept on a micro and macro development level.

The policy dimension of the institutional framework plays a very significant role from the aspect of implementing the sustainable development concept, but also managing this complex development phenomenon. The policy dimension of the institutional framework for the sustainable development concept implies the creation of an adequate integral decision-making system through horizontal, vertical and diagonal policy integration.

Horizontal integration is the integration of policies between different sectors, i.e. departments and ministries. *Vertical integration* is the integration of policies between different levels of government or management, such as local, national, regional and global. By connecting the horizontal and vertical policy integrations one gets the diagonal policy integration (figure 3). *Diagonal integration* implies at the same time both horizontal integration between sectors and vertical integration between levels of management (Berger, Steurer, 2009).

Figure 3. Horizontal, vertical and diagonal policy integration for the sustainable development concept



Source: Berger (2009, p. 9) according Steurer (2008).

From the aspect of the policy dimension of the institutional framework for the sustainable development concept and creating an adequate integral decision-making system, the *diagonal policy integration* also means the possibility to convey and solve different sector problems in development (*economy, society and environment*) on different levels of management and decision-making (*local, national, regional and global*).

Besides the horizontal and vertical, i.e. diagonal policy integration, the policy dimension of the institutional framework for the sustainable development concept is determined by the following principles (Steurer, 2009):

1. *integrating stakeholders in decision-making (participation);*
2. *integrating different types of knowledge (reflexivity);*
3. *integrating short-term and long-term time scales (intergenerational equity).*

Through this horizontal and vertical, i.e. diagonal policy integration, one can assure a *win-win* coordination of development activities, coherency of sector development policies and consistency in the process of development decision-making. This kind of approach assures a rational, i.e. optimal problem solving and improving goal reaching in the domain of the sustainable development concept.

Creating an adequate integral decision-making system through horizontal, vertical and diagonal policy integration implies the existence of an adequate institutional framework. From the aspect of establishing an integral decision-making system, i.e. horizontal, vertical and diagonal policy integration, this means that there must be an adequate interaction between the four basic elements, which are:

1. *institutions as a motive factor in development changes;*
2. *instruments as a means of conducting development changes;*
3. *processes as a sum of activities in channelling development changes;*
4. *actors as participants in development changes.*

Namely, adequate institutions set different processes in motion by using certain instruments with participation of relevant actors. This is why it is necessary to create an integral decision-making system based on adequate institutions, with relevant political support.

An integral decision-making system, through horizontal, vertical and diagonal policy integration, determines the strategic development approach for the purpose of realizing the sustainable development concept on a local, national, regional and global level, on a long-term basis. Such an approach implies suitable institutional adaptation in the development environment, i.e. creating a model of the sustainable development concept through the institutional prism.

The sustainable development concept model through the institutional prism

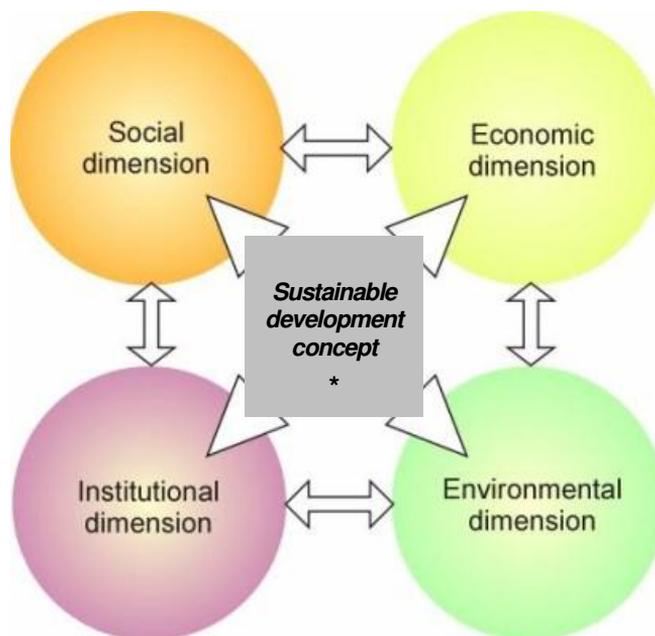
The sustainable development concept model through the institutional prism points out the role and significance of the institutional framework in the economic, social and environmental development spheres from the aspect of achieving a greater degree of compatibility between them. In the same way, the sustainable development concept model through the institutional prism shows the potential of institutional reforms in relation to existing interaction between the economic, social and environmental spheres of development.

The examination of the sustainable development concept model through the institutional prism implies establishing institutional framework as 4 dimensions. By introducing the institutional framework as 4 dimensions into the analysis of the sustainable development concept, we widen the interaction reach between the basic dimensions, ensure a holistic approach and strengthen the systematic way of thinking. The institutional dimension of the sustainable development concept contributes to a higher degree of compatibility of the economic, social and environmental dimensions through a multicriterial optimization of development resources.

The sustainable development concept model through the institutional prism uses an illustrative way in the form of a suitable visual graphic to make possible observing the different mutual relationships between the economic, social, environmental and institutional dimensions. The *economic dimension* refers to creating material value in order to satisfy human needs. This is the so-called *financial capital*. The basic goal of this dimension is economic growth and promoting competition. The *social dimension* refers to promoting the quality of human life through standards, rights, knowledge, skills, experience and behaviour. This is the so-called *human capital*. The basic goal of this dimension is social righteousness and promotion of cohesion. The *environmental dimension* refers to reaching ecosystem stability through preserving natural resources. This is the so-called *natural capital*. The basic goal of this dimension is preserving the environment. The *institutional dimension* refers to different organizations, but also different rules which systematically regulate and shape the human behaviour, and establish connections between people by means of adequate social policies. This is the so-called *organizational capital* in the form of systems, structures,

mechanisms, procedures and policies. The basic goal of this dimension is participative decision-making and establishing high grade and efficient structures. Bearing in mind all of the previous aspects covered by the 4 dimensions, as well as the goals of each one of them, we can conclude that there is a complex interaction between different dimensions of the sustainable development concept (figure 4). *The institutional dimension is the motive factor, i.e. the moderator of shaping the economic, social and environmental dimensions from the aspect of achieving sustainable development and vice versa.*

Figure 4. *A complex interaction between different dimensions of the sustainable development concept - economic, social, environmental and institutional*

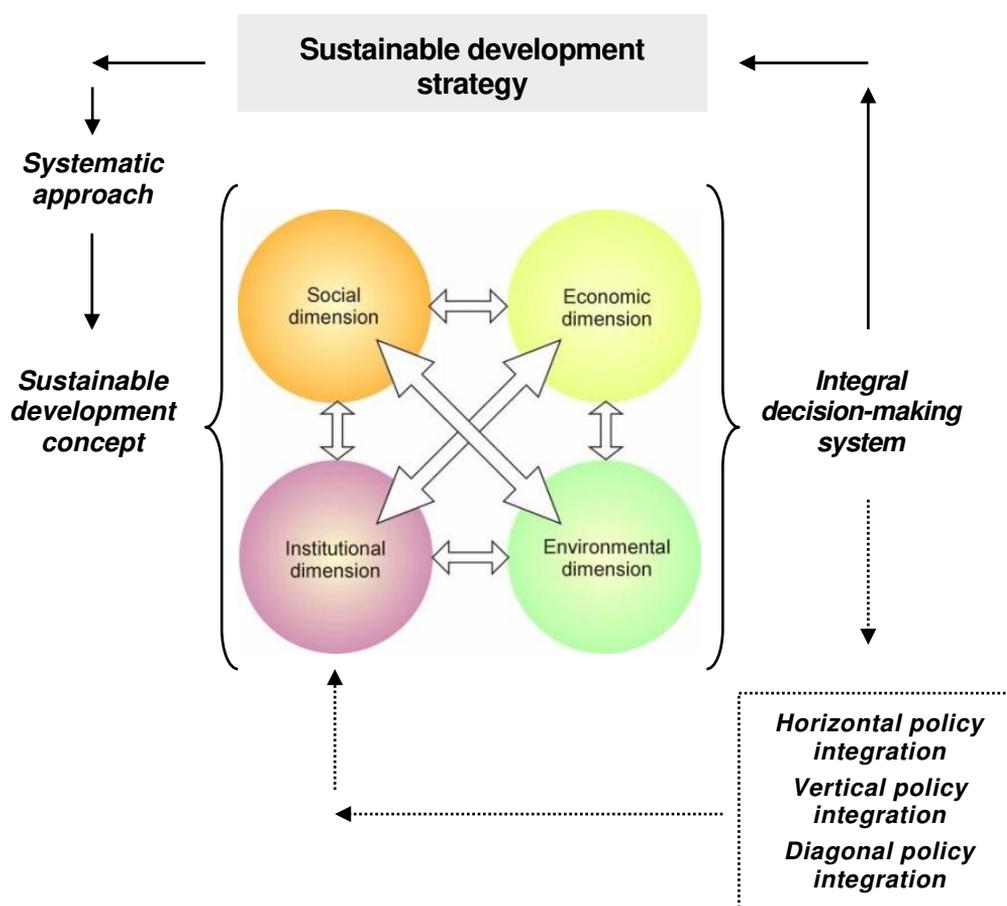


Source: *Global crisis and sustainable development: the inspiration for the EOLSS, UNESCO-Encyclopedia of Life Support Systems*, * Author's own illustration (inserted quadrat into an existing figure), available at: <http://www.eolss.net/Eolss-Inspiration.aspx> (accessed on September 17, 2013).

Observing the sustainable development concept model through the institutional prism is necessary from the aspect of defining future *sustainable development strategies*. Namely, a sustainable development strategy requires a systematic approach in solving development problems

through mutual coordination of different processes and activities in the domain of economy, society and environment, with institutional and policy support (figure 5). It is therefore necessary to establish an institutional and political consensus in the society about the vision and the basic strategic goals of the sustainable development concept, and it should be based on an integral decision-making system. Strong institutions, through horizontal, vertical and diagonal policy integration are necessary for the implementation of the sustainable development concept through a strategic development approach.

Figure 5. *The sustainable development concept model through the institutional prism*



Source: *Author's own illustration according figure 4.*

Thus, in order to make the sustainable development concept model to function efficiently, it is necessary to strengthen institutions and make them less fragmented. Institutional fragmentation, namely, leads to a *lack of coherence*² in sector development policies in the domains of economy, society and environment, and makes their strategic integration impossible. This impedes the coordination of development activities from the aspect of sustainability, and even the implementation of sustainable development concept on a long term basis. And precisely one of the ways to promote the functioning of the sustainable development concept model through the institutional prism is conducting reform processes in the institutional framework on the basis of an adequate *rights-based approach*³ which implies the following (IBON, 2012, pp. 5, 6):

1. *Redefine the goal of governance;*
2. *Addressing power imbalances;*
3. *Addressing social and economic inequities;*
4. *Addressing implementation and accountability;*
5. *Addressing policy integration and coherence.*

Conclusion

The institutional framework for the sustainable development concept enables a more rational and efficient use of disposable economic, social and environmental resources and potentials in the goal of achieving sustainability on a micro and macro development level. This kind of approach implies a horizontal, vertical and diagonal integration of different sector development policies and management levels in the domains of economic, social and environmental development goals. An efficient implementation of the sustainable development concept is not possible without establishing a firm and high grade institutional framework which shapes new strategic orientation and improves development activities from the aspect of reaching sustainability.

² The lack of institutional coherence is to a large extent rooted in differences in perspectives and approaches to achieve sustainable development (IBON, 2012, p. 4).

³ Provide a holistic and coherent framework for responding to the environmental, social, and economic crises; addressing existing power imbalances between and within nations; and ensuring people-centred strategies and implementation at the global and national levels (IBON, 2012, p. 6).

The institutional framework for the sustainable development concept is not only important for the implementation and managing, but also for the process of defining programmes, planes and development projects, as well as adequate strategies and development policies from the aspect of their mutual complementarity. Establishing an adequate, efficient and high grade institutional framework for the sustainable development concept represents on all levels a necessary, but not a sufficient condition for fulfilling basic goals of sustainability. The basic limiting factors in creating an adequate, efficient and high grade institutional framework for the sustainable development concept are lack of political support, lack of public awareness, undefined system of responsibility, insufficient informedness and education of the public and an inefficient administrative infrastructure.

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FINANCIAL ROLE OF THE STATE IN THE DEVELOPMENT OF RURAL TOURISM IN THE REPUBLIC OF SERBIA

Radovan Pejanović, Gordana Radović¹

Abstract

The aim of the paper is to present and analyse the state's financial role in the development of rural tourism in the Republic of Serbia and to point out the importance and economic necessity of this type of support. Taking into account all the existing potentials for the development of rural tourism, as well as current degree of rural poverty, unemployment, depopulation and underdevelopment of the rural areas, the authors tried to point out that the development of this type of tourism, as a segment of multifunctional agriculture, can serve as a generator for the rural development in the Republic of Serbia. Based on the conducted research, the authors of the paper state that Ministry of Economy has recently realized (quantitatively) the most important financial support, testifying their acknowledgement of rural tourism as the key factor of the development of Serbian tourism. However, it is crucial for this trend to be continued in the coming period, as well as to provide state financial support for pre-financing of investments, whose end investor would be EU pre-accession funds. The state's financial support should be based on the adequate development documentation whose effects should be systematically monitored.

Key words: *rural tourism, development, state's financial support, Republic of Serbia*

Introduction

According to OECD's categorization, rural areas in Serbia occupy 85% of the territory, i.e. 3904 out of 4715 places are rural. Based on the data from the Survey on the workforce from 2012, 42% of the workforce in Serbia

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lives in rural regions. Rural economy largely depends on agriculture, where 75% of people are engaged in subsistence farming. Preliminary results from the Census of Agriculture in 2012, show that Serbia has 631 122 agricultural households. Family owned agricultural households are dominant and make 99.6% of the households registered.² Family owned agricultural households-farms, are predominant as they make 99.6% of the registered farms, while their average size is up to two hectares. These farms can not provide conditions to develop competitive agricultural production, therefore, it is of essential importance to develop other non-agriculture related activities.

Rural areas are characterized by great natural, infrastructural and other differences. These differences are seen in the economic and social development, demographic characteristics, trends, cultural specificity, size and morphology of the place and together influence the economic activities and the quality of life. In recent years, poverty has become “rural phenomenon” with 14.2% of the poor living in the rural areas, while 7.8% of the poor live in towns or cities. The cause for this can be found in the fact that during the period of transition, majority of the people in the rural areas lost their sources of income. Poverty is the worst in the south-east and partly in the west of Serbia, where farmers make 25% of the total number of the poor in Serbia.³ According to the research conducted in 2009, every second farmer lives below the poverty line, because agricultural households make 54% of all the households, while 34% are nonagricultural households and 31% of them are mixed.⁴

The development of the rural areas could be achieved by the development of rural tourism, since the Republic of Serbia has rich resources. Natural beauty, clean air, preserved rural architecture, rich cultural and historical heritage, traditional hospitality and diverse cuisine, special ethnic features as well as the long tradition of old crafts make a list of comparative advantages which should be valorized on the tourist market. “In our rural areas, there are around 1500 different events organized a year, which means four events every day, a fact that should be used in order to

²<http://www.rzs.stat.gov.rs> (September 11,2013)

³ Bogdanov N., (2007), *Mala ruralna domaćinstva u Srbiji i ruralna nepoljoprivredna ekonomija*, MPŠV RS, UNDP, Beograd

⁴ Cvejić S., Babović M., Petrović M., Bogdanov N., Vuković O., (2011), Rezultati istraživanja nevladine organizacije SEConS, *Socijalna isključenost u ruralnim oblastima Srbije*, UNDP, Beograd.

promote the tourism”⁵. If we look at the potentials for the development, current degree of the poverty, depopulation and underdevelopment of the rural areas, we need to point out the need for the development of the rural tourism as a segment of multifunctional agriculture, which can serve as a generator for the rural development in the Republic of Serbia.

The aim of the paper is to present and analyse the state’s financial role in the development of rural tourism in the Republic of Serbia and to point out the importance and economic necessity of this type of support. “Rural tourism is a segment of multifunctional rural development and its development is conditioned by: demographic factors, natural resources, available financial support, state policy regarding regional and agricultural development, as well as road and social infrastructure.”⁶ The main hypothesis we will start our research from, is that quantitative and qualitative financial support of the state is the key factor of success in the development of rural tourism in the Republic of Serbia. The state’s financial support should be based on the adequate development documentation whose effects should be systematically monitored. “The State would create favourable environment and promote specific developing concept”⁷. The paper considers what the role of the state with regard to financing the rural tourism has been so far, from the perspective of both the state and provincial institutions. It also presents current strategic and normative framework. However, financial support to local economic communities will not be taken into account since only few of them state they have funds for development of rural tourism in their budgets. With the aim of proving the hypothesis right, analytical-empirical, comparative and quantitative research methods were used in this research. In the paper, we will present the existing normative, regulative, strategic and financial support of the State. For the purpose of this hypothesis, analytical, empirical and comparative methods were used. The limitations in the research are related to our incapacity to present the

⁵ Pejanović R., Radović G., (2012), *Ruralni turizam kao faktor diverzifikacije ruralne ekonomije u Republici Srbiji* (Rural tourism as a factor of rural economy diversification in the Republic of Serbia), Rad po pozivu, Međunarodni naučni skup „Sustainable Agriculture and Rural Development in Terms of the Republic of Serbia Strategic Goals Implementation within Danube Region-preservation of rural values“, Tara, 06.-08.decembar 2012.godine

⁶ Berst, Adams B. (2008): *The New Agritourism: Hosting Community & Tourists on your Farm*, New World Publishing, California, Pg.46-47.

⁷ Pejanović R., Njegovan Z., (2011), *Ruralni razvoj i lokalno ekonomski razvoj AP Vojvodine*, monografija, Poljoprivredni fakultet, Novi Sad

data previous to 2006, since this is the year when the State started to financially support the development of rural tourism in Serbia. Thus, our research covers the period from 2006 to 2012. Practical use of the presented research lies in the fact that it enables us to compare the roles of the State in the development of the rural tourism in Serbia to the neighboring countries in the region.

The term, importance and level of development of rural tourism in the Republic of Serbia

Rural tourism is a type of tourism which comprises all tourist activities that can be taking place in rural areas and can be considered as a tourist offer of the area in question. „Tourism has economic, social and political importance“.⁸ In terms of economic importance, it is necessary to point out the possible influence tourism can have on balance of payments, if domicile rural tourist product becomes interesting for foreign guests. Rural tourism has also got social and political influence as it contributes to better understanding of lifestyle, customs, traditions, local gastronomy, history and culture, and finally better understanding of different nations as well.⁹

Rural tourism has also got its negative effects, primarily on the environment, therefore, it is necessary to develop this branch of tourism on sustainable basis.¹⁰ „Development of rural tourism can not be observed only as the economic growth, but it also must include ecological and social aspect“.¹¹ Sustainable development of rural tourism represents a part of integrated rural development, which is defined as a “modern concept that represents a complex development of a specific rural area, based on natural, material, infrastructural and human resources available, that should be managed carefully in order to maintain the balance

⁸ Unković S., Zečević B. (2011): *Ekonomika turizma*, Centar za izdavačku delatnost, Ekonomski fakultet, Beograd, str.33-64.

⁹ Radović G., Pejanović R., Njegovan Z., (2012), *Značaj i uloga integrisanog ruralnog turističkog proizvoda u Republici Srbiji*, Ekonomski vidici - tematski broj: Privredni preobražaj Srbije – mogućnosti i ograničenja, Beograd, God. XVII, broj 4, str.577-591.

¹⁰ Hall D., Kirkpatrick I, Mitchell M. (2005): *Rural Tourism and Sustainable Business*, Aspects of Tourism:26, Channel View Publications, UK-USA-Canada, Pg.353-354.

¹¹ George W., Mair H., Reid D. (2009): *Rural tourism Development Localism and Cultural Change*, Channel view Publications, Toronto, Canada, Pg.235.

between man and nature.”¹² Sustainable development of rural tourism enables the development of rural areas and contributes to the decrease in regional differences, according to which Serbia is amongst leading countries in Europe. Bearing in mind the fact that one monetary unit invested in tourism can bring back 2.2 monetary units to a local community, we can conclude that agricultural households and local economy can easily see the benefits that rural tourism brings.” The key to success lies in using the optimum of the resources, hard work, modern approach, well trained personnel and managers and using familiar instruments that encourage rural and economic development.”¹³

According to the current data, rural tourism is partially developed in the Autonomous Province of Vojvodina, central and western Serbia. Rural tourism development is the imperative in other regions, too, because it is absolutely necessary to stop village depopulation.¹⁴ According to the official data from 2009, there were 145.354 registered overnight stays in rural tourist accommodation in the Republic of Serbia, and 2.556.128 overnight stays that could be referred to as rural tourist accommodation, forming the total of 2.700.000 or 27% of all the tourist overnight stays in the Republic of Serbia. There are no official data on the number of registered agricultural households involved in rural tourism, however, according to the estimates of the local tourist organisations, Serbia offers 10 567 beds in rural households, while it is assumed that 32 747 more beds could be used in rural tourism. Furthermore, it is estimated that in 2010, rural tourism brought 10 billion dinars in revenues, or 16% of 62 billion dinars, which is the total direct domestic gross product for tourism in 2010 in Serbia.¹⁵

Strategic and normative framework for the development of rural tourism

The development of rural tourism on the territory of the Republic of Serbia is strategically defined in the following documents: (a) Law on

¹² Njegovan Z., Pejanović R., (2009), *Ruralna regionalizacija AP Vojvodine*, monografija, Poljoprivredni fakultet, Novi Sad, str.180.

¹³Pejanović R., (2013), *Ogledi iz agrarne i ruralne ekonomije*, monografija, Poljoprivredni fakultet, Novi Sad, str.265

¹⁴ Program razvoja održivog ruralnog turizma u Republici Srbiji, Službeni glasnik Republike Srbije br.85/2011.

¹⁵ Program razvoja održivog ruralnog turizma u Republici Srbiji, Službeni glasnik Republike Srbije br.85/2011.

Tourism;¹⁶ (b) The Tourism Development Strategy;¹⁷ (c) Marketing Strategy of Tourism in Autonomous Province of Vojvodina.¹⁸

The Law on Tourism defines catering service in agricultural households, while the Tourism Development Strategy sees rural tourism as the priority type for the tourists with different interests. In accordance with the adopted Strategy, the vision of the rural tourism must be harmonized with current global trends, experience, models of development and followed by internal standards of regulation. The development of rural tourism of AP Vojvodina is defined by the Tourist Marketing Strategy as the highly potential tourist product. In order to achieve rural development and development of rural tourism in the Republic of Serbia, we urgently need to adopt the Strategy of agricultural and rural development, and according to the amenable Ministry, it should be adopted by the end of 2013.

In November 2011, The Government adopted The Program of Sustainable Rural Tourism, according to which the main goal is diversification of rural economy through reduction of poverty, improvement of living conditions, preservation of cultural heritage and environment as well as fostering even regional development.¹⁹ According to the same OECD criterion, only the following municipalities in Vojvodina are not rural: Novi Sad, Stara Pazova, Sremski Karlovci, Pančevo, and Temerin. The program of Sustainable Rural Tourism is the result of the Master Plan for Sustainable Tourism Development in Serbia²⁰, created by Ministry of Agriculture, Forestry and Water Management, Ministry of Finance and Economy's Department of Tourism, National Tourism Organisation of Serbia and five UN agencies: Food and Agriculture Organisation (FAO), United Nations World Tourism Organization (UNTWO), United Nations Children's Fund, (UNICEF) and United Nations Development Programme (UNDP). The program defines 12 territorial units - clusters in the Republic of Serbia, where this branch of tourism should be a priority. The clusters are divided into four groups, namely: Central and Western Serbia,

¹⁶ Law on Tourism, Official Gazette of the Republic of Serbia No.36/2009,88/2010,99/2011.

¹⁷ Tourism Development Strategy in Serbia, Official Gazette of RS No..91/2006.

¹⁸ Marketing Strategy of Tourism in Autonomous Province of Vojvodina , 2009

¹⁹ The Program of Sustainable Rural Tourism. Official Gazette of RS, No 85/2011.

²⁰ Master Plan for Sustainable Tourism Development in Serbia (2011), UN joint program „Sustainable tourism in rural development “, Belgrade.

Southern Banat, the Lower Danube Region (Donje Podunavlje), Eastern Serbia and the cluster comprising Vojvodina and Upper Danube Region.

The Program of Sustainable Rural Tourism also contains the set limitations for the development of this type of tourism. First of all, the document states that in the rural areas, there is a lack of knowledge about the values, cultural heritage and tourist potential of the region. There is also a lack of management and organization at national, regional and local level, necessary for a successful, efficient and sustainable running of rural tourism. The limitation also means the lack of proper tourist offer that corresponds to natural and cultural resources of the rural areas, poor presentation and promotion of the existing offers, uncontrolled construction works, the lack of care for preservation and promotion of old arts and crafts, insufficient investment in public infrastructure, public transport and networks. According to the data presented in the Program, rural tourism in the Republic of Serbia is characterized by great seasonal variations in tourists' visits and low occupancy of tourist accommodation. The average occupancy rate in rural tourism in Serbia is 4%, while in other branches of tourism, the occupancy rate is 21%.²¹

The Budget support to this rural development is defined by The Law on Agriculture and Rural Development and The Law on Agricultural Incentives and Rural Development. The Law on Agriculture and Rural Development clearly states the application of the systems of budget support in order to achieve the following development goals: (1) stronger competitiveness of agricultural products on the market; (2) provision of quality and safe food; (3) provision of support to farmers who can not produce enough to remain on the market; (4) provision of support to the rural development and protection of the environment from the negative effects of agricultural production.²² The Law on Incentives in Agriculture and Rural Development, which was adopted in 2013, defines the measures of agrarian policy that will be applied along with the prescribed types of incentives. The incentives, defined by the Law are the following: (1) direct payments; (2) incentives for the measures of rural development;

²¹ The Program of Sustainable Rural Tourism in Serbia, Official Gazette of RS, No. 85/2011.

²² Law on Agriculture and Sustainable Development, Official Gazette of RS, No 41/2009.

(3) special incentives regarding creation of institutional framework for the implementation of the previous two types of incentives.²³

Financial support of the state

Financial support of the state for the development of rural tourism in the Republic of Serbia from 2006 to 2012 was realised through:

- (a) non-refundable grants – subsidies from Ministry of Agriculture, Forestry and Water Management
- (b) non-refundable grants – subsidies from Ministry of Economy (previously Ministry of Finance and Economy)
- (c) loans which Ministry of Economy approved via the Development Fund of The Republic of Serbia.
- (d) non-refundable grants-subsidies from Provincial Secretariat of Agriculture, Water Management and Forestry of AP Vojvodina
- (e) non-refundable grants-subsidies from Provincial Secretariat of Economy of AP Vojvodina

Ministry of Agriculture's financial support to the diversification of the domestic rural economy and development of rural tourism from 2006 to 2012, was demonstrated through stimulating grants – agrarian budget subsidies. The right to apply for grants had: legal persons-registered owners of the farms, entrepreneurs, agricultural cooperatives, churches and monasteries, associations and professional services. The Ministry granted the subsidies for building and adaptation of houses that resembled old village houses, restoration of authentic rural buildings such as mills and wine cellars, acquisition of the equipment necessary for better tourist offer, and promotion of rural tourism and events that are traditionally held in rural areas. Ministry of Agriculture also granted subsidies for purchase of raw and processed materials as well as for purchase of the equipment necessary for preservation of old crafts and other non-agricultural activities.²⁴

²³ The Law on Agricultural Incentives and Rural Development, Official Gazette of RS, No 10/2013.

²⁴ Analiza budžetske podrške razvoju seoskog turizma u Srbiji i diverzifikaciji ekonomskih aktivnosti na selu, (2009): Ministarstvo poljoprivrede, šumarstva i vodoprivrede Republike Srbije, Sektor za ruralni razvoj, Beograd.

Table 1. *Subsidies for development of rural tourism, Ministry of Agriculture, Forestry and Water Management*

YEAR	AGRARIAN BUDGET FUNDS FOR DEVELOPMENT OF RURAL TOURISM	REALISED FUNDS FOR DEVELOPMENT OF RURAL TOURISM	AGRARIAN BUDGET	SHARE OF REALISED FUNDS IN AGRARIAN BUDGET (%)
2006.	-	27.827.116 RSD	23.593.481.000 RSD	0,11
		352.242 €	298.651.658 €	
2007.	40.000.000 RSD	27.028.686 RSD	21.410.029.000 RSD	0,12
	504.820 €	341.115 €	270.205.146 €	
2008.	40.000.000 RSD	36.724.413 RSD	27.634.337.342 RSD	0,13
	451.462 €	414.492 €	311.896.450 €	
2009.	59.000.000 RSD	58.685.782 RSD	15.964.071.000 RSD	0,36
	615.296 €	612.019 €	166.485.252 €	
2010.	80.000.000 RSD	Data in process	20.572.438.000 RSD	-
	758.307 €	-	195.002.740 €	
TOTAL	219.000.000 RSD	150.265.997 RSD	109.174.356.342 RSD	0,13 (without 2010)

Source: *Ministry of Agriculture Forestry and Water Management of the Republic of Serbia.* **Note:** *The authors calculated the amounts in euros according to the middle exchange rate of NBS on the last day of the observed year.*

In the period from 2006 to 2010, Ministry of Agriculture, Forestry and Water Management invested 219 millions of dinars or 2.3 millions of euros through subsidies for rural tourism development, and realized 150.3 millions of dinars or 1.7 million of euros of favourable assets by the end of 2009. Based on the comparative analysis of the data presented in Table1, it can be concluded that the share of the realized subsidies in agrarian budget in the first three years was at the same level, and that in 2009 there was a rise in the share. However, the reason for this was not a significant rise in realized subsidies, but significant fall in agrarian budget, which was decreased for 42% in comparison to the previous year. The average share of realized funds for subsidies for development of rural tourism in agrarian budget from 2006 to 2009 was only 0.13%. There was no budget allocated

for boosting the development of rural tourism in 2011 and 2012. In 2013, The Government adopted The Regulations on Incentives for improvement of rural economy through support to non-agricultural activities.²⁵ The types of incentives, conditions and rules of applying as well as maximal amounts per user are also defined in the regulations.

Ministry of Economy²⁶ has been granting subsidies and grants for financing the projects of tourism development and within them, for rural tourism development, since 2007. The amounts for these projects are annually planned in The Law on Budget of The Republic of Serbia, and the assets are granted in accordance with The Programme of schedule and use of the subsidies and grants, adopted annually by the Serbian Government. Ministry of Economy co-finances projects of promotion, improvement of the quality of tourist offer, education in rural tourism and infrastructural projects in the municipalities which belong, according to the Law on regional development, to the second, third and fourth group and devastated areas. Based on the projects, the share of subsidies can be up to 50% of the total value of the project in the first year, then up to 30% in the second year and up to 10% in the third year of the project. The amount of subsidies can be up to 100% of the total value of the project, if the projects' goals are promotion of Serbia as a tourist destination, improvement of communal infrastructure and development of building land. Table 2 presents the subsidies and grants for the period between 2007-2012. The presented data comprises the investments of five special UN agencies in the municipalities where project „Sustainable tourism in function of rural development“ is realised.²⁷

Based on the data in Table 2, it can be concluded that from 2007 to 2012, the share of subsidies and grants for the development of rural tourism in the overall grants for the development of tourism in the Republic of Serbia was high (77.59%). The above mentioned fact states that rural tourism is recognised as the key factor for the development of tourism in Serbia. It is also necessary to emphasise that in the given period, „subsidies and grants for rural tourism made 90.11% (2.888.260.762.39 dinars) and they were

²⁵ Pravilnik o podsticajima za unapređenje ekonomskih aktivnosti na selu kroz podršku nepoljoprivrednim aktivnostima, Službeni glasnik Republike Srbije br.81/2013.

²⁶ U skladu sa Zakonom o izmenama i dopunama Zakona o ministarstvima, Službeni glasnik Republike Srbije br.76/2013, Ministarstvo finansija i privrede je podeljeno na dva ministarstva, Ministarstvo finansija i Ministarstvo privrede u okviru koga se nalazi i Sektor za turizam.

²⁷ Source: Ministry of Economy of RS, 17.09.2013.

placed into infrastructural projects, while 9.89% (316.836.348,50 dinars) were placed into projects of promotion and education.²⁸

Table 2. *Subsidies for development of rural tourism, Ministry of Economy*

YEAR	TOTAL OF SUBSIDIES AND GRANTS FOR TOURISM	SUBSIDIES AND GRANTS FOR RURAL TOURISM	SHARE OF SUBSIDIES FOR RURAL TOURISM IN TOTAL SUBSIDIES FOR TOURISM (%)
2007.	460.608.705,30 RSD	330.970.164,70 RSD	71,85
	5.813.109,47 €	4.177.007,03 €	
2008.	1.189.440.245,74 RSD	989.610.098,25 RSD	83,19
	13.424.681,95 €	11.169.288,13 €	
2009.	708.165.868,00 RSD	431.123.711,00 RSD	60,87
	7.385.282,41 €	4.496.079,94 €	
2010.	458.815.194,18 RSD	391.327.728,18 RSD	85,29
	4.349.033,39 €	3.709.330,86 €	
2011.	787.340.608,76 RSD	684.515.608,76 RSD	86,94
	7.524.214,80 €	6.541.568,44 €	
2012.	525.953.800,00 RSD	377.549.800,00 RSD	71,78
	4.625.058,59 €	3.320.044,35 €	
TOTAL	4.130.324.421,98 RSD	3.205.097.110,89 RSD	77 ,59
	43.121.380,61 €	33.413.318,75 €	

Source: *Ministry of Economy of the Republic of Serbia. Note: The authors calculated the amounts in euros according to the middle exchange rate of NBS on the last day of the observed year.*

Ministry of Economy has been granting loans for development of rural tourism through the Development Fund of the Republic of Serbia. The loans are granted after the competition for loans for improvement of quality in tourist offer. All the registered farms, small and medium enterprises registered for hospitality industry have the right to apply for the loans. The minimal amount of the granted loans for farms and entrepreneurs is 500.000 dinars, while the amount of the loans for small and medium enterprises is 2.000.000 dinars. The share of the loans in the project must be more than 50% of the total value of the project. The loans are granted with the annual interest rate of 1% indexed, with the

²⁸ Data from Ministry of Economy of RS

repayment period of 72 months, after 12-month deferred payment period, starting from the day of withdrawal of funds. Loan repayment is in quarterly installments with the usual instruments for loan security.²⁹

Table 3. *Loans for the development of rural tourism, Ministry of Economy and Development Fund of the Republic of Serbia*

YEAR	LOANS FOR THE DEVELOPMENT OF RURAL TOURISM (RSD / €)	DEVELOPMENT FUND LOANS FOR DEVELOPMENT OF TOURISM AND HOSPITALITY INDUSTRY (RSD / €)	LOAN SHARE PLACED IN DEVELOPMENT OF RURAL TOURISM WITHIN TOTAL NUMBER OF LOANS FOR DEVELOPMENT OF TOURISM (%)
2008	55.500.000 RSD	861.900.000 RSD	6,43
	626.403 €	9.727.881 €	
2009.	57.600.000 RSD	1.170.150.000 RSD	4,92
	600.696 €	12.203.198 €	
2010.	25.550.000 RSD	775.633.000 RSD	3,29
	242.184 €	7.352.097 €	
2011.	4.800.000 RSD	667.547.502 RSD	0,71
	45.871 €	6.379.413 €	
2012.	6.814.672 RSD	624.202.852 RSD	1,09
	59.926 €	5.489.027 €	
TOTAL	150.264.672 RSD	4.099.433.354 RSD	3,66
	1.575.080 €	42.151.616 €	

Source: *Ministry of Economy of the Republic of Serbia. Note: The authors calculated the amounts in euros according to the middle exchange rate of NBS on the last day of the observed year.*

From 2008 to 2012, Ministry of Economy granted 150.265 millions of dinars or 1.575 millions of euros as the loans for the development of rural tourism in the Republic of Serbia. Based on the analysis of the data presented in Table 3, it can be concluded that the amount of loans placed for the development of rural tourism was reduced by 88% in 2012, compared to the amounts placed in 2008. During the above mentioned period, the average share of these loans in the total number of long term loans of the Development Fund granted for the development of tourism and hospitality industry was only 3.66%.

²⁹ Data from Ministry of Economy of RS

Table 4. *Subsidies for the development of rural tourism, Provincial Secretariat for Agriculture of AP Vojvodina*

YEAR	GRANTED SUBSIDIES FOR DEVELOPMENT OF RURAL TOURISM	THE TOTAL BUDGET OF THE SECRETARIAT FOR AGRICULTURE	SHARE OF GRANTS FOR RURAL TOURISM IN THE TOTAL BUDGET OF SECRETARIAT FOR AGRICULTURE (%)
2006.	50.040.827 RSD	986.039.625 RSD	5,07
	633.428 €	12.481.514 €	
2007.	35.000.000 RSD	821.438.354 RSD	4,26
	441.717 €	10.366.958 €	
2008.	37.691.532 RSD	1.444.563.547 RSD	2,61
	425.408 €	16.304.145 €	
2009.	-	2.493.532.793 RSD	-
		26.004.422 €	
2010.	70.000.000 RSD	2.556.176.614 RSD	2,73
	663.518 €	24.229.576 €	
2011.	47.400.000 RSD	3.705.377.863 RSD	1,27
	452.978 €	35.410.417 €	
2012.	90.000.000 RSD	3.891.297.168 RSD	2,31
	791.429 €	34.218.742 €	
TOTAL	330.132.359 RSD	13.404.893.171 RSD	2,46
	3.408.478 €	133.011.352 €	

Source: *Provincial Secretariat for Agriculture, Water Management and Forestry of APV.* Note: The authors calculated the amounts in euros according to the middle exchange rate of NBS on the last day of the observed year.

The Provincial Secretariat for Agriculture, Water Management and Forestry of AP Vojvodina has been financially supporting the development of rural tourism since 2006. So far, the Secretariat has been granting the subsidies for the restoration of traditional rural households, farms, construction and adaptation of premises necessary for tourism, as well as for the acquisition of equipment needed in hospitality industry and rural tourism. The aim of granting the subsidies is diversification of activities happening at the farms and their surroundings, so that alternative, additional incomes are generated. The subsidies were not granted only in 2009, since the annual Programme for Rural Development was not adopted that year.³⁰

³⁰ Data from The Provincial Secretariat for Agriculture, Water Management and Forestry of AP Vojvodina

According to the data presented in Table 4, from 2006 to 2012, The Provincial Secretariat for Agriculture, Water Management and Forestry of AP Vojvodina granted the subsidies of 330.13 millions of dinars or 3.4 millions of euros for the development of rural tourism. The average share of the subsidies for the development of rural tourism in the total budget of The Provincial Secretariat for Agriculture, Water Management and Forestry of AP Vojvodina, for the given period was only 2.46%.

The Provincial Secretariat for Economy of AP Vojvodina, invested the total of 306.7 millions of dinars or 3.4 millions of euros in tourism development on the territory of the Autonomous Province of Vojvodina (Table 5) from 2007 to 2012. Our opinion is that overall investments could be regarded as the investment in different forms of rural tourism, bearing in mind the fact that in Vojvodina, according to the criterion set by the OECD methodology, which says that an area with a population density below 150 inhabitants per 1 km² is classified as rural, 40 out of 45 municipalities are considered rural. According to the same OECD criterion, only the following municipalities in AP of Vojvodina are not rural: Novi Sad, Stara Pazova, Sremski Karlovci, Pančevo, and Temerin.³¹

Table 5. *Subsidies for development of tourism, Provincial Secretariat for Economy of AP Vojvodina from 2007 to 2012*

YEAR	SUBSIDIES FOR DEVELOPMENT OF TOURISM IN AP VOJVODINA	
2007.	110.000.000 RSD	1.388.254 €
2008.	55.250.000 RSD	623.582 €
2009.	52.600.000 RSD	548.552 €
2010.	2.850.000 RSD	27.015 €
2011.	25.500.000 RSD	243.691 €
2012.	60.500.000 RSD	532.016 €
TOTAL	306.700.000 RSD	3.363.110 €

Source: *Provincial Secretariat for Economy of AP Vojvodina. Note: The authors calculated the amounts in euros according to the middle exchange rate of NBS on the last day of the observed year.*

The Provincial Fund for the Development also granted the loans for the development of rural tourism in AP Vojvodina. The competition was published in 2008, when 37 applications arrived, but only 11 of them were granted with the loans of 856.350 euros. The loans had three-year

³¹ Pejanović R., Njegovan Z. (2011): *Ruralni razvoj i lokalni-ekonomski razvoj AP Vojvodine*, monografija, Poljoprivredni fakultet, Novi Sad.

repayment period with a year of grace period, they had quarterly installments with the annual interest rate of 4.2%, if the client's mortgage was collateral. The annual interest rate was 2.8% with the bank's guarantee.³²

Conclusion

Based on the conducted research, it can be said that, in the previous years in the Republic of Serbia, there was a financial support to the development of rural tourism, but unfortunately the support was not sufficient. Ministry of Economy has recently realized (quantitatively) the most important financial support and testified their acknowledgement of rural tourism as the key factor of the development of Serbian tourism. However, it is crucial for this trend to be continued in the future, as well as to provide state financial support for pre-financing of investments, whose end investor would be EU pre-accession funds. The conducted research has also shown that in the period from 2006 to 2012, the share of subsidies and donations for projects of promotion and education in the non-refundable grants from Ministry of Economy, was relatively low (9.89%). In the future, it is necessary to increase the state's financial support to such projects, since the development of rural tourism can not be achieved without adequate and qualitative promotion and improvement of the quality of services.

Bearing in mind the importance of sustainable development of rural tourism for rural and regional development, this segment of multifunctional agriculture should be given the priority in the Strategy of Agricultural and Rural Development of the Republic of Serbia. From our point of view, this document should be a future developing platform, based on which financial support to the development of rural tourism should be realised. For the effects of the investments to be monitored, „it is necessary for us to form The Registry of Incentives in Rural Tourism and The Green Book for Rural Tourism, which are in accordance with The Law on Incentives in Agriculture and Rural Development“.³³ Based

³² Radović G., Pejanović R., Košić K., Njegovan Z., (2012): *Uloga države u razvoju ruralnog turizma u Republici Srbiji*, Treći međunarodni kongres o ruralnom turizmu, Osijek, 23.-26.maj 2012.godine.

³³ Radović G., Pejanović R. (2013): *Neophodnost institucionalnih reformi u cilju razvoja ruralnog turizma u Republici Srbiji*, Zbornik radova sa Konferencije: Institucionalne reforme, ekonomski razvoj i proces pridruživanja Evropskoj uniji, Naučno društvo ekonomista Srbije sa Akademijom ekonomskih nauka i Ekonomski fakultet u Beogradu, str. 301-312.

on this proposition, more precise evidence of the overall investments, as well as the effects these investments would be possible, while the application of monitoring would contribute to more effective and efficient implementation of state financial support to the development of rural tourism in the Republic of Serbia.

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RURAL DEVELOPMENT MODEL OF BOSNIA AND HERZEGOVINA

Stevo Mirjanić, Gordana Rokvić¹

Abstract

The new rural development policies are focused on the definition of effective mechanisms to ensure coordination of the development of agriculture and other activities in rural areas in accordance with the principles of sustainable development, in order to improve the standard of living and quality of life. Historical and cultural heritage, social structure, level of development of economy and society, as well as other relevant parameters differ considerably among European countries. Therefore, there are significant differences in the objectives, institutional and financial support and general conceptual approach to rural development. Overcoming regional development disparity is no longer the main focus of policy development in rural areas. The main objective of the research was to develop an optimal model for rural development in Bosnia and Herzegovina based on the analysis of the current policy frameworks and EU policy requirements. The ultimate goal is to define an optimal model for the encouragement of sustainable development of rural areas and to find the most effective policy to be implemented at various levels of government institutions in Bosnia and Herzegovina.

Key words: *rural development model, sustainable development, integrated rural development*

Introduction

The rural development model suggested in this research is based on the specific socio-economic status and administrative environment of Bosnia and Herzegovina, as well as on the models applied at the level of the

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member states of the European Union. From the perspective of the management of rural development, the model suggests solutions that are functional in relation to the reality of the situation in Bosnia and Herzegovina.

Given the current prospects of development in Bosnia and Herzegovina, simply copying the models of rural development as they exist at the EU level, the structure and management measures, would not be sufficient nor satisfactory measures to improve the situation in rural areas of Bosnia and Herzegovina. EU model of rural development implies the level of economic and social development that currently does not exist in Bosnia and Herzegovina. That model is the one to whom Bosnia and Herzegovina seeks to achieve in terms of competitiveness, sustainable development and natural resources management, diversification of income, and improving the quality of life in rural areas. To achieve this, Bosnia and Herzegovina should, at all levels of government, define its strategic priorities, management system, policy measures and actions, build vertical and horizontal coordination mechanisms, and along with the unfolding of a given process, it should apply good EU practice in all spheres of rural development that can be applied in Bosnia and Herzegovina.

The strategic framework of rural development at the national level

The analysis of the strategic framework on the national level in the field of rural development in Bosnia and Herzegovina has proved the following:

- Rural development policy in Bosnia and Herzegovina is implemented at the entity level and is regulated by a variety of strategic and other supporting documents;
- The Law on Agriculture, Food and Rural Development at the state level is defining a framework objectives for Bosnia and Herzegovina in this sector;
- Jurisdiction for the implementation of rural development policies is given to the Entity ministries of agriculture, and at the state level jurisdiction is given to the Ministry of Foreign Trade and Economic Relations (Division of agriculture, food, forestry and rural development);
- Decentralized management structure for rural development policy has not been established at any level of government in Bosnia and Herzegovina;
- The agriculture financial support systems at all levels of government include measures for rural development but the process of harmonization of policies among entities has not been reached.

Therefore, for the purposes of establishing an appropriate model of Rural Development it is necessary to define the guidelines at the state level for programming of rural development. The aim of the guidelines should be to:

- Set up a common framework of rural development policy in Bosnia and Herzegovina;
- Define the legislative and legal basis for the implementation of rural development policy in Bosnia and Herzegovina;
- Set up a framework for coordination of rural development in Bosnia and Herzegovina with EU rural development policy;
- Set the framework of the management structure of rural development policies at all levels of government;
- Set the framework of the strategic programming of rural development at all levels of government;
- Set the stage for the delimitation of less favourable areas in Bosnia and Herzegovina.

Common framework at the state level, is not only a prerequisite to pre-accession process to the EU, it is an indispensable prerequisite for setting the basis for sustainable management of rural areas in Bosnia and Herzegovina in terms of defining strategic priorities, guidelines and ways of managing rural development in Bosnia and Herzegovina. Such a framework is also the basis for the harmonization of entity policies and their harmonization with EU directives. In addition, the framework provides guidelines for rural development programming at lower organizational levels. Strategic programs at the entity level present the core of rural development policy, which is aligned with the needs of the rural population, the existing resources, administrative and institutional capacity to implement rural development policy at the entity level and other lower levels of government.

Regional and local rural development programs (whether adopted at the cantonal level, municipalities or groups of local communities) are operational programs which define strategic projects, business ideas, and other regional products. These programs are based on a 'bottom-up' approach and include by default the public, business and civil society, as well as an integrated and multi-functional approach to rural development. The process of rural development programming should be created in direct consultation with the social partners and end users. Just in case of the consensus of all stakeholders, selected priorities may be a reflection of the actual will of the population and can be the basis for the successful implementation of rural development strategy. Experiences of other

countries show that the imposition of solutions and defining priorities by "top-down" system cannot provide long-term sustainable development of rural areas. At all stages of programming it is necessary to ensure coordination with representatives of the sector, institutions and organizations of importance to the development of rural areas. Equally important is coordination achieved at the horizontal level between the various ministries, government organizations and bodies, in order to achieve a broader consensus on the importance of rural areas and overcoming obstacles in overall development.

So, in order to create a sustainable, comprehensive and efficient model of rural development at all levels of government, following principles need to be fulfilled:

- Model reflects the general social and development priorities;
- In the process of developing the model, a consensus of actors making the horizontal level is provided;
- Model ensures utilization of existing administrative structures and accountability in the management of rural development;
- Model allows the inclusion of beneficiaries (the rural population, the social partners, the municipal level, small entrepreneurs, NGOs) in the process, starting from the development of the program, through the implementation, till the evaluation of actions and measures that are implemented;
- Strategic guidelines have been developed in such a way that any conflict of goals is avoided, either in their ultimate effect they might produce, either by their cause-effect relationship.

Assumptions that need to be fulfilled by creating guidelines and policy framework for rural development in Bosnia and Herzegovina are:

- Adopt a model of decentralized management of rural development in the territory of Bosnia and Herzegovina;
- Define the institutional structure of the management of rural development in Bosnia and Herzegovina at all levels of government;
- Agree on long-term priorities of rural development in Bosnia and Herzegovina on the basis of the performed analysis and the guidelines of the EU rural development policy;
- Based on the defined criteria, determine the delineation and classification of areas of Bosnia and Herzegovina according to the degree of remoteness, conditions of work and life in rural areas.

Institutional mechanisms for management of rural development

Characteristics of institutional mechanism of rural development management as it are today in force in Bosnia and Herzegovina can be summarized as follows:

- Lack of coordination between the entity and state institutions in the planning and implementation of rural development policy;
- Lack of developed institutional infrastructure at the entity level (all the responsibility in the hands of departments or ministries of agriculture);
- Underdeveloped lower institutional levels (regional and local) managing rural development policy;
- Centralized approach to the planning and implementation of rural development policies at all levels of government;
- Lack of coordination among different sectors in different levels of government in terms of planning and management of rural development.

Elements of good governance that can be extracted in the approach to rural development, which are applied at the level of the EU and OECD countries, can be summarized in five terms:

- Participation,
- Intersectoral coordination,
- Vertical coordination,
- Adaptive and iterative approach,
- The use of democratic and accountable practices.

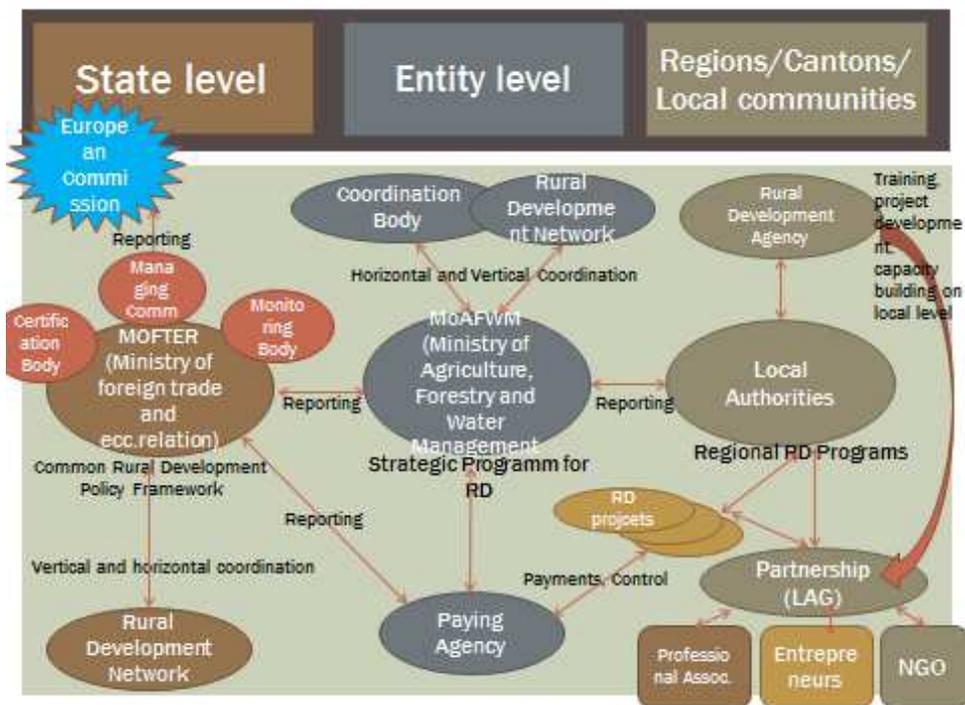
These models included in the "EU White Paper", represent the management models for rural development as they are now applied in the EU. In relation to the presented description of the elements of good governance, the adoption of a decentralized management of rural development for Bosnia and Herzegovina is proposed, that would, in institutional terms, include development of three levels of management (Scheme 1):

- The state level with the institutional structure, responsible for establishing a framework for the implementation of rural development policy, alignment with EU policies, the implementation of EU procedures, reporting and other relevant institutions;
- The level of the entity responsible for the strategic programming of rural development that would be in line with the guidance provided at the state level and the specific area in which the plan applies. Strategic

programs at the entity level include measures that are available to lower levels of management in the selection of priorities specific to the rural areas;

- Entity level is responsible for the payment, monitoring and control, as well as vertical and horizontal coordination of all stakeholders of the importance for the development of rural areas;
- The level of regions and local communities responsible for capacity building at the local level, resource mobilization, prioritization, preparation and selection of projects, building partnerships, etc.

Scheme 1. Management model of Rural Development in Bosnia and Herzegovina



Source: Authors.

The model proposed in this research is trying to meet all the elements of good governance through four forms of decentralization: decentralization of governance, decentralization in programming, decentralization of payments and decentralization in the preparation and selection of projects, as indispensable factors of efficiency of rural areas. Decentralization of rural development should therefore be enforced through three levels: state, entity and regional (cantonal and local).

Compared to the existing concept of rural development in Bosnia and Herzegovina, in this model, the three levels of government would act in the common framework of decentralized management policy. All three government levels have jurisdiction over rural development at present time, but - in contrast to the model proposed here – at present time there is no coordination between the three levels and all attempts to coordinate that so far have not being successful. Decentralized management model is a system of coordination, definition of priorities, implementation, reporting, monitoring and control, which is characterized by traceability and transparency through all three levels of management. Institutions need to service this management model are:

- At the state level: the Ministry of Foreign Trade and Economic Relations (MOFTER) with bodies that are prescribed by the European Commission for the management of rural development policy, namely: Managing Authority for certification, monitoring body. In addition to these, there are already existing departments in MOFTER who care about the control of the payment system, analysis and programming, monitoring and evaluation, etc. In addition, the state level is foreseen to establish networks for rural development, to contribute to the exchange of information, best practices and monitoring the effects of implementation of the program at all levels.
- The entity-level management is given to the Ministry of Agriculture, Forestry and Water Management (Department of Agriculture in Brcko district). There are also the Paying Agency, which manages funds for rural development, national and EU funds. Insurance of vertical and horizontal coordination is ensured trough the Government Coordinating Body and entity Rural Development Network,
- At the regional or local level there are cantonal or local authorities, depending on the entity, as well as the Rural Development Agency, and formal and non-formal partnerships between public, private and civil sectors, which are established in order to define priorities and more efficient management of rural development projects.

This is definitely a new model which will take time to develop in areas of Bosnia and Herzegovina, but the only long-term effective model that can provide a change of the current situation. Centralist approach that has so far conducted, where the Ministry is proposing priorities and measures for investment in rural areas, with the formal participation of all interested parties, but without their responsibilities in the implementation of development strategies and programs, did not bring positive effects.

Decentralization in rural development programming involves creating a framework of rural development programs in each of the three levels of management. Differences between the individual stages are the following:

- On the state level to create a framework for the implementation of the common rural development policy which: provides guidelines for defining the priorities of rural development, ensures compliance of rural development policy with the general socio-economic development of Bosnia and Herzegovina with the European guidelines and key challenges of rural development in Bosnia and Herzegovina. From the state level rural development programs are submitted, as well as the corresponding (sub) programs, for approving by the European Commission, as the level of Bosnia and Herzegovina sends feedback on the effects of the implementation of the program and other statements that relate to the general implementation of the policy;
- The entity created strategic rural development programs with an expanded list of priorities, as well as a list of concrete measures and actions taken by the entity government towards the realization of the strategic goals in terms of solving specific problems in some rural areas; entity levels of government are responsible for complying with the priority needs of the population, the decentralization process and the application of vertical and horizontal coordination in the management of rural development policy;
- At the regional or local level main focus is on the strengthening of local institutions and partnerships that actively participate in the planning and implementation of the entity programs, creation of specific projects and, where appropriate, local development programs, innovative ideas to solve problems of rural development are encouraged at this level, identification and the mobilization of local resources is performed and the building of human capacity that will be in charge of development is encouraged.

Decentralized Management of the EU funds is a model prescribed by the European Commission which, in fact, fits very easy into the proposed decentralized model (Scheme 1). Decentralization of the management of the funds implies decentralization in terms of providing different sources of funding (European funds, national funds, funds of users), decentralization of payments (Commission, national fund, and paying agency), decentralization of control (Commission certification body, ministries, agencies for payments).

Decentralization in the preparation and selection of projects is achieved by transferring the responsibility of selection of projects on regional, cantonal or local level. Local authorities would build a partnership with representatives of all sectors: business, civil and public. Via this partnership selection of projects would be made, on the basis of pre-defined and agreed criteria. In this way a consensus of the general public about deciding on regional and local rural development is achieved. A prerequisite of this kind of decentralization is certainly building capacity at local and regional level that, taking into consideration the conditions in Bosnia and Herzegovina, will take time and resources to make this level of government stronger and trained to participate in the democratic process.

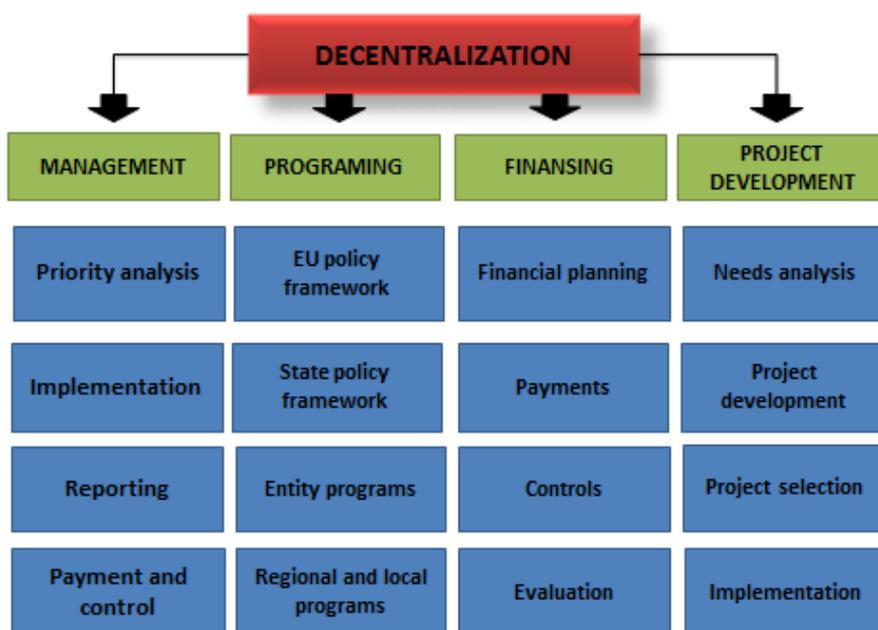
Decentralization as a process is represented differently in different spheres of society, as well as individual countries, not only because of the different political systems, but also due to the differences in tradition and system of decision-making in individual countries. As Bosnia and Herzegovina in its political structure is much decentralized state with a very pronounced autonomy of local communities in the planning and financing of local development, this model of rural development should be easily applicable. However, differences in the capacity of certain levels of management can be a stumbling block in the realization of such a model. The experiences of other countries in decentralization of the state management prove following:

- More efficient identification of the needs of local population;
- More efficient mobilization of local resources;
- Secure the participation of local representatives in decision-making;
- More efficient local government;
- The transfer of powers has a stimulating effect on local development;
- Improvement of democracy;
- Better protection of minority interests.

On the other hand, the problems that may arise in the process of decentralization are:

- Scarcity of resources in small communities;
- Overlapping powers of central and local government;
- Lack of transparency and corruption at the local level;
- Excessive control by the central government, which slows down the process.

Picture 2. *Decentralized Model of Rural Development Management in Bosnia and Herzegovina*



Source: *Authors.*

To ensure some of these benefits and to prevent problems that could arise in the decentralization process on time, the processes of vertical and horizontal coordination are designed. Vertical coordination in the management of rural development refers to the coordination of all levels of management of rural development, the participation of all stakeholders of the importance for the development of rural areas, to ensure the planning process is adjusted to the needs, the coordination of actions and measures for achieving strategic priorities, to monitor the impact of the activity. Vertical coordination that is proposed in in the model is provided through the establishment of the networks for rural development. The network model is defined by the EU as a way of coordinating the different actors involved in rural development. Network for rural development at the state level should include representatives of government at the state level, the entity ministries, representatives of cantonal, regional and local authorities (elected representatives), and representatives of the entity network for Rural Development, Rural Development Agency, representatives of the business sector representatives of the civil and professional associations. The role of the Network is reflected in the:

- Coordination of the various actors involved in the planning and implementation of rural development through seminars, workshops and other types of education;
- Networking of various stakeholders at all levels of government, as well as participation in the exchange of information and good practice with networks for rural development at the EU level;
- Monitoring the implementation of rural development programs by assessing the impact of these programs and providing a feedback to decision makers;
- Dissemination of information on rural development, concept, good practices, measures and programs available to users, organization of web sites, and other ways of communicating with customers.

The entity networks for rural development act in a similar way, that play important role particularly in communication of programs and rural development policy towards beneficiaries, they are coordinators of the process of building partnerships between the public and civil sectors, and present the main centre for the dissemination of information about innovative solutions to improve the situation in rural areas. Depending on the chosen model of the entities, networks may be given a central role in educating beneficiaries about the possible use of funds, connecting beneficiaries with partners at national and international level. The special role of the network should be in organizing a discussion about the problems in the process of rural development at the entity level, identifying bottlenecks, reporting and more. Also, as well as at the state level, the role of networks is in the monitoring of the impact of rural development policy. The composition of the network is made of representatives of the Ministry, the Paying Agency, local authorities, the Rural Development Agency, local action groups, entrepreneurs, associations, NGOs.

Vertical coordination at the regional level (be it the cantons in the Federation of Bosnia and Herzegovina, Association of Municipalities in RS or individual local communities in both entities) is ensured through the establishment of partnerships between the public, private and civil sectors. What form will these partnerships take, will they be formed as local action groups, which are required in the application of the LEADER program, or as an association, foundation or just an informal group of citizens, are optional. More important is the willingness of the partners for joint action in the direction of more efficient regional or local development.

Horizontal coordination is also an important part of the management of rural development that enables inter-agency coordination in the field of rural development. This involves animating representatives of all sectors of importance to rural areas such as agriculture and forestry, health, education, local government, tourism, commerce, finance, economy, organization of education in rural areas, research and development, protection of minority rights, etc. The activities in all these sectors are related to the rural development, and effective implementation of individual sector programs can bring a better effect if achieved in coordination with similar programs. The practice of horizontal coordination is described in the good practices of some OECD countries. Current examples of rural development policy in Bosnia and Herzegovina have recognized horizontal coordination only in the Strategic Plan for Rural Development of the Republic of Srpska (RS). The plan envisages the formation of a coordinating body that would bring together representatives of most of the ministries in the Government of RS and central government agencies and ensure coordination of their activities in the direction of more efficient rural development. Although the effects of the formation of this body are still not visible in the RS, the model suggested in this research also envisages the place for the Coordination body in the governance process and such forms of co-ordination in the future should be insisted upon.

Rural and Regional Development in Bosnia and Herzegovina

Regional and Rural Development have many overlapping, starting from the time when rural development was an integral part of regional policy, to the present day when the regional approach (territorial approach) is most often used in integrated rural development. Rural development can contribute to the competitiveness of the region in terms of regions identity, creating new products, enriching the economic structure, boosting tourism, and local initiatives, democratic decision-making and coordination of public, NGO and business sectors at regional and local level. On the other hand, balanced regional development is the guiding vision of rural development. The spotting of regional inequality was the initial trigger creation of rural development policy. So, all the goals and activities of rural development serve the regional development of the territory, especially if spatial approach model is applied, where a region or territory represents a basis on which the assessment of resources available is made, their mobilization and income generation, and other public goods that serve the population of the territory.

Regional policy in the new (post-war) Bosnia and Herzegovina is not clearly defined and is mainly implemented by the entity level management. According to the Spatial Plan of the Republic of Srpska, six regional units are units with centres of Banja Luka, Bijeljina, Doboj, Prijedor, East Sarajevo and Trebinje and four sub-regional centres: Gradiska, Zvornik, Mrkonjic Grad and Foca.

Regions of the Republic of Srpska, according to geography textbooks, are: Banja Luka region, bipolar-Doboj Bijeljina region, bipolar Sarajevo-Zvornik region, and bipolar Trebinje-Srbinje region. According to relief, climatic and biogeographic units in the Republic of Srpska, three areas are usually distinguished: the Pannonia area, Mountainous Basin area and the Adriatic area.

The Federation of Bosnia and Herzegovina is in turn divided into 10 cantons and counties. These regions (cantons) are the second level of local autonomy in the Federation of Bosnia and Herzegovina. The names of cantons or counties are: Una-Sana, Posavina, Tuzla, Zenica-Doboj, Bosnia-Podrinje, Central Bosnia, Herzegovina-Neretva, West Herzegovina, Sarajevo and Hercegbosnia.

When it comes to statistical monitoring of development indicators, they are in the Republic of Srpska monitored at national and municipal levels, and regions as levels of analysis are used only in the Chamber of Commerce and other organizations. In the Federation of Bosnia and Herzegovina statistical indicators are monitored regionally, or by the cantons or counties. Unfortunately, no level of statistical analysis does provide separate indicators for rural and urban areas with the exception of the surveys that have been carried out periodically.

The rural and regional development policy should acknowledge and recognize the differences in the level of development of the various regions and offers solutions for the convergence conditions and quality of life in all regions. Policy of a balanced local and regional development is based on the need to create conditions of life in which everyone will have equal opportunities to develop their potential, regardless of their place of residence and other, related, features. This policy is based on a partnership and cooperation between the public, private and civil sectors and this relates to the cooperation between government authorities, local (regional) governments, local governments, businesses, academic and professional institutions, social partners and civil society organizations from the region.

Within balanced local and regional development the basic principles of modern regional policy needs to apply, which is reflected in the following:

- The principle of *subsidiarity*, which refers to the process of decentralization and reform of the state administration in the sense that the central authority should have a subsidiary function only in carrying out those responsibilities and tasks that cannot be effectively implemented by the regional or local level. This is necessary to implement parallel with the process of raising the level of competence of local and regional authorities, as subsidiarity can lead to inefficiencies in terms of lack of capacity to implement new responsibilities;
- The principle of *partnership*, which is related to the cooperation of the public, civil and business sector at all stages of design, implementation, monitoring, evaluation and funding of development programs on a local and regional basis, so that all stakeholders (local and regional authorities, the other carriers development and actors, non-governmental organizations, social partners, representatives of the business community, etc.) are included in all stages of design and implementation of development programs;
- The principle of *programming* refers to the need to adopt multi-year development plans, which is also necessary to adopt and implement in accordance with the principles of partnership. Programming is necessary to implement in coordination with local, regional and central level. In this regard, the local development strategy is necessary to comply with national development strategies, and local rural development plans with the Strategic Plan for Rural Development at the entity level. Here we should emphasize the need for active public participation in the process of programming. Public participation in the form of representatives from various non-governmental and other civil society organizations in the early stages of the programming process makes a significant contribution not only to increase the chances of success of the programming process, but also to avoid non-productive investment. Social consensus is very important, first of all, to the success of local and regional initiatives, which also creates a dynamic environment for foreign investors and economic actors. The participation of the younger generation in the process of planning and programming increases the chances for the public interest for long-term planning and development of effective and innovative participation;

- The principle of monitoring and evaluation (M & E) should be implemented in a way that defines the procedures for their systematic application, ex ante and ex post implementation of any development program.

In this regard, it is necessary to create a legal basis, and to suggest the necessary mechanisms at the central and lower levels for the incorporation and implementation of the basic principles of EU regional policy (the principle of subsidiarity, partnership, programming, complementarity, coordination, concentration, and monitoring and evaluation) in the regional policy of Bosnia and Herzegovina - in order to create a basis for the implementation of modern regional policy, which is also compatible with EU regional policy. In this regard, it is necessary to:

- Create a Law on Regional Development, which would define the regions, regional development objectives, measures and programs to promote regional development, institutional responsibility for regional development, the method of financing of regional development, the criteria for measuring the competitiveness of the region and other elements in accordance with the European regulations;
- Define the criteria on the definition and delimitation of less favoured areas;
- Make a plan (policy or strategy) for balanced regional and local development;
- Revise the Law on Local Self-government in accordance with the European regulations in order to implement the decentralization process;

Considering the dominant rural character of the region in the RS, and the fact that a balanced local and regional development cannot be achieved without the application of the principles of sustainable rural development, as well as that the sustainable rural development cannot be achieved without a balanced local and regional development, there is a basis for both development concept to be regulated under common strategic framework and institutional arrangements.

Conclusion

The aim of this study was to investigate the optimal model to stimulate the sustainable development of rural areas and finding the most effective policies and management models, to be implemented by all levels of

government. Analysis of strategic and institutional context of rural development has shown the existence of strategic orientations for rural development at all levels of government, an increase of funds for rural development, particularly in the RS, a broad list of support measures for rural development, and the weak level of utilization of individual measures.

Support system at different levels of governance is not harmonized and rural development policy is implemented at the entity level, while the institutional structure for the management of rural development has not been fully developed. Models for managing rural development within the entities are only partially decentralized. The optimal model of rural development in Bosnia and Herzegovina in line with EU policy should have a system of decentralized management in all phases: management, programming, funding and design of rural development.

The rural and regional development policy should acknowledge and recognize the differences in the level of development of the various regions and offers solutions for the convergence conditions and quality of life in all regions. Privacy balanced local and regional development is based on the need to create conditions of life in which everyone will have equal opportunities to develop their potential, regardless of their place of residence and other, related, features. Hence, the policies in rural and regional development should be based on partnership and cooperation between the public, private and civil sectors, that understands the cooperation between government authorities, local (regional) governments, local governments, businesses, scientific and professional institutions, social partners and civil society organizations from the region. Vertical coordination in the management of rural development should ensure participation of all stakeholders of the importance of rural development and the creation and implementation of rural development policy. Horizontal coordination should ensure intersectoral cooperation and efficient use of resources for the development of rural areas.

Coordination in the management of rural development should also imply coordination of resources in funding programs, measures and rural development projects at all levels of government, to ensure maximum efficiency in the use of funds, as well as their effectiveness in accordance with the program approach and the planning and implementation of the budget for funding rural development programs.

At the state level, appropriate institutional coordination should be established which is based on the constitutional responsibility of the relevant institutions, while at the entity and the regional level a set of relevant Bodies should be established that will use the network for the development of rural areas to develop partnerships with public, private and civil sectors and lead activity on the implementation of strategic, regional and local development programs.

Decentralization of the management of funds implies decentralization in terms of providing different sources of funding (European funds, national funds, funds of users), decentralization of payments (Commission, national fund, and paying agency), decentralization of control (the Commission, the certification body, ministries, agencies for payments). Rural areas in Bosnia and Herzegovina are faced with many problems and contradictions in its development. Therefore, the optimal development model is the model which will fully respect the particularities of certain areas and be supported by adequate measures of a wider range (economic, ecological, social, demographic, and other similar measures).

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FINANCIAL INSTRUMENTS FOR ENVIRONMENTAL PROTECTION PROMOTION

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Abstract

Research subject of this paper is analysis is the function of economic instruments in environmental protection, with a goal to emphasize the importance of ecological taxes and the necessity of rational usage of limited natural resources. In this paper comparative analysis is used in order to look at the ecological tax system in EU countries, neighboring countries and our country as well. Through research it was found that experiences in the application of ecological taxes are modest. In Scandinavian countries the level of awareness of the importance of environmental protection and revenues from ecological taxes is high. Unfortunately, the application of ecological taxes in Serbia is still relatively modest, even though a progress was recorded in recent years. It is necessary to encourage the use of ecologically friendly technologies, fuels and energy sources that minimally damage the ozone layer.

Key words: *ecological tax, economic instruments, environment*

Introduction

The result of contemporary trends in industrial production and intensive agricultural production is environmental pollution at a high degree. The government is taking a number of measures aimed at reducing pollution and protecting natural resources. Economic instruments have a special role that appears in various forms, such as taxes and fees, subsidies or as a kind of refundable deposit. Within economic instruments the majority is ecological taxes. In the EU, Scandinavian countries have the highest revenues from ecological taxes, while in Serbia revenues from ecological taxes have a small share in GDP. The system of ecological taxes and

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ecological policy are still not sufficiently developed and the impact on their impact on environmental protection is limited.

The function of economic instruments in environmental protection

ECOLOGICAL TAX – One of the basic principles of economic as pointed out by Mankiw is that “*Markets are usually* a good way to organize economic activity”. It can be concluded that the “invisible hand” of the market, according to Smith, leads the consumers to choose products freely guided by their desire to maximize personal benefit. The question that arises is what happens in the case when the market isn’t functioning and doesn’t provide resource allocation. In practice, instruments that would allow overcoming market inefficiencies are needed.

The idea of introducing a special instrument of the tax system that would serve in preserving the environment, originates from Arthur Pigou. According to Pigou monopolies and imperfect competitions often lead to irrational use of natural resources, and ecological taxes would contribute to overcoming the limitations and imperfections of the market. During the period of strengthening ecological awareness Pigou’s idea on taxing externalities was expanding. However, during the late eighties, the amount of ecological taxes increased and their punitive character was enhanced, so ecological taxes gained their importance. Classical Pigovian tax involves paying per unit of emitted or discharged pollution. In practice more money is used for ecological purposes - Pigovian taxes. This group consists of: indirect taxes – customs, general sales tax and excise tax. In fact, products whose production or consumption leads to pollution of the environment are taxed at a higher tax rate while ecologically eligible products are taxed at a lower rate.

Ecological tax, according to Ilić – Popov (2000) should be: ecologically effective; shouldn’t prevent allocation of resources; simple in a tax-administrative sense; inexpensive and as neutral as possible in relation to the competition conditions and performance of free trade. The main roles of ecological taxes, according to Jelčić are: ***Internalizing external costs*** – ecological taxes should ensure that by adjusting prices of certain goods and services optimal use of the environment is achieved and in that way increase economic efficiency. ***Motivating role*** – ecological taxes should encourage potential polluters to choose between paying taxes or give up polluting and thus liberate themselves from paying taxes. ***Fiscal role*** – even though ecological taxes are of limited fiscal importance, they

contribute to an increase of total public revenue in country. Revenues collected in this way fund measures for pollution control and various environmental protection programs.

Economic instruments of ecological policy, according to Ilić – Popov (2000) can be divided into ecological taxes in a narrow and broad sense:

ECOLOGICAL TAX IN NARROW SENSE implies introducing payments for goods that have an influence on pollution of the environment or deficit goods. Ecological taxes in narrow sense consist of Emission taxes, Taxes on products and taxes on inputs and Tax differentiation.

Taxes on emissions are Pigovian taxes, so the amount of tax burden is determined per unit of pollution emitted with a goal to tax all activities that cause negative externalities. Fiscal effect of tax on emissions is still modest, due to high costs of establishing and introducing these taxes.

Taxes on products and taxes on inputs are used for taxing products that create pollution, whether it was at the time of their production or consumption. Taxes on inputs are used to tax raw materials used in the production of finished goods in the event that they lead to environmental pollution. In the event that production, importation or consumption of final products endangers the environment they are taxed by tax on products. These taxes are more efficient and have lower administrative costs. Insufficiencies and limitations of these taxes are due to their inability to include all inputs.

Differentiated taxation means taxation of similar products by different tax rates depending on their ecological characteristics. Lower tax burden is envisaged for ecologically friendly products and a higher burden for harmful products.

ECOLOGICAL TAX IN A BROADER SENSE implies various fees, charges and taxes for non-compliance with ecological standards and ecological regulations. Ecological taxes in broader sense are ecological fees. It is difficult to methodologically differentiate the concept of ecological taxes and ecological fees, as both payments are the "cost" of pollution. Forms of ecological fees are: Fees for use of public goods, Fees for pollution and Fees for products.

Fees for the use of public goods are legally set prices for the use of public goods. This fee is determined depending on the amount of operating costs of using public goods.

Pollution fees are followed by large overhead costs. Additional problems are related to measuring harmful emissions and measuring the pollution of different pollutants, which come from various sources of pollution. Developed industrial countries apply the following ecological fees: *Fees for air pollution, Water pollution fee, Fee for soil contamination, Waste fees, Fee for increased noise and Fee for creating unpleasant odors.*

Product fees burden prices of products that have a negative impact on the environment, whether in the production or consumption phase, in order to encourage the production and use of ecologically reliable products.

SUBSIDIES – In the group of economic instruments for environmental protection, subsidies are very important. Subsidies are a form of financial assistance to potential polluters, respectively users of natural resources. Subsidies encourage polluters to reduce pollution, to adjust their behavior to set ecological standards or to introduce new modern production technologies. According to Parry (1998) four groups of subsidies are used:

- *Pigovian subsidies* increase efficiency by encouraging external effects (by subsidizing forestation soil erosion is reduced, flooding of rivers, etc.).
- *Indirect subsidies* improve the environment by encouraging the production of ecologically acceptable products.
- *Production subsidies* should discourage the production that could create external costs (subsidies to farmers not to organize their agricultural production in the so-called ecologically sensitive areas).
- *Non-ecological subsidies* negatively affect the mitigation of ecological problems (for example subsidies granted to agriculture may affect deforestation, increased use of fertilizers and pesticides thus directly causing environmental pollution).

SYSTEM OF RETURN OF DEPOSITS - Deposit refund system involves the obligation of paying additional fees i.e. deposits for

ecologically unfriendly products. The aim of introducing deposits is so that contaminants are additionally burdened at the beginning of the production process. In case that the polluter does not cause pollution with his activities he has the right to a refund of his deposit. Deposit refund system indirectly encourages recycling (paying a deposit when using glass bottles or cans).

MARKET OF TRADABLE PERMITS – The market of tradable permits is a recent economic instrument for environmental protection. Transferable licenses imply a system in which the polluters increased pollution from one source must be compensated by reducing their pollution from other sources. The market share of overall pollution allowed is specified by a permit. Pollutant's unused license can be sold on the market.

TAXES FOR CONTEMPT OF ECOLOGICAL STANDARDS AND ECOLOGICAL TAXES - are a kind of punishment against individuals and legal entities in the event of non-compliance with regulations on environmental protection. The main purpose of taxes is of a fiscal nature in order to fund ecological expenditures.

ADMINISTRATIVE TAXES - are, according Đorđević and Ignjatijević (2013), special and individual fees for services that state agencies and institutions, within their power do, at the request of individuals and legal entities. Their height is determined by the amount of costs that state authorities have when performing certain actions.

Ecological tax instruments in the European union

Economic instruments for environmental protection which are used the most in the EU are: ecological taxes, deposit system and trade of rights. In the EU countries ecological tax is used as a tax measure in the taxation of energy, transport, protection of air, water and waste management. *In the energy sector* there are elements of environmental endangerment that differ significantly from country to country. The purpose of these taxes is to reduce the pollution of nature. *In the field of transport* in recent years efforts have been made to reduce emissions from the use of motor vehicles. Motor fuels are burdened by numerous taxes (value added tax, respectively other general sales tax, excise tax, special taxes, special ecological taxes, etc.), while traditionally the most significant in the EU are excise taxes on petroleum products. Tax differentiation is present in

all of the EU countries and it involves the application of different tax rates depending on the quality and type of fuel (unleaded petrol is taxed at a lower tax rate than leaded petrol in order to encourage its use). Certain countries (Finland, Norway and Greece) apply tax incentives for purchase of "cleaner" cars that meet certain emission standards.

The application of tax incentives in Greece has had positive results and reduced the number of old vehicles. In the air transport sector significant fees are paid for the increased noise caused by aircrafts taking off and landing (Belgium, France, Germany, Hungary, Netherlands, Norway, Poland, Sweden and Switzerland). *In agriculture* inputs are taxed, and those are fertilizers (Norway and Sweden) and pesticides (Denmark, Finland, Norway and Sweden). In particular *ecologically unacceptable products can be taxed* in order to limit their use, respectively encourage recycling.

Thus, for example tax is used on: batteries (Belgium, Denmark, Hungary, Portugal, Sweden and Switzerland); paper bags (Denmark); plastic bags (Denmark, Hungary, Iceland, Poland, Switzerland and Italy); disposable aluminum cans for soft drinks and beer (Belgium, Denmark, Finland, Hungary, Iceland, Norway, Poland and Portugal); tires with nails (Denmark, Finland and Hungary); substances that damage the ozone layer (Czech Republic, Denmark, Hungary and Poland); disposable cameras and razors (Belgium); car lubricants (Denmark, Finland and Norway); solvents, cardboard cups, disposable plates (Denmark); *In the field of water protection* several fiscal charges are used (fee for the use of water and fee for wastewater). *In the area of waste management* ecological fees are used in order to reduce the amount of waste and encourage recycling. These include: fees for waste disposal, special fees for hazardous waste and tax for waste disposal.

In the EU, the Nordic countries have the highest awareness of the need to protect the environment. By the number and diversity of ecological taxes and ecological fees, these countries are the most advanced in their application (Denmark, Finland, Norway, Sweden, Belgium and Netherlands). On the other hand, there are countries that are lagging behind in the use of tax instruments in order to lead an active environmental policy (Spain, UK, Italy, Turkey and Greece).

Below, the participation of ecological taxes in GDP and total tax revenue in the EU countries is shown.

Table 1. *The shares of revenue from ecological taxes in GDP respectively total tax revenues*

Member states	Share in GDP (%)					Share in total tax revenues (%)				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
EU (27 countries)	2,48	2,4	2,34	2,39	2,37	6,29	6,09	5,95	6,24	6,19
Euro zone (17 countries)	2,43	2,32	2,25	2,3	2,26	6,08	5,78	5,67	5,9	5,81
Belgium	2,15	2,08	1,96	2,02	2,07	4,84	4,75	4,44	4,66	4,71
Bulgaria	2,9	3,37	3,45	3,04	2,92	9,45	10,1	10,69	10,49	10,66
Czech Republic	2,48	2,41	2,35	2,42	2,39	7,03	6,73	6,83	7,2	7,07
Denmark	4,78	4,65	4,21	3,95	4,01	9,63	9,5	8,82	8,27	8,42
Germany	2,41	2,23	2,2	2,28	2,21	6,24	5,77	5,67	5,81	5,79
Estonia	2,19	2,2	2,33	2,98	2,98	7,14	6,99	7,33	8,35	8,72
Ireland	2,48	2,46	2,5	2,35	2,37	7,75	7,86	8,45	8,36	8,40
Greece	2,01	2,08	1,96	1,96	2,41	6,34	6,38	6,08	6,45	7,79
Spain	1,87	1,82	1,64	1,62	1,65	5,07	4,89	4,97	5,27	5,16
France	1,99	1,9	1,87	1,9	1,86	4,31	4,18	4,13	4,32	4,16
Italy	2,76	2,66	2,5	2,66	2,60	6,63	6,23	5,86	6,22	6,14
Cyprus	3,29	3,37	3,16	2,91	2,92	9,21	8,4	8,19	8,23	8,17
Latvia	2,41	2,08	1,96	2,33	2,41	7,89	6,8	6,71	8,75	8,81
Lithuania	1,80	1,77	1,64	2,04	1,86	6,15	5,98	5,48	6,98	6,87
Luxembourg	2,63	2,54	2,5	2,49	2,38	7,33	7,13	7,05	6,61	6,41
Hungary	2,82	2,81	2,7	2,67	2,62	7,57	6,96	6,7	6,64	6,95
Malta	3,4	3,78	3,45	3,35	3,07	10	10,86	10,19	9,77	9,22
Netherlands	4,03	3,8	3,89	3,99	4,00	10,34	9,82	9,92	10,42	10,32
Austria	2,47	2,42	2,4	2,42	2,37	5,96	5,8	5,63	5,69	5,64
Poland	2,76	2,68	2,61	2,56	2,58	8,16	7,71	7,61	8,05	8,13
Portugal	2,87	2,83	2,56	2,5	2,49	8,9	8,62	7,81	8,08	7,91
Romania	1,94	2,06	1,78	1,87	2,05	6,81	7,09	6,35	6,98	7,53
Slovenia	3,01	3	3	3,57	3,64	7,86	7,97	8,06	9,50	9,60
Slovakia	2,28	2,12	2,04	1,95	1,87	7,79	7,23	6,98	6,76	6,65
Finland	3,01	2,74	2,69	2,63	2,76	6,88	6,39	6,27	6,17	6,55
Sweden	2,74	2,64	2,7	2,85	2,76	5,68	5,59	5,83	6,09	6,02
Great Britain	2,4	2,45	2,44	2,59	2,62	6,53	6,76	6,45	7,45	7,36
Iceland	2,49	2,38	1,76	1,55	1,79	6,02	5,87	4,8	4,6	5,11
Norway	2,79	2,77	2,44	2,58	2,60	6,42	6,44	5,79	6,08	6,07

Source: <http://epp.eurostat.ec.europa.eu>

Based on the data, we conclude that the fiscal importance of ecological taxes, pronounced by their share in total tax revenues in 2010 is highest in Bulgaria (10.66) and in Netherlands (10,32%). The largest share of revenues from ecological taxes in GDP is in Denmark (4.01%) and Netherlands (4.00%).

The available data indicates fluctuations in the share of revenues from ecological taxes in GDP and the share of total tax revenue at the EU level. From 2006 to 2010 there was a reduction of ecological taxes in the share of total tax revenues in the EU (27 countries) from 6.29% to 6.19%. The relative share of revenues from environmental taxes in GDP in the analyzed period in the EU (27 countries) was reduced from 2.48% to 2.37%.

Table 2. Total revenue from ecological taxes by the type of tax, EU-27, 2010

Name	EUR (in millions)	% of total ecological taxes	% of GDP	% of total tax revenues
Total ecological taxes	292.434	100,0	2,37	6,19
Energy tax	219.114	74,9	1,79	4,67
Transport tax	61.964	21,2	0,49	1,29
Taxes on pollution and resources	11.356	3,9	0,10	0,22

Source: <http://epp.eurostat.ec.europa.eu>

Ecological taxes can be divided into four categories - taxes on energy, transport, pollution and resource consumption. The most important amongst ecological taxes in the EU is tax on energy use. The share of energy taxes is the largest in the total of ecological taxes and it is at 74.9%, in total tax revenue it accounts for 4.67%, i.e. 1.79% of GDP. In

recent years new categories of tax were introduced so an increase in tax revenues is expected.

Ecological tax instruments in the Republic Serbia

In Serbia, and numerous countries in transition an inadequate environmental tax system was inherited. The main purpose of ecological taxes was fiscal, and most companies were ready to pay a fine in the form of taxes or fees, without paying particular attention to the protection of the environment.

Privatization, restructuring and recession in the countries in transition, had a negative impact on the environment. In recent years, the development of economic activity and living standards has caused significant improvements in the protection of the environment.

However obsolete industrial production continually negatively affects the environment. Air and water pollution is high and exceeds the standards set by law.

In Serbia, the law defines the following benefits:

- Fees for water;
- Forest and agricultural fees;
- Fees for roads;
- Fee for use of mineral resources;
- Tourist and spa resort fees;
- Ecological fees;
- The fee for the use of air space;
- The fee for the use of radio frequencies and TV channels.

The Water Act regulates the management and use of all surface and underground water on the territory of Serbia. The law defines **water fees**: fees for use of water resources, fee for discharged water, water pollution fees, fees for drainage, fee for use of water facilities and systems and basin water fees.

Table 3. Fees for water use, wastewater discharge and for material extraction from water streams

Types of fees	Unit	Amount in dinars
1) Exploitation of water		
Drinking water	m ³	
Households	m ³	0,2068
Personal needs	m ³	0,3341
Companies	m ³	0,3996
Hydroelectric power plants	kWh	2,3% to 3,1799
Thermal power plants	kWh	1,25% to 3,1951
Mineral water	l	1,2147
Thermal water	m ³	3,80
2) Wastewater		
The processing industry	m ³	4,5622
Food processing, metal processing and construction industries	m ³	2,6655
Wood processing and processing of non-metals	m ³	2,5575
Thermal power plants	kWh	1,25% od 3,1951
Water utilities	m ³	0,1863
Other types of wastewater	m ³	1,2722
3) Material extracted from water streams		
From river beds	m ³	51,4082
From land affected by erosion	m ³	64,2523
From agricultural, forest and other land	m ³	100,2349

Source: Regulation on fees for water for year 2012, "Official Gazette of the RS", num. 25/2012

Agricultural Land Law, Forest Law and subordinate legislations based on these grounds have been introduced and regulated for **agricultural and forestry fees**. Agricultural Land Act defines the regulations concerning protection of land. This primarily involves prohibition of discharges of hazardous substances. The law provides compensation for the use of agricultural land for non-agricultural purposes in order to protect agricultural land. Forest Law stipulates payment of fees for the use of forest resources. Tax revenues are flowing into the Forest Administration and are intended to finance forest management.

Law on public roads defines **fees for roads** such as: annual fee for motor vehicles, tractors and trailers; annual fee for motor vehicles which have not been previously covered; fee for special transport; fees for placement of advertising boards, advertising panels, devices image and sound announcement or advertising on a public road, respectively on other land used by the public road manager; special fee for use of the public road, its parts or road facility (toll fee); fees for excessive use of the public road, its parts or road building; fees to lease parts of a land strip of a public road; rental fee for other land used by the public road manager; fees for connecting the road to a public road; fees for placement of water, sewer, electric, telephone and telegraph lines; fees for the construction of commercial buildings with access from a public road; the annual fee for the use of commercial facilities with access to a public road and fees for the use of state roads for vehicles registered abroad.

Law on Mining and Geological studies defines a **fee for the use of mineral resources**. The fee is determined depending on the type of a mineral and other geological resources, the level of exploration of the field, estimated ore potential of a research area, etc. The Tourism Law stipulates **spa and resort fees**. Tourism fee is an amount paid for conducting activities in the tourism area.

Table 4. *The highest and lowest amount of tourist compensation for the category of tourist places*

Category of touristic places	The highest amount of dinars per m2	The lowest amount of dinars per m2
I category	20	10
II category	16	8
III category	12	6
IV category	10	5

Source: *Regulation of the highest lowest amount of tourist fees („Official Gazette of RS“, num. 21/2010)*

Under the Law on spas users of natural healing factors in spas (thermal mineral water, mud and gas) pay a fee for its use. The fee is paid by the quantity of natural healing factors used. The funds generated from this fee represent the revenue of the municipal budget, and are used for preservation and utilization of spas.

Law on Environmental Protection defines environmental fees. The law distinguishes between the following economic instruments: Pollution fees (Fees for emission, Fees for waste and Fees for production); Fees for use of natural resources; Schemes for refunding deposits; Subsidies, tax incentives exemption from payment of fees; Fines for non-compliance with ecological standards.

In Serbia, pollution charges have been introduced for: SO₂, NO₂ emissions, dust and particles; Substances that damage the Ozone Layer, Manufacture and disposal of hazardous and non-hazardous industrial waste; Use of motor vehicles. Types of pollution are all environmental pollutions that originate from the following sources of pollution:

- Emissions of individual sources of pollution;
- Manufactured or disposed waste;
- Substances that damage the Ozone Layer;
- Plastic polyethylene bags so called wrapper bags.

Table 5. *Fee amounts for emissions of SO₂, NO₂ and dust in Serbia*

Types of pollution	Amount in dinars	Units	Corrective incentive coefficients
SO ₂	5.330,00	For one ton of emissions	Reduced fee rates are applied for emissions under 500t annually and emissions below the established maximum value. Corrective incentive coefficient k ₂ is determined according to the origin of SO ₂ or NO ₂ or particulate matter emission.
NO ₂	4.264,00	For one ton of emissions	
Dusty materies	8.528,00	For one ton of emissions	
	120.000,00	For one ton of dust from asphalt plant	

Source: *Art. 7 to 16a of the Regulation on types of pollution, the criteria for calculating fees for pollution of the environment, the amount and method of calculating fees, Official gazette of RS, num. 91/2012.*

Waste Management Act defines waste management in order to reduce pollution, noise, odors and other unpleasant smells.

Table 6. *The amount of waste fee*

Products that become waste after use	Fee amount
I TIRES	
Imported, manufactured or retreaded tires from motor vehicles	17.000 din per tone
Tires for cars and car trailers	110 din per tire
Tires for vans, commercial vehicles up to 3.5 tons and tractors	170 din per tire
Tires for trucks, buses and forklifts	950 din per tire
Tires for construction machines	30 din per kg per tire
Tires for agricultural machinery	20 din per kg per tire
Tires for cargo trailers and trailed equipment	20 din per kg per tire
Tires for vehicles, transport equipment, planes and other	30 din per kg per tire
II MANUFACTURED AND IMPORTED PRODUCTS CONTAINING ASBESTOS	100 din/kg per product
III WASTED BATTERIES AND ACCUMULATORS	
Starters	15 din/kg
Mobile batteries or accumulators	150 din/kg
Industrial batteries and accumulators	15 din/kg
IV WASTE OIL	10 din/kg or 9 din/liter

Products that become waste after use	Fee amount
V WASTE ELECTRICAL AND ELECTRONIC PRODUCTS	
Grade 1 - Large household appliances;	1) od 30 do 1500 din
Grade 2 - Small household appliances;	2) od 60 do 250 din
Grade 3 - IT and Telecommunications equipment;	3) 1%, 5% or 10% PDV
Grade 4 - Consumer equipment for entertainment;	4) 30 din/kg
Grade 5 - Lighting equipment:	5a) 4,13 din/piece
5a) fluorescent, compact and other lamps;	5b) 20 din/kg
5b) incandescent lamps;	6) 50 din/kg
Grade 6 - Electrical and electronic tools (except large stationary industrial);	7) 30 din/kg
Grade 7 - Toys, leisure and sports;	8) 50 din/kg
Grade 8 - Medical assistive devices (except large stationary therapeutic diagnostic);	9) 100 din/kg
Grade 9 - Apparatus for monitoring and supervision;	10) 100 din/kg
Grade 10 - Slots.	

Source: *Regulation on products that become special waste streams after use, form of daily records of the amount and type of produced and imported products and annual report, the method and deadlines for submission of the annual report, fee payers, criteria for the calculation, the amount and manner of compensation and fee payment ("Official gazette of RS", num. 54/2010).*

The fee for a motor vehicle is calculated according to the type of vehicle, type of engine and fuel, the working engine displacement and age. Calculation of fees for motor vehicles is carried out according to the vehicle and payer's data listed in the vehicle documents. Compensation is paid in a sum in advance for 12 months.

Conclusion

Most European countries have introduced a series of ecological tax measures, in order to provide ecological benefits. Tax policy makers have focused on ecological taxes, respectively tax burden from labor to environmental factor by directly imposing ecological taxes on the sectors responsible for polluting the environment. By researching, we found that recent experiences in applying ecological taxes are still relatively modest, and the highest revenues from environmental taxes and other economic instruments generate Scandinavian countries. Funds raised with these taxes are intended to fund environmental projects. As a result of the implementation of ecological policy in the EU, significant results were achieved. Pollutant emissions, as one of the most important results, are under control. On the other hand, consumption of gasoline and other hazardous fuels is reduced, the use of environmentally friendly technologies is promoted in the production process and funds for investment in projects to protect the environment are provided.

In Serbia, the Law on Environmental Protection established the basis of the system of environmental protection based on the principle that "the polluter pays". The use of economic instruments recorded a progress, even though since the beginning of implementation of environmental fees for emissions of certain pollutants, the fee for emission from motor vehicles, fees for import of substances that damage the ozone layer, the fee for the production and disposal of industrial wastes, little time has passed. In Serbia, most of the revenues from ecological taxes are made of excise taxes on gasoline and diesel fuel. Also there are significant revenues from SO₂ and NO₂ emission taxes. It is important that the funds raised through the use of ecological taxes are used to fund projects for reducing environmental pollution. It's necessary to encourage the use of environmentally friendly technologies, fuels and energy sources that minimally damage the ozone layer. However, high price of environmentally friendly fuels, high electricity price and low life standard have resulted in harmful effects on the environment. In the future it is necessary to precisely define environmental goals. It is necessary to further elaborate on the specific economic and regulatory instruments in the goal of reducing pollution.

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SERBIA AS A COUNTRY FREE OF TRANSGENIC PRODUCTION - STATES AND CHALLENGES

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Abstract

The paper discusses Serbian policy on genetically modified organisms (GMOs). In this analysis it has been considered four factors: Serbian public attitudes towards GMOs, the pressure of the Great Powers, activities of non-governmental organizations and the anti-GMO movements, and the government position of the issue. In order to declare the entire state free from GMOs Serbia should establish a proper system of food chain control as well as strengthen movement activities to combat GMOs.

Key words: *GMOs free Serbia, pressure, public attitudes, Law*

Introduction

Genetically modified organisms (GMOs) and foods produced from them-genetically modified (GM) food is highly politicized issues observing the health, economic and environmental aspects. Between 1996 and 2012 the global area planted with GM crops increased by 100 fold, in 2012 covering some 170,3 million hectares (James, 2012). From the very beginning U.S. are major producer of GM crops, with 69.5 million hectares, which produce 95% of the nation's sugar beets, 94% of the soybeans, 90% of the cotton and 88% of the feed corn². In the first year of commercial cultivation of GM crops U.S. accounted for more than 88 %. In 2001, after five years of growing share of this country was 67.9 %, in 2006 U.S. share was 53.53%, while in 2012 the U.S. accounted for 40.8 % of the total area under GM

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² Genetically modified crops had bumper year in 2011, <http://usatoday30.usatoday.com/money/industries/food/story/2012-02-06/biotech-crops/53005000/1> (accessed 01 June 2013).

crops. In fact, U.S. involvement is gradually decreased with the inclusion of other countries in the production of biotech crops. Other major producers of GM crops are: Argentina, Brazil, Canada, China, Paraguay, India and South Africa (Table 1). In U.S. cross contamination has been widespread because there is not a segregated system for GM and non-GM crops. The concept of “substantial equivalence” as applied by the Food and Drug Administration (FDA) does not recognize any inherent risk depending on the source of the product. U.S. law does not require labeling, segregating, or monitoring of these crops.

Table 1. *Top countries GM producers, 1996-2012, million ha*

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
USA	1,5	8,1	20,5	28,7	30,3	35,7	39,0	42,8	47,6	49,8	54,6	57,7	62,5	64,0	66,8	69,0	69,5
Argentina	0,1	1,4	4,3	6,7	10,0	11,8	13,5	13,9	16,2	17,1	18,0	19,1	21,0	21,3	22,9	23,7	23,9
Brazil	--	--	--	--	--	--	--	3,0	5,0	9,4	11,5	15,0	15,8	21,4	25,4	30,3	36,6
Canada	0,1	1,3	2,8	4,0	3,0	3,2	3,5	4,4	5,4	5,8	6,1	7,0	7,6	8,2	8,8	10,4	11,6
China	--	0,0	<0,1	0,3	0,5	1,5	2,1	2,8	3,7	3,3	3,5	3,8	3,8	3,7	3,5	3,9	4,0
Paraguay	--	--	--	--	--	--	--	--	1,2	1,8	2,0	2,6	2,7	2,2	2,6	2,8	3,4
India	--	--	--	--	--	--	<0,1	0,1	0,5	1,3	3,8	6,2	7,6	8,4	9,4	10,6	10,8
South Africa	--	--	<0,1	0,1	0,2	0,2	0,3	0,4	0,5	0,5	1,4	1,8	1,8	2,1	2,2	2,3	2,9

Source: *James (2006, 2007, 2008, 2009, 2010, 2011, 2012)*

Europe has not followed the lead of the U.S. on GM food policy. The products of biotechnology are considered to be inherently different from traditionally developed crops. With its „precautionary approach”, the EU has one of the strictest regulatory frameworks for GM foods and seeds in the world. In fact, Europe is in a constant tension on the issue of GMOs cultivation, increasing the surface occasionally, sometimes approves new GMO, then bans the production, etc. As of 2012, just one GM crops have been cultivated in Europe- MON 810 maize. That compares to more than 90 GM varieties approved for cultivation in the US. Five countries Spain, Portugal, Czechia, Slovakia and Romania produce GM maize on 129,071 hectares, with Spain growing 90% of the total maize production/area/surface. The commercial cultivation for Amflora potato was discontinued in 2012. The commercialization and further development of this project has been completely stopped and there is no intention to resume cultivation in the future (BASF, 2013). Eight countries – Austria, Bulgaria, France, Germany, Greece, Hungary, Luxembourg and Poland – have adopted provisions that allow them to block the cultivation of GM crops on their territory. European fears over new food have included

possible health concerns, worries about damaging traditional agricultural practices and a strong feeling on the part of some that they are "unnatural."

Literature search indicates that the possible negative consequences to environment are: 1) Biodiversity can be threatened; 2) Genes can be transferred to other crops or wild relatives; 3) The properties of non-target species can be changed; 4) The health of soil can be impaired; 5) Super weeds and super insect resistance to pesticides (herbicides and insecticides) can occur; 6) GM animal can mate with wild relatives and 7) Environment can be stressed due to changes of production measures (Pacic Brankov, 2013). Possible health consequences are: 1) Increase of allergens and toxins in GM foods ; 2) The development of antibiotic-resistant bacteria; 3) Increased mortality; 4) Increased sterility, 5) Reduced sexual behavior; 6) Encourage the development of cancer; 7) Frequent miscarriages and premature births; 8) Toxic effects on the kidneys and liver, heart, adrenal gland, and hematopoietic system; 9) Increased aggressiveness; 10) Especially dangerous in newborns can lead to autism (Ermakova, 2006; Finamore *et al.*, 2008; Seralini *et al.*, 2007; Vendômois *et al.*, 2009).

A controversy over GM food arose in 2000 when it was discovered that some food aid donations contained GMOs and grew increasingly in 2002, when several Southern African countries refused GM food aid during a food crisis. The World Food Programme (WFP) and the US Agency for International Development (USAID) had sent shipments of food aid containing GMOs amounting to 3.5 million tonnes per year³. Often, such shipments were in contrast of the national regulations in the recipient country. Ecuador was the first known developing country to receive food aid in a shipment of 30,000 metric tons (MT) of bulk soya paste (FOEI, 2003). In the same year, 2000, some GMOs being found in food aid in Sudan and India, in year of 2001, GM soy was found in food aid shipments in Columbia and Uganda, in year of 2002 such shipments was found in Bolivia, Nicaragua and Guatemala. In response to the serious food shortage in Zambia, Zimbabwe, Malawi, Swaziland, Mozambique and Lesotho U.S. sent 500,000 tons of maize in whole kernel in the summer and fall of 2002, as food aid. When the countries discovered that the aid contained approximately 75 percent of GMOs (WFP, 2002), some of them said they would not accept it, some said they would accept it if it was milled and

³ Rejected GM food dumped on the poor, The Independent (London), <http://foodsafety.k-state.edu/en/news-details.php?a=3&c=29&sc=220&id=45098> (accessed 15 October 2013); Fred Pearce, UN is slipping modified food into aid. New Scientist, <http://www.connectotel.com/gmfood/ns190902.txt> (accessed 25 October 2013).

labeled first, some asked strict monitoring (ISIM, 2004). The U.S. refused to mill the maize before sending it and blamed Europe of being responsible for the African rejection.

The situation in Serbia

Similarly to other, mentioned above, developing countries a controversy over GM food in the Federal Republic of Yugoslavia (FRY) arose in 2001 when it was discovered that 50.000 tons of GM soybeans imported as food aid contained GMOs. FRY has twice refused the US aid of whole soybeans and corn. However, Serbian border repeatedly has been absorbent for entry of smuggled GM seeds. One of the main uncontrolled GM sources is the territory of Kosovo and Metohia, which has repeatedly received a large amount of US food aid (Papic Brankov, 2013). As a result of the Biotech Law adopted in June 2009, Serbia does not produce GMO crops and there is no biotechnology varieties permitted for imports to Serbia.

The current law regulates only conditions for the contained use, research activities, and field trials of biotech products under the strict control of the state. There is a strict and detailed application process for obtaining a permit for transgenic research. The application must provide all the necessary data on the particular biotech event or biotech crop and stipulate parameters for safety procedures and measures. All applications must be submitted to the Serbian Ministry of Agriculture for review and approval. Risk assessments are evaluated by the Biosafety Expert Council, which is composed of representatives from the scientific research institutions in the fields of agriculture, ecological, and biological science. The applicant must submit to the Ministry of Agriculture any renewal requests six months prior to the expiry of the original approval. According to the current GMO Law, agriculture products of non-animal origin are considered GMOs if they exceed a 0.9% threshold for GM content. For seeds and reproductive material the threshold is 0.1%. Despite Law, in Serbia there are thousands of hectares of illegal GM soy, which ends up in the food chain of cattle, mainly on family farms⁴. Worse, in our health food stores you can buy GMO soy in grain form (Dimitrijevic, 2013)⁵. According to Greenpeace (2008) organization that has drawn up a list of food products containing

⁴ Sevarlic: U Srbiji hiljade hektara pod GM sojom, <http://www.novosti.rs/vesti/naslovnna/ekonomija/aktuelno.239.html:455612-Sevarlic-U-Srbiji-hiljade-hektara-pod-GMO-sojom> (accessed 24 September 2013).

⁵ Miodrag Dimitrijevic, full professor at Faculty of Agriculture, University of Novi Sad, Personal communication, October 2013.

GMOs, some of them are on the Serbian market. That are, among other: chocolates (Snickers, M&M, Twix, Milky Way, Cadbury, Kraft, Ferrero Roche, and Nestle), drinks (Coca-Cola, Sprite, Fanta, Pepsi-Cola, 7 Up), children's drinks (Nesqick, Danone, Delma Unilever and Nestle), baby food (Hipp, Abbot Labs Similac), condiments and sauces (Knorr, Hellman, Heinz and Heinz Foods), yogurt and cheese (Danone), soup (Campbell), rice (Uncle Bens), tea (Lipton), coffee (Kraft) and fast food McDonalds. In the analysis of current Serbian policy towards GMOs as well as predicting future steps should be considered four factors: Serbian public attitudes towards GMOs, the pressure of the Great Powers, activities of non-governmental organizations and the anti-GMO movements, and government position of the issue.

Serbian Public Attitudes towards GMOs

It is well known that European consumers' attitudes towards GM in food production are negative. Numerous opinion polls, with the Eurobarometer surveys as the most well-known one, have shown that consumers do not like the idea of GMO in their food. Europeans have consistently been less positive concerning GM foods than Americans (Bernauer, 2003; Gaskell *et al.*, 2003; Jasanoff, 2007). There are some national differences, though the attitude is the most negative in the Greece and Cyprus and is the most positive in UK and Czech Republic, with Belgium, Sweden and Estonia in a middle position. Across the period 1996-2010 it could be seen a downward trend in the percentage of supporters. Per cent (%) of respondents who agree or totally agree that GM food should be encouraged fall from 52 % to 44 % in UK, from 66 % to 35% in Spain, from 49 % to 19% in Greece, etc.

Siegrist (2008) suggest that perceived benefits, perceived risks and perceived naturalness are important factors for the acceptance of new food technologies. Lay people may not only have difficulties in assessing risks associated with novel food technologies, but the benefits of such technologies may also not be obvious. Trust, therefore, is important for the acceptance of new food technologies. Several studies in EU and US pointed out that trust in government could play an important role in shaping public attitudes towards GM food, largely via its links to risk perception (Curtis *et al.*, 2004; Hossain & Onyango (2004); Wolf *et al.* 2004). In order to identify Serbian respondents' knowledge about biotechnology (true/false 'quiz'), consumers' perceived benefits, consumers' perceived risks, trust and willingness to consume and buy GM food a survey was conducted with 500

consumers. Data obtained from a survey were analysed using univariate and multivariate analysis and the statistical software SPSS. The questionnaire used in the research was consisted of 20 questions. It was organised into four groups of questions: consumers' perceived benefits (in terms of food quality), consumers' perceived risks and ethical issues, trust in the actors relevant to the food production chain and decision-making processes in that chain ('trust in government', 'trust in science', 'trust in NGOs' and 'trust in foreign companies') and acceptance of GM food (in terms of willingness to consume and buy GM food). The contents of each question group in the questionnaire are shown in Table 2.

Table 2. Questionnaire

Group	Items (Questions)
Perceived benefits (B)	B1. GM components enhance the taste of food B2. GM components positively affect the freshness of food. B3. GM components extend the shelf life of foods. B4. GM components enhance the nutritional value of food. B5. GM vegetables, fruits and cereals looks finer from the traditional.
Perceived risks and ethical issue (M)	M1. GM foods affect adversely the health of people. M2. GM foods affect negatively on the environment. M3. GM food is unnatural. M4. It is immoral and unethical to modify the genes of plants and animals. M5. Not enough information about GM food.
Trust (T)	T1. The state of Serbia is competent to make decisions regarding GM food. T2. I trust that the state authorities will take into account the interests of citizens in all future decisions regarding GM foods. T3. I trust the scientific analysis of risks and benefits of production and use of GM foods. T4. I trust the attitude of NGOs (e.g. the Green movement), in conjunction with GM food. T5. I trust foreign private companies, producers of GM foods.
Readiness to accept (R)	R1. How willing are you to consume foods with GM ingredients? R2. How willing are you to consume GM food if they reduce the amount of pesticides applied to crops? R3. How willing are you to consume GM food if they are more nutritive than traditional foods? R4. How willing are you to consume GM food if they would positively influence human health (for example, eliminated the cause of allergies)? R5. Would you buy GM food if it were the same taste as the traditional, but cheaper?

Source: *Papic Brankov et al., 2013*

Our results (Papic Brankov *et al.*, 2013) showed that most Serbian participants had negative opinion about GM in general. Majority of Serbian consumers believe that genetically engineered components extend the shelf life of food and enhance external appearance, but reduce its taste, freshness and nutritional value. They consider GM food potentially harmful to human health and environment. They believe that it is immoral and unethical to modify the genes of plants and animals, and are frightened by the lack of information. The majority of the respondents have no confidence in the state of Serbia and in scientific analysis or in multinational companies. Consumer surveys demonstrate that the major motivation for buying GM food seems to be health related.

Almost half of all respondents (48.56 %) said they would consume GM food if it positively influences the human health, which makes a threefold increase compared to 15.06% who generally accept this food. The question 'Would you buy GM food if it were the same taste as the traditional, but cheaper?' was used to assess how price affects purchase criteria and how important consumers perceive that the price is. Respondents' results showed that the price reduction issue does not have a dominant role in making buying decisions. Only 19.7% of respondents would buy GM food if it tastes the same as a traditional food, but cheaper.

Our results may generally imply that consumers who disapprove of buying GM food products cannot be easily persuaded to change their mind even with the additional nutritional enhancement in the product and a lower price. The main conclusion from this research is that the introduction of GM food into agro-food markets in Serbia should be accomplished by adequate policies to guarantee consumer safety, since some of the most influential factors in consumer perceived risk from these foods are distrust in multinational companies and concerns about health. Our findings suggest that nearly half of Serbian consumers have no trust in government, what means that possible GM food production approval of the State will not significantly increase its acceptance.

The pressure of the Great Powers

Very restrictive Law has caused long and constant pressure from representatives of different countries, so in December of 2010, Serbia completed the work on preparing amendments. The amendments will allow to import and to grow GMO crops and products, but only under very strict control of the state.

The biggest push for legislative change has been made by the U.S. Like many times in the past (Pacic Brankov and Lovre, 2013) U.S. used World trade organization (WTO) as an instrument of threat. Therefore, official document of the U.S. Embassy in Belgrade says „Restrictive law on GMOs is continuing to be one of the main obstacles for the Serbian future accession to the WTO“ (USDA, 2012). In the last annual report on biotechnology U.S. Embassy expressed dissatisfaction with the cooperation with the Ministry of Agriculture „the Ministry of Agriculture is keen to promote Serbia’s non-GE and organic production and has done little to dispel any misinformation about biotechnology and EU approved GE events” (USDA, 2013).

In order to promote the transgenic technology American Embassy often sponsors the training of local experts in the U.S. Also, the Embassy sponsored arrivals of foreign experts in Serbia. For example, in April 2013, five Serbian experts participated on an “Open World” program on biotech research and legislation. “Open World” programs provide an opportunity for countries to exchange views on a particular theme.

The team visited Washington DC and Tulsa, OK; In September 2012, the US Embassy sponsored two speakers - Dr. Ralph Scorza, USDA/ARS plant breeding scientist and Victor Felix Nicolescu, member of Romania’s National Sanitary, Veterinary and Food Safety Authority to discuss US and EU regulatory frameworks. Dr Scorza also described his research on a disease resistant GE plum; In May 2013, the North American Export Grain Association (NAEGA), sponsored a speaker for two feed events in Serbia. The events focused on best practices in grain production, biotech legislation in the U.S. and EU, some practical suggestions for mycotoxin management, and the importance of adopting international science based standards that foster innovation and trade.

As in the other parts of the world, in Serbia Monsanto directly or indirectly participate in creating the conditions for the opening of the new market. So, in May 2012, the University of Belgrade’s Department of Agriculture hosted the Fifth International Undergraduate Research Symposium (IURS). Undergraduate researchers and their “advisors” from the United States, Philippines, and Serbia (including members from the University of Novi Pazar) spent six days discussing the results of each university’s agricultural research efforts.

The guests—two students and an instructor from Ohio’s Wilmington College—received grants on behalf of Monsanto Corporation⁶. Embassy believes that the issue has proven to be too politically charged, so that even politicians in favor of innovation do not take a public stance.

Grain farmer and trader organizations are not united on the issue, as there is both an import and export interest involved. Serbian researchers are well educated and are not anti-GMO, but are not active in passing these messages to the general public.

Anti-GMO campaign

The anti-GMO campaign in Serbia included a large number of organizations and individuals, but two are the leading: Green and Dveri Movements. These groups make claims that membership in the WTO automatically mean acceptance of GMO⁷ and lately, it appears that their activities against GMOs strengthen.

On May 2013, Serbia was one of 40 countries that have organized protest against Monsanto. The rallies are organized by “March Against Monsanto” movement, and it is estimated that about 200,000 activists was participated the massive campaign which includes 6 continents, 40 nations, and at least 48 U.S. countries.

In Serbia, the protest was held in Belgrade on the Main Square, Novi Sad on the Square of Freedom and in Nis on the Square of King Milan. Acknowledged university professors spoke about the negative effects of GMO seeds, food for the health of people as well as the Serbian economy, specifically.

So far, more than 80 municipalities in Serbia with four million inhabitants, has made "a declaration against GMOs," which are the local government declared its territory for GMO-free zones, including cultivation, import and trade (Picture 1).

⁶ The Seed of Food Fascism, <http://www.balkanstudies.org/articles/seed-food-fascism> (accessed 12 October 2013).

⁷ Dveri zahtevaju da Skupština proglasi Srbiju za državu bez GMO. <http://www.vesti.rs/Dveri/Dveri-zahtevaju-da-Skupstina-proglasi-Srbiju-za-drzavu-bez-GMO.html> (accessed 1 November 2013).

Government policy on GMOS

Observing international agreements relevant in a some way to GMOs, Serbia is currently a member of CODEX Alimentarius, the European Plant Protection Organization (EPPO), the Convention on Biodiversity (CBD), the International Union for the Protection of the new Varieties of Plants (UPOV), the World Intellectual Property Organization (WIPO), the European Cooperative Program for Crop Genetic Resources Networks (ECP/GR), and is a signatory of the Aarhus Convention and the International Plant Protection Convention (IPPC). Serbia is a party to the Convention on Biological Diversity, ratified in 2002, and ratified the Cartagena Protocol on Biosafety in 2006. According to Serbia's obligations under the protocol, it must create a Biosafety Clearing House (BCH) consisting of a national database keeping record of all biotech trials, production, and trade activities in the country.

The legal regime for Intellectual Property Rights (IPR) protection has improved substantially in recent years as Serbia has revised laws to meet the WTO's The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) standards, although Serbia is not yet a WTO member. IPR Intellectual property rights are treated in a series of laws, as follows: The Law on Copyright and Related Rights (2009), The Law on Patents (2004), The Law on Trademarks (2009) and the Law on Geographical Indications (2010).

The Ministry for Agriculture, Forestry and Water Management is the competent authority responsible for all GMOs issues in Serbia. The Ministry deals with all contained use of GMOs and is the focal point for the Cartagena Protocol, Biosafety Clearing House, plant varieties registration and protection, genetic resources, and accreditation of laboratories. The Agricultural Ministry is also responsible for appointing members to the Biosafety Expert Council. The Ministry of Agriculture supervises the application of the GMO Law and its subsequent regulations through a national inspectorate. It manages all phytosanitary inspectorates and quality control of food and feed production. It also is responsible for financing research projects in the fields of agriculture and the protection of plant genetic resources.

The debate on GMOs grew increasingly when talking about Serbia joining the WTO. Current Minister of Foreign and Domestic Trade and Telecommunications has repeatedly expressed the view that Serbia's

membership in the WTO "does not necessarily mean that GMO will be introduced in the country"⁸, as well as "The dilemma over the production of GM foods in Serbia as a condition for acceding to the WTO is being set up as a false dilemma for which lack of knowledge, mystification, bad faith and particular interests are reasons"⁹.

On the other side, in January 2013, Serbia signed the „Danube Soya Association“ promoting non-GMO soya cultivation and processing in the Danube region of Europe. This Association was founded in 2012 as an international multi-stakeholder association based in Vienna with farmers, agricultural trades, feed companies, major retailers, and green organization as members.

The recent statement (29 October 2013, Brussels) of the Minister of Agriculture, M. Glamocic, has attracted considerable public attention. Minister said „Serbia going to change the law banning the imports of GMOs, but their marketing will be strictly controlled“.¹⁰

Conclusion

Prior to the adoption of the current Law on GMOs in 2009, Serbia imported soybean meal which contained approved Round-Up Ready soybeans. Imported quantities reached 70-100,000 metric tons annually, valued at \$40-60 million. Several Serbian crushing plants have long-term contracts with EU buyers to export non-biotech soybeans and products. Serbian soybean producers are receiving government production subsidies of 6,000 dinars/MT (70 USD/MT) (USDA, 2013).

This indicates a clear economic motive on both sides. On the one hand the Americans and their representatives in our country want to change the Law in order to strengthen and restore the lost market. On the other hand, domestic soybean producers want the primacy of the national market as well as access to the EU market and other GMO-free markets. A Serbian public attitude toward GM food is also clear- the citizens of Serbia do not

⁸ WTO membership "does not imply introduction of GMOs" http://www.b92.net/eng/news/business.php?yyyy=2013&mm=03&dd=26&nav_id=85368 (accessed 1 September 2013).

⁹ Niko ne traži da prihvatimo GMO, (accessed 1 September 2013). http://www.b92.net/biz/vesti/srbija.php?yyyy=2012&mm=11&dd=06&nav_id=658123,

¹⁰ Ministar Glamović o Zakonu o GMO: Potrošači će znati šta kupuju, <http://www.mpt.gov.rs/?lang=lat> (accessed 30 October 2013).

want GM food. They are afraid of possible adverse effects to human health and environment; also believe that it is immoral and unethical to modify the genes of plants and animals. The majority have no confidence in the state of Serbia and in scientific analysis or in multinational companies' producers of GM food. In this sense, most of the public approve any actions of the struggling against GMOs.

There are no economic motives for producing this food in Serbia. Serbia's rural areas are featured of traditional farming, and 55% population live in this area (Rodriguez, 2009). Major players in seed production are two semi-state owned institutes controlling over 60% of the country maize seed market (Van Berkum et al., 2012). Apart this, Serbia has applied for just 19 patents in 2011 (WIPO, 2012) (none in transgenic field) which indicates the difficulty of surviving in the patent world. This leads to the conclusion that Serbia has no capacity to develop new GMOs to compete with multinational companies (Papic Brankov and Lovre, 2013).

Official Serbian government has been sending mixed signals on the issue. However, at this point it seems that one thing is certain- Serbia will adopt amendments to the GMO Law. This change will allow the GMOs marketing in our territory. After this step, there are two scenarios. The first option is a weakening of the general public resistance and poor state control of GM food placement. In this case, the multinationals will completely conquer the market, national institutes and varieties will be destroyed, farmers will impoverish, environment will be polluted and citizens will have a reason for additional health concern. If it happens another, better scenario- Serbia will establish a proper system of food chain control, authorities will destroy illegally planted GM crops, GM foods will be labeled so that consumers have the right to choose, and movement activities to combat GMOs will strengthen. As the end point of such positive efforts Serbia will be able to declare the entire state free from GMOs.

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ECONOMIC POSITION OF AGRICULTURAL ENTERPRISES OF VOJVODINA¹

Veljko Vukoje, Tihomir Zoranović²

Abstract

This study analyses basic indicators of the economic standing of agricultural and food production enterprises, at the territory of AP Vojvodina, (Autonomous Province of Serbia), in a period of one year, from 2001 to 2011. The analysis demonstrates that, in spite of the increasing levels of business activities during the observed period, it did not result in realization of the expected results and more favourable conditions for improvement of agricultural business. Agricultural enterprises of AP Vojvodina recorded positive financial results only in two observed years, out of eleven, and with quite modest profit rates of 0.22% (2006) and 2.42% (2007). Low profitability of production followed by accumulated losses represents one of the basic reasons for deterioration of the company financial structure. The level of indebtedness of 67.2% (2011) can be estimated as very high for agricultural enterprises, which, through the expenditures of financing, significantly reduces financial results.

Key words: *agriculture, food industry, balance sheet analysis, financial standing, financial results*

Introduction

The strategic role of agriculture and food industry is confirmed by their share in the gross domestic product (GDP) of the Republic of Serbia, which is approximately 17%. Out of that, the primary agriculture has a share of 10.6%, and the food industry has 6.4%, which is much more as compared to agriculturally developed countries of EU (*the Chamber of Commerce of RS, 2012*). The significance of domestic agriculture, that is,

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agricultural sector in its entirety, reflects in the fact that it represents one of the rare areas of business which manages to realize the foreign trade surplus.

Apart from the emphasized problems during the period of transition, the agriculture, together with the food industry, remained one of the most important branches of business. That is certainly going to continue to the future, taking into account the exceptional natural conditions and the overall potentials available for further growth and development.

During the reported period, simultaneously with the ownership transformation, significant efforts were directed towards the consolidation of the legal regulations applicable in the EU countries. However, the positive effects of privatization are visible only in some segments of the economy. Business activities of the agricultural enterprises, during this period, were burdened with numerous problems, such as: narrowed domestic market and slow approach to other markets, insufficient protection against the excessive import, technical and technological stagnation, relatively high inflation, lack of own accumulation, expensive borrowing of capital, etc. The global economy crisis also influenced worsening of already existing problems of agricultural enterprises during the last few years (*Vukoje and Dobrenov, 2011*).

The model of ownership transformation can significantly influence the level of economic success. Those countries that have implemented the gradual model of privatization recorded better results as compared to the countries that implemented the system of the mass and rapid sales of the state owned property (*Jugović, 2010*).

Intensifying of privatization should solve the problems arising during the process of ownership transformation. Accordingly, the dynamics of the process of ownership transformation represents one of the main factors for attraction of direct foreign investments in Poland, and consequential improvement of business efficiency of agro-industrial complex (*Walkenhorst, 2001*).

However, *Vissak (2009)* warns that it is hard to foresee all the effects of the direct foreign investments, as they can change during the time. The biggest part of direct foreign investments is directed towards the service sector (financial mediation, post office and telecommunications) and that only one small part of equity is invested into domestic production.

Privatization of the production capacities in our country has been performed in such a way that the vertical chain in food production has not been preserved. That is the cause of frequent market disturbances, mainly price disturbances, which exposes the producers to great income risks. The absence of stable vertical and horizontal links in production chain slows down the implementation of quality standards thus resulting in oscillations in volumes and dynamics of proposals.

Taking into consideration extremely favourable environmental conditions for realization of the efficient agricultural production, but, on the other hand, accumulated systemic problems which burden this branch of economy, there is a question in terms of what should be done in order to turn the agricultural enterprises into the successful business subjects that lead the way of the development of the domestic agriculture. The answer to the aforesaid question reflects the essence of efforts of the researchers engaged in this study.

Material and methods of work

The subject of the research in this study are the most significant parameters of success, property and financial standing of the agricultural enterprises, but also the enterprises from the field of food industry, which operate at the territory of AP Vojvodina. The focus of analysis is directed towards the agricultural enterprises, that, according to the official classification of business activities belong to branch 01-Agriculture, hunting and service activities (hereinafter referred to as: *agriculture*) while the enterprises from the field of food industry branch 15 – Manufacture of food products and beverages (hereinafter referred to as: *food industry*) mainly serve as a reference value for making comparison among the agricultural enterprises.

The analysis comprised only those economy subjects in a capacity of legal entities (enterprises and cooperatives; hereinafter referred to as: the enterprises), and not individual agricultural farms and entrepreneurs. The research is mainly based on the data from the statement of balance positions of agricultural enterprises of AP Vojvodina, and the food industry enterprises in AP Vojvodina, for the period from 2001 to 2011. The tables and charts, due to the space limitation, do not always present all the years of the observed period, which are, naturally, taken into consideration in interpretations and comments.

As this is mainly the analysis of the statement of balance positions, the basic implemented methods are the following: division method and comparison method. The period of eleven years is long enough to reveal causal and consequential relations and developments of the observed phenomena. In order to derive more reliable estimations and results, certain parameters are being compared during the longer period of time, using the previously published data from domestic and foreign bibliography. Spatial comparison is executed between the agricultural enterprises and the food industry enterprises at the territory of AP Vojvodina. Those are two related and comparable economy branches that make the base of the agricultural sector.

Results and discussions

At the territory of AP Vojvodina, in 2011, 1678 agricultural enterprises were operating, with 20381 employees in total. Out of the total number of the enterprises, 89.5% are small, 9% middle sized, 1.5% big enterprises. In the food industry, 910 legal entities were operating, employing approximately 26100 workers. That makes 11% out of the total number of enterprises at the territory of AP Vojvodina, that is, approximately 22% out of the total number of the employees. As compared to 2001, the number of the employees in the agricultural sector in AP Vojvodina, was reduced for 54.7 %, while the reduction in the food industry was 32.9%.

At the end of the year 2011, the property of agricultural enterprises was 275 billion dinars worth (2.6 billion Euros), while the value of the property of the food industry enterprises was approximately 343 billion dinars (3.3 billion Euros) (*Source: Business Registers Agency, 2012*). Agricultural enterprises, as compared to the beginning of the observed period, increased their property for 71.52% (food industry for 107.7%).

During the analysed period, the share of the working capital in the structure of the total assets was significantly increased, as in agricultural enterprises (from 26.7% to 43.7%) so in food industry enterprises of AP Vojvodina (from 38.6% to 50.4%) (*Table 1*). The explanation of this phenomenon lies mainly in intensifying of the business activities of the economy subjects. However, what contributed to the growth of the relative share of working capital in the observed period was the slower growth of the fixed assets, due to:

- More realistic carrying of assets in the statement of balance positions after privatization, that is, after implementation of the international accounting standards since 2004;
- Insufficient investing during the last two decades, with highly expressed disinvesting process after privatization;
- Failure to recognize the state owned agricultural land from the own assets after privatization, and shifting to “off-balance sheet assets”, etc. (*Vukoje and Zekić, 2010*).

Table 1. *Structure of total assets (in %)*

No.	Position	AGRICULTURE							FOOD INDUSTRY						
		2001	2003	2005	2007	2009	2010	2011	2001	2003	2005	2007	2009	2010	2011
1.	Fixed assets	64.7	63.2	65.6	54.8	54.4	49.1	47.8	49.8	44.7	53.1	49.7	44.8	44.4	45.3
2.	Working capital	26.7	25.6	33.7	43.7	43.9	46.0	43.7	38.6	44.9	45.4	47.5	51.9	51.0	50.4
3.	Working capital	91.4	88.8	99.3	98.5	98.3	95.2	91.5	88.6	90.7	98.5	97.2	96.7	95.4	95.7
4.	Loss(above the level of assets)	8.2	10.5	0.7	1.5	1.7	4.8	8.5	10.8	8.9	1.5	2.8	3.3	4.6	4.3
5.	Non-working capital	0.4	0.69	-	-	-	-	-	0.6	0.4	-	-	-	-	-
6.	Total assets	100	100	100	100	100	100	100							

Source: *Calculation done by the authors, based on the data from the NBS and Business Register’s Agency.*

The constant increase of share of working capital in the structure of the total assets took the period by the year 2008, followed by the mild decrease. The average share of working capital in agriculture in the period 1980-1983 was 42.1% (*Duvnjak, 1989*), that is 33.8% in 1990 (*Bukvić, 2003*). During the period from 1997 to 2000, this share was moving approximately 24% (*Vukoje and Obrenović, 2004*).

Owing to the nature of business, agricultural enterprises still have higher share of the fixed assets as compared to the working capital. During the following period, we can expect the increase of share of fixed assets, resulting from the need to change the equipment which is technically and economically obsolete.

As those are collective balance sheets, the position “loss above the level of assets” is regularly present, as there are the enterprises with very bad financial standing. The share of this position in assets of agricultural enterprises of AP Vojvodina significantly varied during the analysed period (*Table 1*). However, during the last few years, this position showed the tendency of repeated growth, from 1.7% (2009) to 8.5% (2011) of the total assets (food industry with 3.3% to 4.3%). That is the consequence of numerous problems that one part of agricultural enterprises encounters (unsuccessful and annulled privatization, bankruptcies, over-indebtedness, unfavourable climate conditions, etc.), as well as the negative influences of the global economy crisis.

Analysis of financial results

The structure of the total income is shown by the source and level of incomes, while the distribution of the total incomes indicates to the encumbrance with certain types of expenditures, as well as the share of the realized financial result. The total income of agricultural enterprises of AP Vojvodina recorded increase during the analysed period from 984.1 million Euros (2001) to 2302.2 million Euros (2011), or for 133.9% (food industry: growth of 91.7%). The constant increase of the total income of agricultural enterprises was missing only in 2009.

The evident growth of shares of operating incomes in the structure of the total incomes of agricultural enterprises of 2.6% (food industry: growth of 1.6%) (*Table 2*). This is an encouraging phenomenon, as those are basic incomes, which keep the essence of the company business. Relatively low average share of financial incomes in the structure of the total incomes of agricultural enterprises of 1.4% can be considered expected, taking into account low financial power of enterprises (food industry: 2.0%). The share of “non-operating and other” incomes is still on a quite high level, but there is a slight tendency of decrease in the second half of the observed period.

In the production enterprises, the biggest part of the total incomes goes for covering of business expenditures, more than 90%. Financial expenditures made 4.5%, on average, of the total income of agricultural enterprises (food industry: 5.4%). This percentage in agricultural sector should not exceed 3.0-3.5% not even in much more favourable business environment (*Vukoje and Zekić, 2010*). During the period 1980 to 1983 the share of financial expenditures in the distribution of the total

agricultural incomes was 2.75% on average (*Duvnjak, 1989*). The average share of other expenditures in the total income of agricultural enterprises was 7.6% (food industry: 5.1%), which can be characterized as excessive. They recorded significant growth during the last few years, from 5.9% (2008) to 10.8% (2011), which can be explained with the aforesaid transitional business problems.

Table 2. *The structure and distribution of the total income (in%)*

No.	Position	AGRICULTURE						FOOD INDUSTRY					
		2001	2003	2005	2007	2010	2011	2001	2003	2005	2007	2010	2011
1.	Operating incomes	91.5	90.1	93.1	91.1	93.2	94.1	93.6	92.3	93.6	94.0	94.9	95.2
2.	Financial incomes	0.8	1.0	0.9	2.1	1.5	1.4	0.6	0.8	1.7	2.3	2.5	2.6
3.	Other incomes	7.7	8.9	6.0	6.8	5.3	4.5	5.8	6.9	4.7	3.7	2.6	2.2
4.	Total incomes (1 to 3)	100	100	100	100	100	100	100	100	100	100	100	100
5.	Operating expenditures	88.6	99.4	94.4	89.9	90.4	89.7	88.6	90.6	90.3	89.3	87.5	85.5
6.	Financial expenditures	3.8	5.0	4.3	3.8	5.1	3.7	3.4	3.5	4.6	4.2	7.6	4.9
7.	Other expenditures	8.0	7.0	3.2	3.8	10.3	10.8	7.9	6.9	4.9	7.0	4.4	4.6
8.	Total expenditures (5 to 8)	100.4	111.4	101.9	97.5	106	104.2	99	101	99.8	100	99.5	95.1
9.	Gross results (4 – 8)	-0.4	-11.4	-1.9	2.5	-5.7	-4.2	1.1	-0.9	0.2	-0.5	0.5	4.9
10.	Tax to result	0.1	0.08	0.09	0.07	0.1	0.1	0.3	0.3	0.2	0.4	0.5	0.6
11.	Net result (9 – 10)	-0.5	-11.5	-2.01	2.42	-5.8	-4.3	0.8	-1.2	-0.03	-0.9	-0.03	4.3

Source: Calculation made by the authors on the basis of the data taken from the NBS and the Business Registers Agency.

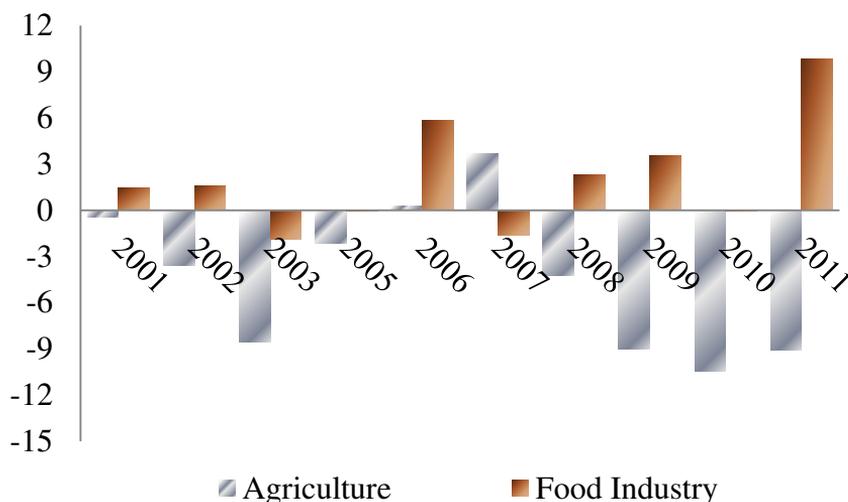
Agricultural enterprises of AP Vojvodina realized positive net results only in 2006 and 2007, with modest income rates of 0.22%, that is 2.42%. They again shifted to the zone of losses in 2008, as a result of unfavourable business environment, that is, the problems which some enterprises encountered with. We should have on mind the fact that those are all collective statements of balance positions, that is, net results of all enterprises observed together. Out of total number of 1678 agricultural enterprises in AP Vojvodina, only 1002 of them, at the end of 2011 carried

the profit in their balance sheets. However, the total amount of the losses of other 676 unsuccessful enterprises is significantly higher from the total profit of the successful enterprises. On the basis of the realized negative financial result, agricultural enterprises of AP Vojvodina, during the analysed period, lost 513.2 million Euros in total, which makes 46.5% of assets of the observed enterprises.

The food industry recorded negative rates of financial results, during the four years out of the entire observed period (2003, 2005, 2007, 2010). The realized income rates were moving from 0.15% (2004) to 4.3% (2011). During the period of eleven years, the food industry enterprises realized net profit of 267.9 million Euros.

Profitability is one of the most significant indicators of the business success, as it indicates to the ability of the invested funds to bring the output, that is, it reflects the earning power of the equity. In majority of the observed years, agricultural enterprises in AP Vojvodina recorded the negative rates of profitability to the own equity (*Graph. 1*). The value of this indicator was moving inside the range of 3.65% (2007) to -10.4% (2010). The rates of profitability of the own equity of enterprises in food industry are much better, and were moving from -1.91% (2003) to 9.46 % (2011).

Graph 1. Rate of return of equity (in %)



By analysing the possibilities of improvement of financial results of the agricultural enterprises in the Czech Republic, it is shown that, apart from the influence of subventions and the climate conditions, very important factor of profitability are also the prices of agricultural products. That clearly indicates to the necessity of correction of the basic institutional relations in the vertical chain of agricultural and food products (*Streleček at al., 2011*). There is a wide range of factors which influenced higher efficiency of agricultural enterprises in Slovakia, during the period of transition, among which the most significant are: intensifying of the production of goods, reduction of production costs, increase of prices of agricultural products and subventions (*Chrastinova u Burianová, 2012*).

Analysis of financial positions

In interpretation of financial positions of the enterprises, the starting point is vertical and horizontal rule of financing. Financial statement of enterprises is defined, mainly by:

- Statement of financial positions,
- Degree of indebtedness,
- Maintenance of the real value of own capital,
- Reproduction ability.

The study puts stress to the first two indicators, as the most important. The financial balance implies that the assets, by volume and time of being tied (non-cashable) respond to the volumes and time of availability of source of financing (*Rodić at al., 2007*). The analysis of the financial balance in this study is based on net operating fund (NOF), which is calculated as the difference between fixed and long-term sources of financing and fixed assets. The existence of financial balance is checked through comparison of NOF and fixed assets. The existence of financial balance is checked through comparison of NOF and fixed supplies.

The obtained indicators clearly indicate to very unfavourable financial structure and serious problems in domain of solvency of agricultural enterprises from the territory of AP Vojvodina (*Table 3*). The NOF had negative values. In such environment, it is clear that from the short-term liabilities, not only the total fixed supplies will be financed, but one part of the fixed assets will be financed as well. In order to establish the financial balance in agricultural enterprises, at the end of the observed period, 66.8 billion dinars is required, that is, 638.9 million Euros.

Duration of the production process, emphasized seasonality of production and sales, requirements of crop rotation, etc., cause relatively high levels of average stocks in agriculture, as well as their emphasized variability (seasonality) during the year. Because of that, the agricultural enterprises find it very important to provide the stability of the net operating fund, on the level of the fixed supplies, as much as possible (*Vukoje and Zekić, 2010*).

Table 3. Coverage of fixed supplies by working capital (in 000.000 RSD)

№	Position	AGRICULTURE							
		2001	2003	2005	2007	2008	2009	2010	2011
1.	Long-term source of financing	67560	71817	93833	118351	127028	134855	120877	119512
2.	Long-term funds without supplies	65101	75894	95858	115762	124712	136442	134864	143423
3.	NOF(1-2)	2796	-4077	-2025	2589	2316	-1587	-13987	-23911
4.	Fixed supplies	12810	14774	20883	32358	33662	31051	38878	42917
5.	Coverage of fixed supplies NOF(3/4)*100	21.83	-27.6	-9.7	8.0	6.88	-5.11	-35.98	-55.71
6.	Deficit of long-term sources (3-4)	10014	18851	22908	29769	31346	32638	52865	66828
7.	Sort-term liabilities	23865	35171	51355	89736	113227	111735	140330	155146
FOOD INDUSTRY									
8.	Coverage of fixed assets NOF (%)	30.86	51.27	28.51	52.6	49.5	45.1	32.0	39.2
9.	Deficit of long-term sources	14811	16599	23548	23759	30615	31226	40993	40574

Source: Calculation done by the authors, based on the data from the NBS and Business Register's Agency.

For agricultural enterprises, it is very hard reachable goal to finance fixed supplies only from the long-term sources, especially in the years of increased business activities. Domestic enterprises have not managed to approach to this "ideal", not even in their best times. Thus, in the period 1981-1984, the average coverage of supplies with operating fund was 17.3 % (*Duvnjak, 1989*), and in 1988 and 1989, the net operating fund was negative (*Rodić and Vukelić, 1990*).

Financial structure of the food industry enterprises of AP Vojvodina is noticeably better than in agriculture. NOF covers between 30.9% (2001) and 58.2% (2006) of value of the fixed supplies. In the end of the observed period, NOF was sufficient to finance 39.2% of fixed supplies, while there was a shortage of 40.6 billion dinars in order to establish the financial balance, that is 388 million Euros.

Indebtedness of economy subjects is measured by the ratio of own and else's sources of funds. According to the traditional financial rules, the ratio between own and borrowed funds should be 1:1. Such ratio provides the security for creditors in terms of collection of their receivables, as in that case, each dinar of liabilities is covered with two dinars of assets.

It is necessary to consider other factors as well. The nature of the business activity determines various relations between own and borrowed capital. As the agriculture is characterized by the slow circulation of assets and a poor accumulating capacities, it is necessary to move this ratio in favour of own sources of financing, at least 55%:45%.

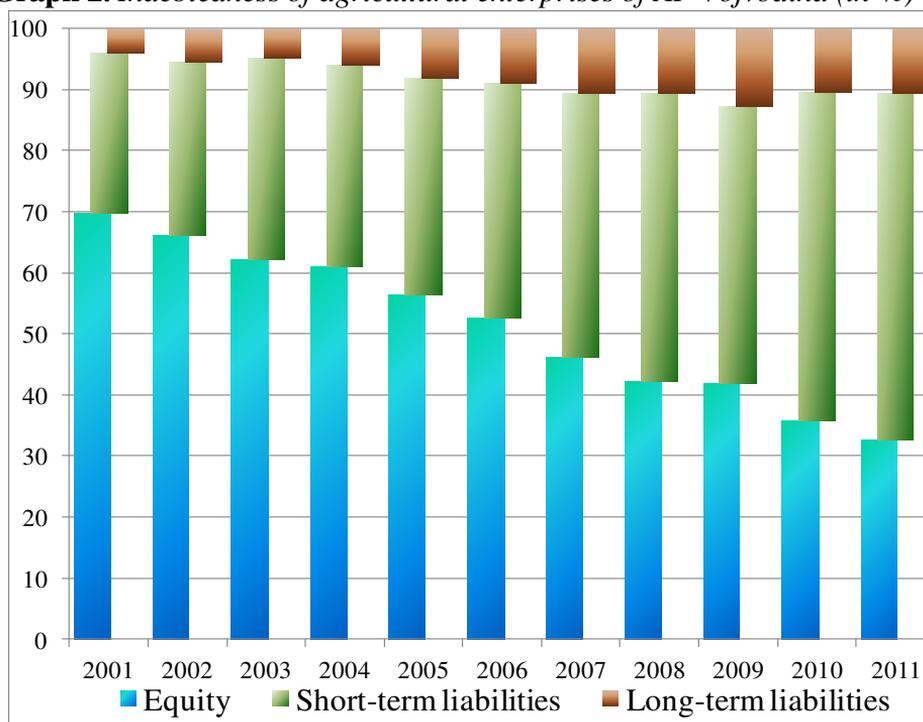
The rate of indebtedness of agricultural enterprises in AP Vojvodina, during the analysed period recorded the constant growth, from 30.2% (2001) to 67.2 % (2011). It is obvious that that the enterprises in AP Vojvodina have reached unacceptably high degree of indebtedness of 67.2% (food industry: 61.7%).The drastic deterioration in the ownership structure of assets of agricultural enterprises is best seen in the following graphic chart (*Graph.2*).

In agricultural enterprises, the dominance of else's sources of funds was present since 2007, and all until the end of the observed period with the trend of growth. The total indebtedness of agricultural enterprises at the end of the analysed period is 182.9 billion dinars, that is, 1749 million Euros (food industry: 1988 million Euros). Additional encumbrance is also the fact that the short-term liabilities go to the level of 845% (2011) of total liabilities. More than half of short-term liabilities are so called spontaneous sources of financing (suppliers and other current operating liabilities), where the default in settlement often results in payment of default interests and penalties.

Such high rate of indebtedness is in good part the consequence of conceptual solutions in the Law on Privatization. New owners of enterprises fulfil investment obligations, but most often from other

sources but own, by means of enterprise encumbrance, through new banking loans (Vukoje and Figurek, 2012). The existing governmental funds for support and development of agriculture, grant the loans at much more favourable conditions, but their funds are limited and insufficient (Vukoje and Dobrenov, 2011).

Graph 2. *Indebtedness of agricultural enterprises of AP Vojvodina (in %)*



Big problems with financial structure, mainly the striking growth of rate of indebtedness, resulted in threatening to solvency of agricultural enterprises. The coefficient of solvency records the drastic drop from 3.37 (2001) to 1.36 (2011) (food industry: from 2.14 to 1.57).

The agriculture of AP Vojvodina, during the observed period, realized the index of growth of the net own capital of 141.0 (2001=100), while, at the same time, the cumulative index of inflation was 266.3. Accordingly, the real value of own capital of agricultural enterprises is reduced for 125.3%. This is extremely sharp drop, mainly caused by the losses, than bankruptcies, defects and more realistic presentation of assets in statements of balance positions, and other transitional operating problems (food industry reduction for 10%).

Having on mind all weak values of the previously presented indicators of financial results and positions, it is clear that the agricultural enterprises are not able to independently finance their own reproduction. During the last three years of the observed period, the rate of net reproductive assets was even negative, that is, the amount of loss was higher than the amount of amortization and other incomes of assets for reproduction. The value of this indicator, in food industry enterprises, is slightly more favourable, but again not good sufficient.

Possibilities of improvement of financial results and financial standing

Financial results and financial standing of the enterprise are directly related, and multiply interwoven, with many conditions, that is, mutual influences. That means that, if observed in the long term, negative financial results cannot go together with good financial standing, and vice versa. Due to that, the best thing would be to consider the possibilities of joint improvement.

Agricultural enterprises realized the positive financial results from regular business operations only in the last year of the analysed period (*Table 4*) while the food industry enterprises only in 2003, realized the loss from regular operations. That indicates to serious problems and disturbances in operation of agricultural enterprises, mainly due to the low cost efficiency and security of favourable sources of financing.

Table 4. *Structure of financial result (in 000.000 RSD)*

№	Position	AGRICULTURE								
		2001	2003	2005	2006	2007	2008	2009	2010	2011
1.	Results from business incomes	1748	-5408	-1157	-1996	1616	2257	-579	5426	10340
2.	Financing results	-1774	-2287	-2899	-1459	-2303	-5018	-5136	-6834	-5416
3.	Results from regular business (1+2)	-26	-7695	-4056	-3455	-687	-2761	-5715	-1408	4924
4.	Results from other incomes	-202	1058	2382	3830	4183	-1437	-3920	-9569	-14819
5.	Total gross result(4+5)	-228	-6637	-1674	375	3496	-4198	-9635	-10978	-9894

Source: *Calculation done by the authors, based on the data from the NBS and Business Register's Agency.*

It is clear that the agricultural enterprises should reduce the expenses of financing, that is, the degree of indebtedness. However, in the last five years of the observed period, the enterprises recorded negative results, even in the group of operating results, so the essential causes of the losses should mainly be searched in sub-balance of business incomes and expenditures.

Because the amount of 6.4% is earmarked for salary costs (2011), 2.6% for depreciation costs (2011), out of the operating incomes, it is obvious that within these categories there are no significant reserves for improvement of the business results. The essence of the problem lies in the ratio of operating incomes and the variable costs, which can be demonstrated with the coefficient of the global parity of selling and purchase prices (*Table. 5*). By the year 2010, this indicator recorded the constant and quite significant drop from 1.36 to 1.19 (food industry from 1.35 to 1.33). This coefficient naturally, does not only depend on the ratio between selling and purchase prices, but also on the profitability of physical expenditures of the most important inputs. The parity of the selling and purchase prices during the period 1980-1983 was, on average, 1.434 (*Duvnjak, 1989*).

Table 5. *Global parity selling and purchase prices of agriculture (000.000 RSD)*

№	Position	AGRICULTURE								
		2001	2003	2005	2006	2007	2008	2009	2010	2011
1.	Sales incomes	51071	52426	78440	101740	124644	146595	136593	178765	217059
2.	Variable expenditures of sold products	37420	41820	59827	80888	100767	119039	112317	149728	179409
3.	Global parity of prices(1/2): purchase price = 1	1.36	1.25	1.31	1.26	1.24	1.23	1.21	1.19	1.21

Source: *Calculation done by the authors, based on the data from the NBS and Business Register's Agency.*

During the last year of the observed period, the further drop of this indicator was stopped, mainly owing to the significant growth of prices of agricultural products and the increase of sales incomes. That is clearly evidenced by the data on growth of operating results and the results from regular business. However, the value is still far from acceptable. The results coming from other incomes and expenditures influenced the creation of the gross financial results of agricultural enterprises of AP Vojvodina, during the observed period. High amount of share of

extraordinary and non-operational incomes and expenditures was influenced by the run of reasons characteristic for transitional and crisis business operations, which often imply sales and disbursement of fixed assets, write-off of payables due to inability of payment, write-off of receivables and collection of previously written off receivables, methods of calculation and booking of revaluation in the environment of inflation, etc.

Quality analysis of possibilities of improvement of financial standing requires availability of detailed accounting data. On the basis of the collective statements of balance positions, and which represented the basic source of data for the needs of this study, it is only possible to see and possibly quantify the global values and ratios, important for improvement of financial structure of the company. Those are, first of all, already mentioned missing long-term sources of financing, necessary for establishment of the financial balance. Further, decrease of indebtedness, and related financing expenditures, changes in the structure of liabilities in favour of the long-term ones, improvement of efficiency of business operations, etc.

In efforts to leave the zone of losses, the enterprises increase their investments into production, which, in case of deficiency in own accumulation, is mainly financed from the loans, which often results in higher volume and value of production, but not in the proportionally higher positive financial results, which is mainly contributed by increased finance expenditures. In order to keep the solvency, the enterprises are forced to take new loans, as a rule, under even more unfavourable conditions. The indebtedness is increasing, mainly short-term indebtedness, which has the adverse effects on the financial structure, reduces the net operating fund, and increases the expenditures of financing (*Vukoje and Zekić, 2010*).

Conclusion

It is obvious that there are serious problems in operation of the significant number of agricultural enterprises from the territory of AP Vojvodina. It can be noticed that the basic reasons of their unenviable economic position are unfavourable repayment period, unfavourable parities of inputs and final products, and particularly, high expenditures as a result of financing. Negative trends cannot be discontinued through quick and simple solutions. It would be necessary to take a number of well-conceived measures, on micro and macro level, and which would be

implemented as medium and long-term solutions. We can single out the following most significant groups of measures, that is, the guidelines for actions implemented in order to improve the current situation:

- *Increase of efficiency of enterprises, where the role of the Quality Management is crucial. Successfully privatized enterprises have already solved this problem, but there are still a lot of those that have not solved this problem yet, and for which the government support is of a great importance.*
- *The government support in domain of production subsidies, marketing development and meeting the standards of developed markets, breaking of monopolies of traders and producers, determination of indicative purchase prices, establishment of the forward trading and development of market of financial derivatives, participation in buyout of necessary stock reserves, within the limits of the realistic possibilities, etc.*
- *With the purpose of reduction of the indebtedness, that is, financing expenditures and the total financial structure, agricultural enterprises need to be provided with the available long-term and low-cost capital. The best way for that would be recapitalization of enterprises, by actual and/or new (co)owners. Apart from finding new owners for enterprises that went bankrupt, the government should, in association with the banking sector, provide the conditions for refinancing of one part of the most expensive loans, that is, the conversion of one part of the short-term loans into the long-term loans.*

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BUILDING MARKET RECOGNITION OF THE DANUBE REGION IN SERBIA THROUGH AGRO CLUSTER DEVELOPMENT

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Abstract

This paper deals with resource and operational capacities of the existing agro clusters in the Danube region in Serbia and the potentials for their development. The objective of this paper is to understand the level of development of agro clusters in the Danube region and to propose actions and measures to strengthen their capacities, so they could contribute to the competitiveness and recognition of farmers and the region analyzed on the international agricultural market. In paper the method of desk research has been used along with a survey in the form of interview with representatives of registered agricultural clusters. The results show that agricultural clusters in the analyzed region are still in the initial stage of development, their operational capacities are underdeveloped and they are unrecognized on the market. In the future, along with transnational approach, support to cluster development should receive already existing clusters, as well as clusters that will develop in the geographical areas that already have market recognition in some agricultural production, where producers are concentrated and associated, and where there is uniqueness and tradition in the production, as well as high production and export performance.

Keywords: *agro clusters, competition, recognition, Danube region in Serbia, the EU Strategy for the Danube Region.*

Introduction

One of the important factors in creating the competitiveness of companies, regions and national economies in modern theories of competitiveness and trade, are clusters. Professor Porter was responsible for popularization and implementation of the cluster concept and in

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numerous studies and scientific works which have clusters as topic, researchers start from Porter's definition of *clusters*. According to professor Porter "clusters are geographic concentrations of interconnected companies and institutions in a particular field" (Porter, 1998, page 78) or "geographic concentration of interconnected companies, specialized suppliers, service providers, companies in related industries and associated institutions (universities, agencies, chambers of commerce) in a particular field of activity that compete but also cooperate" (Porter, 2008, pages 213-214).

Clusters affect competition in three broad ways (Porter, 1998, page 80): (1) by increasing the productivity of companies based in the area; (2) by driving the direction and pace of innovation, which underpins future productivity growth; (3) by stimulating the formation of new businesses, which expands and strengthens the cluster itself. Recently, many other authors (Sölvell, Lindqvist, Ketels, 2003; Enright 2003) and institutions (EC, 2006a; EC, 2006b; EC, 2008; OECD, 2007; The World Bank, 2009; Europa InterCluster, 2010) have identified innovative clusters as the factor that contributes to the creation of a sustainable competitive advantage of companies, regions and national economies, as well as the factor that drives economic growth, employment, entrepreneurship and investments.

Clusters can achieve this "role" in all sectors of the economy (including primary sector, i.e. agriculture), in all countries (regardless of socio-economic context) or geographic regions. Numerous studies and examples show the positive relationship between the degree of clustering of companies in rural areas and income growth in rural areas. Group of authors (Porter, Ketels, Miller, Bryden, 2004, page 47) point out that earnings are higher in rural clusters, compared to earnings of workers outside the clusters, as a result of higher productivity and strong cluster effects on the rapid flow of information, high knowledge accumulation, skills and the like. Some of many examples of successful clusters in the field of agriculture in emerging market and developing economies, which show how the development of a cluster can spur innovation and economic growth in an industry, are the following: (a) Wine industry in South Africa, oft unrecognized, but important world-class low-tech rural cluster (Toerien, 2010); (b) Chilean salmon cluster, Colombian and Ecuadorian flower clusters, Coffee cluster in Nicaragua etc. (Gálvez-Nogales, 2010); (c) the Lake Naivasha cluster as a hub of the Kenya's cut flower industry (Bolo, 2008, pages 37-51); (d) the Lake Victoria Fishing Cluster in Uganda (Kiggundu, 2008, page 87-96).

All emerging market, developing and transition economies (which Serbia belongs to) have great chances to develop agricultural clusters and clusters in rural areas. Cluster development in these countries is a method or way to replace comparative or factor advantages (based on the exploitation of high-value natural resources, cheap labour, cheap products) with competitive advantages that "rely" on: specialized knowledge, innovation, high productivity, networking in the value chain of products, developed business environment.

However, as the nature and depth of clusters varies with the state of development of the economy, in developing/transition or emerging economies clusters are undeveloped and they are impeded by low local education and skill levels, weaknesses in technology, lack of access to capital, poorly developed institutions, and government policy may also work against cluster formation (Porter, 2008, page 250). For example, in Poland efforts and initiatives to establish new connections between farmers, communities and other stakeholders in the agricultural sector are still very inefficient (Bronisz, Heijman, 2008, page 39). In Serbia (Mijačić, 2011, page 32) clusters are also of underdeveloped capacities, low intensity of activities, and the vast majority of clusters failed to build trust and close relationship with their members.

Given the non-competitive agricultural production in Serbia, the cluster approach to networking of all actors in the repro chain, with the support of government bodies and scientific research institutions, could provide the conditions for productivity growth in the agricultural sector and strengthening the competitiveness and recognition of farmers and regions. Exploring the contribution of agro clusters to competitiveness and recognition of the Danube region in Serbia and farmers in this region, is based on significant natural and market potentials existing in the Danube region in the field of sustainable agriculture and rural development. According to research of domestic authors (Popović, Sarić, Jovanović, 2012, page 76), a variety of natural and socio-economic resources and conditions allow the use of various agricultural production systems in the Danube region – from the intensive crop production on the Upper Danube and Ključ-Negotin plain, and intense conventional and organic fresh food production in Belgrade- Novi Sad metropolitan, to extensive livestock grazing and traditional, integrated and organic production of local meat and dairy products, fruit and grapes in the high nature value farmland areas along the Danube river.

In this paper the authors will research the presence and development of agro clusters in the Danube region in Serbia. They will also indicate the necessary assumptions and requirements for their development, as well as market trends of their development in the future. Development activities and strengthening agro clusters in the Danube region, along with encouraging transnational and cross-border cooperation with other clusters in the Danube region in Europe, would contribute to improving the competitiveness and recognition of farmers in the Danube region, creating agricultural identity of the Danube region, as well as active participation of Serbia in the implementation of macro-regional EU Strategy for the Danube Region (EUSDR).

Methodology and research limitations

In this paper agro clusters are defined as clusters registered in crop and livestock production, i.e. in the production of agricultural products (primary products and products of the first stage of their processing occurred in agricultural production).

Through secondary (desk research) and primary research, agro clusters in the Danube region in Serbia are identified in a qualitative and quantitative way (their number, capacities, area of activity, level of development, problems in functioning), and ways and market trends for their future development are proposed.

Secondary research included the analysis of spatial planning documents, development strategy papers of cities/municipalities of the studied area, scientific works of local and foreign authors in the field of clusters and sustainable agriculture, communications and policy documents of the European Commission (EC) and the Government of the Republic of Serbia.

Primary research was carried out through a survey of registered agro clusters in the Danube region in Serbia, i.e. through direct interviews with managers of agro clusters or employees in the organizations, mostly in Regional Development Agencies (RDAs), which lead or implement cluster initiatives. The base for a survey was prepared questionnaire, which contained all the issues relevant to the assessment of cluster capacities, identification of their problems in functioning, proposing directions for cluster development and the like. The market research was carried out from June 15 to July 15, 2013 and the interview was

conducted by telephone interview lasting approximately 30 minutes. To get data on the number of agro clusters, the authors used the database of registered legal entities and entrepreneurs, provided by Serbian Business Registers Agency (SBRA)³. Multiple step sample was formed in three stages:

- In the first stage, searching for legal entities and entrepreneurs using the keyword "cluster", it has been found that 10 companies, 2 entrepreneurs, 101 associations and 4 foundations have the word cluster in their name.
- In the second stage, in the analysis have been included only clusters which in their name have some of the terms related to agriculture and/or rural development ("agriculture", "agro", "agroindustry", "rural", "food", and other terms related to agriculture). In this way a list of 39 clusters operating in Serbian agribusiness has been obtained.
- In the third stage, according to cluster location, agro clusters registered in the Danube region in Serbia have been separated. In this region 19 agro clusters have been registered: 10 clusters in the Belgrade region and 9 clusters in the Vojvodina region (City of Novi Sad and the municipalities: Sremski Karlovci, Sombor, Bač, Ruma and Apatin).

All identified clusters are involved in market analysis and a survey, through interview method, expect 5 clusters in the Vojvodina region, with which the authors were unable to make contact. The geographic area being analysed is the Danube region or the Danube belt in Serbia, which for the purpose of this paper includes the following areas: (a) the Upper Danube region (the municipalities Sombor, Apatin, Bač and Bačka Palanka); (b) metropolitan area of Belgrade – Novi Sad (City of Belgrade, Novi Sad, Pančevo and Smederevo and the municipalities Beočin, Irig, Sremski Karlovci, Inđija, Ruma, Pećinci, Stara Pazova); (c) the Carpathian region in Serbia (the municipalities Golubac, Kučevo, Majdanpek, Kladovo and Negotin). The Law on Spatial Plan of the Republic of Serbia (Official Gazette of the Republic of Serbia no. 88/2010, page 46) points out this region as one of the three dominant development zones ("the Danube belt") and defines this area as wider area or regional entity functionally directed to, or linked with Danube River, which also includes zone along the Sava River.

³ Search for clusters was made on June 10, 2013 using SBRA website, <http://www.apr.gov.rs>.

Results of market analysis of agro clusters in the Danube region in Serbia

Market analysis of agro clusters in the Danube region in Serbia (Paraušić, Mihailović, 2013), indicates that in this development area up to June 10, 2013, 19 clusters have been registered at SBRA: 10 clusters in the Belgrade region and 9 clusters in the Vojvodina region (Table 1, Figure1). Basic characteristics and resource potentials of the surveyed clusters are given below (Paraušić, Mihailović, 2013):

- **Many clusters are registered in the legal form of an association.** Only 4 clusters are registered as a nonprofit joint-stock company.
- **Clusters are new.** Most of the clusters are registered after the Law on Association was adopted, or after 2009.
- **In most cases clusters were established or initiated by RDAs,** which secured funds for cluster development through the EU projects or by applying for the funds from the republic/province, city/municipality budget. In the area of Belgrade region (in the city municipalities Obrenovac and Lazarevac) the Regional Centre for Development of SMEs and Entrepreneurship "Belgrade" initiated the establishment of 7 clusters (the first seven clusters in Table 1). RDAs have initiated the establishment of "Fruška Gora Cluster of winemakers and winegrowers Alma Mons", in Sremski Karlovci, and "Cluster of agriculture Prigrevica", in Apatin. Only two clusters were formed as a result of bottom-up initiatives: "Cluster Baby beef", Belgrade (initiative of companies engaged in the beef fattening and export) and "Cluster Farms Sombor", Sombor (individual initiative).
- In most cases **clusters members** are: registered family agricultural holdings, SMEs and entrepreneurs in the field of agricultural and food production, agricultural cooperatives, farmers' associations, and supporting institutions such as schools and universities, scientific research institutes, certification companies, agricultural professional services, RDAs, experts of various profiles and the like.

- **According to their organizational structure and established network, clusters are similar to associations, cooperatives or NGOs.** Underdeveloped are networks of cluster participants with suppliers, companies in related industries, with supporting institutions, especially with scientific research institutes in the field of R&D. Practically there is no cooperation and coordination among the cluster members: small number of meetings, there is no exchange of knowledge, ideas and information nor joint activities (solving common problems, joint placement of products and purchase on the market, etc.).
- **Clusters do not have critical mass of participants and resources.** Lack of critical mass of clusters is the result of the following factors: (1) membership of big and market strong companies/producers is lacking; (2) membership of some companies and institutions is often formal; (3) narrow geographic area of clusters (for example "Cluster of agriculture Prigrevica"); (4) many clusters are unnecessarily formed or initiated in a narrow geographic area (for example, 4 agro clusters are formed in the city municipality Obrenovac, two agro clusters in Lazarevac and three agro clusters in Sombor).
- All surveyed clusters are characterized by **lack of sustainable and reliable sources of funding** for professional management and cluster activities (joint activities), as well as great reliance on project-based funding (through budget or donor support).
- **Production, export and innovative capacities of clusters are low** (low level of production, small market share, focus on local market and products of lower levels of processing).
- **Local character of clusters and unrecognizable on the market.**
- **Achievement of goals.** Although the goals of almost all clusters aim to increase competitiveness, production, export and innovation in agricultural production, in practice, cluster activities are mainly carried out in the areas of: (a) promotion and internationalization (participation in fairs, study tours, creation of the cluster visual identity/cluster logo and website); (b) education (organization of seminars, trainings, conferences); (c) establishing formal cooperation/network between cluster members (usually only through forming a database on cluster members and their products).

Table 1. Agro clusters registered in the Danube region in Serbia, 2013

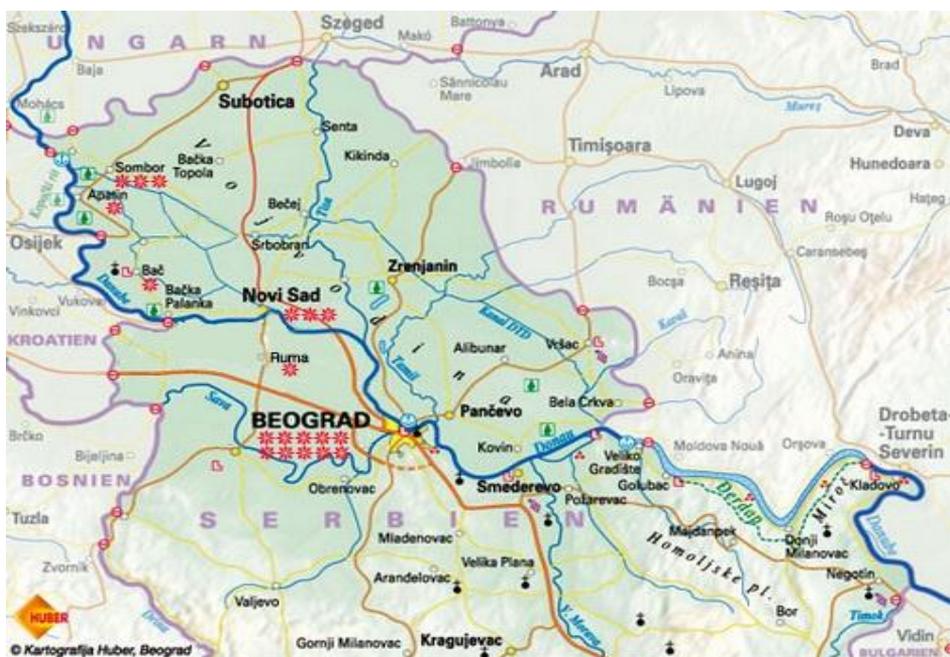
Name of cluster and year of establishing	Operational/Results
Region of Belgrade	
1. "Rakovica agro cluster", 2007.	Not operational (without results).
2. "Agrocluster Obrenovac", 2009.	Insufficiently operational.
3. "Cluster of flowers Obrenovac", 2011.	Partially operational.
4. "Cluster of fruit Obrenovac", 2012.	Initial operating period.
5. "Cluster of vegetables Obrenovac", 2012.	Initial operating period.
6. "Cluster Beo food 5", Beograd, 2010.	Not operational (without results).
7. "Agrocluster", Lazarevac, 2011.	Not operational (without results).
8. "Plodovi Kolubare Lazarevac", 2012.	Results in the field of promotion and education. Cluster is the result of the EU Exchange 3 Programme.
9. "Plants United", Beograd, 2008.	Initiative of Belgrade Chamber of Commerce/ Insufficiently operational.
10. "Cluster Baby Beef", 2009.	Not operational (without results).
Region of Vojvodina	
1. "Cluster Farms Sombor", Sombor, 2008.	Insufficiently operational, without visible results.
2. "Vegetable Sector Cluster", Sombor, 2010.	-
3. "Cluster Milk", Sombor, 2012.	-
4. "Fruška Gora Cluster of winemakers and winegrowers Alma Mons", Sremski Karlovci, 2010.	Partially operational, with results in the field of promotion and education.
5. "Cluster Fruškogorska jabuka", Novi Sad, 2012.	Initial period. Cluster is the result of cross-border cooperation within IPA project.
6. "Cluster Green table", Novi Sad, 2011.	-
7. "Cluster of agriculture Prigrevica", Apatin, 2011.	Small operation (only in the field of education). Without visible results.
8. Cluster "Voganj 2011", Ruma, 2011.	-
9. "Cluster Bač Agrar", Bač, 2013.	-

Source: *Paraušić, V., Mihailović, B. (2013): Research of agro clusters in the Danube region in Serbia registered at the Serbian Business Registers Agency.*

In terms of sectors, one cluster was registered in the field of crop production ("Cluster Bač Agrar"), trade in agricultural products ("Cluster Beo food 5") and rural development and rural tourism ("Cluster Farms Sombor"). Two clusters were registered in vegetable production ("Cluster of vegetables Obrenovac" and "Vegetable Sector Cluster" in Sombor) and in flower production ("Plants United" and "Cluster of flowers Obrenovac"). Three clusters were registered in the field of livestock production ("Cluster Baby Beef", "Voganj 2011" and "Cluster Milk"), and most of them (4 clusters) were registered in the fruit, grape and wine production ("Cluster Green table", engaged in the production and export of plum; "Cluster Fruškogorska jabuka"; "Fruška Gora Cluster of winemakers and winegrowers Alma Mons" and "Cluster of fruit

Obrenovac”). Four clusters include the wider field of agriculture: “Agrocluster Obrenovac”; “Agrocluster”, Lazarevac; “Cluster of agriculture Prigrevica“, Apatin and “Plodovi Kolubare Lazarevac”.

Picture 1. *Agro clusters registered in the Danube region in Serbia, 2013*



Source: *Serbian Business Registers Agency and survey of agro clusters in the Danube region in Serbia, 2013.*

Market analysis of clusters (Paraušić, Mihailović, 2013), indicates that cluster functioning and development are restricted by numerous internal and external limitations. Some of the most important **internal limitations** are: (a) lack of mutual trust and conflicts expressed by different groups (this problem is particularly present in the "Cluster of flowers Obrenovac", which reduces the membership, and the cluster does not include the leading and large flower producers in this city municipality); (b) inactive members, underdeveloped internal communication and cooperation; (c) lack of entrepreneurial initiative and capital. In terms of **external factors**, the biggest limitations come from: (a) destimulative measures of agricultural policy (this problem is particularly expressed in „Cluster Baby Beef“, Belgrade); (b) underdeveloped business environment for companies and family agricultural holdings; as well as (c) failed privatization of companies in the agribusiness sector.

From the presented characteristics of agricultural clusters it can be concluded that they are still in the initial stage of functioning, they are insufficiently operative and without sustainable sources of funding. They do not have critical mass of participants, nor economic and market strength and they possess very low production, export and innovation capacities. Due to these characteristics, agro clusters do not show their positive effects on productivity growth, innovation and competitiveness of the participating cluster members and the region in which they operate. Moreover, there is a lack of their positive influence on the entrepreneurship development, employment and the creation of new SMEs within cluster activities.

Although it is still too early to assess possible market sustainability of registered clusters in the future, especially having in mind the fact that clusters need a decade or more to develop depth and show their positive effects, it can be noted that the clusters will not develop in a successful way if recorded problems in functioning (especially in the field of external limitations) are not eliminated or at least reduced. The following are assumptions for further development and improvement of capacities of agro clusters in the Danube region.

Assumptions for development of agro clusters in the Danube region in Serbia

Based on a research of attitudes of employers on the business environment in Serbia (Union of Employers of Serbia, 2013, page 11-13), research of cluster development in Serbia (Paraušić, 2012), survey research of agro clusters in the Danube region (Paraušić, Mihailović, 2013), and the analysis of the world literature on the factors that contribute to the success of clusters (Rosenfeld, 2002; Englands Regional Development Agencies, 2003), it can be concluded that the successful development of agro clusters in Serbia will be first of all determined by fulfilling: (a) the **"external"** and (b) **"internal"** assumptions.

External assumptions for cluster development include stimulative and predictable macroeconomic policy, and especially creating stimulative business environment for business and investments of SMEs, cooperatives and family agricultural holdings in sector of agriculture and rural development. The most important external assumptions are: (a) predictable and stimulative agricultural policy; (b) reform of labour laws and trade regulations; (c) reduction of the tax burdens (especially in terms

of wages) and other expenses of business entities (hidden costs of business); (d) development of financial market; (e) effective policy to protect and strengthen competition on the market; (f) depolitization of public institutions and effective coordination of government bodies at all levels; (g) support clusters and SMEs sector by business support organizations or regional development agencies.

Internal assumptions for cluster development include: (a) increasing the critical mass of clusters (participation of major and recognized producers on the market); (b) active cooperation of the cluster members based on trust and long-term relationship; (c) providing stable sources for funding the cluster activities; (d) the entrepreneurial spirit and initiatives; (e) increasing the production, export and innovation capacities of clusters. The most important internal assumption will be providing stable sources for funding the cluster activities by: project funding, i.e. applying for budget and donor funds, as well as the EU funds; membership fees and commercialization of cluster services. Strengthening the internal capacities of clusters is an important assumption, given that the success of clusters in project funding depends on the existence of high production, export and innovation capacities of clusters. Furthermore, strengthening the internal capacities of clusters is also the assumption for greater engagement of consultants by the member companies, who provide expert assistance and necessary knowledge transfer (Mihailović, 2011, page 26). It is important to note that none of these assumptions alone can influence the development and sustainability of clusters, but together, creating synergy, they make a favourable and stimulative environment for the overall development of clusters.

Directions of development of agro clusters in the Danube region in Serbia

In the future support to cluster development in the Danube region should receive already existing clusters, as well as clusters which will develop in the geographical areas that already have market recognition in some agricultural production, where producers of certain products are concentrated and already united in successful cooperatives or associations, where there is uniqueness and tradition in the production, as well as high production and export performance of producers. In accordance with the above mentioned, clusters that would respond to the model of sustainable agriculture and rural development, could be developed in the following productions:

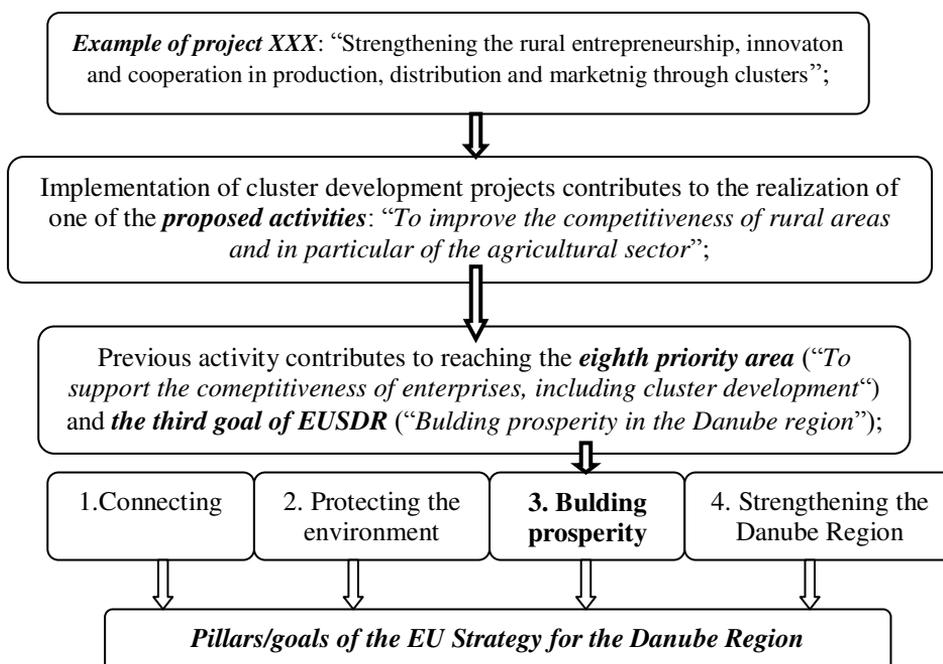
- Organic production in the municipality Bač and other municipalities that belong to Upper Danube region. In the municipality Bač the example of successful business is the company "Zdravo organic", Ltd. This company makes organic products (fruit and vegetable processing), it possesses large and modern facilities, implemented standards and is export oriented.
- Clusters in the field of fruit and grape production in the metropolitan area of Belgrade-Novı Sad, especially in the Belgrade municipality Grocka (Boleč, Ritopek, Begaljica), Novi Sad, Smederevo, Beočin and Sremski Karlovci and in the municipalities Negotin and Kladovo. For example, in the municipality Sremski Karlovci very successful is winemaking cooperative "Bermet", which protected designation of origin for bermet wine in 2007, and in this municipality "Fruška Gora Cluster of winemakers and winegrowers Alma Mons" is also registered.
- Clusters in the field of vegetable production in the metropolitan area of Belgrade-Novı Sad, especially in the Belgrade municipality Palilula (places such as Veliko selo and Slanci), Novi Sad and Pančevo.

In addition, certain areas in the Danube region have high natural resources, and thus provide opportunities for cluster development in the following kinds of production:

- Organic production of cereals, industrial crops, vegetables and herbs in the metropolitan area of Belgrade - Novi Sad, where there are the highest opportunities for placement of products, with the biggest concentration of population of greater purchasing power. Organic production in particular can be developed in the Belgrade municipalities Sopot and Barajevo, which can be roughly defined as "ecological municipalities" (The strategy of agriculture development of the city of Belgrade until 2015, page 377, 383).
- Handicraft production of agricultural products at higher levels of processing according to traditional recipes (meat products, dairy products, especially from goat's milk), integrated production and processing of medicinal herbs, wild and cultivated fruits and grapes, honey. Clusters of agricultural production with high added value in the concept of „High Nature Value farming“, can be developed especially in the Carpathian region in Serbia, which is characterized by high value ecological resources for the development of traditional mountain agriculture.

Development of agro clusters in the Danube region in Serbia should be considered in the context of participation of Serbia in the process of *implementation the EU Strategy for the Danube Region* (EUSDR). According to statements of the European Commission (EC, 2010, page 6; EC, 2010a, pages 64-68), cluster development projects contribute to implementation of the EUSDR by reaching the goal of the eighth priority area and the third goal of EUSDR, as shown in Scheme 1.

Scheme 1. *Link between clusters and EUSDR objectives*



Source: *The authors according to the statement of the European Commission (EC 2010 and EC 2010a).*

Inclusion of Serbia in the implementation of this macro strategy of the EU is recognized as an opportunity for further development of Serbia's cooperation with neighbouring and other countries along the Danube River, as well as assumption for development of potentials of Serbia in the fields of infrastructure, agriculture, environment, tourism, institutional and human capacities. In the Serbian government document from 2010 (The Government of the Republic of Serbia, 2010, page 11-14) it is emphasized that the overall objective of Serbia for participating in a comprehensive EUSDR is: "Using the potential of the Danube as an important resource for the sustainable development of Serbia", and one of the priority areas within

the pillar "Socio-Economic Development", which will be improved along with cluster development is the following: "Economic development and strengthening of regional cooperation and partnership in the Danube region".

The best way to develop agro clusters in the Danube region in Serbia, within implementation of the EUSDR, **is through transnational cooperation, cross-border and cross-sectoral cooperation between the clusters**. The European Commission emphasizes that it is important to strengthen transnational cooperation in the Danube region at political and business level, in order to reduce high socio-economic differences between the countries and achieve greater regional coherence (EC, 2010a, page 64). In addition, the European Commission sees clusters and links between centres of excellence, as factors which will extend the competitiveness of upstream enterprises to the whole region (EC, 2010, page 9-10).

In order to select projects for cluster development in the Danube region in Serbia to be financed from the EU funds, funds of international financial institutions and national funds, and which could be included in the Action Plan EUSDR, it is important to have in mind that potential projects must meet the following criteria (EC, 2010a, page 4-5): (a) They should address identified priorities and be supported by countries, stakeholders or Commission's services; (b) They should have an impact on the macro-region or a significant part of it (thus they should be transnational, i.e. include several countries that want to cooperate); (c) They should be realistic and feasible technically and financially (realistic source of funding should be identified); (d) They should be coherent and mutually supportive.

Conclusion

Primary research of registered agricultural clusters in the Danube region in Serbia indicates that in this region 19 agro clusters have been registered up to June 10, 2013. From the presented characteristics of agricultural clusters it can be concluded that the clusters are still in the initial stage of functioning, they are insufficiently operational and without sustainable sources of funding. Clusters lack critical mass of participants, as well as economic and market strength and they are of poor production, export and innovation capacities. Due to these characteristics clusters do not show their positive effects on productivity growth, innovation and competitiveness of the participating cluster members and the region in which they operate. Furthermore, there is a lack of their positive influence

on the development of entrepreneurship, employment and the creation of new SMES within the cluster activities. Although the clusters need a decade or more to develop depth and show their positive effects on competitiveness of participating cluster members and the region in which they operate, it can be concluded that the clusters will not develop in a successful way if numerous problems recorded in functioning, especially in the field of external limitations of development, are not eliminated or at least reduced.

This paper proposes the necessary assumptions (internal and external) and the survival and further development of clusters will depend on fulfilling these assumptions. Moreover, the authors indicate market trends of agro cluster development in the future, and emphasize the need of transnational approach to their development in the context of Serbia's participation in implementation of the EUSDR. Generally speaking, it can be concluded that in the future support to cluster development should receive already existing clusters, as well as clusters that will develop in the geographical areas that already have market recognition in some agriculture production, where producers of certain products are concentrated and already united in successful cooperatives or associations, where there is uniqueness and tradition in the production, as well as high production and export performance of producers.

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BOND MARKET AS A FACTOR IN COMPETITIVENESS IMPROVEMENTS OF SERBIAN AGRIFOOD SECTOR*

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Abstract

In the following decades, the world is expecting a significant increase in food prices, which is a great opportunity for the economic development of Serbia. The rapid development of the agri-food sector requires significant investments, which is not possible without the development of capital markets. The domestic capital market is currently characterized primarily by expensive bank loans and limited subsidized loans. As a significant alternative to the bank loans stand out the bond market. The aim of this study is to determine the current state of debt securities market and to provide guidelines for its development in order to improve the competitiveness of the agri-food sector in Serbia.

Keywords: *agri-food sector, lending, bonds.*

Introduction

As a specific effect of the economic crisis in Serbia, it may be noted that for several years there has been considerable interest in traditionally neglected sector of agriculture, both in professional circles and in the daily political considerations. After the withdrawal of the U.S. Steel at the beginning of 2012, which was the largest exporter in Serbia before the economic crisis, surplus of agricultural and food products in foreign trade ratio has become significantly pronounced. Exports of agricultural and food products, however, are largely related to just a few products (cereals, sugar and raspberries). It indicates that there are significant unutilized

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opportunities for improving the export performance not only in volume, but even more in the structure, where the products of higher processing levels should take a more important place.

Considering the fact that the world expects pronounced rise in prices of food products in the following years and decades, there is no doubt that the development of agriculture in Serbia may be the most important carrier of the future economic growth. As one of the key issues in the strategy of Serbian agricultural development, stands out the funding issue. The development of agriculture requires very large investments, with the payback period of at least several years. Due to equity deficiency, expensive bank loans and limited subsidized loans, fundraising through the bonds issue represents a significant alternative.

This form of borrowing, which is totally undeveloped in Serbia, has several advantages compared to commercial bank loans: (1) **more funds** can be obtained from multiple sources (institutional investors, banks, corporations, individual investors, etc.); (2) the total amount of borrowed funds, as well as credit risk, is divided by a number of creditors, which means a **lower interest rate**; (3) bonds may be issued without a **mortgage** or lien, which is a mandatory condition for commercial investments loans. Also, as the positive effect of bond market development stands out a creation of competition to banking sector, which in long-term leads to reduction in lending interest rate.

The importance of agricultural production and food industry for economic development of Serbia

According to the Chamber of Commerce and Industry of Serbia (*Privredna komora Srbije*) data, agriculture and food industry in the country's gross domestic product (GDP) participate for about 17% (agricultural production 10.6% and the food industry 6.4%). However, when it comes to the total contribution of agriculture to other economic sectors, especially to producers and input processing, this participation exceeds 40 percent of total GDP.³

Total foreign trade of Serbian agriculture in the January-December 2012 is amounted to 4.18 billion dollars, of which export is accounted for 2.71,

³ Data source: Chamber of Commerce and Industry of Serbia web site, <http://www.pks.rs/PrivredaSrbije.aspx?id=13&p=2&> (available 5.8.2013)

and imports for 1.47 billion dollars. During this period, agriculture's surplus in foreign trade is 1.24 billion dollars, which is 3.5% less than in the previous year.

Compared to the same period of 2011, agricultural export was rose by 0.7%, while import also rose by 4.7%. The coverage of import by export in Serbian agriculture was 184.8%, while in the same period last year stood at 191.9%.

The most important products in the agricultural export (in the period January-December 2012) are: maize in the amount of 541 million dollars, sugar in the amount of 164 million dollars, raspberries (frozen) in the amount of 136 million dollars, sunflower oil in the amount of 96 million dollars, non-alcoholic beverages in the amount of 64 million dollars and soybean oil worth 55 million dollars. According to the structure of agricultural export, the most important are cereals with 30.86% of total export, followed by fruit and vegetables with 19.85%, beverage with 7.84% and oil with 7.21%.

On the import side, the main products are raw coffee (101 million dollars), cigarettes (46 million dollars), food products (40 million dollars), soybeans (40 million dollars), bananas (37 million dollars) and pork (23 million dollars). The agrarian import has the largest share of fruits and vegetables with 19.73%, followed by coffee and tea with 14.32%, tobacco products with 7.53%, fish with 6.28% and grains with 5.81%.⁴

According to these data, the export of agricultural and food products to a large extent (about one-third of the total) only applies to three products: **cereals, sugar and raspberries**. This suggests that there are numerous opportunities for export increase, which can be achieved primarily through: (1) **increased production** of agricultural products; (2) the further **development of the food industry** and thus significant increase in export of more profitable products of higher processing stages.

Food production, according to official statistics for 2012, recorded a slight increase of 0.7% compared to 2011.⁵ Significant increase in growth of the agri-food sector requires large investments in fixed assets, the development of new technologies and products, marketing etc. In terms of

⁴ Op. cit.

⁵ <http://www.pks.rs/PrivredaSrbije.aspx?id=13&p=2&> (available 5.8.2013)

limited own recourses and unfavorable bank loans, it is necessary to find alternative sources of long-term funding in Serbia. In this regard, there is a potentially very significant and almost unused form of long-term indebtedness through bonds issue.

Legal regulation of the market of long-term debt securities in Serbia

According to the Serbian Law on the Capital Market (*Zakon o tržištu kapitala*) debt securities “means bonds or other forms of transferable securitized debts, with the exception of securities which are equivalent to shares in companies or which, if converted or if the rights conferred by them are exercised, give rise to a right to acquire shares or securities equivalent to shares” (Sl. glasnik RS, br. 31/2011, article 2 paragraph 36).

Bonds can be issued through **private placement** or **public offering**. Article 12 of Law on the Capital Market defines the conditions of private placement, i.e. the possibility of selling securities without obligation to publish a prospectus.

A prerequisite for a public offering of bonds in Serbia is publication of prospectus, which must be previously approved by the Securities Commission - SEC (*Komisija za hartije od vrednosti*). The prospectus should contain numerous and detailed information about the company and the issue of bonds that are required by the SEC Rulebook:⁶ information about the issuer, financial statements, review of operations, organizational structure, key risk factors, trends, assessment of profits, board of directors and supervisory board members, ownership structure - majority shareholders, the reasons for the issue and purpose of funds, information about securities and the terms of sale, plans for admitting of securities on the secondary market etc.

After the completion of the bonds issue, it is very important to include them on the **secondary market** that enables the possibility of free trade before bonds maturity. Securities’ trading in Serbia is mainly performed at the Belgrade Stock Exchange - BSE (Scheme 1), which organizes and manages:

⁶ Rulebook on the format, minimum information contained in prospectuses and base prospectuses, and advertisements - *Pravilnik o formi, minimalnom sadržaju informacija koje treba uključiti u prospekt i osnovni prospekt i oglašavanju u vezi sa prospektom*, Sl. glasnik RS, br. 89/2011 i 14/2013.

- The regulated market, which consists of three segments:
 1. *Prime Listing*
 2. *Standard Listing*
 3. *Open Market*.
- Multilateral Trading Platform - MTP BELEX.

Scheme 1. Market Organization on BSE⁷



Securities may be admitted on the Regulated market on the request sent by the issuer to one of the segments determined by the given request. Conditions and procedures for admission of securities to the Listing of the Regulated Market, as well as other issues related to the Listing, are regulated by the Rules on Listing of the Belgrade Stock Exchange (*Pravilnik o listingu Beogradske berze*).⁸

General Conditions for **Prime Listing** are:

- Minimal amount of the issuer's capital - 20 million euros (book value of equity or market capitalization)
- Report on the audit of the Annual Financial Report prepared in accordance with the Law governing accounting and auditing – with expressed unqualified or qualified opinion;
- Issuer's webpage – created both in Serbian and English language.

⁷ BSE Website, [http://www.belex.rs/eng/trzista i hartije/organizacija_trzista](http://www.belex.rs/eng/trzista_i_hartije/organizacija_trzista) (available 6.8.2013)

⁸ Rules on Listing of the Belgrade Stock Exchange, http://www.belex.rs/files/e_regulativa/listing.pdf (available 6.8.2013)

For inclusion, as well continuously during the period of listing of debt security on Prime Listing, in addition to general conditions for Prime Listing, following special conditions must be met:⁹

- The value of issues of at least 10 million euros;
- The issuer's account has not been blocked in the last 180 days.

General Conditions for **Standard Listing** are:

- Minimal amount of the issuer's capital - 4 million euros (book value of equity or market capitalization)
- Report on the audit of the Annual Financial Report prepared in accordance with the Law governing accounting and auditing – with expressed unqualified or qualified opinion;
- Issuer's webpage – created both in Serbian and English language.

For inclusion as well continuously during the period of listing of debt security on Standard Listing, in addition to general conditions for Standard Listing, following special conditions must be met:

- The value of issues of at least 1 million euros;
- The issuer's account has not been blocked in the last 60 days.

Securities which do not qualify for inclusion to Listing, or at the request of the issuer, shall be admitted to the Open Market in accordance with the Rules of Business Operation of the BSE (*Pravila poslovanja Beogradske berze*).¹⁰

General conditions for admission of securities to the **Open Market** are:

- The issuer is not in process of bankruptcy or liquidation;
- alternatively at least:
 - 300.000 euro amount of equity (recorded in last financial statements) or market capitalization (of shares traded on other segments of regulated market or MTP), or
 - 15% of the shares in the “free float”.

In exceptional cases, BSE may approve the inclusion of securities on the Open Market if considers that it is in the interests of the issuer or investors, taking into account the minimum amount of equity or market capitalization and the percentage of shares which are in free float.

⁹ Rules of Business Operation of the Belgrade Stock Exchange , http://www.belex.rs/files/regulativa/pravila_poslovanja_2013.pdf (available 6.8.2013)

¹⁰ Op. cit.

In case the security does not fulfill the conditions for admission to one of the segments of the regulated market, the security is admitted to the **MTP BELEX**.

It is important to note that the Law on Capital Market allows the secondary **OTC (over-the-counter) trade**. According to Section 46 (paragraphs 5 and 6), the issuer is not required to file a request for inclusion of debt securities on the securities market. If debt securities are admitted to trading on a regulated market or MTP, such securities can also be traded OTC in accordance with the provisions of this Law.

Debt securities trading in Serbia

Depending on the issuer, Serbian market of long-term debt securities can be classified into three groups:

1. *government debt securities*
2. *municipal debt securities*
3. *corporate debt securities*.

Law on the Regulation of the Public Debt of the Federal Republic of Yugoslavia (*Zakon o regulisanju javnog duga Savezne Republike Jugoslavije*) from 2002 prescribes the mandatory conversion of citizen's foreign currency savings to government bonds. To settle those obligations, the Republic of Serbia in 2002 issue bonds, whose final series matures in 2016.

In recent years the government has raised significant funds by long-term bonds, which to some extent can be explained by the need to cover the budget deficit. Primary market of government securities in Serbia is organized by Public Debt Administration of the Ministry of Finance and Economy (*Uprava za javni dug Ministarstva finansija i privrede*). Issue of government securities is done by auction at a single interest rate.

The government has issued bonds with maturities of up to seven years. By the end of 2012 the longest maturity was five years, while in March 2013 government issued bonds denominated in dinars with maturity of seven years. Two-year bonds with a variable interest rate, which is linked to changes in the key policy rate (reference interest rate) of the National Bank of Serbia with the addition of a fixed-rate, were first issued in august 2012. Three-year and five-year bonds denominated in dinars were issued with a periodic coupons payment and coupon rate of 10% per year. From 2013

there has been a change from the semi-annual to the annual coupon payments on government bonds.

At the end of 2012 the total balance of undue government bonds, whose primary trade was organized by the Public Debt Administration calculated at nominal value, amounted to 469.9 billion dinars (not including bonds issued in accordance with the Program of measures to preserve financial stability of banks in the amount of 16.8 billion dinars). From the total amount of specified undue government bonds, 354.5 billion (75%) were denominated in dinars and 115.4 billion (25%) denominated in euros (1.01 billion euros). Foreign investors, with an average annual participation in primary trade auctions of 61.1%, showed the greatest interest for the three-year government bonds denominated in dinars, which included 21.6% of total government “dinar bonds” at the end of 2012.¹¹

Government securities denominated in euros were issued only with a maturity of over one year. At these auctions, the largest buyers were domestic banks, with an average share of 75.8% in 2012. The average auctions sell rate of government “euro bonds” amounted to 78.3% in 2012. Payment obligation on these bonds has increased from 0.55 billion euros in late 2011 to 1.01 billion euros at the end of 2012.

Investors with the highest participation in auctions of government “dinar bonds”, at the end of 2012, were domestic banks (49.8%) and foreign investors (42.8%), while domestic institutional investors (insurance companies, pension and mutual funds) and natural person had minor participation.¹² Increase in the trade participation of domestic institutional investors would reduce the vulnerability of public debt. That is because foreign investors often react more quickly to any negative news from the domestic and international environments than local investors.

Municipal bonds market in Serbia is undeveloped and illiquid. According to the Central Securities Depository and Clearing House (*Centralni registar, depo i kliring hartija od vrednosti – CR HoV*) data only two local governments have issued municipal bonds (up to August 2013): City of Novi Sad and Municipality of Pančevo. Municipal bonds are issued to well-known investors, without any public offer and they are denominated in euros.

¹¹ Data source: Godišnji izveštaj o stabilnosti finansijskog sistema - 2012 (Annual Financial Stability Report – 2012), Narodna banka Srbije, published on July 2013, p. 73.

¹² Op. cit, p. 74.

Unlike the government, which undertakes permanent activities in order to issue long-term debt securities, corporations in Serbia show no significant interest in this type of financing. Until 2012, **long-term corporate bonds** in significant amounts issued (over 1 million) only NLB Bank and Tigar.

During the 2010, **NLB Bank** issued long-term bonds with fixed interest rates denominated in euros. It was the first series of such bonds in Serbia. In this way, they borrowed about 450 million dinars. Securities were issued through a private placement to professional investors, among which the most important were insurance companies and pension funds. The nominal value of one bond was 100,000 dinars, with a maturity of 5 years and a fixed interest rate of 5%. The interest payment was semi-annually, while the nominal value of the bond is paid at maturity. The securities were issued with euro currency clause and they were listed on the BSE. In June 2012, NLB bank has decided to withdraw from MTP market of BSE.¹³

In August 2010, **Tigar** issued long-term corporate bonds in the nominal amount of 167.5 million dinars, with a maturity of 5 years. First issue of long-term bonds was bought by local professional investors - Commercial Bank (*Komercijalna banka*), insurance company Wiener Städtische and Takovo. In the form of a private placement, Tigar issue 16,750 bonds with a nominal value of 10,000 dinars. The bonds had an interest rate of 7.75 percent annually with quarterly payment (which include interest and the corresponding part of the principal) and a put option after the first year. Each bond had 20 coupons, payable on maturity in the euro equivalent (in dinars) at the average exchange rate of the NBS. During October 2010 Tigar has realized the second issue of long-term bonds in the domestic capital market. Second issue of long-term bonds was also bought by local professional investors: KBC Bank, DDOR insurance, Wiener Städtische and Takovo. The total amount of the issue was 83 million dinars. Terms of the second issue were the same to the terms of the first issue. In July 2011 Tigar realized the third issue of bonds, with a maturity of 4 years. Investors were: KBC Bank, Jubmes Bank, DDOR, Takovo and Wiener (Reinsurance). The bonds were issued in total amount of 90 million dinars, with annually interest rate of nine percent denominated in foreign currency.¹⁴

¹³ BSE Website, <http://www.belex.rs/data/2010/08/00064037.pdf> and <http://www.belex.rs/data/2012/06/00077197.doc> (available 6.8.2013).

¹⁴ All information on issuing long-term bonds were taken from their website: <http://www.tigar.com/tigar.php?str=186&lg=sr> (available 6.8.2013).

During the 2012 the two commercial banks, Societe Generale Bank and Erste Bank, issued the first long-term “dinar bond”. Issuance of such bonds, which do not include a currency clause, may mean a support in the process of restoring confidence in the domestic currency.

In May 2012, **Societe Generale** sold its first issue of “dinar bonds” in the amount of 1.7 billion dinars. The bond had maturity of three years and put option. Interest is paid quarterly, and the interest rate consists of a fixed part (5.25%) and a variable part based on the reference interest rate. Bond was included in BSE Open Market in September 2012. In March 2013 bond was transferred to the MTP, due to the lack of trading in the period of 180 days.¹⁵ Issue of long-term bonds was bought by insurance and voluntary pension funds (8 investors with a percentage share in total issue of 15%) and banks (3 investors with a percentage share in total issue of 85%).¹⁶

In November 2012 **Erste Bank** issued two-year “dinar bond” by public offering through the BSE and thus enabled participation in the primary market to all interested domestic and foreign investors. Bonds were sold in amount of 1.5 billion dinars. The interest rate was fixed at 15% annually and interest is paid quarterly. The most important investors were banks (Commercial Bank, Raiffeisen Bank, UniCredit Bank) and insurance companies (Wiener Städtische and Delta Generali). The bond is included on the BSE Open Market from November 2012.¹⁷

According to data from the *CR HoV* website (7 August 2013), there are 33 issuers of debt securities. After excluding government, municipal and short-term corporate securities, it may be noticed that there are only six companies that issued long-term corporate bonds. Besides four companies that were already mentioned, two other companies in Serbia issued long-term corporate bonds: Galeb GTE in 2010 and Telefonija in 2011. Both

¹⁵ BSE Website, <http://www.belex.rs/data/2012/09/00079523.pdf> and <http://www.belex.rs/data/2013/03/00081499.pdf> (available 6.8.2013).

¹⁶ Societe Generale Website, http://www.societegenerale.rs/fileadmin/template/main/pdf/Izvestaj_o_ishodu_javne_ponude_duznickih_hartija_od_vrednosti.pdf (available 6.8.2013).

¹⁷ BSE Website, <http://www.belex.rs/data/2012/11/00080419.pdf> and <http://www.belex.rs/data/2012/11/00080439.pdf> (available 6.8.2013).

issues were in the form of a private placement in the amount of 50 million dinars each. The investor was Wiener Städtische.¹⁸

Long-term sources of finance for companies in the agri-food sector

According to obtained results, it is evident that the long-term corporate bond market in Serbia is underdeveloped. The offer is very limited, while on the demand side dominate institutional investors and to some extent banks.

However, example of Tigar, which in the period 2010-2011 collected more than 3 million euros through the sale of bonds, suggests that even in a recession, economic crises and general absence of investors, potentially successful corporate enterprises can raise significant funds in the long-term securities market. That is possible only if their business and investment plans provide credible guarantees to institutional investors.

Starting with the great potential of the agri-food sector in Serbia, the question is whether it would be possible for some of the most successful companies in this sector to issue bonds in the near future? The research in this paper includes **ten representative corporations**, from the aspect of profitability, equity value, market capitalization, business operations and listing on the regulated market of the BSE. These are: Bambi a.d. Požarevac; Crvenka fabrika šećera a.d.; Dijamant a.d. Zrenjanin; Frikom a.d. , Beograd; Imlek a.d. Beograd; Mlekara Subotica a.d; Mlekara Šabac a.d.; Neoplanta a.d. Novi Sad; Sojaprotein a.d. Bečej; TE - TO a.d. Senta; Vital a.d. Vrbas.

As already discussed, bonds issue represents a very important alternative to commercial bank loans. A large amount of debt can be "broken" to several creditors, who are thus exposed to a much smaller individual credit risk, which means a lower interest rate. The bonds may be issued without a mortgage guarantee, which is a mandatory requirement for large bank loans.

As a first step in the analysis of the potential importance of the establishment and development of the bond market, it is necessary to determine the extent to which firms use **long-term loans** to finance investments (Table 1).

¹⁸ BSE Website, <http://www.belex.rs/data/2010/06/00062450.doc> i and <http://www.belex.rs/data/2012/05/00075496.pdf> (available 14.8.2013).

Table 1. *Relevant balance sheet data (in 000 dinars)*

Corporation	Equity*	Long-term loans*	Increase/decrease in long. loans**
Bambi	4,246,450	0	-41,102
Crvenka	3,514,205	156,623	17,102
Dijamant	9,360,773	138,647	-118,103
Frikom	5,671,728	0	-2,616,023
Imlek	10,594,382	762,401	-524,117
Mlekara Subotica	2,800,799	0	-78,046
Neoplanta	3,803,327	431,132	165,793
Sojaprotein	12,449,372	2,306,316	-589,187
TE – TO	2,620,509	368,444	116,593
Vital	3,256,568	2,046,306	12,358
		Σ	-3,654,732

Source: *Individual annual stock market reports for each company, taken from the BSE website (www.belex.rs).*

* Balance sheet accounts Equity and Long-term Loans refers to day 31.12.2012.

** Difference in balance sheet accounts Long-term Loans on 31.12.2012 and 31.12.2011.

According to their financial statements for 2012, long-term loans have been "eliminated" by three companies (Bambi, Frikom and Mlekara Subotica), which is especially pronounced in Frikom. In 2012 Frikom decided to prepay loans taken from IFC (International Finance Corporation) and Credi Agricole bank in total amount of nearly 23 million euros (14.3 million was IFC loan and 8.5 million was Credi Agricole loan). The loan was intended for investments in new manufacturing equipment and to increase production of frozen fruit.¹⁹ Three other companies have significantly reduced the amount of long term loans during the 2012 (Dijamant, Imlek and Sojaprotein).

Four companies (Crvenka, Neoplanta, TE-TO and Vital) have increased long-term loans, but to a much lesser extent than the loans repayment of six other companies. There is an apparent tendency towards **reduction in the use of long-term loans**, that observed in the sample of ten companies is around 31 million euros (\$ 3.6 billion dinars).

¹⁹ Data source: Godišnji izveštaj za 2012. godinu - (Annual report for 2012), Frikom a.d., str. 17., <http://www.belex.rs/data/2013/04/00082028.pdf> (available 7.8.2013).

In terms of the economic crisis, most successful companies in the world are trying to reduce debt and to a large extent finance their needs from its own funds. Due to the relatively expensive bank loans (which are primarily a consequence of high inflation, investment risk and mandatory reserves), this phenomenon is clearly more pronounced in Serbia.

If companies do not want to borrow from banks, they can obtain funds for investments primarily through the **issue of new shares** or to **reinvest profit**. In Serbia, however, even before the economic crisis primary stock markets was not developed, which means that companies were mostly using their own internal resources for investments.

Table 2. *Net profit (2008-2012)*

Corporation	Net profit (in 000 dinars)				
	2008	2009	2010	2011	2012
Bambi	24,906	200,810	556,003	897,929	1,098,494
Crvenka	848,544	548,159	1,059,665	1,033,190	975,883
Dijamant	1,053,472	458,610	341,804	892,001	1,537,806
Frikom	684,820	366,193	198,520	549,844	474,733
Imlek	900,889	867,815	1,155,535	1,946,522	2,670,444
Mlekara Subotica	559,818	260,840	41,869	244,619	119,188
Neoplanta	3,532	1,896	56,640	116,848	336,087
Sojaprotein	407,103	488,229	792,014	1,142,832	689,000
TE – TO	22,047	3,714	254,528	1,532,957	1,380,337
Vital	569,790	30,520	442,312	57,103	-322,863

Source: *Individual annual stock market reports for each company, taken from the BSE website (www.belex.rs)*

Of the ten companies surveyed (Table 2), almost all consistently operate with a **profit in the last five years** (with the exception of Vital, who has made a loss in 2012). This points to the great potential of the food sector in Serbia, especially if taken into account that these results were achieved during the economic crisis.

It is evident that the successful companies from the food industry are trying to reduce the share of long-term loans in total liabilities and to focus more on their own sources of funding. The question whether these companies will have **interest to sell bonds** in future depends primarily by the *interest rate*, *maturity date* and the *cost and complexity of issue* procedures.

The experience of developed countries shows that the long-term development of the bond market is primarily determined by the placement of **institutional investors**: insurance companies, pension funds and investment funds. Also in Serbia, on the demand side for bonds are primarily institutional investors, especially insurance companies because of relatively flexible legislation that regulates their investments.²⁰ However, even insurance companies have been interested mainly in government securities and avoided to invest at greater extent in long-term assets denominated in dinars.

In short term, Serbia can not expect significant progress in the development of the bond market. Since the requirements of issue are much easier for a private placement to known investors, this form will remain dominant.

It is evident that the long-term development of the bond market is primarily determined by the activities of institutional investors. **Insurance companies** have been most involved in the purchase of corporate bonds. According to the NBS, the total premiums that insurance companies collect during 2012 amounted to 61.5 billion dinars. Of these, 19.3% or 11.87 billion dinars are related to *life insurance premiums*, which are an extremely important source of investment in long-term securities. In 2011 the share of life insurance premiums were lower by about 2% and amounted to 17.4%.²¹ As in developed EU countries the share of life insurance in total premiums often exceed 50%, its further development in Serbia could be expected.

In addition to insurance companies, **voluntary pension funds** in the future will also be a significant source of demand for long-term securities, given the *rise in the average age* of the population in Serbia and the potential *illiquidity of the state pension insurance system* - the first pillar of pension funding. Private pension funds have a legal option for investing in securities (issued by entities registered in Serbia), which are traded on a regulated market.²²

²⁰ According to the Law on Insurance (*Zakon o osiguranju*), insurance companies can invest technical reserves in bonds that are traded on the regulated securities market, but also in bonds that are not traded on a regulated market, which has issued a legal person registered in Serbia (Article 114, paragraphs 2 and 3).

²¹ Godišnji izveštaj o stabilnosti finansijskog sistema - 2012, Narodna banka Srbije, objavljen jula 2013, str. 65.

²² Zakon o dobrovoljnim penzijskim fondovima i penzijskim planovima, Article 31, paragraphs 6.

Investment funds are third important source of demand for corporate bonds (they operate in Serbia since 2006). Law on Investment Funds (*Zakon o investicionim fondovima*) defines investment policy, which allows investment in securities (issued by legal entities registered in Serbia), which are traded on a regulated market.²³ The relatively high 22.11% of investment funds in mid-2012th was placed in the debt securities. A more detailed analysis shows that placement was in government bonds, treasury bills and corporate bonds of foreign issuers.²⁴

Conclusion

It terms of global and regional economic downturn, companies analyzed in this paper are being profitable for last several years, which indicate a great potential of the agri-food sector in Serbia. The results show that these companies are trying to reduce the share of bank loans in the liability structure and yet have not issued any long-term bonds. It is certain that there is potential demand by institutional investors for long-term bonds of successful companies from the agri-food sector.

Based on the above, it can be concluded that the bonds issue is an important alternative to bank loans. Issuance of the bonds may provide less expensive long-term funds that are necessary for investments in order to increase the competitiveness of companies in the agri-food sector in Serbia.

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²⁴ Đulić K., Živković B. (2012): *Tržište korporativnih obveznica u Srbiji*, Kvartalni monitor, br. 30, Fondacija za razvoj ekonomske nauke, p. 75.

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SUBSIDIES AND INCENTIVE ASSETS FUND FOR AGRICULTURAL DEVELOPMENT CITY OF NIS¹

Zoran Simonović², Slavomir Miletić³

Abstract

The authors talk about subsidies and incentive funds in livestock and crop production, which gives the Agricultural Development Fund of Nis. Now that pays special attention to agricultural development, local government has an important task. It is the local government becomes the creator and promoter of the development of agriculture. Of adoption of these incentives and subsidies should be the creation of favorable conditions in line with the potential and needs continuity in development activities, human, institutional, business solutions, financial support and everything that can greatly contribute to the rapid development of agriculture and rural areas. The paper is divided into two parts. The first part is a list of incentives related to crop and livestock production which gives the Fund for Agricultural Development. The second part discusses the results of a survey conducted among the farmers who live and work in the City of Nis on incentive funds and subsidies provided by the city.

Keywords: *incentives in agriculture, subsidies, programs of improvement, a survey.*

Introduction

The Agriculture and rural development are regulated by the objectives of agricultural policy of Serbia and the way of its implementation, the types of incentives in agriculture, the conditions for eligibility for subsidies and incentives for users.

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This law introduces a register of agricultural holdings, recording and reporting in agriculture, an integrated agricultural information system, monitoring the implementation of this law.⁴ Strategy for Agriculture and Rural Development, which was adopted at the national level defines the long-term trends of development of agriculture, such as the establishment of a market economy, increasing the overall profitability of agriculture and rural areas, while the national agricultural program established medium-and short-term objectives of agricultural policies, the order and deadlines for the achievement of these objectives, expected results, and the form, type, purpose and scope of specific incentives.⁵

The local agricultural development documents were presented in the Master Plan, the Strategy for the development of local economy and Schedule for the sustainable development strategy of the city. Department of Economy, Sustainable Development and Environment of the City of Nis in cooperation with other organizations, there are several projects related to agriculture, such as: Reka mleka, Dobra farma, Produktna baza.⁶

Based on all indicators of the City of Niš has great potential for agricultural development. The favorable climatic conditions, characteristics of good agricultural lands and water and natural resources, which are essential for overall rural development.

In the situation of implementation of agrarian development trend of local government is an important task. It must be the creator and promoter of the development of agriculture. Creating favorable conditions in line with the potential and needs continuity in development activities, personnel, institutional, business solutions, financial support, and local government administration can greatly contribute to the rapid development of agriculture and rural areas.

Development Department of the City of Nis and Agriculture adopted a series of subsidies and incentives to improve agricultural production in the City. Based on the approved incentives for this purpose we note that greater attention to animal husbandry and livestock production.

⁴ Закон о пољопривреди и руралном развоју, Службени гласник РС, бр. 41/09.

⁵ Стратегија развоја пољопривреде Србије, 2005, Службени гласник РС, бр. 78/05.

⁶ Ка интегралном развоју, Београд, 2006, 31.

In the first part of our work we have chosen to pay special attention to programs for improvement of livestock and crop production. Programs to improve crop and livestock production were adopted by the city council and Nis is incentives for agricultural producers. The second part dealt with a survey we did (in the period June-August 2013.). The main purpose of doing the survey was to learn about the attitudes and opinions of farmers about the use of subsidies provided by the Agricultural Development Fund of the City of Nis. The survey was conducted on a sample of 0.5%. As is well known in the City of Niš has 10,244 farms. This means that we perform a survey of 51 farms. The survey was conducted in June-July 2013th Year.

Program to improve livestock

The issue of improving livestock production provides for the Program for the Development of Agriculture encourages the development of those activities and production segments that were deemed to strategically most important for the maintenance and improvement of livestock production and diversification of economic activities in this area in the rural areas of the city of Nis. This improvement was primarily racial composition of cattle subsidizing the use of top seed bulls, through programs of qualitative breeding bulls from cow's propagation of municipalities which are being controlled by AI system and improving control of reproductive status of breeding cattle modern diagnostic means. Fixing racial composition in sheep and goats will be implemented through the purchase of animals for the formation of basic herd of sheep and goats in order to set the basis for a system of intensive production in these areas.⁷

Improving the racial composition of cattle subsidizing the use of top seed bulls

Improving the racial composition of cattle subsidizing the use of top seed bulls were realized in cooperation of the agriculture and rural development and veterinary stations and clinics that are registered for this service in the city. Management has established a committee to select a

⁷ Симоновић Зоран, Симоновић Драгољуб, Милетић Славомир, (2011). „Неки аспекти програма фонда за развој пољопривреде Града Ниша“ стр. 145-153. International scientific meeting: „SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS IMPLEMENTATION WITHIN DANUBE REGION – Local communities development“, *Економика пољопривреде*, Београд, специјални број 1/2011.

group of elite bulls used for artificial insemination is fast improving racial composition and production traits of cattle in the city of Nis. The Committee has selected bulls of Simmental and Holstein breed. Subsidized the first and second insemination with the first insemination subsidize the purchase of seed and handling charges vet, and in the second insemination only purchase seeds. Table 1 provides an overview of subsidies, the number of inseminated animals and spent funds for the period since 2010. By 2012. Year.⁸

Table 1. *Subsidies, the number of inseminated animals and spent funds for the period since 2010. by 2012. year*

Year	Depending on the bull and order insemination on subsidies amounted to	Number of artificially inseminated cows	Indices		Amounts expended for such purposes		Indices	
			Basic	Chain	RSD	Euro	Basic	Chain
2011	400,00-1.400,00	2055	100,2	100,2	2.595.121,00	25.452,00	109,3	109,3
2012	250,00-1.300,00	2554	124,6	124,3	2.155.833,00	19.076,00	90,8	83,1

Source: *Reports on the work of the Development Fund since 2010. By 2012. Year and the author's calculation.*

For the 2013th year is planned to implement Implementation Program for the Improvement of livestock in the part relating to the improvement of the racial composition of cattle in the city of Nis. Anticipated rapid retrieval racial composition of cattle in the city and the rapid increase in milk production of commercial producers, leading to an increase in motivation of farmers to keep animals in a production herd and begin to increase their number. Activities are carried out in cooperation Department of Agriculture and Rural Development, Agricultural extension and technical services Nis and veterinary stations and clinics that are registered to provide artificial insemination services in the city. Every year we formed an expert commission to select a group of elite bulls of Simmental and Holstein breed whose seeds are procured and used

⁸ Извештај о раду Фонда за развој пољопривреде града Ниша у 2010., 2011. и 2012. години

for artificial insemination of cows in the city. Part of the funds in the amount of 1.541 million will be used to settle the liabilities transferred from the previous year, and the remaining funds in the amount of 3,400,000 will enable the purchase and use of semen for artificial insemination 2,300.⁹

Subsidizing the purchase of quality breeding cattle

Subsidizing the purchase of quality breeding of calves aged between 3 and 6 months derived from propagation of mothers and bulls whose semen used in AI controlled system is a measure that is implemented in order to increase the number of breeding cattle. Department of Agriculture and Rural Development - a group of cattle breeding has produced the data by which the measure is implemented.

Pass criteria were consistent with the legal framework and the situation on the ground. In constant contact with the veterinary and registry services in the field of controlled system insemination candidates are going through administrative procedures in obtaining the necessary documents (identification cards animal pedigrees). For the implementation of these measures has been spent 60,000.00 dinars.¹⁰

Improving the control of reproductive status of primary main herd of cattle in the city of Nis

Improving the control of reproductive status of primary main herd of cattle in the city of Nis was realized in cooperation with experts of the Veterinary Institute Nis who have the necessary equipment for ultrasound diagnosis of pregnancy and reproductive disorders. During the 2010th the subsidized is that ultrasound of registered farms to 123,037.00 dinars.

The aim of this method is to control the reproductive status of the best cattle and propagation in the city of Nis make as efficient to avoid unnecessary failures in insemination and increased costs through increased feeding days to issue a new calf, which significantly reduces the financial performance and motivation of farmers to continue improve production. Transferred liabilities amounted to 3.120,00 Dinars shall be used for funding.

⁹ Програм фонда за развој пољопривреде града Ниша у 2013. године.

¹⁰ Извештај о раду Фонда за развој пољопривреде града Ниша у 2011.

Table 2. *The number and amounts expended for ultra- sound examinations*

Year	Number of subsidized ultra sound examination	Indices		Amounts expended for such purposes		Indices	
		Basic	Chain	RSD	Euro	Basic	Chain
2011	146	146,0	146,0	146.662,00	1.438,00	116,3	116,3
2012	265	265,0	181,5	260.583,67	2,306,00	206,6	177,7

Source: *Reports on the work of the Development Fund since 2010. By 2012. Year and the author's calculation.*

During the 2011th, in the period January - October subsidized 146 ultrasound examinations of registered farms. The aim of this method is to control the reproductive status of the best cattle and propagation in the city of Nis make as efficient to avoid unnecessary failures in insemination and increased costs through increased feeding days to issue a new calf, which significantly reduces the financial performance and motivation of farmers to continue improve production.

The 2013th is planned to control and determine the best and reproductive status of registered animals in the city of Nis make as efficient to avoid unnecessary failures in insemination and increased costs through increased feeding days to issue a new calf.

Of particular importance is that in the fourth year of implementation of these measures establish a representative sample, the average reproductive status of statistical production herds.

It is anticipated that for this purpose engage experts of the Veterinary Institute Nis who have the necessary equipment for ultrasound diagnosis of pregnancy and reproductive disorders, as well as the most reliable of all the methods used for this purpose. The total funds allocated for this measure amounts to 500,000.00 dinars.¹¹

¹¹ Програм фонда за развој пољопривреде града Ниша у 2013. године.

Subsidizing keeping quality breeding female heads (the program of artificial insemination) for year 2012

Subsidizing keeping quality breeding female heads of program of artificial insemination is a measure implemented in the 2012th in order to motivate manufacturers to maintain quality female breeding animals obtained from the program of artificial insemination. Funds in the amount of 820,000.00 dinars will be used to settle the liabilities transferred from the previous year.¹²

Subsidizing specific parameters of milk quality and quality of cattle feed in the productive herd of cows in the city of Nis

In the field, the production gradually include the heads of their own selection, and began the implementation of new technologies feeding of cattle, as well as the standards of hygiene in milk production that farmers are trained in education programs in recent years.

Each individual analysis of concentrated feed is subsidized by the net amount of 5.400,00 dinars, and nutrient - conserving silage in the net amount of 8.400,00 dinars. In collaboration with their agencies from the City (" Agrar servis Team " KK " Nonius " and Veterinary Station "Nis ") began with the analysis of feedstuffs and in the reporting period, there were 36 analyzes. Funding for this measure amounts to 239,400.00 dinars and will be paid as a liability transferred from the funds of the 2013th.¹³

Improvement of sheep and goat

Improvement of sheep and goat breeding is realized by creating the conditions for an intensive engagement by expanding stem sheep's herd of sheep.

In 2010 and 2011th the equipment was purchased quality female and male breeding animals Württemberg sheep breeds to extend the main herd. Established flock will be the basis of improving sheep in the city in the coming years.

¹² Програм фонда за развој пољопривреде града Ниша у 2013. године.

¹³ Извештај о раду Фонда за развој пољопривреде града Ниша у 2012.

Table 3. Amounts expended for the purchase of female and male breeding animals Württemberg sheep breeds

Year	Supply of high-quality female and male breeding animals Württemberg sheep breeds	Amounts expended for such purposes	
		RSD	Euro
2010.	-	616.000,00	5980,00
2011.	-	543.080,00	5326,00
-	-		-

Source: Reports on the work of the Development Fund since 2010. By 2011. Year and the author's calculation.

During the 2012th were not appropriated funds for this category. And in the 2013th year, this measure provides for acquisition of registered male breeding animals in the sheep, goat and pig . Male breeding animals carry half their genes in the population so that through this measure shall improve production traits that are essential for obtaining a new quality offspring. The purchase of the propagation of male breeding animals and their agencies from our territory, much easier to work , and our growers will benefit from it because it will be easier to be eligible for subsidies related to agricultural budget of the Republic of Serbia . In this way we improve the racial composition of sheep, goat and pig in the city of Nis. The allocation for this purpose is 500,000.00 dinars.¹⁴

Subsidizing the purchase Apiguard drug for the treatment bee of Varoa destructor – varoa

Since the disease Varooza one of the most important problems in beekeeping which can use a variety of treatment chemicals that may significantly affect the quality of honey subsidized the purchase of drugs Apiguard - only drug on the market that has the full effectiveness of the agents of these diseases, and meets all criteria for use in organic production. Subsidized the acquisition and packaging of medicines distributed over two associations of beekeepers in the city - Beekeepers Association "Niš" and Beekeepers Society "nut ". In this way, quickly and efficiently help our beekeepers to provide top quality honey which is necessary to be able to achieve the necessary competitiveness to export significant quantities of honey.

¹⁴ Програм фонда за развој пољопривреде града Ниша у 2013. године.

Table 4. *Subsidizing the purchase Apiguard drug for the treatment of Varroa destructor – varroa*

Year	Number of drug packaging	Indices		Amounts expended for such purposes		Indices	
		Basic	Chain			Basic	Chain
				RSD	Euro		
2010	5160	100,0	-	980.397,00	9.528,00	100,0	-
2011	4784	92,7	92,7	999.856,00	9.806,00	101,5	102,0
2012	3999	77,5	83,6	999.493,60	8.844,00	101,1	99,0

Source: *Reports on the work of the Development Fund since 2010. by 2012. Year and the author's calculation.*

Programs to improve crop production in 2011 and 2012th it is planned to stimulate the development of those activities and production segments that were deemed to strategically most important for the preservation and promotion of horticulture, viticulture and vegetable production. It is primarily the improvement loans for agricultural products and the production of healthy food security.

Serbian beekeeping in recent years made the first important steps in the organization of export of honey, and especially to the EU market. Export price is very favorable, and the demand is so great that Serbia cannot satisfy her, so it is imperative that the 2013th year continue to support the production of beekeeping in the city and help beekeepers and Nis to be involved in these processes. Bearing in mind the present situation in our beekeeping and the fact that the disease Varoza one of the most important issues to support the development of beekeeping will be realized by improving the health of bees.

This will quickly and efficiently help our beekeepers to provide top quality honey which is necessary to be able to achieve the necessary competitiveness to export significant quantities of honey. The realization of all activities will be conducted in collaboration with associations of beekeepers and experts of the Veterinary Institute Nis. Total funds allocated for this measure amounts to 1,200,000.00 dinars.¹⁵

¹⁵ Програм фонда за развој пољопривреде града Ниша у 2013. године.

Program crop production

A program to improve crop production is anticipated to stimulate the development of those activities and production segments that were deemed to strategically most important for the preservation and promotion of horticulture, viticulture and vegetable production. It is primarily the improvement loans for agricultural products and the production of healthy food security.

Subsidizing agricultural fruits, grapes and vegetables in the 2011th year

Subsidizing analysis of agricultural products - fruits, grapes and vegetables are implemented to support the development of diversification of production in rural households that sell their products in local markets, as well as incentives to support agricultural exports and domestic sales in the chain of retail stores. This measure applies to products 34 farms in the city of the analyzes were conducted on pesticide residues, residues of nitrite and nitrate residues of heavy metals and radioactivity. Type of analysis is determined in accordance with the needs and requirements of users. Expended funds in the amount of 399.000, 00 dinars.

Subsidizing the purchase tomato seedlings for the second harvest in 2012th year

Subsidizing the purchase tomato seedlings for the second harvest is an important component in vegetable production and refers to the purchase of seedlings for planting tomatoes in late autumn harvest, for indoor production. Subsidies to purchase tomato seedlings for the second harvest were carried out for the Association of Niški Povrtar which has 23 members. The subsidy amounted to 50% of the total, and the amount of funds spent 499,910.00 dinars.

Subsidizing agricultural products analysis is carried out in order to support the development of households who sell their products in local markets, as well as incentives to support agricultural exports and domestic sales in chain retail stores. The preliminary analysis of pesticide residues in vegetables (organic flora and organophosphate) and heavy metals (lead, cadmium, mercury and arsenic) in the fruit and the products are covered by members of the "Niš vegetable growers " who sell their products in the green market. During the reporting period were made 52 analyses. Each individual analysis subsidized is the net amount of 4846.15 dinars. During the 2012th year for this measure realized an amount of 299,999.00 dinars.

The Program for Agricultural Development Fund for 2013th and the decision of the Board of Directors of the Fund for the Development of Agriculture on the provision of funds for the implementation of the Program for the improvement of life and diversification of economic activities in rural areas of the 2013th City of Niš year invited tenders for subsidies in agriculture for 2013th year in September this year. The competition is planned to be financed seven programs. These are the following programs:

Program 1. Supply and installation of irrigation equipment.

Program 2. Perennial crops (supply proper health , quality of fruit and vine planting material , supply restraint perennial plants and procurement and installation of anti-hail protection) .

Program 3. Purchase of new machinery and specialized equipment (fruit and wine, vegetable and crop production).

Program 4. Purchase of specialized equipment for the collection, storage and processing of milk and dairy products.

Program 5. Purchase of specialized equipment for beekeeping production and packaging of honey and nuts and swarms of quality

Program 6. Support to agricultural holdings for the initial investment in agricultural production.

Program 7. Improvement and development of other activities in rural areas.¹⁶

The second part

Survey

The first of the questions that were asked in the survey was “What factors according to you is the biggest constraint to agricultural production in the City of Niš, but also in the whole territory of Serbia.” To this question, almost 60 % of those surveyed responded that it is marketing of agricultural products. Slightly less than 20 % said that a lack of affordable and long term financing. 15.7% as a reason for limiting agricultural production indicated low support from the agricultural budget , and a little less than 8 % of the respondents cited as a reason for not belonging to the association or cooperative (Table 5) .

¹⁶ <http://www.niskoselo.com/?p=2488>

Table 5. *Factors that limit agricultural production*

Ordinal	Description of factors	share in %
1.	Placement (the risk of collection / payment dispute claims, monopolized market and low bargaining power of farmers, price volatility and demand)	56,9
2.	The lack of affordable and long term financing (loans)	19,6
3.	Not belonging to the association or cooperative (farmers fragmentation)	7,8
4.	Low support from the agricultural budget	15,7
	total n = 51	100,0

Source: *Author's calculations based on survey.*

The second question was, "How you know that the Ministry of Agriculture and the agricultural city of Nis give incentive funding for the development and improvement of agricultural production." On the basis of answers to this question may give the impression that the farmers solidly informed that gives the city of Nis incentives (Table 6). Slightly more than 37% said that secondary familiar and almost 20% is a lot known, few are aware of 35.3% and only 7.8% do not know.

Table 6. *Informing farmers about the stimulus funds, the Ministry of Agriculture of Serbia and the Development Fund of the City of Niš*

Ordinal	Description reviews	Number of surveyed	share in %
1.	many known	10	19,6
2.	medium	19	37,3
3.	little is known	18	35,3
4.	not known	4	7,8
	total n = 51		100,0

Source: *Author's calculations based on survey.*

The third question was about the use of incentives and reads: 'Did you, in 2010, 2011 and 2012. The incentives used by the Fund for the City of Nis agriculture?' "This question was answered positively 17.6% and negative 82.4% of farmers (Table 7). The most common reasons cited for not using

financial incentives are not registered farm, lack of awareness of the fact that the Fund provides incentives, complicated procedure of applying.

Table 7. *The use of incentives since 2010. By 2012. The Agricultural Development Fund of the City of Niš*

	Number of surveyed	share in %
yes	9	17,6
no	42	82,4
total n = 51		100,0

Source: *Author's calculations based on survey.*

Relations between the state (city) in agriculture in the opinion of 35.3 % of poor farmers, and not enough on the development of agriculture. Nearly 30% believe that this relationship is neither good nor bad. Slightly more than 25% believe that the relationship between the state and capital in agriculture is an obstacle to its faster development. Only less than 2% believe that the state (city) takes care of agriculture and about 10% say that the relationship meets and could be better (Table 8).

Table 8. *Review of state (city) in agriculture*

Mark	Description reviews	Number of surveyed	share in %
1	Very bad	13	25,5
2	Bad	18	35,3
3	Neither good nor bad	14	27,5
4	Satisfactory, and it could be better	5	9,8
5	Good	1	1,9
	total n = 51		100,0

Source: *Author's calculations based on survey.*

Have you used the technical assistance and information services to the fund for the development of the City of Nis? It was the next question. Based on the responses we received from of surveyed farmers, we can conclude that a large number of farmers are not familiar with the work of the Agricultural Development Fund of the City of Nis almost 75%. On the other hand the work of city services has been introduced to only 25%.

The reason why so many large percentages of respondents were not familiar with the work of the Fund should be sought in the lack of interest of the farmers surveyed for the Fund. Advisory panels and other meetings organized by experts of the Fund have a response mainly in young farmers.

Table 9. *Knowledge with the professional assistance of the Development Fund of the City of Niš*

	Number of surveyed	share in %
yes	13	25,5
no	38	74,5
total n = 51		100,0

Source: *Author's calculations based on survey.*

The last question was: "Are you a member or subcontractor of farmers' associations or cooperatives?" Based on the survey we can conclude that the numbers of respondents slightly more than 47% of the respondents belong to membership of cooperatives or associations of farmers and nearly 53% do not belong to any association (Table 10). In the explanation to why do not belong to an association were surveyed responded to their rural settlement has farmers' or inters have to be members of the Association wks.

Table 10. *Belonging to a cooperative or an association of farmers*

	Number of surveyed	share in %
yes	24	47,1
no	27	52,9
total n = 51		100,0

Source: *Author's calculations based on survey.*

Surveyed farmers who are members of associations or cooperatives we asked which belong to an association or cooperative. We list a large number of associations. One gets the impression that all these associations and cooperatives have a small number of members. It probably is their main problem when enter the market.

Table 11. *List of associations, cooperatives of farmers of surveyed*

Name of associations and cooperatives	Place	Number of
Udruženje „Stočar“	Čokot	1
Udruženje „Agro proizvod“	Donje Međurovo	1
Udruženje „Stočar“	Lalinac	1
Udruženje voćara i vinogradara	Gabrovac	1
Zemljoradnička zadruga	Gabrovac	1
Zemljoradnička zadruga „Čegar“	Donji Matejevac	1
Voćarsko udruženje Čegar	Gornji Matejevac	2
Udruženje kozara „Mlečni put“	Gabrovac	1
Udruženje voćara	Gornji Matejevac	2
Udruženje stočara i vinogradara	Oreovac	1
Udruženje voćara, vinara i vinogradara „Pantalej“	Donji Matejevac	3
Udruženje odgajivača svinja „Tri praseta“	Hum	1
Udruženje niški ratari i semenari	Hum	2
Udruženje stočara „Ada“	Sečanica	2
Udruženje „105 +“	Sečanica	1
Pužarska zadruga „Heliks“	Supovac	1
Grupe žena poljoprivrednika	Gornja Trnava	1
Udruženje „Budućnost“	Leskovik	1
Udruženje „Euromilk“	Hum	1
Udruženje „Napredak“	Trupale	1

Source: *List is determined on the basis of the survey.*

Conclusion

City of Nis, through its Agricultural Development Fund provides financial incentives and subsidies. Incentives that are given are determined by type of production and relate to livestock and crop production. Assets held for livestock production mainly include the following categories of subsidies: to improve the racial composition of cattle subsidizing the use of top seed bulls, for the procurement of quality breeding cattle, improved control of reproductive status of the primary main herd cattle, to keep quality breeding female heads (the program of artificial insemination) for the analysis of basic parameters of milk quality and quality of cattle feed in the productive herd of cows in the city of Nis, for improve sheep and goat farming, procurement Apiguard drug for the treatment of Varroa destructor - mites. The aim of subsidizing these is to increase the number of stem herds of cattle, sheep and goats. Also, special attention was paid to the development of beekeeping subsidizing a drug to treat Varroa destructor.

Resources devoted to crop production are primarily designated for the following purposes: subsidizing agricultural fruits, grapes and vegetables, subsidizing purchase tomato seedlings for the second harvest. From all the above presented, we conclude that the Agricultural Development Fund of Nis provides incentives and as much as it is able. Funds that the Fund chose to subsidize allow certain categories of farmers to improve their production. We believe that in a situation where the uptrend support of rural development and agriculture continues to be in the future zoom funds intended for the Program Fund for Agricultural Development. A survey was conducted in the City of Nis acknowledged the dissatisfaction of farmers amounts of aid they receive the name of incentives and subsidies from the Fund. In addition to the amounts that are small complaints are addressed and complicated procedures for obtaining funds and delays in payment thereof.

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