Sustainable Agriculture and Rural Development in Terms of The Republic of Serbia Strategic Goals Realization within The Danube Region(preservation of rural values)

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Institute of Agricutural Economics Belgrade, Serbia

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

- preservation of rural values -

Thematic Proceedings

December, 6-8th 2012.
Hotel „Omorika", Tara – Serbia

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INTRODUCTORY ANNOTATION

International Scientific Meeting *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION" (preservation of rural values),* which be held in period 6-8th December 2012 on mountain Tara (Republic Serbia), through major number of presented papers provides an overwiew of results of scientific research on the integrated and interdisciplinary project *„Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the danube region"*.

Carrier of the project *„Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals realization within the Danube region",* where is engaged over 70 researchers and scientific workers, is the *Institute of Agricultural Economics, Belgrade,* which in realization of this project collaborates with 9 scientific educational institutions. It includes the following Institutions: *University of Belgrade - Faculty of Agriculture; University of Novi Sad - Faculty of Agriculture; University of Belgrade - Faculty of Economics; University of Novi Sad - Faculty of Economics Subotica; Faculty of Biofarming, Backa Topola, Megatrend University; Faculty for Management of SME, Belgrade; Institute for Science Appliance in Agriculture, Belgrade; AES Institute „Tamiš" Pančevo; Center for Small Grains, Kragujevac*.

Project *„Sustainable agriculture and rural development in terms of the republic of serbia strategic goals realization within the Danube region",* is implemented in period 2011-2014., and funded by resources of Ministry of Education, Science and Technology Development of Republic of Serbia. Realization of project is carried out throught three sub-project, having in mind regiona specifics of agriculture and rural/periurban areas in Danube Region: *(1) Sustainable agriculture and rural development in Upper Danube Region; (2) Urban and peri-urban agriculture in Metropolitan area of Belgrade - Novi Sad; (3) Sustainable agriculture and rural development in Carpathian area (mountain area within the National Park „Đerdap" and its protective zone).*

International Scientific Meeting *„SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IN TERMS OF THE REPUBLIC OF SERBIA STRATEGIC GOALS REALIZATION WITHIN THE DANUBE REGION" (preservation of rural values),* gathered major number of scientific and

experts researchers from about the countries. Besides the authors from Republic Serbia in papers are represented and authors from *Romania, Bulgaria, Russian Federation, Bosnia and Herzegovina, Hungary, Netherland and Macedonia.*

In frame of the Proceedings, is positively evaluated by the reviewer and presented on the Scientific Meeting 91 paper and it is published in the Proceeding. Publisher is Institute of Agricultural Economics, Belgrade, together with 38 eminent scientific and educational Institution from Serbia and foreing. In the Plenary section was presents three (3) papers which stand out with their contributions to our Scientific Meeting. Rest of the paper are systematized in three (3) sections.

Represent and published papers are systematized in three (3) thematic section:

I *SUSTAINABLE DEVELOPMENT AS A MODERN DEVELOPMENTAL APPROACH IN PRESERVATION OF AGRICULTURE AND RURAL VALUES (in this section represented 41 papers);*

II STRATEGIC PLANNING AND INSTITUTIONAL-POLITICAL DIMENSION OF AGRARIAN AND RURAL DEVELOPMENT (in this section represented 13 papers);

III AGRIBUSINESS OF RURAL AREAS, DIVERSIFICATION AND COMPARATIVE ADVANTAGES OF RURAL ECONOMY (in this section represented 34 papers).

Belgrade,

December, 2012.

Editors,

Prof. Drago Cvijanović, Ph.D.
Jonel Subić, Ph.D.
Andrei Jean Vasile, M.A.

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PAPER BY INVITATION

RURAL TOURISM AS A FACTOR OF RURAL ECONOMY DIVERSIFICATION IN THE REPUBLIC OF SERBIA

Radovan Pejanović, Gordana Radović [1]

Abstract

The main hypothesis serving as the ground for this research is that in order to develop rural tourism, which is recognized as the main factor contributing to rural economy diversification, it is necessary to provide both strategic and financial support of the state. Taking into account that the role of the state in the Republic of Serbia vis-à-vis investing in rural tourism has been unsatisfactory so far, and that the assets were placed without a proper strategy, creating an integrated rural tourism product was proposed in this paper. For the purpose of this research, integrated rural tourism product is considered in a narrow sense, as a synergy of rural and event tourism, whose platforms are ethnographic and gastronomic events. It is necessary to direct the financial support of the state strategically towards in order to enable development of integrated rural tourism product. Further, by placing it properly on the local and international market, rural tourism development and rural economy diversification.

Key words: *rural tourism, rural economy, ethnographic and gastronomic events, integrated rural tourism product.*

Introduction

Rural tourism is one of the nine tourism products defined by the Tourism Development Strategy as being the priority for the development of this branch of economy in the Republic of Serbia.[2] At this moment, it is most developed in the Autonomous province of Vojvodina, central and western Serbia. Rural tourism development is the imperative in other regions, too,

[1] Prof. Dr. Radovan Pejanović, full professor, University of Novi Sad, Novi Sad, Trg Dositeja Obradovića 8, pejanovic@polj.uns.ac.rs, tel: 063/600-217; Gordana Radović, MSc, PhD candidate, Faculty of Agriculture, University of Novi Sad, Novi Sad, Trg Dositeja Obradovića 8, finpoljo@eunet.rs, tel: 064/13-78-643.

[2] Rural Tourism Development Strategy of the Republic of Serbia, (2006), Official Gazette of the Republic of Serbia No. 91/2006.

because it is absolutely necessary to stop village depopulation, bearing in mind that every fourth village in Serbia is simply dying out. Rural tourism can be conceived as the flywheel of the regional economy development in the Republic of Serbia because it is the main factor contributing to rural economy diversification and development of the multifunctional agriculture.

The main hypothesis serving as the ground for this research is that in order to develop rural tourism, which is recognized as the main factor contributing to rural economy diversification, it is necessary to provide both strategic and financial support of the state. With the aim of proving the hypothesis right, this paper considers the role of the state in Republic of Serbia so far and with regard to financing the rural tourism, from the perspective of both the state and provincial institutions. Qualitative, analytical-empirical and comparative research methods were used in this research.

With the aim of developing rural tourism, this paper proposes creating an integrated rural tourism product, followed by strategic and financial support of the state. For the purpose of this research, integrated rural tourism product is considered in a narrow sense, as a synergy of rural and event tourism, whose platforms are ethnographic and gastronomic events. In addition, this paper proposes strategic and financial support of the state in creating integrated rural tourism products, which will enhance rural tourism development and, at the same time, rural economy diversification.

The role of the state in rural tourism development

Rural tourism development in the Republic of Serbia is grounded in the Law on Tourism and Tourism Development Strategy of the Republic of Serbia, as well as on Marketing Strategy of Tourism in Vojvodina. Strategic plan of the rural tourism development in Serbia is defined in the Master Plan for Sustainable Tourism Development in Serbia, which was created by the state and international organizations, and which served as the basis for adopting the Program of sustainable rural tourism in Serbia, in November 2011.

Financial support of the state

Financial support from the Ministry of Agriculture was demonstrated through stimulating grants – agrarian budget subsidies and granting favourable loans. Since 2006, the state Ministry of Agriculture has been actively boosting the diversification of the domestic rural economy through the development of rural tourism. In the period between 2006 – 2009, the State Ministry of Agriculture invested 150,27 millions of dinars or 1,7 billions of euros through subsidies for rural tourism development. However, average share of the subsidies realized in the agrarian budget of the Republic of Serbia between 2006 – 2009 was only 0,19%, which is insufficient with respect to the need for more active engagement of the state in developing this segment of multifunctional agriculture. It is important to point out that there was no budget allocated for boosting the development of rural tourism, neither last year in 2011, nor now in 2012.[3] Since 2008, the state Ministry of Agriculture has approved relatively favourable loans aimed at rural tourism development through the existing Development Fund of the Republic of Serbia. Between 2008 – 2011, the state Ministry of Economy granted a total of 143,45 millions of dinars or 1,515 millions of euros for the rural tourism development in the Republic of Serbia. However, this makes only 4,1% of the average share of these assets in the overall number of long-term grants allocated by the Development Fund of the Republic of Serbia.[4] 100 millions of dinars is allocated to development of all tourism sectors in the state budget for 2012. These assets are granted according to the usual practice through an open call for applications, and the eligibility conditions remained unchanged compared to previous years.

Development of rural tourism in the Autonomous Province of Vojvodina is supported both strategically and financially from the provincial secretariats, first of all the Provincial Secretariat for Agriculture, Water Management and Forestry, and Provincial Secretariat for Economy. Between 2006 – 2011, the Provincial Secretariat for Agriculture, Water Management and Forestry granted a total of 240,13 millions of dinars or 2,6 millions of euros of subsidies for boosting the rural tourism

[3] Radović G.,Pejanović R.,Košić K.,Njegovan Z., (2012), *Uloga države u razvoju ruralnog turizma u Republici Srbiji,* Treći međunarodni kongres o ruralnom turizmu „Ruralni turizam-pokretač održivog razvoja“, Osijek.

[4] Radović G.,Pejanović R.,Košić K.,Njegovan Z., (2012), *Uloga države u razvoju ruralnog turizma u Republici Srbiji,* Treći međunarodni kongres o ruralnom turizmu „Ruralni turizam-pokretač održivog razvoja“, Osijek.

development. Relative share of these subsidies in the provincial agrarian budget has been constantly decreasing and from 5,07% in 2006, it dropped by half to 2,67% in 2011. The average share of subsidies for boosting the rural tourism in the total budget of the Provincial Secretariat for Agriculture, Water Management and Forestry was 2,43% in a given period, which was insufficient to seriously sustain developing this extremely important segment of multifunctional agriculture.[5] Provincial budget for rural tourism development is 90 million dinars for 2012. It is important to point out that this is the highest annual budget ever since the subsidies for rural tourism development have been granted on the provincial level.

Between 2007 – 2011, the Provincial Secretariat for Economy invested a total of 246,2 million dinars or 2,8 million euros in tourism development on the territory of the Autonomous Province of Vojvodina. According to the competent services of the Secretariat, the overall investments can be considered as investing in different types of rural tourism, having in mind that 90% of the territory of the Province is made up of rural areas. 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 Vojvodina are not rural: Novi Sad, Stara Pazova, Sremski Karlovci, Pančevo, and Temerin.[6] In March 2012, the provincial Secretariat for Economy published an open call for allocating 9 million dinars for financing receptive tourism on the territory of the Province, 15,3 million dinars for ongoing investments, and 5 million dinars in capital investments in line with the Marketing Strategy of Tourism in Vojvodina.

Cooperation with international organizations

In recent years, collaboration between the institutions from the country and international organizations towards the rural tourism development in the Republic of Serbia has been oriented to creating the Master Plan for Sustainable Tourism Development in Serbia. This is a project dealing

[5] Radović G.,Pejanović R.,Košić K.,Njegovan Z., (2012), *Uloga države u razvoju ruralnog turizma u Republici Srbiji,* Treći međunarodni kongres o ruralnom turizmu „Ruralni turizam-pokretač održivog razvoja“, Osijek.

[6] Pejanović R., Tomaš M.,Popović-Vranješ A., (2011), *Organska proizvodnja kao faktor ruralnog razvoja u AP Vojvodini,* Monografija: Ruralni razvoj i lokalno-ekonomski razvoj AP Vojvodine, Univerzitet u Novom Sadu, Poljoprivredni fakultet, str.56-57.

with rural tourism development in the Republic of Serbia, implemented by the state Ministry of Agriculture, Forestry and Water Management, state Ministry of Finance and Economy, and the national Tourism Organization of Serbia, together with five UN agencies. According to the Master plan and in line with the Law on Tourism of the Republic of Serbia, the Programme of sustainable rural tourism development in the Republic of Serbia[7] was drafted. According to the document, the goal of the Programme is rural economy diversification through poverty reduction, improving the quality of life, preservation of the country's cultural heritage, environmental protection and fostering even regional development. The Programme sets 12 territorial units – rural tourism clusters, where this branch of tourism should primarily evolve in the Republic of Serbia. The clusters are organized in four groups: central and western Serbia, southern Banat and lower Danube region, eastern Serbia, and the cluster comprising Vojvodina and upper Danube region.

Based on the research conducted, it can be concluded that both the state and provincial governments realized the importance of rural tourism development in enhancing the rural economy and country's tourism offer. Moreover, they realized that the budget share allocated so far was negligible and that the assets were placed without an adequate strategy. Therefore, creation of an integrated rural tourism product is proposed further in this paper, which could also be harmonized with implementation of the Master Plan of Sustainable Rural Tourism Development in the Republic of Serbia.

Integrated rural tourism product

According to the definition form references, "integrated rural tourism product, at the level of a tourist destination as a whole, should demonstrate a striking synergic effect of all the commercial and non-commercial activities". [8] For the purpose of this research, integrated rural tourism product is considered in a narrow sense, as a synergy of rural and

[7] Program razvoja održivog ruralnog turizma u Republici Srbiji, Službeni glasnik RS broj 85/2011

[8] Mojić J., Šušić V., (2011), *Primena marketing koncepta u kreiranju turističkog proizvoda*, Naučni skup sa međunarodnim učešćem Sinergija, Bijeljina.

event tourism, whose platforms are ethnographic and gastronomic events.[9]

With the aim of identifying ethnographic and gastronomic events being held in Serbia throughout the year, their overview is given further in the paper. They are classified in tables according to districts and parts of the Republic of Serbia where they take place:

Table 1. *Districts: Southern Bačka, Northern Bačka, Western Bačka And Nothern Banat*

MUNICIPALITY	LOCAL COMMUNITY/VILLAGE	EVENT
	SOUTH BAČKA DISTRICT	
Bač	Selenča	Bački kotlić; Festival tradicionalnih jela
Bačka Palanka		Etno šor; „Ala volem kolo da igram“, Štrudla fest; Dunavski bal
	Silbaš, Obrovac	Bostanijada; Ovčarski dani
Bački Petrovac	Kulpin	Festival kulena Uskrs u Kulpinu
Bečej	Bačko Gradište	Sajam starih zanata; Festival etno stvaralaštva-Etnos;Međunarodni palačinka fest.
Novi Sad	Festival meda; Dani mladog vina-portugizer; Festival folklora; Interfest-festival vina; Šunka fest	
	Futog	Futoška kupusijada
	Rumenka, Kovilj	Rumenačka pihtijada; Koviljska rakijada-„Parastos dudu“
Srbobran		Dani kulturne tradicije; Festival „Muzika naših predaka“; „Zlatna citra“
	Turija, Nadalj	Turijska kobasicijada; Petrovdanski dani
Sremski Karlovci		Festival nacionalnih kolača; Festival kuglofa; Karlovačka berba grožđa
Temerin	Sirig	Južnobački festival ludaje; Januarski međunarodni sajam vina; Pasuljijada Siriško prelo
Titel		Tradicionalna izložba ručnih radova; Etno manif. „Pokaži da ti ja pokažem“

[9] „Etnografija je nauka koja proučava i opisuje život, rad, običaje, kulturu, karakterne i moralne odlike pojedinih naroda.“..“Gastronomija predstavlja poznavanje veštine pripremanja jela,kult ukusne hrane, uživanje u hrani, sladokustvo.“ Klajn I.,Šipka M.,

		Kotlić pod titelskim bregom
	Šajkaš, Lok	Šajkaški ražanj; Mundijada; Pečurkijada
Žabalj		Škembijada; Zlatni kotlić; Žabaljski dani;
NORTH BAČKA DISTRICT		
Bačka Topola	Sajam poljoprivrede,industrije i vašar zanata „Top expo“; Etno manif. „Našem rodu i potomstvu“	
	Bajša	Bajšansko prelo
Subotica	„Ukusi tradicije“; „Svinjokoljski dani“; Takmičenje žetelaca u ručnom košenju žita „Ris“; Dužijanca; „Interetno“	
	Palić	„Berbanski dani“; „Butkicijada“;“Palićke vinske svečanosti“; „Dani mladog vina“; Festival kulture sveta; „Etnofest“; „Prvomajski uranak“
	Hajdukovo	„Berbanski dani na Hajdukovu“
	Šupljak	Festival belog luka
	Donji Tavankut	Pasuljijada
	Bajmok	Festival bunjevačkih jela
WEST BAČKA DISTRICT		
Apatin	Sonta	Apatinske ribarske svečanosti Izložba starih zanata
Odžaci	Lalić	Rakijada; „Nošnja bal“
Sombor	Festival vina i hrane „Ravan grad Wine Fest“; Somborski kotlić	
	Bački Monoštor	„Bodrog fest“
NORTH BANAT DISTRICT		
Kikinda		„Dani ludaje“
	Rusko Selo	Festival gulaša
	Mokrin	„Gusanijada“
	Iđoš	Dani vina i vinograda; Sabor frulaša „Škripi đeram“
	Sajan	Dani jeseni u korpi; Severnobanatske žetvene svečanosti
	Novi Kozarci	Pitijada krompiruša
Ada		Dan starih zanata; Velikogospojinski vašar
Kanjiža		Svetostefanski dani novog hleba
Senta	Gornji Breg	Međunarodno takmičenje u striženju ovaca i kuvanju perkelta

Source: *www.srbija.travel/kalendar-dogadjaja (25.08.2012)*

Table 2. *Districts: Braničevski, Central Banat, South Banat, Borski, Pirotski and Zaječarski District*

MUNICIPALITY	LOCAL COMMUNITY/VILLAGE	EVENT
BRANIČEVSKI DISTRICT		
Golubac		Sajam Dunava
Kučevo		„Homoljski motivi“
Malo Crniće		Gastro manif. „Stiško prelo“; Etno festival hrane i folklora
Petrovac na Mlavi		„Prasićijada“; Sabor pčelara: Etno manifestacija „Bačijada“
Požarevac	Poljana, Kličevac	Uskršnji festival; Smotra folklornih ansambala sela Srbije
Veliko Gradište	Topolovnik	Alaske večeri
Žabari	Četereže	„Četereško prelo“
Žagubica	Osanica	Sabor vrela Homolja; Sabor frulaša
	Laznica, Krepoljin	Dani zdrave hrane „Priveg“, Dani bilja i gljiva; Spasovdanski dani
CENTRAL BANAT DISTRICT		
Nova Crnja	Srpska Crnja	Liparske večeri „Dani Đure Jakšića“
Žitište		Pilefest
	Ravni Topolovac	Pasuljijada
	Srpski Itebej	Banatska testijada
	Banat. Karađorđevo	„Karađorđevska prela“
Zrenjanin	Lukino selo	„Banatske vredne ruke“; Međunarodni festival folklora „Lala“, Dani paradajza
	Aradac	Festival ljubavi i vina
	Melenci	Svetsko prvenstvo u kuvanju čobanskog paprikaša
Novi Bečej		Velikogospojinske svečanosti
SOUTH BANAT DISTRICT		
Alibunar	Janošik	Dani višnje
Bela Crkva		Belocrkvanski dani jabuke
Kovačica	Debeljača	„Kovačički oktobar“; „Gulašijada“
	Idvor, Padina	Bostanijada; „“Padinski dani kulture“
Opovo	Sakule	Ovčarski dani
Pančevo	 Kačarevo Omoljica	Zlatni kotlić, Takmičenje u kuvanju riblje čorbe Slaninijada Gulašijada; Šunkafest
	Dolovo	Štrudlijada, Dolovački sajam vina; Vinarijada Dolovo

	Vojlovica; B.Brestovac	Žetelački dani; Paprikijada
Vršac	Dani berbe grožđa; Praznične đakonije; Vinofest	
Kovin	Skorenovac Deliblato	Zlatni kotlić Kovina; Dani mađarske kuhinje; Skorenovačke večeri Etno-manif. „Opušteno od srca“; Pihtijada; Etno-bazar „Ne lomite mi bagrenje“, Berba grožđa
BORSKI DISTRICT		
Bor		Etno susreti sela opštine Bor
Kladovo		Etnofestival
Majdanpek	Crnajka, Rudna Glava Miroč	Etno manif.“Biseri Srbije“; „Sačuvajmo gajde i stare igre od zaborava“ “Jorgovanfest”
	Donji Milanovac	„Porečki kotlić“
Negotin		„Sveti Trifun- vinarska slava“
ZAJEČARSKI DISTRICT		
Boljevac	Ilino, Krivi Vir	„Crnorečje u pesmi i igri“;“Ilinsko vrelo“, Smotra narodnog stvaralaštva „Timočka buna na izvoru crnog Timoka“
Knjaževac	Balta Berilovac Novo Korito	„Špricerfest“; Smotra narodnog stvaralaštva „Molitva pod Midžorom“; „Šipurijada“
Zaječar	Veliki Izvor	Sajam suvenira „Zlatno ruke“; „Potekla voda studena“
	Vražogrnac	Etno manif.“Vražogrnački točak“
Sokobanja		„Zlatne ruke Sokobanje“
PIROTSKI DISTRICT		
Bela Palanka		„Dani banice- takmičenje u pripremanju pita“
Dimitrovgrad	„Velikdenska Peraška“; Sajam balkanskog agrobiodiverziteta i seoskog nasleđa	
Pirot	Svetsko prvenstvo u pripremanju pirotske peglane kobasice; „Pirotska jagnjijada“; Pasuljijada	
	Temska	Festival staroplaninskih jela

Source: *www.srbija.travel/kalendar-dogadjaja (25.08.2012)*

Table 3. *Districts of Sremski, Zlatiborski, Kolubarski and Mačvanski*

MUNICIPALITY	LOCAL COMMUNITY/VILLAGE	EVENT
SREMSKI DISTRICT		
Inđija	Pudarski dani; Dani meda; Sajam vojvođanskih vina; Etno-festival	
	Krčedin	„Sremskipeškir“; Etnomanif.“Tradicionalno graditeljstvo kao srpski proizvod“ „Najbolja vina pod jednim krovom“
	Beška	Zlatni kotlić
	Maradik	Etno manif. „Maradička jesen“
Irig	Šatrinci	Pudarski dani; „Guščevijada“
	Jazak	Etno manif.„Jesen ide dunjo moja, kukuruzi već su zreli“
	Rivica	Dani vina; Bostanijada
Ruma	„Sremski kolač“; Gastronomska manif. „I kada prođu slave ostaje kolač“	
Šid	Berkasovo	„Sremska kobasicijada“; „Sremska vinijada“
	Erdevik	„Sremska kulinijada“
Sremska Mitrovica	Šašinci	Bostanijada
	Zasavica	Gastro manif. „Kotlićijada- varjačom u Evropu“
ZLATIBORSKI DISTRICT		
Arilje	Brekovo	Sajam meda; „Brekovačko prelo“
Čajetina-Zlatibor	Mačkat	Sabor trubača i smotra narodnog stvaralaštva; „Pršutijada“
	Šljivovica	Šljivovički sajam domaće rakije „Rakijada“
	Jablanica	Etno manif. „Seoski višeboj“
Sjenica		„Dani sjeničke pite“; Vašari
Kosjerić	Skakavci	Dečiji gastro festival „Varjačići“; Čobanski dani; Dani seoskog turizma
Nova Varoš		„Zlatne ruke“; Međunarodni dečiji festival „Licidersko srce“; „Zlatarska sirijada“
Priboj	Pribojska banja	Etno manif. „Zavičajno blago“; „Ilindanski dani“
Prijepolje		„Za Prijepolje u cveću“; “Limski darovi – Zetovijada“
Užice	Mokra gora	Međ.dečiji festival „Licidersko srce“; „Zavičajni dani Mokre gore“
KOLUBARSKI DISTRICT		
Mionica	Banja Vrujci Donja Toplica	Sajam zdrave hrane i pića, starih zanata i narodnog stvaralaštva “Prela i posela”

Ljig Valjevo	Etno manif.“Zlatni opanak“; Kosidba na Rajcu Festival duvan čvaraka	
	Brankovina	Dani maline
	Medvednik	Dani gljiva
	Stave	Dani kupine
MAČVANSKI DISTRICT		
Bogatić		„Boj na Dublju“; „Hajdučko veče“
Koceljeva		Festival zimnice
Krupanj	Dani krompira u Rađevini; Dani gljiva u Rađevini, „Krkušijada“	
	Dobri potok	Etno manif. „Nadigravanje za dukat“;
	Mačkov kamen	Dani međaša
Loznica	Banja Koviljača Tršić Gornja Koviljača	„Lazarice“; „Pekmezijada“ Međunarodna izložba gljiva i gljivarijada“; Smorta narodnog stvaralaštva „Dodole“ „Miholjski dani seoskog turizma“; Etno manif. „Moba“; „Savinsko prelo“ Sajam vina i starih zanata
Ljubovija	Drlače	Međunarodni drinski gastro festival; „ Malinijada“
Mali Zvornik		„Gurmanijada“
	Radaljska banja	„Jesen u Radaljskoj banji“

Source: *www.srbija.travel/kalendar-dogadjaja (25.08.2012)*

Table 4. *Disricts of Rasinski, Moravički, Podunavski, Pomoravski, Šumadijski and the city of Belgrade*

MUNICIPALITY	**LOCAL COMMUNITY/VILLAGE**	**EVENT**
RASINSKI DISTRICT		
Aleksandrovac		„Župska berba“; Sajam vina
Brus		Etno manifestacija „Zlatne ruke Brusa“
Kruševac	Etno manifestacija „Eto, baš hoću“; „Čarapanijada“; „Saborovanje u Lazarevom gradu“	
Trstenik	Rujišnik	„Trstenik na Moravi“; Dani vinara i vinogradara; „Dani kupine“
MORAVIČKI DISTRICT		
Čačak		Evropska smotra srpskog folklora dijaspore i Srba u regionu
	Mrčajevci Prislonica Banja Gornja Trepča	„Kupusijada“ Sabor frulaša Srbije „Oj, Moravo“ Izbor najlepše rakije „Šumadijska kraljica“
Gornji Milanovac	Ozrem	„Mud(r)ijada”
Ivanjica		Etno manifestacija „Zvuci Golije, Javora i Mučnja“
	Prilike	Festival izvorne srpske pesme, Festival dečijeg folklora „Svetlost na

	Kušići	brežuljku“; Etno manif. „Javorski sabor dvojničara i starih muzičkih instrumenata“
Lučani	Guča	Smotra muzičkog stvaralaštva „Raspevano Dragačevo“;Dragačevski sabor trubača
PODUNAVSKI DISTRICT		
Velika Plana		„Karađorđevi dani gurmanluka“
Smederevska Palanka	Azanja	“Dani Azanjske pogače”
POMORAVSKI DISTRICT		
Ćuprija	Manastir Ravanica	Etno manifestacija „Moravo, moje more“
Despotovac	Beljajka	Festival etno hrane
Jagodina		Petrovdanski etno sajam; „Tortijada“
Paraćin	Trešnjevica	„Najtorta“; Etno manif. „Budi in, upoznaj Paraćin“; Dani vina
Rekovac	Manastir Kalenić	Etno manif. „Prođoh Levač, prođoh Šumadiju“
Svilajnac		Gastronomska manif. „Resavski kotlić“
ŠUMADIJSKI DISTRICT		
Aranđelovac	„Gulašijada“; Etno manifestacija „Šumadijski opanak“; Velikogospojinski vašar; Etno bazar; Susreti proizvođača i ljubitelja vina	
Batočina	Brzan	Etno manifestacija „Obredni hlebovi“ Sabor narodnog stvaralaštva „Sveti prorok Ilija“
Kragujevac		Etno manifestacija „Zlatno zrno Šumadije“
Lapovo	Etno manif. „Dan Moravskih šarenica“; „Sveti Trifun, vinogradarska slava“	
Topola	„Đurđevdanski dani vina i rakije“; Sabor narodnog stvaralaštva „Oplenačka berba grožđa“	
	Stragari	„Šumadijski dani šljive“
CITY OF BELGRADE		
Beograd	Festival folklora Srba sa zapadne strane Drine; „Vinogastrofest“; Beogradski salon vina; Beogradski rakija festival; Festival slava i pravoslavlja „Slava gastro“; „Fishfest“; „Vinofest“- Sajam gastronomije i vinskog turizma	
Lazarevac	Perućac	Festival srpskih vina; Festival posne hrane
Mladenovac	Jagnjilo	Međunarodni festival folklora; „Jagnjijada“
Zemun		Etno manifestacija „Božićni praznici“

Source: *www.srbija.travel/kalendar-dogadjaja (25.08.2012)*

Table 5. *Districts: Kosovski, Pčinjski, Toplički, Kosovsko-Mitrovački, Raški, Jablanički and Nišavski*

MUNICIPALITY	LOCAL COMMUNITY/VILLAGE	EVENT
KOSOVSKI DISTRICT		
Štrpce		Dečija smotra folklora Kosova i Metohije
PČINJSKI DISTRICT		
Bujanovac		Etno manif. „Zlatne ruke Bujanovca“
Surdulica	Vlasina	„Zlatne ruke“, Vlasinski kotlić
Vladičin Han		Vidovdanski dani
Vranje	Etno manif. „Stari dani“; Etno sajam; Smotra folklora	
	Vranjska banja	„Dani karanfila“
TOPLIČKI DISTRICT		
Kuršumlija		„Prvi glas Toplice“
Prokuplje		Sajam višnjara „Dani višnje“
KOSOVSKO-MITROVAČKI DISTRICT		
Leposavić	Sočanica	Etno manifestacija „Gospojinski sabor“; „Zlatna frula KiM“
Vučitrn	Prilužje	Etno manifestacija „Starosrpski izvori“
RAŠKI DISTRICT		
Kraljevo	„Pasuljijada“; Dani meda; Smotra dečijeg folklora i ansambala Srbije	
	Ratina	„Projada“; Smotra narodnog stvaralaštva dece Srbije
	Kopaonik	„Dani borovnice“
Vrnjačka banja		Smotra narodnog stvaralaštva „Zlatne niti prela i posela“
JABLANIČKI DISTRICT		
Bojnik		Etno manifestacija „Pustorečki dani“
Lebane	Izložba starih zanata; Etno manif. „Kulturno leto u Lebanu“	
Leskovac		„Roštiljijada“
Medveđa	Marovac, Sijarinska banja	Etno manif. „Dani frule u Medveđi“ „Kosidba na Marovcu“; „Gejzerske noći“; „Zlatni kotlić gejzera“
Vlasotince		„Vinski bal“
NIŠAVSKI DISTRICT		
Aleksinac	Pekarski dani; „Na Moravi vodenica stara“	
	Rutevac	Sabor paprikara
	Gredetin	Dani jagoda
Niš	Etno sajam; Dani bureka; Rakija brend,;Dani vina i meraka; Salon vina i čokolade „Dolče Vita“	
	Niška banja	„Pihtijada“
Svrljig		„Belmužijada“

Source: *www.srbija.travel/kalendar-dogadjaja (25.08.2012)*

According to the research, we can conclude that the municipalities showing the greatest potential for rural tourism development in Serbia, whose platform would be based on ethnographic and gastronomic events, are: Bačka Palanka, Beograd, Čajetina, Deliblato, Inđija, Irig, Kikinda, Kraljevo, Krupanj, Loznica, Novi Sad, Niš, Pančevo, Subotica, Sombor, Titel, Topola, Valjevo, Zrenjanin, Žagubica i Žitište.

According to the research results, Subotica is the municipality with a greatest number of ethnographic and gastronomic events held all year round (including the territory of Palić, where most of the events take place). A total of 15 annual ethnographic and gastronomic events are held on the territory of Subotica.

With the aim of highlighting the originality of a certain locality, it is necessary to avoid having similar events at different places, but to encourage exactly the event which is authentic for a certain area instead. It is desirable to chronologically and territorially relate several events in order to create an integrated rural tourism product which will comprise accommodation of guests in rural households situated near the event localities.[10]

Importance of IRTP[11] for rural economy diversification

According to the research results, the following places show the greatest potential for creating and developing the integrated rural tourism product in the Republic of Serbia, having in mind the interpretation of the term in this paper: Bačka Palanka, Titel, Subotica, Sombor, Kikinda, Žagubica, Žitište, Zrenjanin, Deliblato, Pančevo, Inđija, Irig, Čajetina-Zlatibor, Valjevo, Krupanj, Loznica, Topola, Kraljevo, Niš, as well as the wider area around the cities of Belgrade and Novi Sad. It is necessary to direct the financial support of the state strategically towards these areas in order to enable development of integrated rural tourism product. Further, by placing it properly on the local and international market, rural tourism development and rural economy diversification would be enabled, along with other activities complementary to tourism such as agriculture, traffic, commerce and craftsmanship.

[10] Radović G., Pejanović R., Njegovan Z. (2012), *Etnografske i gastronomske manifestacije kao indikatori razvoja ruralnog turizma u Vojvodini,* Međunarodni naučni skup, Turizam: Izazovi i mogućnosti, Trebinje.
[11] IRTP = integrated rural tourism product

With the aim of implementing the integrated rural tourism product in the Republic of Serbia, it is necessary to establish a governing body on the level of each of the four rural tourism clusters defined by the Programme of sustainable rural tourism in Serbia. The main task of the bodies would be to create and develop integrated rural tourism products on its own territory. Moreover, the main task of the cluster management would be to secure the financial support for development of the rural tourism in the area and target it only to development of the defined integrated rural tourism products, regardless of whether the cluster directly applies for the financial means or intermediates indirectly. This would ensure keeping the financial means together, however small they are, and not scatter them away on countless minor projects whose impact is not sufficient for developing the rural tourism in Serbia. In addition, the task of the clusters' managerial bodies would be to ensure selling the integrated rural tourism product on local and international tourism market. [12] This would also secure the continuity of the offer in rural tourism throughout the year, and to actually increase the average occupancy of the farm tourism households in Serbia, which is currently only 4%.

By realizing the model proposed herewith, many shortcomings defined by the Programme of development of sustainable tourism in Serbia would be overcome: lack of activities enhancing enjoyment of natural and cultural resources of the rural areas, poor presentation and promotion of these regions, lack of interest in preserving and promoting old crafts and folk handicrafts, as well as the lack of managerial and organizational structure on the national, regional and local level, which is by all means necessary to manage rural tourism in efficient and sustainable way.

Conclusion

Having in mind that the Republic of Serbia is ranked number one among the European countries because of huge regional differences in development, and that rural tourism highly contributes to decreasing these discrepancies and diversification of rural economy, it is necessary to give this type of tourism the highest possible priority in the period to come. It is the conditio sine qua non to establish the rural tourism development in the Republic of Serbia on the principles of economic, social, cultural and ecological

[12] Radović G., Pejanović R., Njegovan Z., (2012), *Značaj i uloga integrisanog ruralnog turističkog proizvoda u Republici Srbiji,* Savetovanje: Privredni preobražaj Srbije-mogućnosti i ograničenja, Beograd. (videti u spisku literature).

sustainability. The principle of economic and social sustainability in its essence carries the idea of creating new employment opportunities in rural tourism and its supporting activities, which certainly means more jobs for young people, urban dwellers who lost jobs in the period of transition, but also the valorization of work contributed by women living in village households. Taking into account that a single currency unit spent by a tourist brings a doubled profit of 2,2 currency units to the local economy, it is clear that the benefit from rural tourism is there for both rural households and local economies. Rural tourism development would influence rural economy diversification i.e. development of other activities complementary to tourism: agriculture, commerce, civil engineering and industry. Having in mind the importance of tourism in economy, along with its multiplying effect on the overall economy of the country as a whole, it is of utmost necessity to raise the state financial aid in developing the rural tourism in the Republic of Serbia.

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ANALYSIS OF SOUTH-MUNTENIA REGION, ROMANIA, WITHIN THE WIDER FRAMEWORK OF REGIONAL DEVELOPMENT[1]

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Abstract

The paper presents the regional analysis of South-Muntenia Region, as a premise for underpinning the strategy of development for the above mentioned region. The research question is: What are the profile, infrastructure, population, and the main activities of the South – Muntenia Region? In pursuing this question, statistical data have been gathered and previos research has been analysed for describing the economic status of the region. It was possible to identify, within the region, both the more developed areas and the priority areas facing difficulties regarding environmental protection, unemployment, industrial restructuring, professional retraining, etc. Results show that There are regional disparities in this region, between the northern and southern counties. Thus, the northern counties, Argeş, Dâmbovi a and Prahova, are more developed and here are concentrated more industrial enterprises, representing such industries as chemical and petrochemical, machine building, food etc. The southern counties, Călăraşi, Giurgiu, Ialomi a and Teleorman, are characterized by a predominantly agricultural activity.

Key words: *regional development, regional policy, South-Muntenia*

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1 This paper represents dissemination of the results obtained in the international project "Solutions and interventions for the technological transfer and the innovation in South East Europe Regions", from the programme South East Europe, Priority Axis 1: Facilitation of innovation and entrepreneurship, AoI 1.1: Develop technology and innovation networks in specific fields, TECH.FOOD SEE/A/160/1.1/X.

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Introduction

The present paper describes the economical situation in South-Muntenia Region, within the wider context of regional development, as European Union strategic goal. Regional development is a complex process of harmonious development of all the regions of a country or of the unique European space, a process that can reduce territorial disparities and achieve a relative balance among the levels of economic and social development of various areas, taking into account the sustainable management of natural resources and the protection of the environment (Istudor, 2006). The research question that this paper is trying to answer is: What are the profile, infrastructure, population, and the main activities of the South – Muntenia Region? In pursuing this question, statistical data have been gathered and previos research has been analysed for describing the economic status of the region.

Previous research (the international project "Solutions and interventions for the technological transfer and the innovation in South East Europe Regions") show that the regions of Romania are below the average economic development level of the regions in the other EU member states, but they are also characterized by large internal discrepancies between the rural and urban areas, or among the development regions (for example, between the Bucharest-Ilfov Region and the rest of the development regions).

Law no. 151/1998 on regional development stipulates the objectives, institutional framework, specific tools and competencies for the definition and implementation of the regional development policy in Romania. An efficient regional development policy should address the following major objectives:

- initiating and fostering domestic and international inter-regional co-operation, which has an important potential to ensure overall progress;
- revitalizing the disadvantaged areas;
- diminishing the existing regional disparities;
- preventing the appearance of new disparities;
- fostering the balanced develpment of the regions, and countries, respectively.

Regional development in Romania is focused on a few major strategic axes mentioned in the operational programme for regional development, such as:

- creating the necessary prerequisites for continuous economic growth and improved competitiveness by developing the market economy mechanisms;

- ensuring equal opportunities for access to information, education and continuous training of the population in the entire region;
- disseminating the results of the technological research and development activity all over the regional territory;
- promoting a harmonious development of the region;
- reducing the development disparities among counties, beween central and peripheral areas of a region, as well as between urban and rural areas;
- preventing the emergence of areas characterized by various disparities;
- developing particularized differentiated development policies that may address the peculiarities of each area;
- developing the human resources, modernizing vocational schools and providing higher quality social services;
- improving the regional infrastructure, with special emphasis on environmental rehabilitation and the development of Romanian tourism;
- providing specialized assistance for regional publicity campaigns, preparing and supervising projects, training project beneficiaries;
- increasing the capacity of each region to carry out and support its own internal development processes.

Territorial Zoning as a tool for an effective coordination of regional development

The territorial zoning was meant to establish areas with various economic and social characteristics in relation to specific regional policy measures, aimed at reducing inter- and intra-regional disparities and ensuring a balanced national development. The decision to mark off the regions is based on several specific zoning theories (Antonescu, 2003) grounded on the following criteria: transport costs; market attractiveness; the main profile/line of business; the existence of development poles, etc.

A good knowledge of the economic reality in different regions of the country may be a prerequisite for devising regional development programmes tailored to the requirements imposed by the European Union. In specialists' view (Istudor, 2006), within the EU regional development policy, the region is the cornerstone of the theoretical and practical approaches to substantiating the strategies and policies for economic and social development at territorial level. The non-involvement of regions in the elaboration of development programmes may hinder the programme implementation process. That is why it was necessary to establish development regions in Romania and involve them in the elaboration

of programming documents. In order to ensure an institutional framework conducive to regional development, eight regions were delineated in Romania by grouping neighbouring counties, according to their historical traditions, and economic and social profile. Development regions are established by voluntary association of neighbouring counties. The development region is not an administrative-territorial unit in the true sense of the word, and has no legal personality (Pop, 2006). Currently, eight development regions have been defined in Romania:

- The Bucharest-Ilfov Region;
- The South–Muntenia Region, including the counties: Argeş, Călăraşi, Dâmbovi a, Giurgiu, Ialomi a, Prahova, Teleorman;
- The South-West Region, including the counties: Dolj, Gorj, Mehedin i, Olt, Vâlcea;
- The Western Region, including the counties: Arad, Caraş-Severin, Hunedoara, Timiş;
- The North-West Region, including the counties: Bihor, Bistri a, Cluj, Maramureş, Satu-Mare, Sălaj;
- The Central Region, including the counties: Alba, Braşov, Covasna, Harghita, Mureş, Sibiu;
- The North-East Region, including the counties: Bacău, Botoşani, Iaşi, Neam , Suceava, Vaslui;
- The South-East Region, including the counties: Brăila, Buzău, Constan a, Gala i, Tulcea, Vrancea.

It was possible to identify, within each of the eight regions, both the more developed areas and the priority areas facing difficulties regarding environmental protection, unemployment, industrial restructuring, professional retraining, etc. New structures of regional cooperation were set up, and The Green Charter of regional development policy was elaborated. An example is the National Agency for Regional Development (ANDR), designed to ensure the appropriate Romanian institutional framework for development in the Central and Eastern European context.

The regional development policies in different states focus on the agricultural regions facing difficulties, on declining industrial regions or on those that suffer from the „pressure" of rapid growth, etc., establishing measures to reduce the disparities between these regions and others, as well as specific criteria to quantify the results and disparities.

In order to ensure the consistency of regional development policies at European level, it is permitted to designate certain „disadvantaged areas", for a maximum period of 10 years, under the conditions of fair competition among regions for attracting investors and structural funds for improving socio-economic disparities.

In Romania there are also other types of areas, called „assisted areas", for which national programmes were conducted to support their economic growth by identifying and highlighting Romania's strengths and turning them into competitive advantages, by focusing on the development of industry, services, tourism and other modern and less polluting, wealth-generating fields of activity, by stimulating the private and public investment process.

The continuation of the European integration process requires the coordination of Romania's economic, social and environmental policies with those of the EU member states, as well as new forms of planning and management of the existing resources and of those provided by regional and operational programmes. In order to carry out the EU-funded structural programmes, the local administrations need programme/projects packages resulting from the coordinated planning of public policies and an increased human and organizational capacity to manage these projects (POL, 2009).

Sustainable development (in English, „sustainability"), responds to the necessity to meet the needs of present-day generations without compromising the interests of future generations. The overall objective of sustainable development is finding a balance in the interaction - a dynamic and flexible process - of four systems: economic, human, environmental and technological (Man, 2008).

The paper highlights the most important aspects of the South -Muntenia Region in terms of the territorial profile, namely the physical-geographical characterization, the demography and the human resources, the economy with all its branches, the environment, etc.

The general description of the South-Muntenia Region

The South – Muntenia Region, covering an area of 34,456 km^2 (14.45% of Romania's area), is located in the south-east and is bordered by the Central Region on the north, by the South-East Region on the east, by Bulgaria on the south (the border being marked by the natural boundary on the Danube River)

and by the South-West Region on the west. The South - Muntenia Region is characterized, in economic terms, by the following general features:

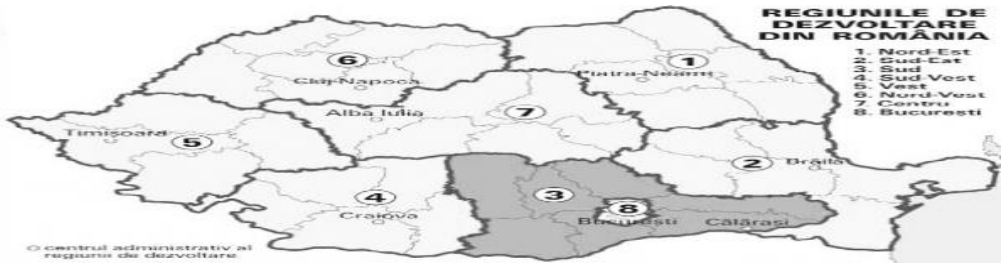
- values registered for some economic development indicators are below the existing country average;
- the main industrial sectors are concentrated in the north of the region;
- the decline of traditional industries.

The physical-geographical characterization

The region's landscape, characterized by variety and an amphitheater layout, includes three major forms of relief: mountains (9.5%), hills (19.8%), plains and river meadows (70.7%). These three forms of relief are arranged with a height difference of 2,500 m.

The hydrographic network is quite rich, and dominated by the River Danube, into which the main rivers of the region, the Olt (615 km), the Argeş (350 km), the Ialomi a (417 km), the Dâmbovi a (286 km) and the Prahova (193 km) flow. This is complemented by a series of natural lakes, Amara, Mostiştea, Suhai, Vidraru, Văcăreşti and Pecineagu, as well as anthropogenic lakes, used for complex purposes (RSM, 2009).

Figure 1. *The location of the the South – Muntenia Region in Romania*



The climate, as a whole, is moderately temperate continental, with annual average temperatures between 10-12 degrees Celsius in the south, and 2-6 degrees Celsius in the north, and with a rainfall regime characterized by an average annual quantity of 504-600 mm in the lowlands, and 1000-1300 mm in mountainous areas.

The variety of landforms and their geological complexity account for the fairly diversified natural resources of the region. In the mountain and hill area are

concentrated the natural resources of the subsoil (oil, natural gas, coal, ores and radioactive metal, salt, calcareous marls, sulfur, gypsum and mineral water springs), which are important for the energy industry, chemical industry and building materials industry.

Apart from the subsoil resources, of particular importance and direct influence on the development of certain economic sectors are the soil resources. The agricultural area of the South – Muntenia Region, is 2,447 million hectares (16.61% of the country's agricultural area), of which 1,974 are arable land (20.92% of the country's arable land).

The region has significant water resources (3.4% of the region's area) which are used in various fields, thus playing an important role in the region's economic development. The great diversity of its flora and fauna is another natural wealth of the region.

The infrastructure

The infrastructure of the South – Muntenia Region is composed of: railway – 1671 km (608 km, electrified), public roads - 11,104 km (2534 km of motorways and national roads), 11 ports on the River Danube - the main trans-European waterway, access to Henri Coandă (Otopeni) airport - Bucharest. The national road network totals 21.2% of the total road length of 11,818 kilometers. County roads have a share of 78.8%. Four railway lines ensure the connection with all the historical regions: Moldova, Dobrogea, Transylvania and Banat.

The link to Bulgaria, representing one of Western Europe's main links with the Middle East, is provided via 3 border crossing points, the most important being the road-rail bridge at Giurgiu-Ruse. As a weakness, we should mention the lack of modern urban infrastructure (water, sewerage, upgraded roads, public lighting) in rural areas, which adversely affects the interest of foreign investors (ROP, 2007).

Railway transport

The region's railway network is well developed, with lines in use of a length of 1253 km, and the region ranking 6th in the country in this regard.

Table 1. *Railway lines in operation*

NO.	Region Name	Operational railway line (km)
1	Northeast Region	1624
2	Southeast Region	1716
3	**South - Muntenia Region**	**1253**
4	Southwest Region -Oltenia	989
5	Western Region	1904
6	Northwest Region	1678
7	Central Region	1346
8	Bucharest-Ilfov Region	279

Source: *Territorial statistics , Regional economic and social highlights.*

In relation to the region's area, the railway lines have a density of 36.4 km/1000 km^2. The highest-density railway network is in Ialomi a County (66 km/1000 km^2), whereas Giurgiu county registers the lowest value (13.3 km/1000 km^2) from this point of view.

Road transport

The length of public roads is 12051 km, the region ranking 2nd in the country. The density of public roads is 35 km/100 km^2; the highest value is registered in Prahova County (46.4km/100 km^2) and the lowest is in the county of Călăraşi (24.9 km/ km^2).

Table 2. *Length of public roads*

NO.	Region Name	Public Roads (km)
1	Northeast Region	13411
2	Southeast Region	10722
3	**South - Muntenia Region**	**12051**
4	Southwest Region -Oltenia	10478
5	Western Region	10305
6	Northwest Region	11884
7	Central Region	10211
8	Bucharest-Ilfov Region	890

Source: *Territorial statistics , Regional economic and social highlights.*

The region benefits from checkpoints and border crossings for car and rail traffic with Bulgaria, located in the counties of Teleorman, Giurgiu and Călăraşi. The most important of all is the Giurgiu-Ruse border crossing-checkpoint and cargo customs terminal, which, due to the road-rail bridge, ensures the connection between the countries of central and northwestern Europe and the Middle East.

Water transport

The hydrographic network of the region does not allow water transport, as the only waterway in the region is the Danube. A main artery of European navigation, the Danube ensures and facilitates trade with the riverside European countries, through the river ports of Giurgiu, Călăraşi, Zimnicea and Turnu Măgurele.

The population

The population of the South - Muntenia Region is 3379.4 thousand inhabitants, with a density of 101.2 inhabitants per km^2. In terms of the division by living environments, it is characterized by the fact that 41.63% live in urban areas, and 58.37% in rural areas. Compared with the southern counties, the northern counties of the region have a larger population and a greater number of urban centers. The dynamics of the population structure by age shows the appearance of a slow but steady process of ageing, a phenomenon that is characteristic of all the component counties of the region we are analysing, and of the country itself, and that is generated, of course, by the declining birth rates.

With regard to the regional workforce, in the context of a declining trend, the active population was 1265 thousand, representing 14.17% of Romania's active population, while the employed population at the end of that year amounted to 1.184 million (13.98% of Romania's employed population). The structure of employment is as follows: 35.4% employed in agriculture; 32.4% in industry and construction, and 32.2% in services. The educational structure in the South - Muntenia Region can provide education at all levels. It includes kindergartens, primary and secondary schools, colleges, vocational and apprenticeship schools, post-secondary schools and higher education institutions. The population density, analysed in terms of density value, time and territorial distribution, is characterized by:

- Superior value to country-level density - 96.1 inhabitants per km^2 at regional level versus 90.5 inhabitants per km^2 at country level, which shows that the degree of urbanization is higher in the analyzed region than at country level;

- A decrease of 7.8 inhabitants per km^2, compared to 1990;

- Diversity of the actual distribution of population, reflected in high density values in the region's northern counties versus its southern counties (Prahova county, with 174.6 inhabitants per km^2, and Dâmbovi a, with 132 inhabitants per km^2 being on top, whereas Călăraşi, with 62.2 inhabitants per km^2, and Ialomi a, with 65.4 inhabitants per km^2, rank last).

The gender structure of the population is characterized by a slight numerical dominance of the female population - 51.20% to 48.80% males. The evolution of the region's population structure by age groups since 1990 has shown a reduction in the share of the young population and the appearance of a slow but steady ageing process, and these are demographic phenomena characteristic of districts all over the region and the country. A detailed situation of the population structure by age ranges is shown in the following tables:

Table 3. *The population structure by age groups (absolute values)*

Year	Country/Region	Number of inhabitants			
		TOTAL	0-14	15-59	60 and over
1990	Romania	23,206,720	5,468,676	14,105,078	3,632,966
	South - Muntenia Region	3,581,068	836,645	2,126,519	617,904
2000	Romania	22,435,205	4,098,080	14,117,075	4,220,050
	South - Muntenia Region	3,465,468	624,650	2,115,356	725,462
2006	Romania	21,584,365	3,334,072	14,084,985	4,165,308
	South - Muntenia Region	3,312,342	502,360	2,102,020	707,962

Source: *Territorial statistics , Regional economic and social highlights.*

Table 4. *Share of population by age (percent)*

Year	Country/Region	% of total population		
		0-14	15-59	60 and over
1990	Romania	23.56	60.78	15.66
	South-Muntenia Region	23.36	59.38	17.26
2000	Romania	18.26	62.92	18.82
	South-Muntenia Region	18.02	61.04	20.94
2006	Romania	15.44	65.25	19.31
	South-Muntenia Region	15.16	63.47	21.37

Source: *presentation based on data provided by the „Territorial statistics , Regional economic and social highlights".*

The age structure imbalance caused by declining birth rates and the phenomenon of migration of the young population has major social consequences, leading to a change in the ratio of the employed active population to the non-active and supported one.

Another demographic factor with a major impact on the population dynamics and population size is the natural growth of communities, which was characteristically negative after 1990. The situation resulting from the demographic analysis is characterized by: a numerical decrease in population; a population density higher than the national average; a negative natural population increase.

The Region's population includes a total of 3379406 inhabitants and has a density of 101.2 inhabitants per km^2. The population structure by gender, according to RSM (2009), is: 1,723,497 (51%) females and 1,655,909 (49%) males. By age, 63.47% of the region's inhabitants are between 15-59 years old, 15.16% are in the 0-14 age range, and 21.37% are over 60. According to ROP (2007), The South-Muntenia Region is undergoing a significant phenomenon of population ageing, accounting for the largest share of population aged over 60 (21.37%), and an accentuation of this trend is to be expected in the future.

However, Romania still has the advantage of low wage employment, compared to labor costs in the EU countries (ROP, 2007), which could contribute to an increase in the volume of investment.

Statistics support the idea of choosing areas such as agriculture, zootechnics, woodworking or construction, but also rural tourism, transportation, consulting and trade in rural areas. Half of the entrepreneurs who make investments in rural areas choose the production sector. Approximately 90% of the firms operating in rural areas have fewer than 10 employees, and the average age of those who set up small businesses in the countryside is 33, the youngest age being 18 and the oldest - 67. The most reluctant to invest in villages are farmers because there are no markets for their products near their residence area (ZF, 2009). The number of construction permits for residential buildings reached in the first seven months of 2008, to 35,233, up 11.6% over the corresponding period last year, according to INS (The National Institute of Statistics). The most significant increases in the first seven months of the year were registered in the South – Muntenia development region (943 more permits) (ZF, 2008).

Table 5. *Number of employees (thousands)*

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Regiunea Sud	**770.5**	**720.8**	**657**	**620.8**	**604.3**	**598.4**	**598.9**	**592.5**	**571**	**566**
Argeş	182.3	180	168.5	167.9	155.9	153.2	148.5	145.5	137	137
Călăraşi	59.5	59.5	46.4	45.5	42.4	41	43.4	45.9	44	45
Dâmbovi a	115.8	106.2	96.2	89.7	88.5	88.6	87.4	87.6	85	81
Ialomi a	58.6	49.7	45.7	39	39.4	42.4	42.8	43.7	43	43
Giurgiu	44.6	38.2	36.2	34	32.9	31.8	32.8	33.4	33	32
Prahova	234.9	214.2	193	179.9	184.2	180.6	185.2	180.5	173	173
Teleorman	74.8	73	71	64.8	61	60.8	58.8	55.9	56	55

Source: *www.adrmuntenia.ro*

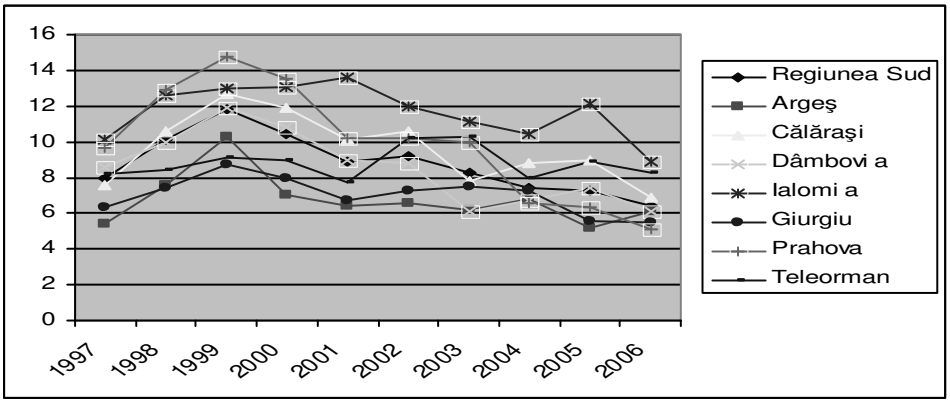
An upward trend in the number of completed houses was noted in all regions, and the South – Muntenia Region registered an increase of 791 homes. According to INS, in the South – Muntenia development region 6201 dwellings were completed (ZF_1, 2008). According to the classification provided by Man (2008), the South – Muntenia Region is predominantly rural, with over 50% of the population living in rural areas (58, 3%, according to RDS).

Table 6. *Unemployment (at year end) (no. of people)*

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
South Region	**120983**	**149254**	**172996**	**150656**	**123494**	**123577**	**109897**	**94685**	**93142**	**81209**
Argeş	16324	23574	32053	21532	18501	18627	17064	18304	13845	16055
Călăraşi	9957	14335	16183	15304	12275	12025	8630	9658	9992	7517
Dâmbovi a	21077	23842	29084	25098	20404	19564	12949	14259	15832	12902
Ialomi a	13146	15453	15807	15421	16021	13624	12228	11198	13262	9495
Giurgiu	7166	8031	9660	8846	7209	7162	7298	6838	5198	5033
Prahova	36191	46701	51902	45491	33473	32907	32385	20568	19509	15938
Teleorman	17122	17318	19297	18964	15611	19668	19343	13860	15504	14269

Source: *www.adrmuntenia.ro*

Figure 2. *Evolution of unemployment rate – all over the South - Muntenia Region from 1997 to 2006 (%)*



Source: *www.adrmuntenia.ro*

Industry

Traditional industries in the South - Muntenia Region are: the chemical and oilfield equipment manufacturing industry; the petro-chemical industry, the car manufacturing/ automotive industry – Dacia-Renault.

The general characteristics of the industrial activity in the South - Muntenia Region are:

- the industry in the region is complex and diverse, covering all the component domains, and relies on the richness and variety of the existing natural resources;
- the industrial areas are located in and generally belong to large communities such as cities and towns, and are concentrated mainly in the three northern counties of the region (Prahova, Dâmbovi a and Argeş);
- part of the region's industry is still under the influence of the national economy's decline, driven by several factors, such as the heritage of a heavy industry-based structure; some industries' dependence on imported raw materials; relatively high energy consumption; reduced efficiency and competitiveness; inadequate economic restructuring measures;
- the lack of coherent policies to boost cooperation relations between enterprises and research in the context of specialized human potential available in the research area;
- an insufficient promotion of local industries and of the domestic and international cooperation of the enterprises in the region;

- the downsizing and interruption of the activity of some production capacities in various industrial sectors, which turned industry into the main unemployment-generating branch of the economy;
- some communities' dependence on the existence of a single industry, and the preponderent concentration of foreign investments in the northern part of the region.

Production structure and potential:

The region's industry, based largely on traditional activities and oriented spatially according to the location of natural resources, covers a wide range of fields and has the following structure: extraction and processing of oil and natural gas, coal, limestone, clay and salt; electric and thermal energy production; the manufacture of chemical and oilfield equipment; steel production and processing; the manufacture of machine-tools and electrical equipment; the manufacture of electrical and household appliances; car manufacturing; woodworking; agro-food products processing; textile manufacturing; rubber and plastics manufacturing; production of chemical fertilizers for agriculture; the manufacture of bearings; the manufacture of construction materials, etc. The above activities were present in 9056 entreprises, whose structure by profile, size category and number of employees is presented in Table 7.m The image provided by the above table leads to the conclusion that manufacturing firms have the highest share (67.42%) of the total number of enterprises in the region. This situation, generated by the increasing dynamics of privatization, restructuring and orientation of enterprises towards the requirements of market economy in the region, indicates the existence of real potential and opportunities for development in the region.

Table 7. *Number of enterprises, by size category*

No.	Type of activity	Total no. of enterprises	Of which: by size categories, according to number of employees			
			0-9	10-49	50-249	250 and over
TOTAL Of which:		**9056**				
1.	Mining and quarrying industry	**128**	63	30	28	17
2.	Manufacturing industry	**6 106**	4 147	1 219	560	180
3.	Electric and thermal energy, gas and water	**92**	20	19	24	29
4.	Construction	**2 730**	2 094	437	180	19

Source: *presentation based on data provided by the „2008 territorial statistics, Regional economic and social highlights".*

Agriculture

The South - Muntenia Region is largely agricultural (2449 thousand hectares, representing 71.1% of the total area of the region), as demonstrated by the size of its agricultural area of 2449 thousand hectares, as well as by its 71.1% share of the total area of the region. The remaining area is occupied by forests (19.3%) and water and swamps (3.4%). The structure of agricultural land includes the predominant arable land (80.2%), followed by pasture and meadow (15.7%) and last place are vineyards and orchards (4.1%). The region's private sector accounts for over 96.1% of the agricultural area and 48.6% of the employed workforce. Crop production and meat production are well represented in this region. The existence of suitable ecological farming land creates further opportunities for regional development by harnessing new technologies and delivering healthy agro-food products, in accordance with consumers' growing demands and food safety standards.

Services

The services sector has recorded a positive development and a high degree of representativeness; it covers a wide range of activities in areas such as: banking-finance, insurance, transportation, real estate, post and telecommunications, tourism, education, health and social assistance, consulting, etc.

Table 8. *Number of establishments of tourist reception with functions of tourist accommodation*

	Number of establishments	**Ranking**
Total South region, of which	433	
Argeş	123	2
Călăraşi	9	6
Dâmbovi a	38	3
Giurgiu	15	5
Ialomi a	17	4
Prahova	222	1
Teleorman	9	6

Source: *www.adrmuntenia.ro*

Mountain tourism in particular is one of the strengths of the Region. We should note that at present there are still significant untapped tourist resources, which constitutes a real opportunity for regional development. (ROP, 2007).

The environment

Environmental quality, judged by the degree of pollution of its individual components (air, water, soil, forests), differs from one area to another, as determined by each area's characteristics and peculiarities. After 1990, the environmental conditions began to be gradually ameliorated by increasing the investment for environmental protection, by improving and applying the relevant laws and by reducing or even closing down the polluting enterprises.

Due to its high degree of industrialization and concentration of polluting industrial activities, the region's northern area is facing the biggest environmental problems that affect all environmental components, with a negative impact on the quality of life and living conditions.

In this area, Prahova County, characterized by the highest level of industrialization in the country, registers high level of both air pollution (caused by suspended sulfates, sulfuric acid aerosols and dust) and soil pollution (caused particularly by petroleum products).

The poor technical condition of sewage, wastewater and industrial water treatment plants, and the use of outdated technologies determine the existence of high biological and microbiological pollution of the collecting rivers. The agricultural areas in southern Romania, due to their low level of industrialization, are less affected by polluting factors, but instead are affected by the action of limiting environmental factors, such as erosion, the low level of nutrients and chemical pollution, whose negative effects on agricultural productivity and the quality of the living environment are obvious.

The widespread use of chemicals to treat soil and crops in the context of long-time practices of intensive agriculture has adversely affected the quality of groundwater, whose pollution level is quite high. A special problem is the storage of household and non-household waste, because the region has a small number of ecological storage areas for it, and those are generally located in urban centers. Another current issue is the population's low awareness and education level, and its concrete involvement in protecting nature and the environment. The conclusions we have drawn from the analysis of the environment domain for the South - Muntenia Region are:

- high levels of pollution of all environmental components in the northern counties;

- increased soil pollution in the southern counties;
- relatively adequate water quality of rivers;
- increased pollution of groundwater.

Ongoing regional development programmes

In Romania's pre-accession period, the South - Muntenia Region received financial assistance from the EU, and financial support from the Romanian State. In addition to other Operational Programmes (OPs) that pursue national objectives in order to reduce disparities between Romania and other European Union Member States, there is the Regional Operational Programme 2007-2013 – REGIO, which is currently under way, and aims to reduce development disparities among the eight development regions of Romania. To implement the Regional Operational Programme 2007-2013 in the region, The South - Muntenia Regional Development Agency has been founded, its role being that of an Intermediate Body.

REGIO gives priority to backward regions and to less developed areas within more prosperous regions. Another strategic objective of this OP is to support the sustainable development of cities – potential urban growth poles, which may contribute to a polycentric development of the Romanian territory (REGIO, 2009). The total REGIO budget of around 4.4 billion euros for 2007-2013 represents funding from one of the EU Structural Funds, namely the European Regional Development Fund (84%) and the rest comes from Romanian public funds (14 %) and private funds (2%). The South - Muntenia Region is allocated approximately 630 million euros. REGIO covers six key areas of funding, called „Priority Axes" :

- Priority Axis 1: Supporting sustainable urban development – potential urban growth poles;
- Priority Axis 2: Improving regional and local transport infrastructure;
- Priority Axis 3: Improvement of social infrastructure;
- Priority Axis 4: Supporting the development of the regional and local business environment;
- Priority Axis 5: Sustainable development of regional and local tourism;
- Priority Axis 6: Technical assistance to support the implementation of the ROP.

Table 9. *Regional gross domestic product (million RON current prices)*

	2001	2002	2003	2004	2005
The South Region, of which counties	**18773.6**	**24776**	**31709.5**	**36322.1**	**36322.1**
Argeş	4573.3	6231.8	7709.6	9532.9	9532.9
Călăraşi	1239.9	1739.9	2523.8	2287.6	2287.6
Dâmbovi a	2791.3	3634.9	4535.6	5458.7	5458.7
Giurgiu	1129.3	1403.1	1952.3	2059.9	2059.9
Ialomi a	1559.4	2160	3001.9	2939.4	2939.4
Prahova	5445.9	7137.1	8669.3	10637.1	10637.1
Teleorman	1787.7	2034.5	2469.2	3317	3406.5

Source: *www.adrmuntenia.ro, accessed January 29, 2010.*

Conclusions

There are regional disparities in this region, between the northern and southern counties. Thus, the northern counties, Argeş, Dâmbovi a and Prahova, are more developed and here are concentrated more industrial enterprises, representing such industries as chemical and petrochemical, machine building, food etc. The southern counties, Călăraşi, Giurgiu, Ialomi a and Teleorman, are characterized by a predominantly agricultural activity.

Following the privatization process and the transition to market economy, there has been a fundamental decline in the number and size of state enterprises, and at the same time an increase in the number of private businesses. The private sector, characterized by a slow, but consistently positive, evolution in time, is relatively well represented in the region, being supported by the continuous foundation and development of Small and Medium-sized Enterprises (SMEs) (The South - Muntenia Regional Development Agency, South-Muntenia Region - Development Plan).

The South - Muntenia Region does not differ fundamentally from Romania's other regions, but has a real potential that is still untapped at maximum capacity. With disparities between its component counties, the South - Muntenia Region falls under the general trends of economic development of our country that have been marked, however, by the effects of the global economic crisis - and evidently the domestic economic crisis over the past two years.

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SOME ENTREPRENEURS' SUCCESS STORIES FROM THE NORTH GREAT PLAIN REGION OF HUNGARY

Andrew F. Fieldsend[1], Gyula Vasvári[2]

Abstract

Agriculture is generally no longer the dominant sector in rural regions (at least in much of the European Union); indeed, in Hungarian villages, official data suggest that over 25% of jobs are in the manufacturing sector. However, the importance of non-agricultural rural entrepreneurship is often overlooked. This paper reports the results of interviews with representatives of five successful non-agricultural entrepreneurs in the North Great Plain region of Hungary. From these we conclude that continuing innovation is a key success factor, as are good management and related skills. Entrepreneurs have sought support from friends and family, and from the Chamber of Commerce and Industry, but business support from other sources has been limited. Constraints to entrepreneurship include an unstable legal background and complex taxation rules. If there are to be more 'success stories' similar to those described here, non-agricultural rural entrepreneurship must be given a much higher priority in the Hungarian policy agenda.

Key words: *Entrepreneurship, innovation, business support, Hungary*

Introduction

Despite clear evidence that across Europe the proportion of the workforce employed in agriculture has been declining (e.g. Copus *et al*., 2006), a view has persisted in some quarters that rural employment remains dominated by agriculture. Consequently, OECD (2006) notes that rural and agricultural issues have often been considered to be virtually synonymous and it has been assumed that agricultural and rural objectives

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could be pursued through a single set of policies designed to aid the transition of the agricultural sector. If ever that were possible, that situation has changed, principally because agriculture is generally no longer the dominant sector in rural regions (at least in much of the European Union, EU), either in terms of output or employment.

For example, a comparison of the employment profile of urban and rural areas in Hungary reported by Fieldsend (forthcoming) is of interest. Data disaggregated by NACE code and town/village location (presumably based on the residence of the worker rather than of the workplace) are available from the Hungarian Central Statistical Office 2005 microcensus. The employment profile of villages in Hungary is remarkably diverse. The most notable difference in employment profile is, as would be expected, in *Agriculture and related industries*, which accounts for 2.8% of employment in Budapest and the towns, and 9.4% in the villages. The percentage of jobs in *Mining and quarrying* in the villages is double that in Budapest and the towns, although the total number of jobs is small (0.4% c.f. 0.2%). Notably, however, *Manufacturing* accounts for 27.1% of jobs in the villages and just 20.2% of jobs in Budapest and the towns. Three other sectors, *Construction*; *Transport and related industries* and *Public administration etc*. are marginally more highly represented in the employment profile of the villages.

By contrast, the relatively important sector of *Wholesale and retail trade, repair of goods* accounts for a greater percentage of employment in Budapest and the towns (15.9% c.f. 12.8%), as do the high Gross Value Added sectors of *Financial intermediation and Real estate, services, business activities*; and *Education and Health and social services*. Agriculture (farming) is therefore a distinctive (and declining), rather than a defining, source of employment in Hungarian rural areas, which have an economic diversity approaching that of towns.

Recognising that this multisectoral nature of economic activity also applies to rural areas in Romania, the Valcea Chamber of Commerce and Industry, which is based in Ramnicu Valcea in central Romania, set up the project entitled 'Ro4RuralBiz - Initiative for sustainable rural development' in partnership with organisations from Romania, Hungary and Bulgaria, as follows:

- University of Agricultural Sciences and Veterinary Medicine of Banat Timisoara, Romania;
- EuroConsult LLC, Romania;

- Romanian Association for Electronic and Software Industry ARIES Oltenia;
- National Centre for Information Services, Pleven, Bulgaria;
- University of Debrecen, Hungary.

The University of Debrecen was an obvious partner to include in the project as it has considerable experience of taking part in non-agricultural rural development projects in cooperation with Romanian partners. For example, it was involved in the preparation of a 'Rural Entrepreneurship Toolkit' (Fieldsend and Boone, 2008) which brought together the expertise accumulated by partners in the Interreg IIIC project 'Praxis – Making Rural Entrepreneurship Work'. Initially published in English, a Romanian language version was prepared by Arad County Council, a Praxis project partner, and is now available on the Ro4RuralBiz website.

More recently, the university was a partner in the EU Framework 7 project entitled 'New sources of employment to promote the wealth-generating capacity of rural communities', acronym 'RuralJobs', alongside Babes-Bolyai university in Cluj-Napoca, Romania. The consortium also included partners from Bulgaria and Lithuania. The results of the project were described in detail by Fieldsend (2011).

Ro4RuralBiz (website: www.ro4ruralbiz.ro) started on 1 March 2010 and is planned to last for 36 months. The project aims to increase the level of employment in non-agricultural activities for people who live in rural areas of the West and Southwest regions of Romania, with a set of actions designed to encourage business creation and skills development in rural areas. These actions include:

- Training activities (skills and entrepreneurship);
- Regional networks to support entrepreneurial initiative;
- Policy recommendations for the development of rural entrepreneurship.

To gain a better understanding of the factors that are important for successful non-agricultural rural entrepreneurship, the Ro4RuralBiz partners interviewed successful entrepreneurs in their region. This paper reports the results of interviews with five companies in the North Great Plain region of Hungary. Three of these companies are in manufacturing, one in construction, and one in the service sector (consulting). The paper draws a number of general conclusions from the results of the interviews.

Methodology

The entrepreneurs to be interviewed were selected on the recommendation of the Chamber of Commerce and Industry of Hajdú-Bihar. Face-to-face interviews were conducted in October and November 2011, mostly at the company premises, and normally lasted for 90 to 120 minutes. A semi-structured format was used, where each interviewee was asked the same basic questions but was given the freedom to elaborate on their answers to the extent they saw fit. With the agreement of the interviewees, the discussions were recorded and subsequently transcribed. The questions asked were as follows:

- Please provide some basic information about your company;
- How to start a business? How to become an entrepreneur?
- Is your business performing as well as you would like and what are the biggest achievements?
- What impact, if any, has the economic crisis had on your business?
- What are your future business plans (new products, more staff etc.)?
- What do you consider to be important to succeed in business?

The interview transcripts proved to be rich and diverse sources of information on rural entrepreneurship issues and the 'framework' method (Brunt, 1997) was used to ensure that this information was properly managed, analysed and presented.

Results

UNIHOLZ Kft

Location of the company: Hajdúnánás
Interviewee: Tóth Tibor, Senior Partner
Field of activity: supplier of construction materials
Main products/activities of the company: metal products for construction; paints and sprays; safety equipment; accessories
Year founded: 1990
Number of employees: 50
Website: www.uniholz.hu

Uniholz Kft was started by Török István and his wife, the parents-in-law of Tóth Tibor, and is still a family-owned company. The two main reasons behind deciding to set up the business were:

- The political and economic changes which caused the break-up of the state cooperative; the part of which used to work with wood formed the basis of the new company;
- Identification of a market demand (initially) for wood products and (later) for steel and, to a lesser extent, aluminium products

The owners received no help in setting up the business. No loans were available so no special financial credit was taken for the purchase of the company. The owners worked together with a partner (initially) and with the employees, when necessary taking a very 'hands-on' approach to getting the work done.

The company's objective was to distribute high-quality products at moderate prices, in as wide a product range as possible. Compared to the average of 50 products per kind at the beginning, Uniholz now offers more than 3000 kinds of products to its customers. A quality control system has recently been introduced which enables the precise tracking of goods and data retrieval. The annual net revenue increased five-fold between 2002 and 2008. Although profitability is important management (organisational) skills have played a very important role in the progress:

- Good marketing skills allowed new branches to be opened in the eastern part of Hungary;
- Skills in economics helped to improve the profitability of the company. Efficiency was increased without any increase in the number of employees.

Until the financial crisis began, the company had hoped to set up more branches in the region but these plans are now on hold. The following conditions are needed to allow such business development to take place:

- Low interest rates to make finance available for investment, but Tóth Tibor cannot see this happening;
- Future reliability in the investment environment including a stable legal background, less regulation and bureaucracy, all of which would reduce administration costs, lower taxation (including 'overhead costs' of employing people) and simpler taxation rules;
- Grants should be available to help investment together with training on how to apply for grants and write project applications (entrepreneurs do not have these skills).

The reasons for the initial success of the company were (a) the owners had natural management skills, and (b) in the early days they took a tough

and decisive approach to managing the company. Only an authoritative (autocratic) manager could be successful at that time. Nowadays a company should be run in a more democratic way. Innovation, such as going over to online sales, is the primary key skill and is more important than in the towns. Personal capital for networking is also very important.

Marketing POINT Iroda

Location of the company: Hajdúszoboszló
Interviewee: Korény Istvánné, company owner
Field of activity: consulting
Main products/activities of the company: marketing consulting
Year founded: 1995
Number of employees: 1
Website: http://szaktanacsadas.hupont.hu/2/kapcsolat

The company was started in 1995 when there was a lack of marketing expertise, only one or two universities had started courses, but there were no specialists. The entrepreneur had a very good network but had also completed a course in high school in Budapest which at that time was recognised as the best. On these bases she was able to set up the business with very little investment. The county Chamber of Commerce had a wide network which was a great help to her as a customer base.

The company's target group was micro and small (and some medium sized) enterprises. The demand for consultancy was most obvious in the smaller companies which did not have help from big marketing companies who felt that developing strategies for small companies would involve just as much work but would bring in less money.

The company eventually had four employees plus the entrepreneur and flourished until around 2000 when the mass privatisation resulted in companies being broken up and the loss of many contacts. It was necessary to rebuild contacts with new companies. The business emphasis shifted to helping entrepreneurs in the village tourism sector with strategic planning and grant applications in the lead up to the EU accession. The entrepreneur has also used her knowledge to support local governments who lacked relevant knowledge in marketing and ecotourism. Since around 2006 the entrepreneur has operated as a sole trader: owing to the development of technology it is now not necessary to employ so many people.

A major problem has been the rapidly changing legal environment. Until around 2000 it was fairly stable but since then it has been constantly changing. The bureaucracy and the administration that is a consequence of it is also a problem. During the economic recession the major problems facing rural business have been (a) a lack of resources, mainly money, and (b) the bank system does not really help micro entrepreneurs as they are not considered to be reliable. They think that they will not pay back the money they have been loaned. Small businesses are also facing the problem of late payment of bills by companies they supply to.

In terms of what is important to succeed in business, belief in yourself is an important factor. Rural entrepreneurs are much more reliant on the local environment and they must be much more aware of that market, including through networks such as the local Chamber of Commerce. Rural businesses suffer from lack of information and lack of Internet access which means that they cannot maintain contacts and therefore cannot attend conferences and training activities etc. Yet many entrepreneurs do not realise that they are lacking this information and their business strategies just rely on their local markets. In rural areas family entrepreneurs/ companies are much more frequent and family help is extremely important. It is also very important how the owner tries to educate the business successors, particularly in a family situation.

Kromberg, Kft

Location of the company: Hosszúpályi and Debrecen
Interviewee: Ráthy István, co-owner and General Manager
Field of activity: production and trade of textile accessories
Main products/activities of the company: ribbons (including Jacquard ribbons); cords; laces; passamanteries
Year founded: 1995
Number of employees: 20
Website: www.kromberg.hu

Fritz Kromberg GmbH previously traded directly with a Hungarian company but, being dissatisfied with its efficiency, established Kromberg Hungaria Textil Ltd on 1 July 1995. Kromberg GmbH's products are manufactured at the last minute 'just in time' so the delivery times are very short. In 1995, delivery times were 2-3 weeks while the German company was looking for 2-3 days. Thus the task of the new company was to improve the Hungarian supplier's delivery times and did this by

consulting directly with the staff on the production line of the company. After the supplier closed in 2007 Kromberg Hungaria Textil Ltd opened their own manufacturing plant in Debrecen with ten people.

The necessary conditions to start a business are: a marketable product / service, the existence of a medium-to long-term, adequate funding background, and trained staff. The company is the only one in Hungary with the ability to make the Jacquard ribbons. Thus with no competition in this product it is in a reasonably strong position, helped by the fact that the business partner is the biggest buyer. Otherwise, growing competition from eastern Europe and the Far East - caused by low wages beating down prices - has forced the company to act flexibly.

Financially the company is doing well. In its planning in 2008 the management were very careful about the size of the company and the number of employees. The quality of the staff is very good, having previously been employed at the former company. In November 1997 the company had already set up a warehouse in the village of Hosszúpályi. It paid 35-40% of the sum they would have had to have paid for a similar building in Debrecen. This building was formerly part of a cooperative in which was made wooden pallets. The staff employed here are unskilled.

The professional skills are the most important factor for succeeding in business, also high qualifications and foreign language skills and a very deep knowledge of the product you want to make. Personal discipline such as getting up early in the morning, flexibility, life-long learning and general as well as professional knowledge are important. The connection with the Hajdú-Bihar Chamber of Commerce is helpful in this respect as they have lots of useful events, more than can be taken part in. Ráthy István is a member of a professional association which also has lots of events. The Internet is extremely important: it is possible to keep contact with international partners via email. All of these possibilities can be developed by dedication but help is also necessary. It is important to have people around (family and friends) from whom you can talk with and get advice.

Kiss Koloniál Kft

Location of the company: Esztár
Interviewee: Kissné Szalóki Ágnes, co-owner and Managing Director
Field of activity: high quality furniture manufacturing

Main products/activities of the company: wooden furniture for the home
Year founded: 1993
Number of employees: 142
Website: www.kikol.hu

The business is owned and managed by a husband and wife team. The husband used to work for the agricultural machinery factory in Debrecen which collapsed around 1989/90. They started their entrepreneurial activities by making certain goods, such as curtain rails from wood, which at that time were in short supply, and taking them to various shops that sold them on their behalf. Around 1990 they set up a workshop in the yard of the family house and started applying for the special loans and different supports being offered to entrepreneurs by the Government. Later they started to make beds and managed to rent somewhere in Debrecen to display and sell them. They also managed to buy land next door to the house which used to be a business that made pallets that went bankrupt and they built more workshops and stores there. In 1993 the legal and taxation background changed a lot and to avoid the need to pay back a lot of money the Kft was set up in three days in 1993.

In the mid-1990s the company moved to its present premises which were previously owned by a branch of a cooperative making furniture for export to France, but which was collapsing through a lack of orders. They had grant support (including EU grants) because the village was considered to be multiply disadvantaged (as it is today) which attracted grant, taxation and credit benefits. The main obstacle to development was that after they moved to Esztár and bought the premises (leading up to the EU accession) the legal regulations became very tough.

They opened their first store (in Debrecen) in 2002 and now the company has ten shops of their own including one in Oradea. Their net revenue doubled in the year around 2003-2004. In 2006 they set up manufacturing in Romania, in an old furniture factory in Marghita (59 km from Esztár). More recently they linked up with a partner in Germany that wanted high value, pure wood (beech) products for sale there and in Switzerland. With the recession the Hungarian demand has declined and the number of employees has been significantly reduced but the German demand has allowed the company to survive.

Regarding what is important to succeed in business, not only were grants a source of help in developing the business, but also the management

skills and knowledge of the company founders, and the husband's technical knowledge in machinery. In the early days of the company he repaired and assembled machinery, particularly for specialist tasks and manufacturing the products that they sold, using spare parts for machines found in scrap yards. Kissné Szalóki Ágnes stresses that the company can thank Hungary's EU accession process for the development of the company.

Tó-Ép-Ker Építőipari, Kereskedelmi és Szolgáltató Kft

Location of the company: Hajdúböszörmény
Interviewee: Tóth Krisztina, Commercial Manager
Field of activity: construction, retailing (trade)
Main products/activities of the company: planning, construction and renovation of houses; wholesale and retail building materials suppliers
Year founded: 1992
Number of employees: 8
Website: www.toepker.hu

The business is also owned and managed by a husband and wife team. The husband used to work for the local council company, was responsible for public construction, and was originally a bricklayer. Around 1985 there was always a problem with the building materials being delivered late, and they came from a long way away. With the regime and regulation changes in 1990, they set up a shop, mainly for bathrooms but also for construction materials which provided a local source of supply. At that time the infrastructure for distribution was also not in place so they had to get up early in the morning to take the construction materials to the building sites. The Kft was established in 1992.

In 1994 they bought the shop in Hajdúböszörmény, in 1996 they opened a shop in Debrecen, in 1998 in Nyíregyháza and in 2000 another shop in Debrecen, a total of four shops. The construction activities were closed around 1995/6 and trading remained as the main activity. Around this time the company employed around 30-40 people and the annual net revenue was around HUF 500 million. In 2002 the regulation background changed and the market became saturated because of the establishment of BauMax, Praktika and similar companies. Three shops were closed and construction work recommenced. The trading activity is retained in order to get the supplies directly from the producers for their construction activities and this leads to a 10% cost saving compared to not having a

shop. With the economic crisis, the turnover was very low in 2010 but was expected to approximately double in 2011.

Tóth Krisztina feels that the government should stimulate demand, i.e. somehow motivate customers to buy things. This would help her company because their market is in Hungary. More money should be put into construction to create employment for low skilled people. In the past, during economically difficult periods, the construction sector helped a lot to provide employment. At present, however, she cannot see any help being offered to the construction sector.

To have a professional image and to be very well skilled in your line of work are important for succeeding in business, and these should be coupled with long experience and customer focus. Positive and negative reputations can spread much faster by word of mouth in rural areas than they would in the city or would via printed advertisements. This is potentially a big benefit. For example, 20 years ago the entrepreneur built a house in the town and when the owners wanted to refurbish it they called him to do the job again. Also, it is necessary to choose very reliable suppliers in terms of quality and delivery.

Discussion

Important factors for successful rural entrepreneurship

A recurring theme in all of the interviews is the need for constant innovation. Innovation can be defined as 'any new technique, concept or idea that enables those who manage businesses to make those businesses more sustainable and viable in the future'. All of the companies were set up at the time of, or soon after, the period of political and economic change in Hungary. The entrepreneurs identified business opportunities and set up their companies to exploit them. UNIHOLZ, Kromberg and Kiss Koloniál took over either businesses or premises from socialist era managements who were not innovative enough. However, constant changes in the market, not least those caused by the economic recession of 2008 onwards, have required the entrepreneurs to restructure their businesses, introduce new working practices, and/or move into new markets. For example, Marketing POINT Iroda moved into ecotourism consultancy, Kiss Koloniál moved most of its manufacturing activities to Romania and opened new markets in Germany and Switzerland, while Tó-Ép-Ker moved back into construction rather than trade.

The *Innovation Union* is one of the seven flagship initiatives of the EU's Europe 2020 strategy for a smart, sustainable and inclusive economy (EC, 2010). This study shows that innovation is just as important in rural areas as it is in urban centres. The suggestion that urban areas should be 'competitive' and rural areas should be 'sustainable' is misplaced: both urban and rural areas should be both competitive *and* sustainable.

A second recurring theme is the need for good management skills when setting up a company, which includes the ability to make tough decisions. UNIHOLZ adopted an 'autocratic' approach to changing inefficient working practices inherited from the socialist period, Kromberg significantly reduced delivery times to its parent company while Kiss Koloniál, amongst others, has needed to successfully manage both dramatic expansion both in terms of turnover and employees, and the need to implement cutbacks. The entrepreneurs also stressed the importance of a series of related skills, such as personal discipline (e.g. Kromberg), the need to understand the technical aspects of their business (e.g. Kiss Koloniál), interpersonal and networking skills (UNIHOLZ and Marketing POINT Iroda), and having a professional image (Tó-Ép-Kér).

Responsiveness to changing demands shows the importance of customer focus, a requirement of entrepreneurship noted by Tó-Ép-Kér.

Sources of support for rural entrepreneurship

Of interest are the strategies adopted by the entrepreneurs in setting up, developing and ensuring the survival of their businesses. These can be reviewed in the context of research reported by Fieldsend *et al*. (2005), who compared the business support needs of rurally-based businesses in Hungary, Lithuania and the United Kingdom. UNIHOLZ, Kromberg, Kiss Koloniál and Tó-Ép-Kér stressed the importance of support from friends and family. This reflects the findings of Fieldsend *et al*. (2005), who found that 73% of the Hungarian businesses they surveyed sought support from this source, which was second only to accountants for this purpose. Many rural businesses are family businesses, and Marketing POINT Iroda also pointed out the need to provide support to business successors, who may be the next generation of the family.

Marketing POINT Iroda and Kromberg spoke enthusiastically about the support they had received from the county Chamber of Commerce and Industry, both in terms of making business contacts and in terms of skills

development. Fieldsend *et al*. (2005) reported that a much smaller percentage (29%) of Hungarian companies turned to trade organisations for support than was the case in the UK, where such organisations were second in popularity only to (again) accountants. One interviewee in the present study observed that this is because in the UK membership has always been voluntary and therefore trade organisations have needed to be responsive in order to attract members. While membership in Hungary was compulsory such 'customer focus' was not a priority.

The interviewees in this study did not refer to accountants, banks and solicitors as sources of support, in contrast to the findings of Fieldsend *et al*. (2005). This may be because at the time the companies were set up, in the early 1990s, support from such sources was not widely available. UNIHOLZ, for example, explicitly referred to the lack of availability of loans at that time. Kiss Koloniál, by contrast, reported that they secured government loans at around that period. Both they and Kromberg benefited from grants, taxation and credit benefits that were available to businesses in multiply disadvantaged microregions. Kiss Koloniál has a long history of submitting successful project applications, especially for EU funding, whilst Kromberg has recently submitted an application for money for production machinery and property development. Marketing POINT Iroda noted that with the onset of the economic recession banks have often not been willing to provide loans to small businesses.

Internet search was mentioned only by Kromberg, while Marketing POINT Iroda reminded us that many Hungarian rural businesses still lack Internet access. A striking finding from the interviews, which again reflects the results of Fieldsend *et al*. (2005), is the complete lack of government funded support and advice for businesses in Hungary, especially in rural areas, and also the lack of any support services provided by the voluntary sector. In the UK, until recently, the government funded an extensive 'BusinessLink' network that provided a range of business support services. An example would be help in writing a business plan. Only Kromberg explicitly stated that it carefully planned the future size of the company and the number of employees. UNIHOLZ noted the lack of available help in applying for grants and writing project applications.

Marketing POINT Iroda made the important point that many entrepreneurs do not even realise that they have need for support, for example for skills development or for identifying new markets. A major

gap in business support services in Hungary still remains, therefore, especially in rural areas. At this time of financial restraint a purely government funded solution is not realistic but maybe this gap could be filled by some kind of partnership between existing actors such as the banks and the Chamber of Commerce and Industry. Fieldsend and Nagy (2005) describe an early and not very successful attempt at such a service (EuroKontakt) that was modelled on a similar project in the UK.

Constraints on rural entrepreneurship

In terms of difficulties faced by the interviewed entrepreneurs some common themes again emerged. The need for a stable legal background was mentioned by UNIHOLZ, Marketing POINT Iroda and Kiss Koloniál. Similar measures that would help to reduce administration costs and that fall within the remit of government are less regulation and bureaucracy and simpler taxation rules.

Not surprisingly, the interviewees also called for financial assistance, either directly or indirectly, through measures such as investment finance provided at low interest rates and stimulating consumer demand. They were not, however, very optimistic that such measures would be enacted.

Towards a strategy in support of non-agricultural rural entrepreneurship

Fieldsend and Boone (2008) listed seven 'issues' relating to stimulating rural entrepreneurship, as follows:

- Communication - Effective rural partnerships. ('Good communication and working in partnership help to stimulate rural entrepreneurship through the exchange of good practice');
- Strategy - Regional and local and sustainable rural development strategies. ('Strategies must have the people to deliver, dates and milestones, be clear about outcomes, and celebrate success');
- Support - Innovation support through sharing good practice. ('Rural entrepreneurs must be offered business support which is relevant to their needs and presented in a way they can understand');
- Awareness - Promoting the correct understanding of entrepreneurship in rural areas. ('Effective rural entrepreneurship support depends on understanding the true context in which rural entrepreneurship operates');

- Funding - Maximisation of the use of European funding including alignment with core (i.e. national) funding. ('EU funding can be used as a catalyst for stimulating rural entrepreneurship');
- Customer focus - Creating an environment in which rural entrepreneurship can flourish. ('Excessive bureaucracy and regulation unnecessarily constrain rural entrepreneurship');
- Education - Creating an entrepreneurial mindset. ('Economic growth in rural areas is closely associated with the entrepreneurial capacity of the local population').

This present small study has reaffirmed the relevance of these issues. Some have been explicitly mentioned, including 'support' (the help available to support entrepreneurship and innovation is very limited); 'funding' (entrepreneurs need information and assistance related to applying for grant funding) and 'customer focus' (aspects of the present business environment constrain rural entrepreneurship). The relevance of others is clearly implied, such as 'communication' (more partnership working and exchange of good practice can help entrepreneurs to prosper) and 'education' (the entrepreneurs interviewed in this study have created significant wealth and employment in the region). The remaining two issues are, however, arguably the most important because perhaps they are the least obvious: 'awareness' (it must be clearly understood, especially by policy makers, that 'rural business' is not another term for 'farming') and 'strategy' (based on this awareness, policy makers must have a clear view on how to promote entrepreneurship in rural areas).

In an earlier study, Fieldsend and Nagy (2006) obtained similar results from a survey of rural actors in eastern Hungary. They identified seven general areas where action is needed to promote rural entrepreneurship:

- Better customer focus and less bureaucracy;
- Better access for entrepreneurs to information and 'signposting';
- Improved cooperation (partnerships);
- Better targeting, devolution to the local level and the importance of local-level plans
- The need for education at a young age;
- The continuing importance of agriculture; and
- Measure success!

This latest study provides further evidence about the strategies and needs of non-agricultural rural entrepreneurs in Hungary. The four featured

manufacturing and construction companies employ much larger numbers of people than do most farms. According to official data these two sectors account for 35% of jobs in Hungarian villages. If there are to be more 'success stories' similar to those described here, non-agricultural rural entrepreneurship must be given a much higher priority in the Hungarian policy agenda.

Acknowledgements

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_____I SECTION_____

SUSTAINABLE DEVELOPMENT AS A MODERN DEVELOPMENTAL APPROACH IN PRESERVATION OF AGRICULTURE AND RURAL VALUES

EVOLUTION OF FOOD CHEMICAL STABILITY ACCORDING TO QUALITY GRADES

Adrian Stancu[1], *Vladan Lukač*[2]

Abstract

Products react different to internal and external factors during the production, shipping, preservation etc. This is due to their low or high level of chemical stability. In order to establish the evolution of food chemical stability in preservation process, a study was conducted on wine samples from the same vineyard and vintage, but which belong to two different quality grades. The wine samples were storaged at the same air temperature and relative air humidity and were tested in the same moments according to the specific period of validity. The chemical stability of physicochemical characteristics firstly was tested and then the stability of sensory characteristics. The results showed that the two wines have particular chemical stability for each characteristic.

Key words: *food, chemical stability, quality grades, physicochemical characteristics, sensory characteristics*

Introduction

Every product has physical, chemical, ascetical or sensory properties etc. which are necessary in the stage of designing it and after the product is obtained it contributes to satisfy the consumer' needs. In the chemical properties category, besides properties as chemical composition, pH (acidity or alkalinity) etc. the chemical stability is not less important. In the case of foods, the importance of chemical stability is that influences the safety degree which is a major criterion in assessment of quality for both producers and consumers. The chemical stability represents the

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resistance of an entity (product, substance, component etc.) against chemical changes which can come from internal or external factors.[3]

The internal factors are represented by chemical composition of product, especially the number and chemical stability of its components. For foods, the chemical stability is decreasing with the increasing of moisture,[4] [5] proteins, enzyme, vitamins etc. content. Then it is possible that the foods that contain components with low chemical stability should not be recommended in treating some diseases.[6]

The external factor refers to air temperature, relative air humidity, airflow, air chemical composition, solar radiation, biological factors,[7] type and resistance of packages,[8] type of shipping, location of products in conveyance etc. There are few products with high chemical stability, i.e. the noble gases (He, Ne, Ar, Kr, Xe, Rn etc.)[9] and metals (Au, Ag, Pt etc.) which don't react with other substances because its chemical reactivity depends on electronic structure.

Evolution of Wine Chemical Stability according to Quality Grades

A study was carried out on two white wines which belong to two different quality grades, i.e. *Sauvignon Blanc* (which is superior quality wine with Controlled Designation of Origin) and *Dry Muscat* (which is a quality superior wine) in order to establish the evolution of food chemical stability.

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The Sauvignon Blanc and Dry Muscat wines were preserved at the same air temperature (15^{o}C) and relative air humidity (75%), which are the regular preservation conditions for these wines mentioned in standards. The preservation period was different according to its grade, i.e. 60 days for Sauvignon Blanc wine and 40 days for Dry Muscat wine.

During the preservation period, it were selected four testing moments for analyzing the chemical stability of wines which take into account both the specific preservation period of each wine and the frequency of analyses (table 1).

Table 1. *Correlation between the testing moments, frequency of analyses and specific preservation period of Sauvignon Blanc and Dry Muscat wines*

Testing moment of the preservation period	**Frequency of analyses (days)**	
	Sauvignon Blanc	**Dry Muscat**
Beginning	0*	0*
Half	30	20
Three-fourths	45	30
End	60	40

***** *Bottle day*
Source: *Data from own analysis.*

The wine chemical stability can be highlighted by the evolution of physicochemical characteristics during the preservation period. The physicochemical characteristics tested are shown in figure 1. The objectivity of the research is ensured by the fact that both wines:

- are white;

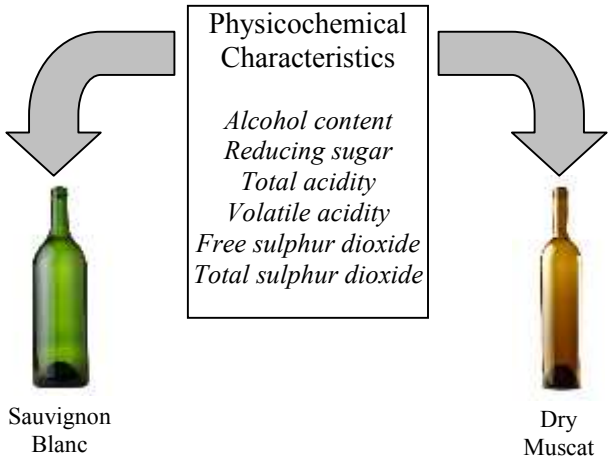
- are medium dry;

- were produced by crushing the grapes from Dealu Mare vineyard, 2005 vintage;

- were storaged at the same air temperature and relative air humidity;

- were tested in the same period according to the specific period of validity (table 1).

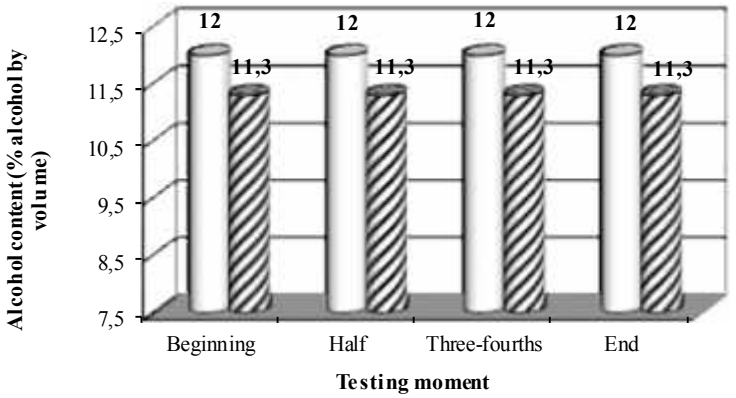
Figure 1. *The physicochemical characteristics tested*



Source: *Made by author.*

The chemical stability of wines depends on the chemical stability of each physicochemical characteristic. Thus, in figures 2-7 is shown the evolution of chemical stability of alcohol content, reducing sugar, total acidity, volatile acidity, free sulphur dioxide and total sulphur dioxide for Sauvignon Blanc (white columns) and Dry Muscat (diagonal hatching columns).

Figure 2. *Evolution of chemical stability of alcohol content for Sauvignon Blanc and Dry Muscat wines*



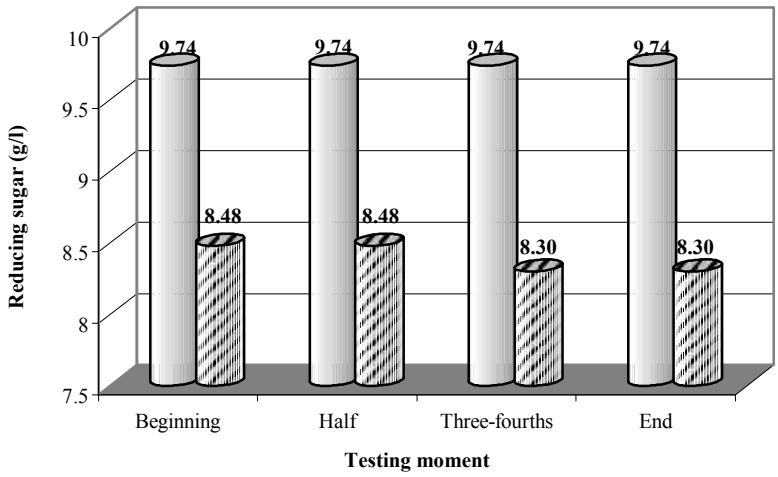
Source: *Data from own analysis.*

Figure 2 shows that the chemical stability of alcohol content is high for both wines because its level remained unchanged during the specific preservation period.

The difference of alcohol content levels of Sauvignon Blanc wine beside Dry Muscat wine is 6.19% and it is constant in the whole validity period. This means that alcohol content did not mange to convert in alcohol vapors which can lose in the air.

The evolution of chemical stability of reducing sugar for Sauvignon Blanc and Dry Muscat wines is presented in figure 3.

Figure 3. *Evolution of chemical stability of reducing sugar for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

In the case of reducing sugar, its chemical stability is different according to the wine grade. Thus, the reducing sugar for Sauvignon Blanc wine has higher chemical stability because its level remained unchanged during the specific preservation period.

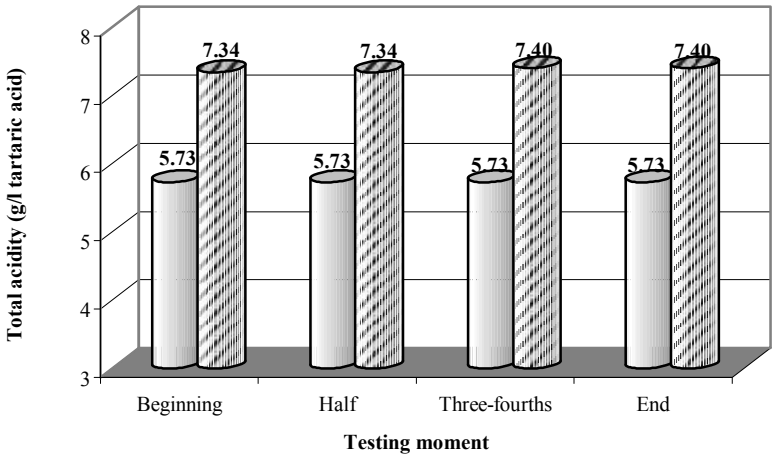
Instead, its chemical stability is relatively low for Dry Muscat wine since after three-fourths and until the end of preservation period, the level of reducing sugar decreased with 2.12%.

In the fist half of preservation period, the difference between the reducing sugar level of Sauvignon Blanc wine is 14.86% bigger than Dry Muscat wine.

But, in the second half, it increased up to 17.35% due to decline of reducing sugar level of Dry Muscat, because the reducing sugar level of Sauvignon Blanc remained unchanged.

Figure 4 illustrates the evolution of chemical stability of total acidity for Sauvignon Blanc and Dry Muscat wines.

Figure 4. *Evolution of chemical stability of total acidity for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

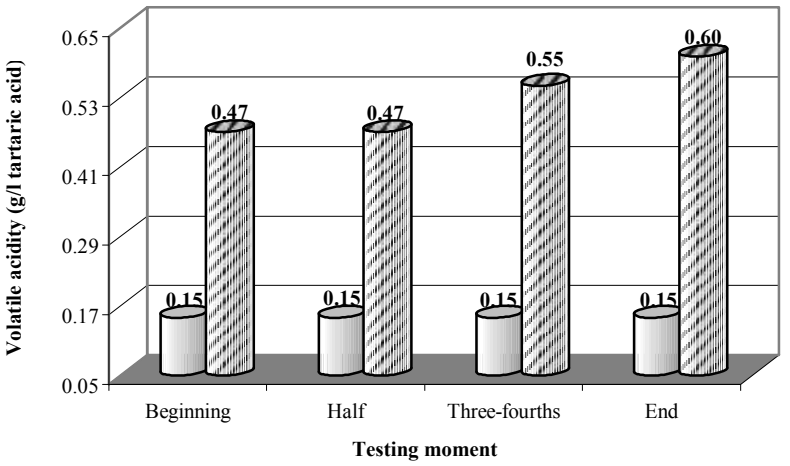
Figure 4 shows that even the Sauvignon Blanc wine has a low level of total acidity its chemical stability is higher than Dry Muscat wine.

The Dry Muscat wine has a 28.1% bigger level in the first half and 29.14% in the second half of validity period. This is due to the fact that the total acidity level of Dry Muscat wine increased in the second half of preservation period.

The total acidity level of Dry Muscat wine increased with 0.82% starting with the first day of three-fourths of preservation period.

The evolution of chemical stability of volatile acidity for Sauvignon Blanc and Dry Muscat wines is shown in figure 5.

Figure 5. *Evolution of chemical stability of volatile acidity for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

The evolution of chemical stability of volatile acidity for Sauvignon Blanc and Dry Muscat wines is almost the same with the total acidity with small differences.

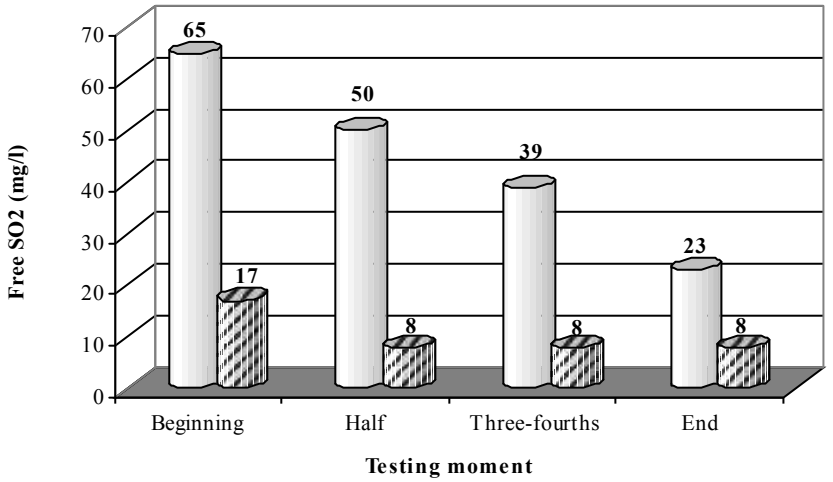
The Sauvignon Blanc wine has a superior chemical stability of volatile acidity than Dry Muscat wine although its level is lower with 68.09% until the first half, with 72.72% at three-fourths and with 75% at the end of preservation period.

The low chemical stability of volatile acidity of Dry Muscat wine is explained by the fact that it increased with 17.02% and 27.66% beside the initial level after second half of preservation period. Instead, it didn't change for Sauvignon Blanc.

In the case of Dry Muscat wine, it must be noticed that the volatile acidity beside total acidity had an additional increase of its level at the end of validity period.

Figure 6 shows the evolution of chemical stability of free SO_2 for Sauvignon Blanc and Dry Muscat wines.

Figure 6. *Evolution of chemical stability of free SO_2 for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

Studying the data from figure 2 at fist view it is not clear if the chemical stability of free SO_2 for Sauvignon Blanc is bigger or lower beside Dry Muscat wine because both their levels changed.

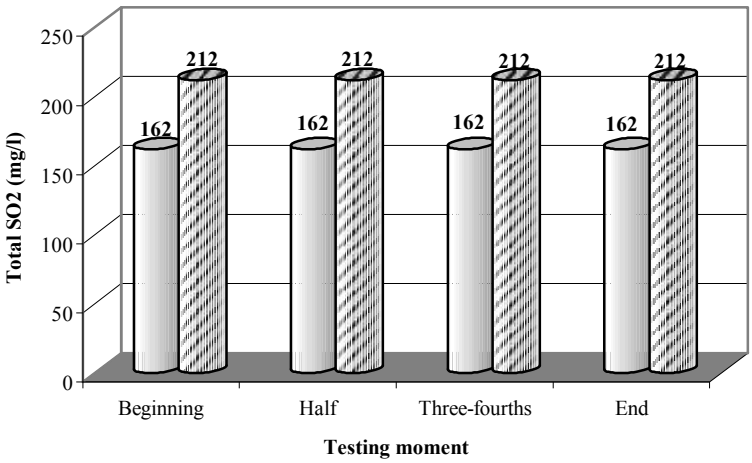
For Sauvignon Blanc, the chemical stability of free SO_2 decreased in each moment of testing with 23.08% at the half, with 40% at the three-fourths and with 64.62% at the end of preservation period.

In the case of Dry Muscat wine, the chemical stability of free SO_2 decreased at the half of preservation period with 52.94% and remained unchanged until the end of validity period.

The differences between the free SO_2 levels of Sauvignon Blanc wine beside Dry Muscat wine are 282.35% at the beginning, 525% at the half, 387.5% at three-fourths and 187.5% at the end of preservation period. Thus, the biggest difference is on the half of validity period and after that it decreased rapidly.

The evolution of chemical stability of total SO_2 for Sauvignon Blanc and Dry Muscat wines is presented in figure 7.

Figure 7. *Evolution of chemical stability of total SO_2 for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

The evolution of chemical stability of total SO_2 for Sauvignon Blanc and Dry Muscat wines is similar with the alcohol content with the difference that the level of Sauvignon Blanc is smaller than the one of Dry Muscat, with 23.58%.

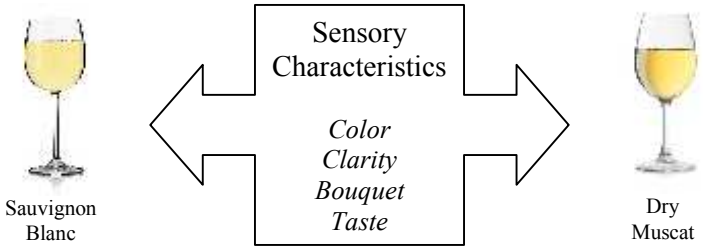
Both Sauvignon Blanc and Dry Muscat wines have high chemical stability of total SO_2, their level remained unchanged during the entire preservation period.

The chemical stability of any food influences its sensory characteristics which are the main characteristics assessed by consumers when they are testing or eating the products.

For Sauvignon Blanc and Dry Muscat wines, the study set up additional testing of the evolution of sensory characteristics level which is affected by the chemical stability.

In figure 8 are shown the four sensory characteristic of wine tested in the same four moments when the physicochemical characteristics were analyzed.

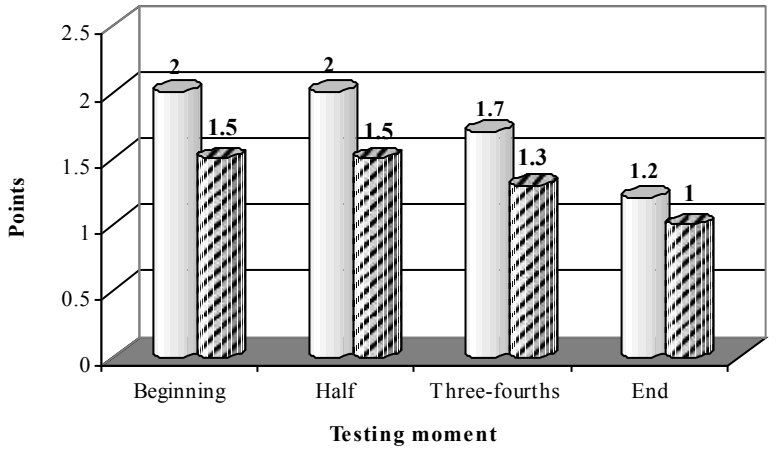
Figure 8. *The sensory characteristics tested*



Source: *Made by author.*

In figures 9-12 is shown the evolution of sensory characteristics for Sauvignon Blanc (white columns) and Dry Muscat (diagonal hatching columns).

Figure 9. *Evolution of color level for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

The figure 9 highlights that the color stability in low for both Sauvignon Blanc and Dry Muscat wines, i.e. its level decreased during the testing period.

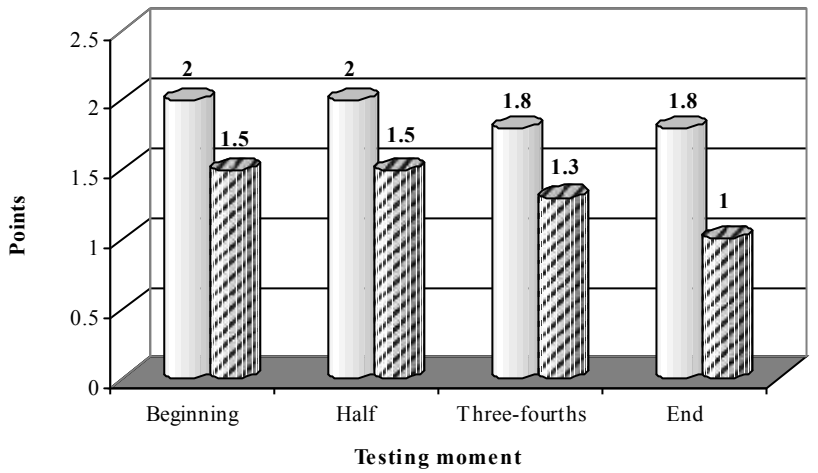
For Sauvignon Blanc wine, the color level remained unchanged until the half of storage period and it declined with 15% in the three-fourths and with 40% in the end of preservation period.

In the case of Dry Muscat, the color level maintained constant until the half of preservation period also, but it decreased only with 13.33% in the three-fourths and with 33.33% in the end of storage period.

The differences between the color levels of Sauvignon Blanc wine beside Dry Muscat wine are 33.33% at the half, 30.77% at the three-fourths and 20% at the end of validity period.

The evolution of clarity level for Sauvignon Blanc and Dry Muscat wines is illustrated in figure 10.

Figure 10. *Evolution of clarity level for Sauvignon Blanc and Dry Muscat wines*

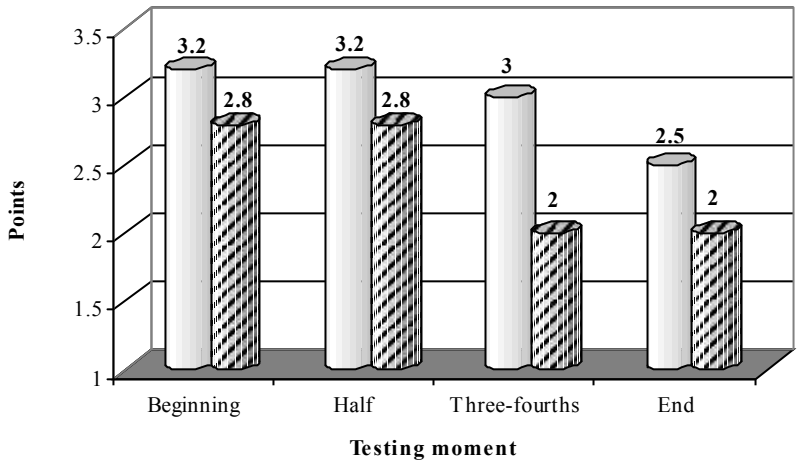


Source: *Data from own analysis.*

Also, the figure 10 shows that the clarity stability in low. For the Sauvignon Blanc wine, the clarity level remained unchanged until the half

of preservation period and it decreased with 10% in the three-fourths of preservation period and since this moment remained constant until the end of validity period. In the case of Dry Muscat, the clarity stability had the same evolution and proportion of changes as color. As regards the differences between the clarity levels of Sauvignon Blanc wine beside Dry Muscat wine are 33.33% at the first half, 38.46% at the three-fourths and 80% at the end of testing moment. Figure 11 presents the evolution of bouquet level for Sauvignon Blanc and Dry Muscat wines.

Figure 11. *Evolution of bouquet level for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

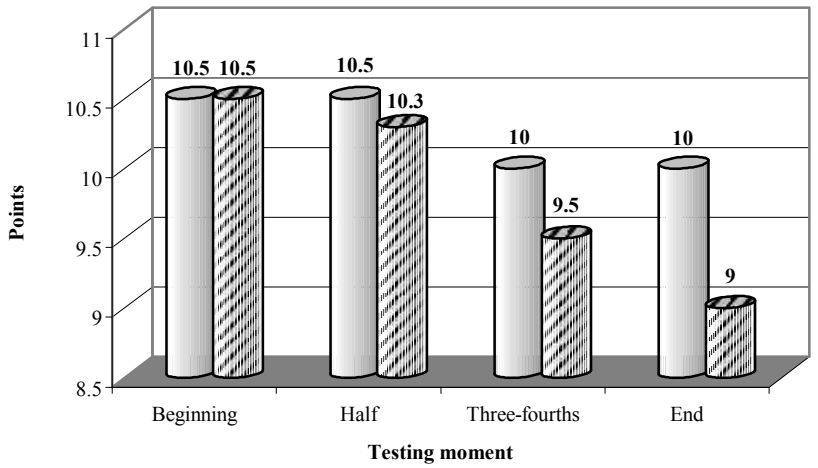
The figure 11 illustrates that the bouquet stability in low for both Sauvignon Blanc and Dry Muscat wines, i.e. its level decreased approximately in the same way the color did.

For Sauvignon Blanc wine, the bouquet level remained unchanged until the half of preservation period. After that, it declined with 6.25% at the three fourths and with 21.88% at the end of the testing moment.

Instead, for Dry Muscat, the bouquet level had the same evolution until the half of preservation period, but after that it decreased with 28.57% and remained constant until the end of validity period.

The differences between the bouquet levels of Sauvignon Blanc wine beside Dry Muscat wine are the same in the first half of preservation period (14.29%) and after that it reached 50% in the three-fourths and 25% at the end of preservation period. The evolution of taste level for Sauvignon Blanc and Dry Muscat wines is shown in figure 12.

Figure 12. *Evolution of taste level for Sauvignon Blanc and Dry Muscat wines*



Source: *Data from own analysis.*

Data from figure 12 reveals that taste of Sauvignon Blanc and Dry Muscat wines have a low stability, as well.

For Sauvignon Blanc wine, the taste level remained unchanged during the fist half of preservation period, but after it decreased with 4.76% in the three-fourths and maintained its level until the end of testing period.

In the case of Dry Muscat, the taste level had a particular evolution. It declined since the second test moment with 1.9%, in the third moment with 9.52% and in the fourth moment at the end of preservation period with 14.29%. The differences between the taste levels of Sauvignon Blanc wine beside Dry Muscat wine are 1.94% at the first half, 5.26% at the three-fourths and 11.11% ate the end of validity period.

Conclusions

Only two of six physicochemical characteristics have high chemical stability for both Sauvignon Blanc and Dry Muscat wines, i.e. alcohol content and total sulphur dioxide because its level remained unchanged during the entire preservation period. Additional, the Sauvignon Blanc wine has higher chemical stability for three physicochemical characteristics (reducing sugar, total acidity and volatile acidity) beside Dry Muscat wine because their level remained the same in each testing moment. Instead, both Sauvignon Blanc and Dry Muscat wines have low chemical stability for the same physicochemical characteristic, i.e. free sulphur dioxide, since its level decreased.

The free sulphur dioxide of Dry Muscat wine declined more and suddenly (52.94%) at the half of preservation period and remained unchanged until the end of validity period. But, in the case of Sauvignon Blanc wine the free sulphur dioxide decreased gradually in each testing moment with proportions that not exceed the decrease of Dry Muscat (23.08% at the half and 40% at the three-fourths), with an exception at the end of testing moment when it reached 64.62%. Thus, the Sauvignon Blanc wine has a higher stability of free sulphur dioxide than Dry Muscat wine.

Even the Sauvignon Blanc wine is highly appreciated for its color beside Dry Muscat wine due to higher points, it has a smaller stability because it decreased with 1.67% and 6.67% more in the last two testing moments. The Sauvignon Blanc has slightly higher stability of the clarity beside color due to the fact that after the half of preservation period even its level decreased it remained unchanged until the end of validity period. The Dry Muscat wine has a lower stability of clarity beside Sauvignon Blanc wine because its level decrease with 5% more at the three-fourths and 30% more at the end of testing moment.

Even the bouquet level of Dry Muscat wine decrease and remained unchanged at the first half of preservation period, it has a lower stability than Sauvignon Blanc wine. Thus, the bouquet level of Dry Muscat wine declined with 22.32% at the three-fourths and 6.69% at the end of validity period beside Sauvignon Blanc wine. The taste stability of Dry Muscat wine is lower than the one of Sauvignon Blanc wine because its level decreased with 4.76% more at the three-fourths and with 9.53% more at the end of preservation period. In order to have a better view, the

chemical stability of each physicochemical and sensory characteristic of Sauvignon Blanc and Dry Muscat wines is presented in table 2.

Table 2. *The chemical stability of each physicochemical and sensory characteristic of Sauvignon Blanc and Dry Muscat wines*

Characteristics	Sauvignon Blanc		Dry Muscat	
	High	Low	High	Low
Physicochemical				
1) Alcohol content	✓	-	✓	-
2) Reducing sugar	✓	-	-	✓
3) Total acidity	✓	-	-	✓
4) Volatile acidity	✓	-	-	✓
5) Free sulphur dioxide	✓	-	-	✓
6) Total sulphur dioxide	✓	-	✓	-
Sensory				
1) Color	-	✓	✓	-
2) Clarity	✓	-	-	✓
3) Bouquet	✓	-	-	✓
4) Taste	✓	-	-	✓

Source: *Data from own analysis.*

The information from table 2 shows that Sauvignon Blanc wine has high chemical stability for all six physicochemical characteristics and three out of four sensory characteristics. Instead, Dry Muscat wine has high chemical stability for only two out of six physicochemical characteristics and one out of four sensory characteristics. Taking into account all this information, overall it is clear that Sauvignon Blanc wine has a higher chemical stability and safety beside Dry Muscat wine due to its higher quality determined by the stability of physicochemical and sensory characteristics. In future, the current study can be extended as follows:

- it can be selected and analyzed other white wines from the same two quality grades (superior quality wines with Controlled Designation of Origin and quality superior wines), for example Chardonnay and Italian Riesling, or red wines (Pinot Noir and Băbească neagră);

- it can be selected and analyzed white wines from other quality grades (quality superior wines and table wines), for example Aligoté and Saint Emilion, or red wines such as Burgund mare and Sangiovese.

As regards the frequency of analyses, for a future study it can be set up five testing moments at beginning, one-fourths, half, three-fourths and end of preservation period. As well, the preservation conditions can be different either the air temperature or relative air humidity or both.

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THE EFFICIENCY OF TAXATION CONSIDERING THE IMPACT OF ENVIRONMENTAL TAXATION REGRESSIVITY

Adriana Florina Popa[1], *Laura Brad*[2]

Abstract

The environmental taxation is one of the most important economic areas as it brings about important revenues to the government. There is a problem though that in many countries, the environmental taxation is still regressive, that is the low income households have to pay a larger amount of money then the high income households. This article focuses on environmental taxation, especially in transport and energy's domains, pointing out the way that fiscal policy affects their regressivity or progressivity. It seems that in developed countries the environmental taxation is progressive, while in underdeveloped countries and emergency ones, the environmental taxation is regressive. Evidence is revealed by presenting Romania's characteristics in comparison with developed countries.

Key words: *fiscal policy, environmental taxation, progressive/regressive character, Romania, efficiency*

Introduction

The development of a country always brings effects on the environment, as current decisions, that are due to assure a proper development, can influence the existence of welfare of each generation. In consequence, it is essential to establish how much pollution can be allowed and moreover, who is going to pay the taxes for the environmental protection. In this case, it is important to point out if the environmental tax is efficient or not. It is a general assumption that taxation policy frequently has a disproportional effect upon households and employees as its regressivity impact is frequently found. On the other hand, without any rules

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regarding the taxation of pollution sources, there would be no interest, not even, for companies to reduce their pollution cost. Nevertheless, the existence of an environmental policy is important, as the government can reassign the revenues gained due to pollution taxes to other sectors in order to assure a less regressive impact upon society. Moreover, when the environmental policy is applied, we have to take into consideration the market structure as the negative impact upon society can be increased. Dwight (1975) emphasize that pollution taxes will acquire a least-cost abatement when this element is considered.

Nonetheless, the taxes imposed to population have to be properly analyzed, as they could be reticent about their actual effect, and moreover, as there could be a resistance regarding the payment that should be done. A new environmental tax should initially have a lower rate, with the possibility to be raised taking into account the national economic and social conditions, without omitting the standards that have to be respected if the country is affiliated to an international organism.

The problem regarding the environmental policy nowadays is referring to the efficiency of taxation policy and, moreover, to its impact, as the general assumption is that they generate a negative effect upon society.Based on these issues, we are going to emphasis through our research which is the effect of environmental taxation in the case of some representative countries. We plan to include a comparison between countries as a part of our analysis.

Literature review

When talking about taxation of environment, several elements have to be taken into consideration. The main literature is focusing on pointing out the impact that carbon, gas, energy, transportation or other kind of protective taxes have upon the economies in general. It is a reality that it is important to reduce taxes in a particular industry field, in order to assure a competitiveness environment, but it is also crucial to reveal the environmental tax schemes and the impact they have upon society. In this regard, the European Countries have established a general objective which refers to obtaining important targets when energy savings, reduction of greenhouse emission and development of renewable energy sources are analyzed. Korosen and Nicodème (2009) revealed that tax energy could be used both for innovations in environmental activities and for compensation the household and business for their regressivity effect

EEA (2006) realized that taxes on energy and heating usually have a regressive impact, as households with low-income generally spend more from their revenues that the amount spend by the households with high-income. On the other hand, they considered that transportation taxes have effect on the opposite direction, therefore, in general, there is a neutral effect upon households when environmental taxation is analyzed. Bureau (2011) points out that taxes applied to car fuels are regressive in France before revenue recycling, but when surplus of revenues is redistributed into economy the consequences upon the low income households are improved. Blow and Crawford (1997) and Santos and Catchesides (2005) considered that is a regressive effect of gasoline taxation in case of household car owners. Mayeres and Proost (2011) centered their analysis on differences between gasoline taxes and diesel ones. They discovered that, even though these taxes have a negative impact on households with low income, there should be no differences in the taxes imposed on them as the total air pollution is in general higher for diesel cars than for gasoline ones. Poterba (1991) revealed that the taxes regarding gasoline in United States are higher than the taxes in the European area, but their impact is still regressive. He also discovered that the regressive impact could be reduced if the revenues obtained during the whole life are used for calculation.

Different results are pointed out by Rausch et al. (2011) who concluded that there are no significant differences in the effect of environmental fuel taxation, even though the revenues gained are considered to be annual or for the whole life period. Most of the models used in the economy tend to reveal the negative effect of carbon taxes upon households, as the regressivity of their impact could not be denied. Major studies from the 90's period, like Casler and Aisha (1993), Jorgenson, Slesnick and Wilcoxen (1992) focus on the regressivity effect of environmental taxes.
Not only the taxes imposed on the transport fuel are important, but also the taxes for the energy consumption and other elements. Consequently, Goulder (1993) pointed out that energy taxes have a lower impact upon households with lower income than other types of taxes, while they are applied to a form of gross output compared to gasoline taxes that are applied to the final consumer goods. Moreover, these taxes are considered to have a nine times higher effect, considering environmental policies, than the reduction of income tax alternative. Liang Zhao, Xiao-Ping Wei and Xue-HongQuan (2009) illustrated that raising the price of energy, even though it could sometimes determine negative effects on households with lower income, generates positive effects for economic development

and the increasing of GDP on a short term period, while there could be a reduction of these taxes in terms of sustainable development, on a long term period. Nonetheless, major studies report regressivity when environmental taxes are considered. Seen from another point of view, the fiscal policy effect and its efficiency can be an important issue when environmental behavior and taxation are analyzed. Most of the studies focus on direct effects of taxation, while the effects of indirect elements are not considered. Due to this fact, the environmental taxes could also have indirect effects because the price of taxation can also affect the consumption of other commodities**.** Jacobsen, Birr-Pedersen and Wier (2001) emphasize that even though these effects have a lower impact upon low income households at the first sight, in reality they are a higher burden for these categories and their effect is to make the environmental taxes more regressive. Johnstone, Alavalapati, Janaki (1998) review some of the distributional implications of environmental tax reform when residential energy, road transport and agriculture sectors are considered. The authors point out that the indirect effect of environmental taxation usually has a regressive impact when the distribution implications are analyzed. In consequence, the tax burden is much higher for low-income households that for the households that are into a high income category. The consequences upon the environmental and social elements can be revealed in the sense that the impact upon the low income households can be mitigate if the excess revenues are used in order to help them supporting the regressivity of the taxes.

The environmental taxes should be used to established proper efficiency policies, and moreover, to obtain relevant economic development. The Regional Environmental Centre (2011) focuses on the fact that even though most of the environmental taxes have a regressive impact, measures should be taken in order to protect the vulnerable citizens and households. Furthermore, transparent income transfer would be more efficient than the subsidies existence. The problem regarding the regressivity character of environmental taxes is a particular concern for the policy makers. Due to this presumption, an idea has been launched that imposing dividends twice or more could mitigate raised taxes on the environmental elements. Rausch et al. (2011) focus on the fact that no matter how the income is affected, the double dividend taxations cannot replace the influence of environmental taxation.

On the other hand, European Commission points out that there has to be a mixture between the policies adopted for environmental taxes. Moreover, a combination of these taxes should be applied in order to obtain relevant results. It is considered that the imposed level to be reached can not be diminished but, on the other hand, countries could adopt policies for somehow protecting the low income households, which usually have a higher tax burden than the persons that receive a higher amount of money. Nonetheless, when we refer to the environmental taxation, other elements have to be considered. For example, we have to illustrate which are the differences between the economic and legal background of these types of taxation. Fullenton and Metcalf (2002) emphasize that, from the legal point of view, there should be one person that has to pay the environmental tax. From the economic point of view though, there are assumptions that there is another person who really bears the effects. Consequently, in a partial equilibrium market the taxes on pollution and other environmental elements depend upon the price character related to demand and offer. Taking the producer's point of view, if the demand is elastic, while the offer is inelastic, than higher prices and higher burden would be supported by the consumer. Moreover, the competitive of prices should be taken into consideration as the produces can easily transfer the total cost on the consumers. For example, a raise in the energy price would be totally paid by the final consumers. On the other hand, if we analyze the petroleum industry, no effect due to the raising of petrol would be observed that on the short term, while on the long term, all the amounts would be paid by producers when interchangeable products appear on the market, as Stiglitz (1998) pointed out.

As a result, the policy applied should affect both the producer and the consumer in order to assure a more efficient effect that would not only affect the incomes of low-income households. As emphasized in the main literature, the environmental taxes can be progressive when developed countries are analyzed, as we are going to discuss in the following section

Evidence regarding the environmental taxation in developed countries and fiscal policy decisions

When analyzing development countries, we observed that sometimes the environmental taxes do not have a regressive effect, but a progressive one. The explication can be that development countries offer high degree of benefits to the population and moreover, the taxes imposed to them are not higher when they are related to the income obtained by persons or

households. There are numerous studies that emphasize that the environmental taxation is not equally distributed. This principle is in most of the cases connected to heating and energy elements, as well as to transportation taxes, like those regarding the fuel and the motor vehicles. While the first category is considered to be regressive no matter how the development of the country is, the second category can be either regressive or progressive, depending on the characteristics of the country and the way these taxes are perceived by the population.

The efficiency of fiscal reform could be pointed out when there is important evidence not only on the economic effect, but also on the social one. For example, in the United Stated, the taxes on gasoline are regressive when comparing the middle class with the high one, and progressive when low-income households are analyzed**.** Smith (1992) showed that the countries that firstly formed the European Union, Belgium, France, Italy, Luxembourg, Netherlands and Germany have a progressive tax on gasoline in more than 80%. Consequently, the taxes imposed in the United States taxes are more regressive than the taxes imposed in Europe, with relevant evidence from the Nordic countries even though the level of taxation is these regions is really high.

In Finland, Trulli (2009) studied the taxation and fiscal policy impact in the case of transportation taxes. They discovered that the effect is similar with the one obtained in United Kingdom, the main difference being that tax is progressive between 60% and 80%, depending of the macroeconomic evolution. Even though, Finland is one of the most developed countries from EU, the regressivity of the tax can not be denied when the discussion focused on persons that have the highest salaries in Finland. The explication is that the number of persons who have a car increased directly with total income. The conclusion of their study is opposite to the one extracted for Great Britain where the owners of the cars are in disadvantage when their burden is analyzed. Taking it as a whole, nationally, it is not necessary to talk about regressivity of transport taxation, therefore the low-income households do not suffer a higher burden than the high-income households and the fiscal policy has an efficient effect.

Similar studies where realized for Sweden in the same year. Their main conclusions are that regressivity is present when the annual income is taken into consideration, while its effect diminishes when total expenditure is illustrated. Due to these elements, we observe that there is

an increase in the total amount paid by households, due to the increase in the total value of income that the households receive. Consequently, we can affirm that the regressivity impact is not present.

In Norway, Aasness and Larsen (2003) pointed out that both regressive and progressive effects could be identified when these taxes are revealed. As a fact, there are some categories like cars, motorcycles, taxies and planes that have a progressive tax, while for other categories the taxes is regressive. The justification can be found in the fact that there are several different categories through which the population chooses to invest their income and that the categories significantly differ from one level to another of income.

Other studies illustrate that in Denmark there are significant differences between the environmental taxes. The transport related taxes, like the registration fees and fuel taxes are equally progressive and progressive. When the total income gained during a lifetime is analyzed, the progressivity is much higher. This happens because Denmark has quite high taxes on transport, as it is considered that people that have higher incomes should pay higher taxes. Therefore, the car is be associated to a luxury good, and consequently, the taxes paid for the transportation are be bigger. As a consequence, we can observe that countries from the Nordic region usually have a higher progressivity of their taxes.

Not only have the Nordic countries a progressive taxation when the environmental taxes are analyzed, but also other developed countries present similarity with them. In Spain, even though water charges are generally regressive, when we talk about transportation and the cost of fuel, the charges point out to be more progressive and therefore, the households with higher income pay higher fees that the persons with low income.

In Germany, most of the taxation is progressive, not only the income one, but also the environmental one. These elements can be explained by the degree of development that this country has when its economy is analyzed. It is somehow considered to be the model of the European area, as it is less affected by the economic crisis. Even though, it does not have an extra purchase tax besides the VAT when buying a new car, the fuel used on internal flights is taxed for compensating the absence of other tax. It seems that Germany has a target of 20 million electric cars by the end of 2020 as the development indicators are one of the highest in Europe.

Supporting our above described considerations, Leipprand et al. (2007) revealed the influence of environmental taxation on developed European countries. They point out that most of the German environmental taxes are related to the transportation field, while the regressive effect can be found in the sector of energy taxation. On the other hand, social welfare recipients receive significant benefits for heating, so a rise in the price of heating almost compensates any effect.

Other countries, like the United Kingdom, also have an influence mixture in terms of environmental taxation. In their case, several decisions were taken in order to cover the negative influences of the environmental taxes, as they are notably regressive. The regressivity of taxation can also be seen in water charges, as the total quantity of water spend is less related to the charged prices. As possible effective measures, it is better not to reduce the cost of energy or other types of environmental taxation, but to illustrate that a minimum level should be established when transport and energy standards are presented and reported to the entire population. Moreover, in order to obtain social acceptance and to increase gains from environmental efficiency, environmental friendly investments should be made as this type of policy would not only influence the consumers' behavior, but also it would raise the number of employed people in the economy.

Important studies revealed that a less developed society damages less the environment than a developed one, therefore the taxes should not be regressive as they have a lower effect on the evolution and the development of the country. It is argued that taxes should definitely be progressive in order to sustain the development of a country.
Both regressive and progressive taxation can be found while analyzing the main literature. The conclusions drawn mostly depend on the national development period.

When taking into account the fiscal policy, the environmental and non-environmental taxes should be mixed. The negative distribution of the environmental policy can be corrected by applying social and fiscal policies. The increase in income tax or in the benefits obtained by the low-income households can diminish this distribution. The reduction of social contributions is another important element to be taken into consideration as a measure of reducing the regressivity of environmental taxation. The total effect comes from the fact that a certain level of progressivity is ensured in terms of environmental taxation. Moreover, the

redistribution of the revenues obtained can be used so that more benefits can be offered to lower-income persons. The reduction of social contributions can generate a decrease in the costs of the labor force. Consequently, the number of employees increase, this being an element that illustrates an increase in the market prices. The results can be seen in an increase of real revenues, in terms of consumption and economic activities. Other possible decisions to be taken by the fiscal administration can refer to an equal redistribution of income received for the environmental taxation brought into economy, so that the regressivity would be somehow diminished. If the redistribution of revenues is made taking into account that the low income category will receive a higher compensation, than a more progressive character of the environmental taxation could be induced.

It is believed that the main elements, through which the progressivity of environmental taxation can be realized, are based on the fact that there should be several increases in taxes regarding the transport area, accompanied by a slow decrease in other analyzed elements. Nevertheless, we must not forget that the European Union established a policy through which not only the environmental taxation is observed, but also the values of the benchmark taxation are determined through time. It is somehow implied that all countries should pay the same amount on general taxes that can affect the environment, such as the taxes on CO2 or other elements.

The harmonization principle is one that European Commission is focusing on, as the main objective is to ensure a competitive development environment with the main economic powers from world. Moreover, the environmental taxation is definitely an element that can contribute to the sustainable development of the regions and of any county. It is somehow promoting the idea that not only the revenues and social living conditions for our generation are important, but also the effect that our activity can have on the development of the society.

Evidence regarding the environmental taxation in Romania

Several aspects must be emphasized when talking about taxation in Romania. Romanian fiscal policy is generally marked by regressivity in all levels of taxation, even in the environmental one. That is similar to the fact that Romanians who earn less money pay higher taxes to the Romanian Government than people with higher revenues do. Moreover,

The European Union pointed out that the Romanian system should increase the environmental taxation, by reducing the taxes requested in the labor area. The idea is that the consumption and pollution attitudes must be charged and not the production activities. One of the main problems of Romania is that the amount of environmental taxation has decreased immediately after negotiations with the European Union started. The integration of Romania in the European brought changes in the situations of revenues obtained from environmental taxation, and we often wonder if these taxes are relevant or not to the level imposed by the European Commission.

Considering these elements, the environmental taxation can be seen as an activity that includes those taxes and compulsory payments imposed by the government that are charging base with particular relevance to environment. In Romania, these taxes refer to pollution, products energy, vehicle engine, green gas emissions and other elements. In general, these taxes are used with corroboration of economic and social development on the long run.

The problem regarding the environmental taxation is to ensure a minimum level of competitiveness between countries. In order to find a solution to this problem, some of the companies that use a huge amount of energy are exempt for taxation, the direct consequence being the transfer of the impact on households and transportation sector. On the other hand, offering incentives for companies can contribute to their development even though they have to pay pollution taxes.

When the environmental perceptions are revealed, there is general a conflict between what governments want and what the consumers' point of view is. A strategic policy could be adopted on the implementation of a new tax by establishing a lower tax at the beginning with the condition of raising it in the next period. Romania suffered a severe decrease in the amount received on environmental taxes between 1999 and 2007. After 2007, an important increase in the total expenditure could be observed. There is also an important fluctuation of the environmental taxes that is mainly due to the fact that the energy prices increased several times. While analyzing the taxes for transportation, their evolution is also observed. They refer mainly to fees charged for possession and usage of vehicle and they represented only 0,1% of GDP until 2006. This is a very low level compared to the European Community level, being an

insignificant event in communist countries cases. This situation is explained by the very low level of property taxation in Romania.

On the other hand, tripling revenues were obtained in 2007, when the first vehicle registration tax was introduced. This is actually a beginning of an upward trend. Comparing the level of Romanian environmental taxes to those from the European Union, we found that Romania chose to maintain the lowest possible level of excise duties at absolutely all chapters in general, and to some fuel products like diesel and kerosene, in particular. The adjustment process is not totally finished nowadays, as Romania still keeps having low price levels for fuel elements. The explication for this situation is based on the development conditions and, somehow, on the level of environmental taxes which still has a regressive effect.

The option to maintain excise duties for renewable energy at lowest level possible can be pointed out when the price of fuel distributed through gas station had the minimum levels during 1995 and 2008, not only compared to the European Union level, but also to countries like Albania or Montenegro. Even though there was a constant increase in the price of gasoline, nowadays, in Romania, there still is a low price level at petrol and diesel elements. The quotes can be compared to the prices met in Bulgaria and Cyprus.

When the proportion of several types of income in the total environmental taxation is analyzed, a similar evolution with states like Hungary and Czech Republic can be observed. Taking the Eurostat statistic, we observed that the most relevant statistic is the one that shows a predominance of absolute oil revenues (60.3%) and unleaded petrol (34.9%) at the end of 2010. As a matter of fact, basically, Romania does not get any income from coke and coal, meaning that the industry branches which produce these energy sources are still aided by the state.
Actually, if a data analysis of the taxation level and of the income tax profile of environmental taxes is accomplished, particular evolution will be seen. The main explanation of this situation is that environmental tax revenues are at a very small tax level for all energy sources.

On the other hand, other elements have to be analyzed as the impact the pollution is experienced at national level. Romania's policy of charging low fees for gasoline and energy could indicate a low interest regarding the environment protection in the geographical area. Overall, Romania is

a country that still has low emissions of carbon dioxide. The justification is due to the low economic development that Romania suffered in the post-communist period. Despite the fact that Romanian had for a long period of time the lowest fess for environmental taxation and that the capacity to collect this taxes is at a lowest level, it does not have a bad situation when the national carbon dioxide is analyzed. However, the total emissions of greenhouse gases decreased significantly in Romania, mainly due to the de-industrialization process. Nowadays, a decrease of using synthetic fertilizers is observed, while the total surface grown has decreased sharply. The only significant source of emissions growth was the energy consumption and the increasing in the percentage of the population that is connected to household waste recycling systems.

Romania did not have to strive in order to meet the criteria set by the Kyoto Protocol. This is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) that set binding obligations on the industrialised countries to reduce their emissions of greenhouse gases. The criteria were to reduce by 8% the emissions of greenhouse gases by 2008-2012 compared to 1990. By the end of 2010, the reduction was higher than 46%.

Through Emergency Ordinance no. 196 / 2005, the Environmental Fund Administration was established as an instrument for financial and economic support for the implementation of projects that are directed through environment protection. The organism failed to become the instrument by which Romania should be able to fulfill its obligation regarding the amount of 1 milliard euro obtained by structural funds project, as the organism has revenues 40 % lower than it should had. If Eurostat data are analyzed, we observe that between 2001 and 2007, there was a decline of total charges for pollution and use of resources. It is important to say that in 2007 Romania collected a total of 16 million euros regarding these taxes, being ranked on 21 from 27 in the EU. The problem that can explain such low revenues is that only 4 from 15 categories (pollution tax - or first registration tax, fees for pollutant emissions, atmosphere packaging fees and tires fees) brought significant revenues to the Environmental Fund.

Despite this limited revenue collection, the revenues collected from the Environment Fund have increased sharply between 2005 (119 million lei) and 2009 (1.785 million lei). The reason is that the pollution tax revenue was transferred to the Environmental Fund. The influence of the

economic crisis was also observed in Romania as pollution tax earnings had an amount of 800 million lei in 2009. Nonetheless, in 2009, an amount of 190 million lei was set for the "scrappage program". The measure was taken for supporting the automotive industry, even if it is not considered a classical type of environmental protection measures.

When the evolution of Environmental Fund revenues is pointed out, we are able to notice that 1.644,15 million lei in 2009 and 1.658,50 million lei in 2010 were obtained due to the car pollution tax that is applied starting 2008 due to Emergency Ordinance no. 50/2008. The contribution of 3% from ferrous and nonferrous scrap metal and goods for breaking sale revenues increased from 39,59 million lei in 2005 to 58,2 million lei in 2010. The fees for emissions of pollutants into the atmosphere, collected from businesses raised from 13 million lei in 2005 to 33.95 million lei in 2010.

A tax on bags that are made from plastic was also imposed, the total revenues being increased from 4 million lei in 2009 to 19 million lei in 2010. Moreover, a rate of 2% of dangerous chemicals sold by producers and importers is used. It suffered a decreased from 8 million lei in 2005 to 3 million lei in 2010. Regarding the estimations made by European Union, it is concluded that in Romanian transportation taxes are very regressive as the persons with low income pay higher taxes that persons with high income when environmental taxation is taken into consideration. It is a fact the implementation of constant taxes quotes at European level would generally have a neutral impact. Exceptions from this situation are contries like United Kingdom, Ireland, Romania and Hungary, where a low regressivity can be still observed. It is considered however, that United Kingdom and Ireland would suffer such an evolution if a general taxation rate is imposed at the household and the companies level. By applying a general taxation rate at the Union level, no matter of the good taxed, in Romania, Hungary and Italy the regression could not be omitted.

If the transportation taxes are subtracted, the environmental taxes would have a regressive effect among all the Europeans countries. Consequently, the progressive system from a country would become a regressive one, while countries with regressive system would achieve a more regressive system regarding taxation.

Conclusions

The purpose of this article was to point out how the environmental taxation affects the households and, moreover, what is its impact on the revenue obtained by them.It is generally known that the environmental taxation has a regressivity impact, mainly because households with small revenues pay high amount of environmental taxes than households with high revenues. In the development countries, the transportation taxation is progressive and it compensates the regressivity of other types of environmental taxation. The article points out that Nordic countries are looking for a progressive taxation when transportation sector is analyzed. Moreover, the environmental taxes could be progressive if considering other elements and not the annual real income. The explication is that even though the environmental taxation can be regressive when the annual income is the reference, it would be progressive when the lifetime revenues are considered.

Regarding the fiscal elements that can be used in order to reduce the regressivity of environmental taxes, the government can reduce the social contributions, measure that is going to increase the total number of employees and the real income gained by a person. When the regressivity is analyzed in Romania, our findings show that there is a high level of regressivity at almost any level of environmental taxation. We observed that Romania has increased the revenues collected from environmental taxes, but it is still under the European Union level. If the European Statistics are analyzed, than Romania would have a regressivity taxation if different taxation quotes are imposed, and a more regressive taxation level if a unique quotes is introduced at European level. Moreover, the study points out that the existence of transportation fees is essential, as their exclusion would have severe impacts on the economies. Furthermore, the economies that have a progressive environmental taxation would become economies with regressive taxation, while economies with regressive taxation would became economies with a more regressive environmental taxation.

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THE BIOLOGIZATION OF FERTILIZER SYSTEMS IS THE WAY OF DEVELOPMENT OF SUSTAINABLE AGRICULTURE

Alexander Esaulko, Lyudmila Gorbatko[1]

Abstract

This article gives the results of long-term researches in the long-term station included in the state register of the Russian Geographical network of experiences with fertilizers and other agrochemical means. On the basis of the received results the agronomical, economic and power assessment of efficiency of three of fertilizer systems is given:

- the recommended fertilizer system with a saturation of a crop rotation of NPK of 115 kg/hectares, including $N_{50}K_{58,75}K_{6,25}$ at NPK ratio = 1:1,18:0,13+5 t/hectares of manure.

- the biologized fertilizer system - focused on the maximum use of organic fertilizers with a saturation of a crop rotation of NPK-of 62,5 kg/hectares, also N 42,5 P20K0, at N:P:K ratio = 1:0,47:0+8,2 t/hectares of organic fertilizers, including 5 t/hectares of litter manure

- the rated fertilizer system is planned for obtaining the greatest possible productivity of crops.

We counted production efficiency of crops in a crop rotation depending on postaction of applied fertilizer system. We received conclusions on optimization of fertilizer systems.

Key words: *economic assessment of fertilizer systems, biologized fertilizer system, bioenergetic assessment of crop rotations.*

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Introduction

Need of development of an innovative component of agriculture of Stavropol Territory in the conditions of strengthening of the competition is an important condition of sustainable agriculture. «The sustainable agriculture» in many publications is considered as «alternative agriculture», being characterized by transition from technogenic industrial system of agriculture to ecologically steady system with the minimum use of non-renewable energy resources in which utility of an agrolandscape for a long time remains, low-cost technologies, «ecological agriculture», «biological agriculture», «dynamically adaptive» and «ecologically balanced agriculture» are applied.

For consideration of various systems of the fertilizers corresponding to certain formations of society it is necessary to stop on characteristics of agricultural systems of Europe and Russia. Manuring of soils and entering into it various production waste for increase of a crop of cultivated cultures is used by mankind throughout thousand years. For 2 thousand years B.C. manure were applied in Egypt, Greece and China. Romans knew about positive influence of plaster, marl and green fertilizer on fertility of soils; however a meaning of these receptions remained the unknown.

In 1656 German chemist I.Glauber showed in the experiences the influence of saltpeter on increase of a crop of plants. A little later (1795) Dendonald noticed a role of phosphates and that found confirmation in Saussure's experiences (1804) (2). At the end of the XVIII century in Western Europe radical turn in reassessment of a role of organic and mineral fertilizers in a feeding of plants occurred after Shpringel, Libikh, Vigman, Polstrof, Salm Gorstmar's works. In Russia systematic scientific researches in the field of plant feeding and application of fertilizer systems begin from 60-70th years of the XIX century. Especially A.N. Engelgardt, D.I.Mendeleyev, P.A.Kostychev, K.A.Timiryazev's works had great value.

Russian chemist D.I.Mendeleyev made the first field experiments on studying of efficiency of fertilizers in various regions of the country, i.e. he laid the foundation for the Geographical network of field experiments for clarification of regularities in operation fertilizers on soil and climatic zones. In the majority of civilized countries mineral fertilizers prevail in applied systems of fertilizers. Organic fertilizers can't be considered as

alternative to the mineral. But at the end of the twentieth century the tendency to an agriculture biologization was outlined. Biologization of fertilizer systems in Russia has a long history. The first ideas of a scientific biologization can be found in A.T.Bolotov's works. Questions of the biologization receive further development in I.M. Komov's works who developed more perfect fruit seeding crop rotations. Most fully ideas of fodder grass cultivation as one of the main means of the biologization of agriculture, were developed in A.V. Sovetov's works. A considerable contribution to the biologization of fertilizer systems was brought by A.N. Engelgard, P.A.Kostychev, V. V. Dokuchayev, I.A.Stebut. Big achievement in the biologization of fertilizer systems was creation by V. R. Williams of the doctrine about fodder grass cultivation system of agriculture. The significant contribution to biological bases of maintaining an arable farming in Russia was brought by D. N. Pryanishnikov - on use of green fertilizer. (2)

Productivity of crops in the conditions of purely biological fertilizer system is as a rule lower, than in traditional systems with an intensive use of means of chemization. It is much more long-term to use application of such fertilize systems in which along with use of positive ecological advantages of biological agriculture ecologically safe chemical means will be applied in admissible limits. Biologization of fertilizer systems will allow reducing considerably expenses of resources and energy, reducing product cost, raising indicators of its quality and improving an ecological situation of environment. (1)

Place and conditions of carrying out researches

Our researches were carried out and the economic assessment of fertilizer systems was received in a station of chairs of agrochemistry and the agriculture, located in an agricultural experimental station of Stavropol State Agrarian University, it contains a long experience «Theoretical and technological bases of biogeochemical streams of substances in agrolandscapes», certificated in register of certificates of long experiences of Geonet VNIIA of Russian Federation.

Stational relief: a macrorelief - the Stavropol height, a mesorelief - a northern gentle slope with a steepness about 7 degrees, a macrorelief - a flat place. Soil type: a leached few humus hard loamy chernozem. Experience is three-factorial, it is presented by the following factors: a

- fertilizer systems in a crop rotation, B - ways of the main processing of the soil, c - a time factor. Options, with studied according to the scheme of experience by systems of fertilizers, and were imposed on variant with various ways of the main processing of the soil: 1- a mould way (PLN processing - 4-35 in depth of 20-22 cm); 2- a nonmould way (KPG-250 u. 20-22 cm); 3- a rotor way (a processing with a mill «Rotters» in depth of 20-22 cm); 4 - a superficial processing BDT -3 in two traces in depth 10-12 cm. An arrangement of options in repetitions is a systematic following in two circles with the split allotments. Type of crop rotation – graincultivated, with the following alternation of cultures: pea-oat mix (busy steam) - winter wheat; - winter wheat (since 1994 - winter barley), corn for silo, winter wheat, peas, winter wheat, sunflower (since 1994 - an winter rape; since 2000 - a summer rape), will develop in space and time. Total area of an allotment - 108 м: a registrated area - 60 sq.m. The agrochemical characteristic of the soil of the station before the experience (0-20 cm a layer): pH w. - 6,7; Hg - 2.7 mg-eq/100 g. of the soil; S-42,1 mg-eq/100 g of the soil; V- 95%; the movable forms P_2O_5, -24, K_2O - 260 mg/kg of the soil.

In the station there was studied influence of fertilizer systems and ways of processing of the soil in agrochemical properties of the soil and efficiency of crops of a crop rotation during two rotation of a crop rotation (1978-1993). Three fertilizer systems were studied in comparison with control (without fertilizers):

- the recommended one is developed on the basis of short-term experiences of chair of agrochemistry of SSAU and NIU of the territory with a saturation of a crop rotation of 60 kg/hectares of NPK (N 22,5; R 35; K 2,5) in combination 2,5 t/hectares of manure and correlation NPK=1: 1,56:0, 12;

- the balanced one is calculated on sufficient balance of elements of feeding with a double saturation of a crop rotation of 120 kg \hectares of NPK (N 45; R 57; K 17,5 in combination 5 tons of manure and correlation NPK=1: 1,28:0, 39.

- the rated one is calculated on positive balance of nutrients in a crop rotation with a threefold saturation of a crop rotation and achievements of a programmed yield of crops (a pea-oat mix of-300 c/hectares, winter wheat - 50 c/hectares, winter wheat of-40 c/hectares,

corn for silo - 400 c/hectares, winter wheat - 43 c/hectare, peas-30 c/hectare, winter wheat - 50 c/hectare, sunflower - 30 c/hectare)-180 kg/hectares of NPK (N 67,5; R 82,5; K 30) in combination 7,5 t of manure and correlation NPK=1:1,23:0,45. (3)

As fertilizers we applied ammonia saltpeter, urea, the simple powdery and granulated superphosphate, potassium chloride, semi-rerotting manure of cattle. (tab. 1, 2, 3)

Table 1. *Recommended fertilizer system in a crop rotation (1978-1993)*

Alternation of crops of crop rotation	**Types of addition of fertilizers**		
	main	**with cultivation**	**feeding**
1. occupied fallow	manure 20 t/hec +	-	--
2. winter wheat		P_{20}	N_{30}
3. winter wheat	$N_{30}P_{60}$	-	-
4.corn for silo	$N_{30}P_{30}$	P_{20}	
5. winter wheat		P_{20}	N_{30}
6. peas	P_{4O}	-	-
7. winter wheat		P_{20}	N_{30}
8. sunflower	$N_{30}P_{20}K_{20}$	P_{20}	-

Source: *Own research.*

Table 2. *Balanced fertilizer system in a crop rotation (1978-1993 years)*

Alternation of crops of crop rotation	**Types of addition of fertilizers**		
	main	**with cultivation**	**feeding**
1. occupied fallow	manure 40 t/hec +	P_{20}	--
2. winter wheat	$N_{30}P_{20}$	P_{20}	N_{30}
3. winter wheat	$N_{30}P_{40}K_{40}$	P_{20}	N_{30}
4.corn for silo	$N_{60}P_{50}K_{30}$	P_{20}	
5. winter wheat	$N_{30}P_{40}$	P_{20}	N_{30}
6. peas	$P_{30}K_{30}$	P_{20}	
7. winter wheat	$N_{30}P_{20}$	P_{20}	N_{30}
8. sunflower	$N_{60}P_{50}K_{40}$	P_{20}	

Source: *Own research.*

Table 3. *Rated fertilizer system in a crop rotation (1978-1993 years)*

Alternation of crops of crop rotation	Types of addition of fertilizers		
	main	with cultivation	feeding
1. occupied fallow	manure 60 t/hec + P_{100}	P_{20}	--
2. winter wheat	$N_{30}P_{40}$	P_{20}	N_{30+} N_{30}
3. winter wheat	$N_{30}P_{70}K_{60}$	P_{20}	N_{30+} N_{30}
4.corn for silo	$N_{90}P_{70}K_{60}$	P_{20}	
5. winter wheat	$N_{30}P_{40}$	P_{20}	N_{30+} N_{30}
6. pea	$P_{100}K_{60}$	P_{20}	
7. winter wheat	$N_{30}P_{40}$	P_{20}	N_{30+} N_{30}
8. sunflower	$N_{90}P_{40}K_{40}$	P_{20}	

Source: *Own research.*

Modifications in the station

The station had a reconstruction for the crop of 1994 - there was made a leveling crops of summer barley. During the period from 1995 to 1999 in the station in comparison with control without fertilizers studied influence of postaction of fertilizer systems on agrochemical characteristics of leached chernozem and productivity of agricultural crops. For two rotation of a crop rotation, according to studied fertilizer systems, it was brought: N_{360} $P_{560}K_{40}$+40 t/hec; N_{720} $P_{920}K_{280}$+80 t/hec; N_{1080} $P_{1320}K_{480}$+120 t/hectares. In our opinion, it is quite enough for creation of the soil with new agrochemical characteristics and productive capacity.

Postaction of fertilizer systems was studied in context of mould, nonmould, rotor ways and superficial processing of the soil. Iterative winter wheat in a crop rotation was replaced with winter barley, sunflower - on a winter rape. The link with commercial crops received flexibility. In experiences used the zoned grades of crops. Since 1999 started optimization of fertilizer system in crop rotation on the basis of the data received in the station for 1978 -1998.

At control preservation (without fertilizers) the following systems of fertilizers were studied: the **recommended** system of fertilizers – it was synthesized on the basis of the materials received in a considered

station with a saturation of a crop rotation of NPK of 115 kg/hectares, including $N_{50}K_{58,75}K_{6,25}$ at NPK ratio = 1:1,18:0,13+5 t/hectares of manure; the **biological** fertilizer system – it is focused on the maximum usage of organic fertilizers with a saturation of a crop rotation of NPK-of 62,5 kg/hectares, $N_{42,5}P_{20}K_0$ at NP:K ratio = 1:0,47:0+8,2 t/hectares of organic fertilizers, including 5 t/hectares of litter manure; the **rated** fertilizer system – it is planned for obtaining the greatest possible productivity of crops. Norms, ratios and doses of mineral fertilizers were established by results of the current analyses and vegetative diagnostics according to level of programmed productivity and annually specified.

The average saturation of 1 hectare in carrying out researching (2000-2004) made - 167 kg/hectares of NPK, including $N_{80}P_{78}K_9$, at a ratio of N:P:K=1:0,98:0,12+5 of t/hectare of manure (tab. 4, 5, 6).

Table 4. *Rated fertilizers system in a crop rotation (2000-2004)*

Alternation of crops of crop rotation	**Types of addition of fertilizers**		
	main	**with cultivation**	**feeding**
1. occupied fallow	manure 20 t/hec + P_{80}	nitragin+$N_{10}P_{10}$	--
2. winter wheat	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
3. winter barley	$N_{30}P_{60}K_{30}$	$N_{10}P_{10}$	N_{30}
4. corn for silo	$N_{30}P_{30}$	$N_{10}P_{10}$	
5. winter wheat	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
6. peas	P_{3O}	nitragin+$N_{10}P_{10}$	
7. winter wheat	$N_{30}P_{30}$	$N_{10}P_{10}$	N_{30}
8. spring rape	$N_{30}P_{40}K_{20}$	$N_{10}P_{10}$	

Source: *Own research.*

Table 5. *Biologized fertilizer system in crop rotation (2000-2004)*

Alternation of crops of crop rotation	Types of addition of fertilizers		
	main	**with cultivation**	**feeding**
1. occupied fallow	manure 20 t/hec + straw 2,0+P_{80}	nitragin+$N_{10}P_{10}$	-
2. winter wheat	-	$N_{10}P_{10}$	N_{30}
3. winter barley	straw5,4т\га+N_{40}	$N_{10}P_{10}$	N_{30}
4.corn for silo	manure 20т\га straw4,5т\га	$N_{10}P_{10}$	
5. winter wheat	-	$N_{10}P_{10}$	N_{30}
6. peas	straw4,7т\га+N_{40}	nitragin+$N_{10}P_{10}$	
7. winter wheat	straw2,4т\га+N_{20}	$N_{10}P_{10}$	N_{30}
8. spring rape	straw5,3т\га+N_{40}	$N_{10}P_{10}$	

Source: *Own research.*

Table 6. *Rated fertilizers system in crop rotation (2000-2004)*

Alternation of crops of crop rotation	Types of addition of fertilizers		
	main	**with cultivation**	**feeding**
1. occupied fallow	manure 20 т/га + $N_{44}P_{46}$	nitragin+$N_{10}P_{10}$	--
2. winter wheat	$N_{82}P_{102}$	$N_{10}P_{10}$	N_{30}
3. winter barley	$N_{78}P_{82}K_{30}$	$N_{10}P_{10}$	N_{30}
4.corn for silo	manure 20 т/га + $N_{44}P_{90}$	$N_{10}P_{10}$	N_{30}
5.winter wheat	$N_{32}P_{56}$	$N_{10}P_{10}$	N_{30}
6. peas	$N_{22}P_{52}K_{22}$	nitragin+$N_{10}P_{10}$	
7. winter wheat	$N_{58}P_{68}$	$N_{10}P_{10}$	N_{30}
8. spring rape	$N_{50}P_{45}K_{20}$	$N_{10}P_{10}$	

Source: *Own research.*

Results of research

The system of application of fertilizers in a crop rotation or separate cultures is the integral link of intensive scientific agriculture. Application of systems of fertilizers is directed on receiving big and steady crops with

high quality. As a result of the carried-out long-term researches, statistical processing of the received material in table 7 is given the productivity of cultures of a crop rotation which is expressed in grain units.

Table 7. *Influence of fertilizer systems and ways of processing of the soil on efficiency of a grain cultivation crop rotation*

Fertilizer system, saturation of crop rotation NPK (kg/hec) + manure (t/hec), A	**Type of soil cultivation, B**	**Productivity, c/hec g.u.**				**A, HCP_{05} = 0,83**	**B HCP_{05} = 0,83**
		rotations		**Systems consequences (1994-1999)**	**Modification of fertilizer systems (2000-2004)**		
		1 (1978-1985)	**2 (1986-1993)**				
Control	Mould	35,7	35,4	27,2	32,8	31,18	37,06
	Nonmould	33,4	34,2	26,6	31,7		35,32
	Rotary	34,4	34	26,2	31,2		35,36
	Superficial	31,9	31,5	24,6	28,1		32,77
Recommended 60+2,5(1978-1993) 115+5,0(2000-2004)	Mould	39,2	39	28,7	40,1	34,85	
	Nonmould	36,4	37,7	28	38		
	Rotary	37,4	37,1	27,9	37,4		
	Superficial	34,6	35,1	26,3	34,7		
balanced 120+5 (1978-1993) Biological 62,5+8,2 2000-2004)	Mould	41,1	41,2	31,3	40	36,3	
	Nonmould	38,5	39,6	30,2	37,5		
	Rotary	39,4	39,6	30,1	37,1		
	Superficial	36,1	37,1	27,9	34,1		
Rated 180+7,5 (1978-1993) 167+5,0 (2000-2004)	Mould	42,5	41,1	32,5	45,1	38,18	
	Nonmould	39,7	39,2	31,7	42,7		
	Rotary	40,7	39,3	31,6	42,4		
	Superficial	37,4	36,6	29,1	39,2		
C, HCP05 =0,83		37,4	37,36	28,74	37,01	HCP05=2,70 Sx =4,14	

Source: *Own research.*

Analyzing the data of the table 7 it is possible to draw a conclusion that from the agronomical point of view the best indicators of productivity are noted at application of settlement system of fertilizers. The recommended and biological systems of fertilizers on an exit of grain units authentically don't differ, though is authentic above control.

Besides an agronomical assessment it is necessary to do economic one which criteria are correctness of expenses and advantage of use of recommended receptions, technologies. As a resultant indicators of economic efficiency of the fertilizer systems, studied in the station, we accepted - productivity, cost of gross output, costs of work of 1 hectare and of 1 c. of production, its prime cost, and profit and profitability level.

Calculation of economic efficiency of offered receptions is presented in connection with crop rotation, action, postaction of systems of fertilizers in years developments of economy corresponding to the present stage.

Table 8. *Economic efficiency of production of crops in a crop rotation depending on fertilizer systems (1978-1993)*

Indices	**Saturation of crop rotation with fertilizers**			
	0	**60+2,5**	**120+5,0**	**180+7,5**
Annual productivity 1 hec, c g.u.	35,6	39,1	41,2	41,8
Cost of gross production for 1 hec, ruble.	10680	11730	12360	12540
Expenses of labor for1 hec, hour.	14,8	15,6	15,9	16,4
Expenses of labor for 1 c. g.u., hour.	0,42	0,40	0,39	0,39
Production expenses for 1 hec, ruble.	6568	7493	8305	9003
Profit, ruble.	4112	4237	4055	3537
Prime cost for1 c. g.u., ruble.	185	192	202	215
Level of profitability, %	62,6	56,5	48,8	39,3

Source: *Own research.*

As you may see from the data provided in the table 8, the systems of fertilizers studied in a crop rotation during the period from 1978 to 1993 in comparison with a natural agrochemical background increased mid-

annual efficiency of a crop rotation on 9,8 – 17,4 %. Depending on a saturation of 1 hectare of a crop rotation with mineral fertilizers, on options with applied systems of fertilizers, in comparison with a natural agrochemical background costs of work of 1 hectare - increased by 5,4-10,8 %, production expenses – for 14-37 %. Despite reduction of expenses of labor (5-7 %) for production of 1 c. of grain units with options with applied systems of fertilizers with growth of a saturation of a crop rotation with mineral fertilizers profitability level is lowered for 6,1-23,3 % in comparison with a natural agrochemical background. The given results of the analysis of long postaction of fertilizer systems in a crop rotation can seem insufficiently high if not to pay attention to cost of energy and the industrial means applied in agriculture. The created level, both effective and potential soil fertility during 16-year application of fertilizer systems made positive impact on productivity of crops of a crop rotation (tab. 9).

Table 9. *Economic efficiency of production of crops in a crop rotation depending on postaction of systems of fertilizers (1994-1999)*

Indices	Postaction of NPK (kg/hec) + manure (t/hec)			
	control	$N_{360}P_{560}K_{40}$+ 40	$N_{720}P_{920}K_{280}$+80	$N_{1080}P_{1320}K_{480}$+120
Annual productivity 1 hec, c. g.u.	26,8	28,6	31,0	32,3
Cost of gross production for 1 hec, ruble	8040	8580	9300	9690
Expenses of labor for1 hec, hour	13,8	14,1	14,3	14,5
Expenses of labor for 1 c. g.u., hour	0,52	0,49	0,46	0,45
Production expenses for 1 hec, ruble.	5945	6035	6155	6235
Profit , ruble.	2095	2545	3145	3455
Prime cost for1 c. g.u., ruble.	222	211	199	193
Level of profitability, %	35,2	42,2	51,1	55,4

Source: *Own research.*

Studying of postaction of fertilizer systems was accompanied extremely by adverse weather conditions for growth and development of cultures of a crop rotation, i.e. a low efficiency on a natural agrochemical background testifies

the same. Postaction of fertilizer systems made in these conditions positive impact on the main indicators of economic efficiency. In comparison with control, depending on a crop rotation saturation organic and mineral fertilizers increased: mid-annual efficiency of 1 hectare – for 7-21 %, costs of work of 1 hectare – for 3-5 %, production costs of 1 hectare – for 90-290 rub, profit – for 450-1360 rub. Thanks to received crop increases from postaction of fertilizer systems in comparison with control these elements decreased: costs of work of 1 c. g.u. – for 5-13 %, but level of profitability increased for 7-20,2 %. During the period from 1991 to 2005 in connection with an unstable economic situation in the country, absence or not implementation of federal programs on stimulation of application of fertilizers, disparity of the prices for industrial and agricultural output, cost of mineral fertilizers and other means of chemicalization increased till such sizes that they became not easy accessible for the majority of agricultural enterprises and farms. In such situation the particular interest causes search of less expensive fertilizer systems. The rated system provided the maximum efficiency of a crop rotation after updating of a crop rotation and optimization of fertilizer systems (tab. 10).

Table 10. *Economic efficiency of production of crops in a crop rotation depending on optimization of fertilizer systems (2000-2004)*

Indices	control	recommended	biologized	rated
Annual productivity 1 hec, c. g.u.	32,6	39,8	39,8	44,7
Cost of gross production for 1 hec, ruble	9780	11940	11940	13410
Expenses of labor for1 hec, hour	14,5	15,5	15,1	16,2
Expenses of labor for 1 c. g.u.., hour	0,44	0,39	0,38	0,36
Production expenses for 1 hec, ruble	6200	7754	7251	8477
Profit , ruble.	3580	4186	4465	4933
Prime cost for1 c. g.u., ruble.	190	195	182	190
Level of profitability, %	57,7	54,0	61,6	58,2

Source: *Own research.*

As you may see from the data provided in the table 10, the optimized systems of fertilizers during the period from 2000 to 2004, promoted receiving higher increase of a crop in comparison with previous rotation and a natural agrochemical background that allowed improving practically all main indicators of economic efficiency.

In comparison with control of options with the optimized systems of fertilizers increased: mid-annual efficiency of 1 hectare of a crop rotation increased on 22-38 %; costs of labor of 1 hectare – on 5-12 %; production costs – on 1051-2277 rub; profit –on 606-1353 rub. Thanks to the received increase of the crop, the optimized fertilizer systems in comparison with a natural agrochemical background reduced costs of work of 1 c. g.u. – on 11-18 % that is quite essential.

The biologized system of fertilizers was less expensive in comparison with recommended and rated systems, only this system reduced prime cost of 1 c. of grain units on 8 rubles and provided a maximum level of profitability - 61,6 %. Influence of the recommended fertilizer system on prime cost of 1 c. g.u. and level of profitability is adequate to control without fertilizers.

Now the prices for agricultural production and current assets of production constantly change. The distortions allowed at formation of purchase prices of agricultural production on the one hand, and an unreasonable rise in prices for the industrial goods, even in comparison with world, on the other hand, doesn't allow estimating economic efficiency of production of crops in a crop rotation.

In this regard, it is difficult to valuate efficiency of application of fertilizers in ruble in Russia, because of instability of the prices for energy carriers and high level of disparity of the prices for agricultural and industrial output. The energetic method gives much more objective assessment.

We note that economic and energetic indicators in connection with ways of the main processing are easily comparable (tab. 11, 12, 13)

Table 11. *The energetic assessment of production of crops in a crop rotation depending on fertilizer systems (1978-1993)*

Indices	Saturation of NPK (kg/hec) + manure (t/hec)			
	Control	60+2,5	120+5,0	180+7,5
Cost of energy, th. MJ/hec	32,66	36,19	39,69	43,18
Energy, collected by the yield, th. MJ/hec	58,99	64,79	68,27	69,26
Pure energetic profit, th. MJ/hec	26,33	28,6	28,58	26,08
Coefficient of energetic efficiency	1,81	1,79	1,72	1,6
Energetic prime cost, MJ/hec	917	925	963	1033

Source: *Own research.*

Maximum energy-conversion efficiency from application of separate types of mineral fertilizers for the majority of cultures is observed from potash, then phosphoric and minimum from nitric fertilizers. However in scale of increasing of crops of all cultures the specified types of fertilizers settle down in an opposite order that is caused by many times over big costs of energy of production nitric, than phosphoric and potash fertilizers. Fertilizers settle down in the following order of a cost assessment: phosphoric, nitric, potash.

In calculations we recognize that on implementation of technological process mineral and organic fertilizers counting on 1 kg of active ingredient are estimated by the following quantity of energy expressed in MJ: nitric – 86,6, phosphoric – 12,6, potash – 4,4, complex – 51,5, manure – 0,42, straw – 0,2. The maintenance of the general energy (MJ) in 1 kg of a crop of cultures grown up in a crop rotation is characterized by the following indicators: winter wheat (grain) – 16,45; winter barley (grain) – 15,8; sunflower (seeds) – 17,83; rape (seeds) – 15,45; peas (grain) – 000; corn for silo – 000; peas + oats – 000.

The analysis of the data is provided in the table 11, it shows that on studied options of systems of fertilizers during two rotation of a crop rotation the main indicators of power efficiency are lowered. Depending on crop rotation saturation organic and mineral fertilizers, in comparison with control, increased: costs of energy – on 11-33 %; the energy which has been saved up by yield – on 10-18 %; energetic prime cost – on 1-13

%, and the factor of energetic efficiency decreased on 1-11 %. Taking into account action and postaction of fertilizer systems energetic efficiency and an orientation of processes essentially change above the stated representations (tab. 12).

Table 12. *The energetic assessment of production of crops in a crop rotation depending on postaction of fertilizer systems (1994-1999)*

Indices	Postaction of NPK (kg/hec) + manure (t/hec)			
	0	$N_{360}P_{560}K_{40}$ +40	$N_{720}P_{920}K_{280}$ +80	$N_{1080}P_{1320}K_{480}$ +120
Cost of energy, th. MJ/hec	28,64	29,24	30,27	30,76
Energy, collected by the yield, th. MJ/hec	45,07	47,56	51,86	53,85
Pure energetic profit, th. MJ/hec	16,43	18,32	21,59	23,09
Coefficient of energetic efficiency	1,57	1,63	1,71	1,75
Energetic prime cost, MJ/hec	1053	1019	967	946

Source: *Own research.*

The calculations given in the table 12, show that system of fertilizers in postaction made positive impact on indicators of energetic efficiency. In direct proportion to saturation with mineral fertilizers developed during two rotation, in comparison with a natural agrochemical background increased: costs of energy – on 2-8 %; the energy which has been saved up by yield – on 6-20 %; pure energetic profit – on 12-41 %; factor of energetic efficiency – on 4-12 %, and energetic prime cost concerning control decreased on 34-107 MJ/hectares.

Modification of a crop rotation and systems of fertilizers promoted that the recommended, biologized and rated systems improved indicators of energetic production efficiency of crops (tab. 13). In spite of the fact that in comparison with control, fertilizer systems increased costs of energy on 20-33 %, thanks to the additional energy which has been saved up by yield (22-38 %) on the fertilized options increased: pure energetic profit – on 22-44 %; and energetic prime cost, except the recommended system, decreased on 23-33 MJ/hectare.

Table 13. *The energetic assessment of production of crops in a crop rotation depending on optimization of fertilizer systems (2000-2004)*

Indices	control	recommended	biological	rated
Cost of energy, th. MJ/hec	31,45	38,58	37,5	41,66
Energy, collected by the yield, th. MJ/hec	54,02	65,95	65,95	74,07
Pure energetic profit, th. MJ/hec	22,57	27,37	28,45	32,41
Coefficient of energetic efficiency	1,71	1,71	1,76	1,78
Energetic prime cost, MJ/hec	965	969	942	932

Source: *Own research.*

For the main criterion of energetic assessment of technologies of cultivation and harvesting an indicator of power efficiency is taken as it considers expenses of the energy necessary for production, and energy containing in the final product.

Only the recommended fertilizer system practically provides factor of power efficiency, equally to a natural agrochemical background. Biologized and rated fertilizer systems increase this indicator in comparison with control on 3-4 %. Optimum indicators of energetic efficiency were provided by rated system of fertilizers, but the difference with a little expensive biologized system of fertilizers is insignificant.

Conclusion

It is possible to draw a conclusion that the disparity allowed at formation of purchase prices of agricultural production and the industrial goods, absence of subsidizing didn't allow estimating economic efficiency of production of crops in a crop rotation at previous rotation on the basis of the current prices. Therefore, calculation of the main economic indicators in the prices which have developed now (2000-2004), showed low economic efficiency of application of fertilizer systems in a crop rotation during the period from 1978 to 1993. In comparison with a natural agrochemical background all main indicators were lower: production expenses – on 14-37 %, prime cost of a unit of production – on 7-30 rub, and profitability level - on 6,1-23,3%. Studying postaction of these

systems of fertilizers, for six years (1994-1999), we fixed steady excess of economic indicators of production of crops in comparison with a natural agrochemical background.

Optimization of fertilizer systems in a crop rotation (2000-2004) promoted not only to growth of efficiency of crops, but also even to increase economic efficiency in the conditions of disparity of the prices. On the basis of calculation of the main indicators we came to a conclusion that production can recommend two fertilizer systems – low-expensive biologized and highly productive rated. Biologized system of fertilizers, despite smaller efficiency of 1 hectare (39,8 c. g.u.) due to minimization of expenses in comparison with other systems, concerning control, reduces prime cost of 1 c. g.u. - on 8 rub., also increases profit and profitability level – on 24,7 % and 3,9 %. Rated system according to obtaining the maximum efficiency (44,7 c/hectares g.u.) provides significant increase in production expenses in comparison with control (17 %), but thanks to efficiency growth (on 37 %) essentially increases profit (respectively on 38 %).

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TIMELINESS, QUALITY AND EFFICIENCY ARE THE PASSPORT TO SUCCESS OF SMALL AVIATION

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Abstract

The article presents the results of ground-based and aircraft spraying use at a struggle with pests, diseases and weeds in crops of winter wheat. It is established, that the use of the method aviation - aircraft SP-34 with certified equipment AMO-3 as a whole allows to achieve high efficiency of pesticides use along with reducing costs for their use. The aim of research was to study how ultralow-volume type of pesticides spraying influences the efficiency of protective measures against pests, diseases and weeds in crops of winter wheat through air method - plane - SP-34 with the use of certified equipment AMO-3.

Key words: *pesticides, aviation, ultralow-volume spraying, diseases, pests, weeds, thickness of the covering, efficiency.*

Introduction

Phytosanitary situation on the fields of the region in the last decade has undergone considerable changes and is being in constant evolution. It happens as a result of both fluctuations in the weather and human activities. In modern conditions any agricultural enterprise can not count on stable progress, if you do not provide reliable and effective protection of cultivated cultures. Providing reliable protection for plants should be based on a reasonable strategy, and ability to influence the agrocoenosis through ways that are safe for people, nature while reducing energy and money.

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The use of chemical means of protection for plants to fight against harmful objects in the cultivation of many crops remains cost-effective reception in agricultural production. Often the loss of crops because of pests, diseases and weeds nullify investments and efforts made to increase profits. For example, in the use of mineral fertilizers weeds can be a significant part of the nutrients that are intended for cultural plants, apart from massive infestation of pests or epiphytatuve development of the disease.

Along with other technologies and techniques used in agricultural production, chemical protection of plants is constantly being improved. The assortment of pesticides is being updated and expanded, formulations are being improved, as well as technology of the drugs use progresses and expenditure rate on modern highly effective preparations decrease, especially those of systemic action.

At present in the country and in the world the use of aviation for the protection of plants is one of the essential elements of agriculture. This is due to the high productivity of aviation-chemical works (SG&A), their independence from the soil conditions and phases of plant development at the time of processing, decrease in expenses and labour costs and a number of other factors.

Out of new types of certified aircraft for SG&A one can identify SP-34, with the use of certified equipment AMO-3 (certificate of conformity №2021080588 from 27.06.2008) «Aviatiku-May-890SH» of super-light weight category (the payload of up to 100 kg) and «average» An-ZT (up to 1700 kg). Although the technology of protective aerial treatment processing is similar in many ways to the ground, the safety and efficiency of aviation drugs use of significantly depends on strict compliance with the chemical control regulations and these regulations are to a large extent are determined by the type of Armed Forces and type of special equipment. It is very important for emergency treatment against pests and diseases, as well as in the use of herbicides on large areas in a certain phase of crop development and weeds increase the productivity of outfits. For this purpose the rate of fluid flow reduces without a loss of their use efficiency. To provide proper coverage of the workpiece surface, spraying devices of atomizers are being improved, which are able to divide spray material to many small drops of certain diameter, namely, to improve the quality of spray.

Small-drop ultralow-volume spraying may be referred to such technologies , the use of which increases the productivity of processing twofold and significantly reduces their cost due to the reduction of gas stations and delivery of a less quantity of water. With that the following questions arise: whether the effectiveness of the pesticides used in small portions of the working fluid consumption is reduced; whether the danger of sweep and evaporation of a product increases because of the high dispersability of diffusion.

According to GOST 21507-81 (plant Protection: terms and definitions) spraying by pesticides is subdivided into:

1) Big-drop - spraying, in which not less than 80% of the liquid shall be sprayed in the form of drops, with the size of not less than 150 microns.

2) Small-drop - spraying, in which not less than 80% of the liquid shall be sprayed in the form of drops with the size of 50-150 microns

3) Ultralow-volume – small-drop spraying of work surface with the expenditure rate up to 5 l/ha.

4) Highly dispersive (aerosol) - spraying by dissemination of drops with the size of up to 50 microns.

Aviation way of the pesticides use provides in the first place the efficiency of treatments in the vast areas, as well as the processing of tall-stalked crops and those ones of the solid sowing without technological groove. It enables the processing of the field at any condition of the soil and ground features. That will allow for a short period of time to process a large area of land and does not give an opportunity to do harm to pests and disease, but with the use of herbicides it will allow to manage processing in a certain phase of crop and weeds development. For example, processing of grain crops during a phase of milky, milky-wax ripeness against the bug, grain beetles, aphids, thrips are possible only through aviation way, without speaking of sunflower desiccation.

Processing by machinery of vast areas of sunflower seeds from such a dangerous pest as a beet worm, peas from pea grains, is difficult as the plants in this period already have a great height, and in these cases, greater efficiency is necessary.

Compared to the above-ground way of chemical treatments the use of aviation has a number of advantages: high performance (in 6-15 times

higher than above ground vehicles), which allows to perform the work in a short time; economy of labour and material resources (within season one plane releases work of 14-20 workers and 7-10 tractor units), the lack of adverse effects on soil and mechanical damage of plants (with the processing of ground-based machines 6-8% of the sown area is derived from the turnover for the account of the technological track); the ability to perform work in any condition of soil, saving of energy (18-20% less per unit area, in comparison with ground-based equipment).

To compete on today's market agricultural enterprises for reducing the expenses on fuel and oil transfer to the system of minimum soil treatment, which, as experience indicates, leads to the growth of weed of crops, intensive development of diseases and pests reproduction. Such systems require increasing volumes of protective measures.

Lack of financial resources does not allow agricultural producers to adopt traditional technical means and protection technologies of plants in full force due to which new energy - and resource-saving, quite simple and productive technology is required, that is based on the use of inexpensive and comfortable in exploitation of technical facilities. To these requirements adequately corresponds a technology based on the use of ultra-light airplanes with the equipment of small-drop ultralow-volume spraying which allows to process crops with the norms of spray material of 3-10 litres per hectare. That is in 20-40 times less than by machinery.

Ultralight aircraft are practically not inferior in their productivity to large agricultural aircraft and far surpass ground-based complexes. Despite the small amount of chemical tank (100-150 l), at the expense of the equipment ultralow-volume spraying, within one flight they process approximately the same number of hectares as aircraft AN-2 do. Otherwise, performing SG&A ultralight aircraft have an advantage.

Firstly, the process is becoming cheaper through saving fuel and less extravagant maintenance. Secondly, they have more acceptable flight and technical characteristics for the aviation-chemical works: good flexibility; small speed in driving; shortened distance for a take-off or landing, that allows to refuel an aircraft in the immediate proximity to a cultivated field.

Thirdly, the organization of works of ultralight aircraft for the customer is much more convenient – there is no need to bring up a lot of water, it is easier to refuel by a personnel, there is no need to choose a special area for the organization of agricultural airfield. So the use of ultra-light airplanes encourages cost cutting on protective measures, increasing their payback. Abroad ultralight planes are widely used in ultralow-volume spraying of the major agricultural crops.

In recent years a lot of illegal entrepreneurs appeared which offer services for implementation of the SG&A ultralight aircraft (SLA), which apply non-certified spraying equipment, without satisfying technological requirements. They fly without air navigation support. They do not carry out proper training of flight and technical personnel. All this leads to the inefficient use of expensive drugs. That is why some agricultural producers doubt in the effectiveness of the pesticides use with the help of super-light aviation. To make the effectiveness of the SG&A at a high level of processing should be carried out by professionally trained pilots and technicians, who use tested aviation equipment and technologically new spraying equipment.

It is very important to increase the productivity of outfits on emergency treatment with pests and diseases, as well as on herbicides use in large areas in a certain phase of crop and weeds development. For this purpose expenditure rate of working material without a loss of their use efficiency reduces. To ensure proper coverage of the workpiece surface, spraying devices of atomizers are being improved which are able to divide working material to many small drops of certain diameter, that is to say they improve the quality of a spray.

Ultralow-capacity spraying

To such technologies small-drop ultralow-volume spraying is referred, the use of which increases the productivity of processes twofold and significantly reduces the cost of them due to the reduction of gas stations and delivery of a smaller quantity of water.

Drops of a smaller diameter are formed at small-drop ultralow-volume spraying. Tiny drops are more effective, because they better penetrate the cuticle and large drops, for example, with a diameter of 400 microns, contain more active substance in 3-4 times than it is necessary. When a large drop split into drops with a diameter of less than in 10 times the

number of active points on the treated surface increases in 1000 times. Therefore, at a considerable reduction in consumption of the staff, the effectiveness of the treatments is not only non-decreasing, but increasing. For example, insecticides in small drops are significantly toxic than in large and at high temperatures and solar activity synthetic pyrethroids and systemic herbicides are toxic regardless of the number of working.

At ultralow-volume spraying due to the higher concentration of the drug in the composition, the demolition of small drops is not more than at conventional spraying. There is a common misthought that if at a strong wind one transfers to a larger expenditure rate of liquid the demolition and losses decrease. In fact, at high norms of distribution drops of small fraction are formed (less than 50 microns), which are subjected to demolition and evaporation.

A small-drop method of spraying is generally accepted method of pesticides use, that is confirmed by numerous literary data. Low-capacity and ultralow-volume spraying is based on the principles of higher and more equal split of the liquid. Fine and homogeneous drops allow you to get the best coverage of the treated surface. If drops differ from each other in diameter twofold, their amounts differ already in 8 times and at the difference in diameter in 4 times they differ already in 64 times, as the ratio of the drops size is proportional to their diameters in the third degree.

To increase productivity, speed up the realization and reduce the cost of pesticides processing, without decreasing the effectiveness of the drugs use it is important to improve spraying of agricultural crops. The quality of agricultural crops processing by chemical means of plant protection depends on the equality of the functional substance distribution of pesticide on a protected object. A lifespan of a drop of the staff, i.e. from the outlet from the diffuser sprayer to the protected plants should be as small as it is possible, as this depends on the quantity of the active substance that falls on protected plants and, ultimately, the biological effectiveness of the applied pesticides. In the opposite case, i.e., the longer a drop of the staff «lives» from the outlet from the diffuser to the harmful organism, the greater water evaporation from this drop is, especially in the dry hot weather, so it becomes smaller. The speed of its suppression decreases and such small droplets are demolished by air.

The functional substance does not fall on protected plant. An underrated dosage of the drug on the protected plant leads to a sharp decrease of the technical effectiveness of chemical means. Such a use leads to an accelerated formation of stable populations of harmful organisms.

Characteristic of equipment for ultralow-capacity spraying

We have carried out calculations confirming the mechanism of herbicide action for different methods and types of spraying. In studies we used equipment for ultralow-volume spraying AMO-3, Sch.№102 (air sprayer, technical means for spraying of liquid substances, certificate of conformity №2021080588 from 27.06.2008), installed on a plane SP-34 and field sprayer AMAZON working with a working pole Super - L.

Table 1. *Technical characteristics of equipment for low-volume spraying AMO-3*

Tank capacity for chemicals, l	150.0
Pumping unit (pump)	Centrifugal pump with electromotor NC-300
Power of pump electromotor, w	50.0
Operating pressure in spraying boom, кgf/cm^2	0.9
Productivity, ha/h	100 – 120
Atomizers:	
Types of atomizers	VRG
Number of atomizers	4
Number of disks in atomizer	10
Calculate norm of liquid working medium expenditure, l/ha	1.0-10.0
Mass of atomizer, кg	21.0

Source: *Own research.*

Table 2. *Technical characteristics of equipment for low-capacity above-ground boom spraying Super L*

Model	UX 4200
Coverage, m	15-36
Filling, l	4450
Working speed, км/h	6-12
Productivity, ha/h	to 43
Discharge at work with pesticides, l/ha	99-400
Discharge at GKU application, l/ha	200-1060
Required power, hp	100-120
Spraying height, m	0.5-2.50
Weight, кg	3566

Source: *Own research.*

Thickness of drops coverage at expenditure of working material 50 l/ha (ground equipment) with ultralow-volume spraying - 6 l/ha (aircraft equipment) was calculated (table 3).

Table 3. *Thickness of coverage of working surface*

Name of technical device	**Expenditure rate of working composition l/ha**	**Size of drops, %**			**Coverage thikness, p/cm^2**
		0-50 мкм	**50-150 мкм**	**more 150 мкм**	
AMAZONE boom Super	50	0	23.8	76.2	61.0
SP – 34, AMO – 3	4	0.7	88.3	11.0	121.0
SP – 34, AMO – 3	6	0.6	53.5	45.9	116.4

Source: *Own research.*

Calculations show, that at low-capacity spraying the basic amount of material suited drops with the size of more than 150 micron - 76,2%, at ultralow-volume spraying the main part of droplets respectively were of 50-150 m – 53:5 - 88.3 per cent. As a result of studies it is established, that the most high density of coverage at ultralow-volume spraying - 121,0 p/cm² was observed in the variant with a norm of staff expenditure equal to 4 l/ha.

Efficiency of ground and aviation herbicide processing of winter wheat seeds

Our task was to study how pesticides use by above-ground and aviation technology influences weed vegetation, diseases and pests in crops of winter wheat. Natural-climatic conditions of the Stavropol territory are favorable for cultivation of a number of field crops which need protection against weeds.

The main reasons for high infestation of crops are as natural-biological properties of weed plants (high fertility and vitality, stability of control measures, the ecological plasticity, etc.), so non-observance of crop rotation, terms of soil processing, sowing, care of crops, sowing ill-conditioned seeds, release of weed vegetation seeds with organic fertilizers, irrigation water, etc

Weed vegetation of the Stavropol territory is characterized by a large diversity of species. The experimental studies of different types of spraying with the help of small aviation and above-ground equipment were carried out in the droughty zone of the Stavropol territory in JSC «Belokopanskoe».

The most common in crops of winter wheat were the following weed plants: Chorispora tenella, Descurainia sophia, Capsella bursa - pastoris, Ambrosia artemisifolia.

Sprinkling of sowing was carried out in the phase of bushing of winter wheat by herbicide Granstar Pro. The biological effectiveness of herbicides was determined in two weeks after treatment (table 4).

Table 4. *Efficiency of ground and aircraft processing of winter wheat crops by herbicide Granstar Pro, 2011.*

Variants of experiment	Before processing		After processing		Biological effectiveness, %	
	number, p/m^2	Weight of weed., g/m^2	number, p/m^2	Weight of weed., g/m^2	Destruction of weed veg., %	Decrease of. weight, %
Low-capacity, AMAZONE 50 l/ha	41.0	98.4	8.0	49.0	80.5	50.2
Ultralow-capacity, SP-34 – 4,0 лl/ha	40.0	92.0	6.0	50.2	85.0	45.4
Ultralow-capacity, SP-34 – 6,0 l/ha	43.0	94.6	7.0	44.5	83.7	52.9
Ultralow-capacity, SP-34 – 8,0 l/ha	44.0	96.8	7.0	42.6	84.0	55.9

Source: *Own research.*

As a result of studies it is established that the biological efficiency of herbicides as for surface processing with the norm of staff expenditure of 50 l/ha, so in the aviation processing JV-34 with a norm of staff expenditure of 4.0 and 6.0 and 8.0 l/ha was relatively high and amounted to 83.7 - 85.0%. The mass of weed vegetation with that decreases to 45.4 – 55.9.

Efficiency of ground and aviation herbicide processing with fungicide

The effectiveness of the chemical method of crop protection largely depends on the timely destruction not only of weed vegetation, but also of

pests and diseases. The efficiency of land and air treatment by the fungicide Title is presented in the table 5.

Table 5. *The efficiency of land and air treatment by fungicide Title, 2011.*

Variant of experiment	Septoria spot		Oidium		Leaf rust	
	occurance, %	Degree of development, %	occurance, %	Degree of development, %	occurance, %	Degree of development, %
Low-capacity AMAZONE, 50,0 l/ha	64.0	4.1	54.8	3.0	16.6	1.7
Ultralow-capacity , SP-34 - 4,0 l/ha	62.8	4.0	54.1	2.8	17.4	1.6
Ultralow-capacity , SP-34 - 6,0 l/ha	64.6	4.0	54.0	3.0	16.8	1.6
Ultralow-capacity , SP-34 - 8,0 l/ha	63.8	4.0	55.0	2.6	17.2	1.6

Source: *Own research.*

It is established that the application of the ultralow-capacity spraying by the fungicide Title is not inferior in efficiency to an air method, but even superior to the ground-spraying.

Efficiency of ground and aviation herbicide processing with insecticide

Grain crops are damaged more than 20 types of herbivorous bugs, but the most harmful is a pentatomid bug. Various pests do harm to sowings of winter wheat in conditions of the Stavropol territory. Among them the most common bugs are - harmful bug, wheat trips, grain aphid and others. A pentatomid bug damages winter and spring crops, sowed grasses, wild cereal weeds. Adult bugs winter in beds of forest belts, under-shrub vegetation, but in well-lighted and ventilated soil lots with low humidity.

In the period of wintering a pest withstands temperatures from -5 to -14 ºC. A pentatomid bug damages grain crops beginning from the first days of the flight to the crops and till his departure for winter. Approximate date of pentatomid bugs departure from the places of wintering on crops is observed at daily average temperature of air from+13 to +17 ºC (the second half of April, beginning of May). Egg laying begins in 5-12 days after the flight and intensive nutrition, the period of egg laying lasts 40-50 days. It is the most active at a temperature of +24 +28 ºC.

The main number of bugs after the flight is concentrated in the lower parts of plants on the edges of the fields, which border with forest belts. There are three periods of its harmfulness: first period - the phase of the output of the plants in the handset and ear formation (overwintered bugs do harm); the second period - flowering-the beginning of grain formation (the larvae of younger ages) third stage - the stage of milky ripeness and till the harvest (elder larvae and young bugs). For the first and second periods quantitative diminishing of yield is typical due to damage and total destruction of the main stem.

Damage of the stem during an output phase of the plants stem alongation leads to a drop of yield in 50-54%. Damage of spikes in the period of ear formation leads to belokolositsa, a condition when grain is undersized.

Economic threshold of harmfulness for implementing protective measures is the number of imagoes, 1 copy and larvae of 2-4 per square meter. During studies the biological effectiveness of the insecticide treatment depending on the method of application fluctuated within 83.3 per - 96.5 per cent (table 6).

Small-drop ultralow-capacity spraying by aviation equipment was effective at 11.7 13.2 per cent in comparison with the low-capacity spraying machinery. It can be explained by the fact that insecticides at small-drop spraying cover the insect's body more thoroughly and more toxicant enters the body of an insect, which is explained higher biological effectiveness.

Table 6. *Effectiveness of ground and aircraft processing by insecticide Karate Zeon, 2011.*

Variant of experiment	Number of larvae of 2-3 ages, p/m^2		Biological efficiency, %
	Before processing	After processing	
Low-capacity, AMAZONE 50 l/ha	12	2	83.3
Ultralow-capacity, SP-34 – 4,0 l/ha	14	0.48	96.5
Ultralow-capacity, SP-34 – 6,0 l/ha	13	0.6	95.3
Ultralow-capacity, SP-34 – 8,0 l/ha	16	0.8	95.0

Source: *Own research.*

The main criterion for the effectiveness of the studied agromethod is the level of crop productivity. The results of obtained harvest are presented in table 7.

Table 7. *An average winter wheat harvest depending on the type of spraying by pesticides, JSC «Belokopanskoe», 2011.*

Variant of experiment	Crop yield, c/ha	Harvest raise	
		c/ha	%
Low-capacity, AMAZONE 50 l/ha	30.0	-	-
Ultralow-capacity, SP-34 – 4,0 l/ha	31.3	1.3	4.3
Ultralow-capacity, SP-34 – 6,0 l/ha	31.1	1.1	3.6
Ultralow-capacity, SP-34 – 8,0 l/ha	31.2	1.2	4.0

Source: *Own research.*

Analyzing the results of a record grain harvest of winter wheat depending on the type of spraying we discovered, that in variant with application of aviation equipment SP - 34, at ultralow-capacity spraying (4 - 8 l/ha) harvest increase was 1.1 – 1.3 kg/ha.

Economic efficiency of winter wheat production with aviation and ground equipment

Cultivation of agricultural crops is accompanied by a certain set of technological operations, each of which must be economically justified and profitable. Estimation of the results effectiveness concerning the field experience is the final stage of an experiment.

While studying the elements of winter wheat growing technologies along with the grain productivity such economic indicators are necessary: proceeding in cash from a unit area of crop, labor costs, and profit from 1 ha of sowing and some others.

Economic analysis was conducted for the estimation of economic efficiency of the spraying types in the fight against pests of winter wheat by pesticides (table 8).

Table 8. *Economic efficiency of grain production of winter wheat with the use of aviation and ground equipment for implementing protective measures, 2011.*

Indicater	Variants of experiment			
	AMAZON treatment 50 l/ha	**Airial treatment (4L/rha)**	**Airial treatment (6l/ha)**	**Airial treatment (8 l/ha)**
Crop yield out of 1 ha, c	30.0	31.3	31.1	30.9
Running costs for 1 ha, rub	6755.1	6745.1	6737.2	6752.2
Prime cost 1 c, rub	225.2	215.5	216.6	218.5
Profit from 1 ha, rub	5244.9	5774.9	5702.8	5607.8
Profitability rate, %	77.6	85.6	84.6	83.1

Source: *Own research.*

The calculations showed that the small-drop ultralow-capacity spraying with the use of aviation machinery SP-34 is the most acceptable way of the pesticides use in crops of winter wheat. The profit from 1 hectare was bigger in 362.2-434.3 rubles respectively. In connection with this the level of profitability was slightly higher compared with the above-ground treatment by AMAZONE with a norm of expenditure of the working material 50 l/ha to 4.6 - 5.6%, respectively.

Conclusion

1. A grip of pesticide on the plant depends not only on the morphological peculiarities of vegetative and generative organs of protected plants, but also on the size and number of drops.

2. Evaporation and infiltration of the working material of the pesticide in the fabric of a harmful object in the end affects the biological effectiveness of spraying.

3. The use of aviation has a number of advantages over an above-ground type of chemical treatments: high productivity (in 6-15 times higher than ground vehicles), which allows to do work in a short period of time.

4. Saving labor and material resources (for one season a plane releases work of 14-20 workers and 7-10 tractor units), the absence of adverse effects on soil and mechanical damage of plants (at a treatment by above-ground machines 6-8% of the sown area is derived from the turnover at the expense of the technological track).

5. Possibility of performance of works at any state of the soil; saving of energy (in 18-20% less per unit area in comparison with ground-based equipment); high maneuverability and mobility.

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PHYTOSANITARY MONITORING OF WINTER WHEAT ROOT ROT AS A FACTOR OF PLANT PROTECTION

Anna Shutko[1], *Ludmila Tuturzhans*[2]

Abstract

Found that in the three major agro-climatic zones of the Stavropol Territory complex root rot pathogens is represented mainly by fungi of the genera Fusarium and Bipolaris, and since 2009, and Gibellina cerealis Pass. The affecting root rot and harmfulness of the disease varies, depending on the varieties of winter wheat and soil and climatic conditions of cultivation.

Key words: *winter wheat varieties, root rot, complex pathogens, harmfulness.*

Introduction

The action plan for the implementation of sustainable development, called "Agenda XXI», adopted at the Earth Summit (United Nations Conference on Environment and Development) in Rio de Janeiro in 1992, states: "The main goal of sustainable agriculture and rural areas development is the increase of sustainable food production, as well as improvement of food safety." The strategies of sustainable agriculture and rural areas development (SARD) are working around the three main objectives:

1) food safety - by the means of maintaining an appropriate balance between the sustainable self-reliance and self-sufficiency,

2) the elimination of poverty through employment and income generation in rural areas, and

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3) protection the environment and conservation of natural resources.

There has been a growing problem of sustainability of agriculture development because of the negative effects of human activities, such as the destruction of the soil structure caused by the use of heavy machinery, water and wind erosion, soil salinization, water pollution, accumulation of nitrates and residues of pesticide in food as a result of short-sighted use of chemical fertilizers and pesticides.

Today there is such a situation in the agricultural sector of Russian Federation, in which different farms have different levels of agriculture intensification, including plant protection from saturated multicomponent systems with intensive use of chemical products for plant protection to the extensive, which do not even use seed disinfectants. This leads to the deterioration of phytosanitary conditions of growing crops. For the modern world agricultural system, integrated plant protection is the most appropriate type because when implemented properly it provides reliable protection of crops, including wheat, from diseases. However, it has a high pesticide load that Yu.

Odum (1986) associates with the emergence of a number of environmental problems, including pollution of soil, water and the food itself. Such systematic integrated approach that requires the use of multidisciplinary knowledge in agriculture is as a single and continuous process of creation-destruction of fertility which will help to find the solution.

Stavropol krai, which is located in the center of the Ciscaucasia (between 43 ° 45'-46 ° 15 'north latitude and 40 ° 50'-45 ° 40' eastern longitude), traditionally is among the top three grain-producing regions of Russian Federation. Annual winter wheat and winter barley dropping reach 1.6 million hectares. Root rot is one of the main biotic stress factors that influence the formation of yield and quality characteristics of winter wheat in the krai. Root rot under certain conditions, reduces the yield up to 60%, the quality of grain also gets worse. Modern crop protection is a part of a general technology of production and is focused not only on the destruction of individual pest species, but rather on the overall optimization of the phytosanitary conditions of growing crops. Implementation of such an approach requires obtaining of objective information about

crop growing conditions and intensity of harmful and beneficial organisms development. According to V. I. Tanskiy and etc. (2002), the following aspects of environmental monitoring are developed on the up today level: systems observing harmful and beneficial organisms and the conditions of growing, principles and methods of assessing the degree of harmful and beneficial insects development; principles and methods of determining the damage of plants caused by pests and diseases and crop losses; economic rapids of harmfulness; determination of the amount of the stored yield. The aim of the study was the phytosanitary monitoring of root rot spread and its harmful influence on winter wheat in the agro-climatic zones of Stavropol krai.

Complex of root rot pathogens of wheat in the Central Ciscaucasia

Areas of grain crops, including winter wheat as the leading culture, are concentrated in three agro-climatic zones of Stavropol krai: extremely arid, arid and the zone of unstable humidity. The limiting factor determining the range of pathogens, phytosanitary conditions, growing technologies, including the system of plant protection, is the moisture regime. According to the study results in all the three major agro-climatic zones of Stavropol krai the root rot pathogens complex is represented mainly by fungi of the genera Fusarium and Bipolaris (Table 1).

Table 1. *The root rot pathogens complex of winter wheat, depending on the agro-ecological conditions (Stavropol krai)*

Genus	Frequency of occurrence,%		
	The zone of unstable humidity	Arid zone	Extremely Arid zone
Fusarium	47,5	25,4	11,3
Bipolaris	20,3	30,8	2,0
Ophiobolus	8,0	1,0	0
Cercosporella	3,2	0	0
Pythium	6,7	13,1	0
Alternaria	3,6	2,2	2,0
Pseudomonas	3,4	23,0	0
Others	10,3	7,7	18,6

Source: *Shutko, Shmatko, Pchelintseva 2007; Shutko, Lugovenko 2009.*

Fusarium fungi exuded mainly from the primary roots, secondary roots and tillering node. They are sufficiently competitive with saprophytes, so prevalent on the underground organs, especially on the primary roots that they penetrate into the deeper layers of soil. Bipolaris sorokiniana exuded on the primary, secondary roots and epicotyl.

This pathogen is less competitive to saprophytes, parasitizes 3-6 times more on plant organs, located on the soil-air border (sheath columns, tillering node, a stem base), where soil micro flora competition is weaker. In addition, in this ecological niche due to temperature and humidity drop the tissues get weak, which facilitates infection by the pathogens.

The tserkosporella fungus infects mainly lower internodes and Ophiobolus graminis was found on the secondary roots and tillering nodes. On southern chernozem of the arid zone the manifestation of foot rot, due to the more humid environmental conditions, is equal almost to zero.

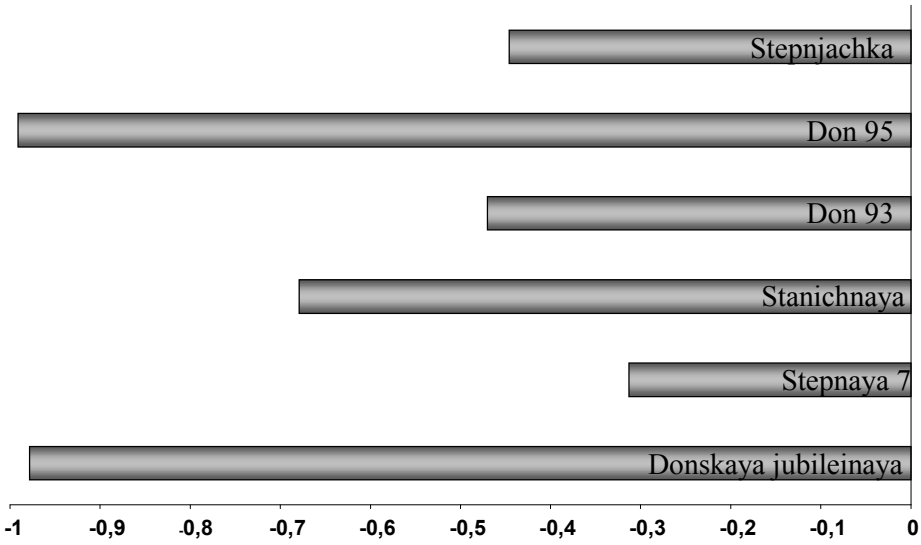
However, during research more moist years than the average ones have led to the appearance of Ophiobolus graminis on winter wheat variety Starshina, Zernogradka 9 and Prikumskaya 115.

In addition besides the major pathogens of root rot of the analyzed samples Pythium, Alternaria, Aspergillus, Penicillium and etc fungi were also found. Enhancement of biological diversity and abundance of saprotrophic microbes -antagonists in soil microbiota determines soil fungistazis and crop infestation with root rot.

It is known from the special literature that some of the Penicillium fungi act as producers of toxic antibiotics, expanding infectious fungus germs until lysis (Belay, 1989).

The correlation coefficient between the frequency of Penicillium and Bipolaris fungi occurrence showed an average feedback (correlation coefficient r=-0,475). Depending on the varieties of winter wheat correlation coefficient ranges from -0.313 to -0.991 (pic. 1).

Picture 1. *The features of correlation between frequency of Penicillium and Bipolaris fungi occurrence, depending on the varieties of winter wheat*



Source: *Shutko, Lugovenko 2009.*

Thus, studies have shown that on light-brown soils, varieties Donskaya Ubileynaya and Don 95 range in aspect of invasion of the root system of plants by fungi Bipolaris at 95,6-98,2%. This invasion is determined by the intensity of fungus Penicillium development; as for Stanichnaya variety, this process takes 46,1%, all the other variants of the experiment take - 9,7-22,0%.

Evaluation of winter wheat according to root rot infestation in specific agro-climatic conditions as part of evidence-based strategies for a variety using

Comparative evaluation of winter wheat according to root rot infestation in different soil and climatic conditions when being cultivated on complete fallow showed that slightly affected by root rot on southern chernozem in the arid zone of Stavropol krai varieties Dey and Batko (degree of the disease development is 3,9 and 9,1% = vs. ERH (economic rapid of harmfulness) 10-15%) show higher susceptibility to the agents of disease on leached chernozem in a pore humidity zone (at 6.0 and 2.1 times, respectively) (Table 2).

Table 2. *Infestation of winter wheat by root rot, depending on the varietal characteristics, soil and climate conditions, the phase of milk-wax ripeness*

Variety	Arid zone		Zone of unstable humidity	
	Occurrence, %	Degree of the disease development , %	Occurrence , %	Degree of the disease development %
Starshina	90,6	19,7	100,0	26,9
Prikumskaya115	94,0	23,1	96,6	14,6
Dey	78,7	3,9	96,4	23,8
Batko	95,1	9,1	96,3	19,9
Rufa	91,4	14,6	87,1	15,6
Zernogradka 9	98,3	18,8	91,2	18,9
Pobeda 50	83,9	22,2	82,8	22,9
Prikumskaya 140	97,7	23,1	100,0	35,9
Prikumskaya 141	100,0	24,2	100,0	19,5
Donskaya bezostaya	98,0	30,2	96,6	16,8

Source: *Shutko, Shmatko, Pchelintseva 2007.*

The features of lignification in plants of different varieties of winter wheat in connection with resistance to root rot

One of the mechanisms of resistance to pathogens is modification of the cell walls of plants by the accumulation and deposition of lignin. Studies have shown that the lignin content in plant tissues of winter wheat varies markedly depending on the varietal characteristics. The number of the developed lignin for each percent of the disease development in winter wheat varieties that are resistant to root rot (the extent of the disease development of which is less than the minimum economic rapid of harmfulness ERH = 10-15%), ranges from 29 to 54 mg / g of dry weight (Table 3). Such varieties as of winter wheat, as Stanichnaya, Rostovchanka 3, Ermak, which intensity of the disease reaches and exceeds the ERH, synthesize less than 27 mg / g of lignin dry weight for each percent of the disease development. This is, apparently, not enough for efficient localization of pathogen mycelium.

Table 3. *The content of lignin in plant tissues of winter wheat depending on the varieties' characteristic features*

Variety	Degree of development, %	Lignin content, мг/г of dry weight	
		At the real level of development	On each 1% of the disease development stage
Erythrospermum variety			
Starshina	4,3	230,91	53,70
Ukrainka Odesskaya	5,1	225,78	44,27
Donskaya Ubileynaya	11,0	263,11	23,92
Stanichnaya	13,8	222,48	16,12
Rostovchanka	14,6	248,27	17,00
Ermak	18,3	299,17	16,35
Lutescense variety			
Don 95	7,4	261,23	35,30
Tanya	7,8	236,50	30,32
Dey	8,7	252,51	29,02
Batko	10,7	290,24	27,13
$НСР_{05}$			6,6
S_x%			2,2

Source: *Shutko, Gavrilov, Perederieva 2011.*

The harmfulness score of root rots on different varieties of winter wheat

It is known that at a relatively low level of infection by phyto pathogens plants increase their respiration rate, increase their metabolic reactions of physiological processes, which ultimately contributes to a certain increase in the productivity of their entire population. Comparative analysis of the yield structure of healthy and ill plants of under study varieties in arid conditions of agro-climatic zone has shown that the most obvious immune response of winter wheat plants to root rot infestation was observed on Donskaya bezostaya (Table 4).

Table 4. *Structure of the yield of healthy and ill winter wheat plants of different varieties*

variety	Infestation of root rot score	Height of plants, sm	Length of an ear, sm	A number of ears in the head, pieces	Amount of grains in the head, pieces.	Weight of grain in the head, gr	Weight of 1000 grains ,gr	Yield , c/ha	average yield c/ha (ac. to the selectors)
Dey	0	85,5	8,4	16,2	34,4	1,23	35,750	56,6	47,4
	0,1	84,0	9,2	16,1	31,9	1,06	33,320		
	1	84,0	8,8	17,0	31,0	1,19	38,390		
	2	-	-	-	-	-	-		
Batko	0	90,51	7,63	16,7	46,5	1,50	32,690	54,9	60,2
	0,1	90,54	7,60	17,0	45,9	1,64	35,590		
	1	83,75	7,41	15,5	42,3	1,48	35,030		
	2	68,87	6,96	12,0	14,8	0,47	31,790		
Donskaya bezostaya	0	93,29	7,45	14,2	32,1	1,13	35,050	50,6	57,6
	0,1	88,96	8,16	14,6	33,9	1,18	34,903		
	1	90,18	8,61	15,3	38,5	1,35	35,190		
	2	77,25	6,80	12,0	34,8	0,63	31,600		

Source: *Shutko, Shmatko, Pchelintseva 2007.*

Calculation of root rot damage coefficients expressing loss of productivity per unit of infestation (score), and the corresponding potential crop losses in specific environmental conditions of the studied varieties showed that grain losses due to root rot disease on southern chernozem in the arid zone of Stavropol Krai of the varieties Dey, Batko and Donskaya bezostaya can be a maximum of 8.0, 1.6 and 4.3%, or based on the average yield according to the selectors of the varieties - 3.8, 0.9 and 2.5 c/ha.

Harmfulness of Gibellina cerealis Pass of winter wheat

In 2009, on the territory of Stavropol krai was revealed a damage of winter wheat dropping caused by white straw disease or Gibellina cerealis Pass. According to the information of Federal State institution branch "Rosselhoztsentr" this disease was found on the territory of Stavropol krai on the area of 113.0 ha (9% of the surveyed area) in 22 districts. In 2011, the disease was found on the area of 1048.0 hectares (62% of the surveyed area) in all 26 districts of the region (http://rsc26.ru/). Gibellina cerealis Pass. is a not well-known pathogen. For the first time the disease was found in Stavropol krai in 1985 on winter wheat of E.I. Monastyrskoy (Kuznetsov, 2010). Diagnosis of this rot is difficult, because the symptoms are very similar to the infestation by the fungi Cercosporella and Rhizoctonia. Research of the symptoms of Gibellina cerealis Pass was conducted in the arid agro-climatic zone of Stavropol krai. So called white straw disease or Gibellina cerealis Pass takes the form of an eyespot with a clearly defined border of coffee color on the stem, mostly above tillering node (Pic. 2).

Picture 2. *Eyespot (Gibellina cerealis Pass.)*

Source: *According to A.O. Shutko and others, 2012.*

Length of the spots is 3-5 mm. The disease affects mainly the leaf sheath, but it can go directly to the stem. By a careful study of the plants one can clearly see the fundamental differences between infestation by Gibellina and the one caused by such pathogens as Cercospora apii and rhizoctonia.

Namely, in a center of the spots if it is Gibellina cerealis Pass there is always a plaque of dark grey color (stroma of the fungus), which looks like charcoal or cigarette ash, and can be seen by the naked eye. The infestation by Gibellina cerealis Pass becomes clearly visible in the tillering stage. One stalk there can be from one to three buds.

There can be infestation of the lower leaves, which can have oval spots 5-7 mm long on the outer side, of sandy-brown color with pale margins. In the center of the black spots one can clearly see a black spew. As the plant grows the spots spread up the stem. In the case of strong development of the pathogen they can completely cover the stem and even merge with each other. The spots form rich spew of mycelium: first white (hence the name of the disease), then while aging - grey (Pic. 3).

Picture 3. *Mycelium of Gibellina cerealis fungus*

Source: *According to A.P. Shutko and others, 2012.*

Small black sclerotia appear on the mycelium. These sclerotia eventually form perithecia protruding by the beginning of earing phase in the shape of stomata through the leaf sheaths. As a result the lower part of the stem of the affected plant gets "bristly" appearance (Pic. 4). Thus, before the booting phase Gibellina manifests as root rot, and then - stem rot.

Picture 4. *"Bristly" stem*

Source: *According to A.P. Shutko and others, 2012.*

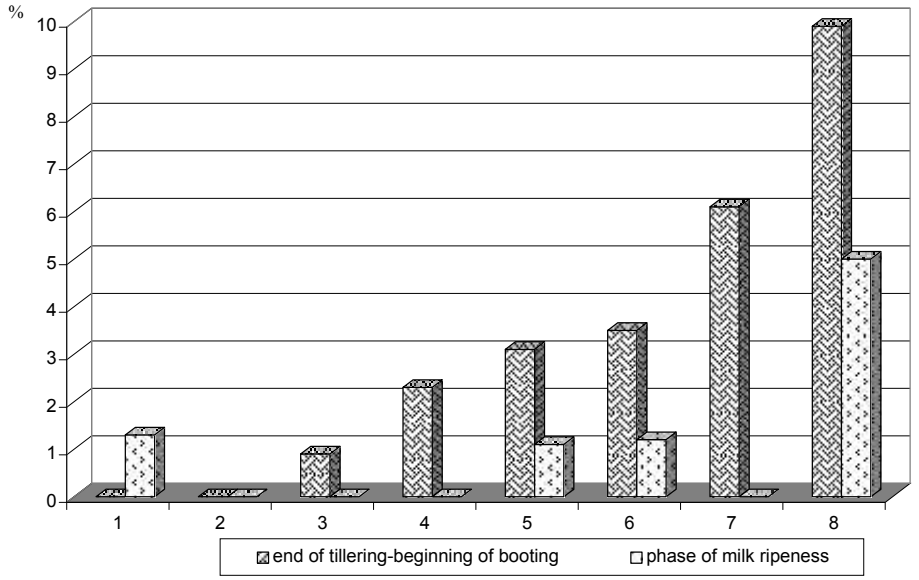
Gibellina cerealis fungus refers to the class of Ascomycota, ascospores with one scar, of honey color (Pic. 5).

Picture 5. *Ascospores of Gibellina cerealis fungus*

Source: *According to A.P. Shutko and others, 2012.*

According to the M.D. Zhalieva (2007), the agent remains in the soil on plants' residues in the form of bags with ascospores in perithecia. The research results showed that in the arid agro-climatic zone conditions of Stavropol krai the most invaded by Gibellina cerealis variety of winter wheat was Petrovchanka (Pic. 6).

Picture 6. *Dynamics of Gibellina cerealis stem rot development depending on winter wheat varieties : 1- Yubileynaya 100, 2 - Rostovchanka, 3 - Esaul, 4 - Moskvich, 5 - Pamyat, 6 - Batko, 7 - Krasnodarskaya 99, 8 - Petrovchanka*



Source: *A.P. Shutko and others, 2012.*

Studied varieties of winter wheat successfully opposed the spread of the pathogen Gibellina cerealis Pass. from infected plants to healthy, what reflected in decrease of the disease spread by the end of the growing season. The exception was the variety Yubileynaya 100.

Such varieties as Batko and Pamyat showed increase in intensity of the disease symptoms, i.e. if at the beginning of the growing season there was just one characteristic spot, then the phase of milk-wax ripeness there were 3 or more spots (Pic. 7).

Picture 7. *Heavy damage of winter wheat plants by Gibellina cerealis stem rot*

Source: *According to A.P. Shutko and the others, 2012.*

So called white straw disease is a very harmful disease. Because of the death of plant as a result of injury or in the case of severe illness in the phase of pip dyewood of plants occur, and death of infected shoots in the tillering phase reduces the coefficient of tillering by the phase of stem elongation. Due to the long period of infection all shoots of a plant generally suffer.

Stems either do not come to ear or formed ears are poorly grained. Severe infestation in the phase of elongation causes stems' lodging, and in the case of flag leaf defeat and when ear of wheat doesn't flower, and grains are not formed. Gibellina violates the conductive system of the plant, which impairs the supply of all organs with water and nutrients. This leads to partial or complete white ear.

The analysis of Gibellina cerealis stem rot showed that winter wheat variety Moskvich showed an active immunological reaction in response to the weak development of the disease (1 spot on the stem) as a result of that, such indicators as the number of grains per ear, grain weight in ear and 1000 grain weight increased (Table 5).

Table 5. *Elements of yield structure of winter wheat depending on the varietal characteristics and degree of Gibellina cerealis stem rot infestation*

Variety (elite)	Score of infestation	Height of plants, sm	Amount of grains per ear, pieces.	Weight of grains in a ear, gr	Weight of 1000 grains, grr
Moskvich	0	99,1	38,3	1,65	42,952
	1 spot	102,3	49,7	2,2	44,422
Yubileynaya100	0	77	27,9	1,11	39,627
	1 spot	65	25	0,98	39,200
Pamyat	0	110,8	38,3	1,53	39,948
	2 spots	72	14	0,45	32,143
Batko	0	82,7	24,5	0,85	34,494
	3 and more spots	74	26	0,59	22,692
Rostovchanka	0	71,6	34,7	1,48	42,794
	1 spot	51	25	0,83	33,200
Petrovchanka	0	86,7	29,8	1,06	35,479
	2 spots	85	29	0,95	32,758
	3 and more spots	68	16	0,30	18,745

Source: *A.P. Shutko and the others, 2012.*

Plants of varieties Yubileynaya 100 and Rostovchanka showed deterioration of element of yield structure in response to even weak defeat by pathogens. On winter wheat varieties Pamyat, Batko and Petrovchanka more intensive development of the disease was founded (2, 3 or more spots), which led to disruption of the process of grain filling, deterioration of its plumpness and, as a consequence, reduce of weight of grain per ear. Moreover, plants of varieties Pamyat and Petrovchanka when more infested form a smaller amount of grains per ear.

Conclusion

Orientation of intensification processes in plant growing to economy of resources and environment protection involves reducing the use of pesticides by strengthening the role of self-regulation mechanisms and structures in agrocenosis and agro landscapes. Thus, the most important task of the immediate future is the development and widespread practical application of scientific principles of zoned oriented farming, environmentally less harmful pesticides.

In ecologized plant protection systems the decisive role is given to the pest development monitoring, the results of which are the cornerstone of a conceptual scheme of protection of winter wheat from the complex pathogens, including root rot, based on the following environmental principles: Phytosanitary monitoring → Determination and description of diseases spread and their stage of development → Prediction of harmfulness → Selection of the target objects → Selection of methods and means of winter wheat protection. Data on variety resistance for specific agro-climatic conditions are the basis for the justification of the structure of high-quality crops.

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LAND POTENTIAL

Branislav Gulan[1], Danilo Tomić[2]

,,Our lovely, blue planet Earth is the only home we know... the Earth is exactly like it should be... We disturb our poor planet in a way being serious and contradictable in that "we people are now new and perhaps decisive factor. Our intelligence and our technology gave us the power to influence the climate and land. How will we use that power? Whether we will make concessions to ignorance and self-satisfaction in the things concerning the whole man's family? Do we appreciate short-lived benefits than the benefits of the Earth? Or we will, perhaps, start thinking about what comes tomorrow, taking care of our children and grandchildren, tending to understand and protect complex systems of living on our planet? The Earth is a tiny and fragile world. It should be fostered and cherished.''

Karl Segan, **Kosmos**

Abstract

In this paper authors has researched utilization of land potentials in the world, Europe, Serbia and its ratio according to population. On the results of research authors remark that relation toward very important resources are not satisfied at the global and national level. Permanent grow worlds population from one side and limited land from other side must be very seriously warning for the creators of the national governments and wider union of states that responsibility relation in utilization of this resource.

Key words: *land, population, non rational utilization*

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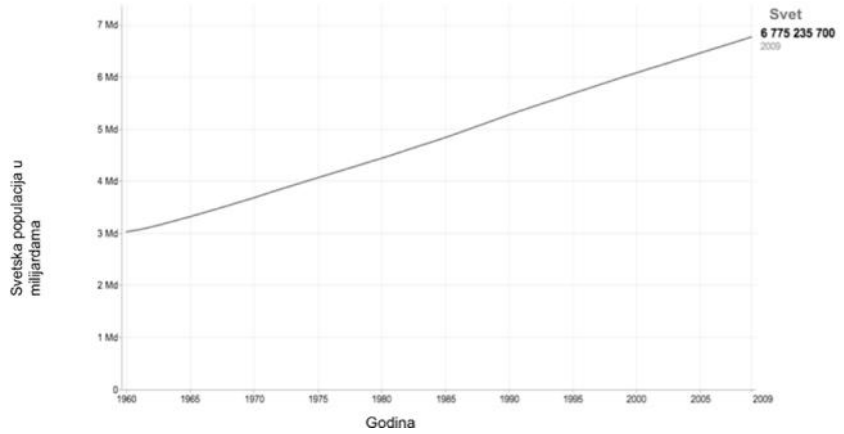
Introduction

On the Earth, water (oceans, seas, lakes and rivers) and land (agriculture and others) are in relation 6:4. This relation has not changed since the beginning of the world which reveals the fact that a man could not influence it. The main reason is that it is exclusively a product of the nature. However, the great changes influence both water (relation of drinking and salt water) and continental part of the planet. A man could not influence the changes caused by the natural factors. On the other side, a man is responsible for certain changes. Although the land is non-renewable natural resource the pressure on it was too huge in the previous century. This trend is popular in the XXI century, too.

Global problems

From three billion in 1960 the number of inhabitants grew to 6,7 billion in 2009, and as of 2011 there are seven billion people living on the Earth. This number is constantly increasing, so by 2030 it could be expected to be 8,2 billion inhabitants, and by 2050 there will be near nine billion inhabitants *(Graphic1).*

Graphic 1. *The increase of number of inhabitants from 1960 to 2009*



Source: *Republic Office of Statistics (RZS72010).*

According to the data obtained from the UNCTAD in Serbia in 2012 the number of inhabitants dealing with agriculture amounted to 563.000 and participated in total labour force with 12,6 percent. With 355.000 of men there were total of 208.000 women dealing with the agriculture production. The number of men in this activity is higher by 70,7 percent.

In ancient year 1992 (corrected by estimated number in Montenegro) the number of those being in the agriculture was 1.218.000 and share of 27,7 percent in total labour force. With 630.000 of men there were 588.000 of women, so it means that there were by seven percent more men than women.

According to the projections for 2020 (when Serbia is expected to become the EU member-state) the number of people dealing with the agriculture will amount to 378.000, with the share of 8,3 percent in total employment rate. There will be 255.000 men, and 123.000 women and the number of men will be higher by 107 percent. As of 1922 the labour force in Serbia will increase by 3.3 percent by 2020. In that case, the number of those dealing with agriculture will be reduced by 69 percent.

This data on the trend sin the labour force could be compared with the data referring to the countries being in transit, where a growth by 3,7 percent, while the data on the agricultural labour force might be compared with the developed countries where the decrease will amount to 70,6 percent. With the share of 12,6 percent of the agricultural in the total labour force in Serbia is 112.181 countries for which there are the data to be compared with the data for 2012. A higher share of the agricultural in the total labour force in Europe has only Albania (39,6 percent) and Poland (15,4 percent). Among the former Yugoslavian Republics the lowest share has Slovenia 0,6 percent, and only five countries have lower share such as: Qatar, Bahrain, Singapore, Brunei and the Netherlands Antilles. After Slovenia the lowest share has Bosnia and Herzegovina (2,5 percent), then Croatia (3,7 percent), while Macedonia (6,5 percent) has a half lower share of the agrarians in total labour force in Serbia.

Total area of the Earth is constant and amounts to 14,94 billion ha of agricultural or 2,22 ha. Such trend of growing number of inhabitants by 2050 will result in the reduction of total land from the current 2,22 to 1,66 ha, in other words, to 0,13 ha of arable land per capita.

Furthermore, since the beginning of industrialization, we witness taking of the arable areas for the construction of suburbs and business facilities. Therefore, the expansion of urban areas, industrial and technological parks, on one side, and constant increase of the number of inhabitants, on the other side, reduce not only total area, but the arable areas too, what is

more important. In this way in the world near 30 million ha has been lost every year. For comparison, it is the size of whole Italy.[3]

Industrialization is not the only problem. Cutting of forests, then turning of unfertile areas (meadows and pastures) into fertile and arable lands the problem of the lack of agricultural land is partly solved, but it endangers the ecological balance. At the same time, a dynamic growth of the number of inhabitants on the planet and a growth of the demand for food and purchasing power make the problem of rational use of the agricultural land more serious day in day out.

For example, in the world the arable areas increased by 1,8 billion ha in 2008 in comparison to 1992. This is the consequence of cutting forests and turning the meadows and postures into arable areas. It happens, first and foremost in the countries of Asia, Africa, Latin America where a growth population is high. This is the reason why the arable areas are reduced from 0,28 ha (in 1992) to 0,22 ha (in 2010) per capita, which means that in the world the increase in population is more dynamic that the expansion of arable areas.

Table 1. *Arable and non-arable areas (in 000 hectare)*

1992	**World**	**Europe**	**Serbia**
Arable areas	1.512.302	318.791	4.076
Non-arable areas	11.547.557	1.941.103	6.124
Total:	13.059.859	2.259.894	10.200

2008	**World**	**Europe**	**Serbia**
Arable areas	3.440.708	303.993	4.225
Non-arable areas	11.526.172	1.956.106	6.476
Total:	13.066.880	2.260.099	10.200

Source: *FAO for the years listed (2008).*

Although we have in consideration the figures aforesaid, we are mistaken that total agricultural areas in Serbia amount to near five million hectare and that the arable areas make up 4,2 million hectare. It is said that an

[3] Sundquist B., (2000) *Topsoil Loss – Causes, Effects, and Implications: A Global Perspective*, No.7, Revue - University of Minesota

average 0,56 ha is per capita, which is far more than in the Netherlands, Germany, which is our wealth, as someone states. In reality, we do not have these areas anymore. Because of the road construction and illegal construction on best arable areas and the fond of arable areas is getting reduced every year. The precise data do not exist, it is estimated that Serbia losses near 25.000 ha annually. On the other side, near 600.000 ha is not cultivated, which does not allow even more developed countries that Serbia is. Observed at the global level the less arable areas per capita for the last four years have the countries showed in the *Table 2.*

Table 2. *Arable areas per capita*[4]

Country	**ha arable areas per capita (2006-2010)**
United Arabic Emirates	0,00
Japan	0,01
China	0,10
United Kingdom	0,10
The Netherlands	0,10
Mexico	0,20
France	0,30
Brazil	0,30
Serbia	0,40
Bulgaria	0,40

Source: *FAO for the years listed (2008).*

When it comes to the countries with the developed market economy, first and foremost, on the territory of the European Union and transoceanic countries the problem concerning the reduction of arable areas solve in two ways. Firstly, they take care of the natural resources keeping under control the increase of inhabitants, and the second way is directly, through the environmental protection and particularly the public care of agricultural and arable areas. It is arranged by laws, regulations and directives. It is great importance because the interests of producers (whose motive is to make a higher profit), the consumers whose interest is better and cheaper food and the government of the national states and a group of states whose interest is to take care of the resources are being entwined and harmonized here. On the other side, the states with dense population (china, India) are forced to have two harvests annually, wider

[4] www.fao.org

areas covered by irrigation system and higher usage of chemicals so as to provide healthy food for numerous populations, which makes the pressure on resources previously aforesaid.

Near 25 percent of global areas destroyed

One forth of the global areas has been substantially destroyed and this trend must be changed so as to provide enough food for the whole inhabitants living on the planet constantly increasing are the results of the first UN survey on the condition of the global land and water resources. The report discloses that 25 percent of the global land is currently destroyed at great extent, since there are the erosion of the soil, the reduction of water resources and the loss of biodiversity. Yet eight percent is 'slightly destroyed', while 36 percent is stable or slightly endangered, while only 10 percent of the land is improved. The rest of the world land is covered with deserts or water areas. The Western part of Europe is particularly endangered where the intensive agricultural production caused the contamination of the soil and underground waters and resulted in the loss of biodiversity, then Himalaya, Andes, Ethiopian Highlands and South Africa where there are the erosion and intensive floods. In the South-eastern and Eastern Asia the rise fields are deserted mostly due to the drop of the value of this agricultural produce. The UN Food and Agriculture (FAO) estimates that the agrarians will have to produce 70 percent more by 2050 so as too meet the needs of the world population which is expected to reach to nine billion people. It means that it will have to be produced one billion ton more of wheat, rise and other crops and 200 million ton more of beef and other kinds of meat. The current situation is such that the most fertile areas have already been cultivated but in a way to reduce their productivity and the soil is being exhausted and water spent. In order to meet the needs for food at the global level it is necessary to intensify the agricultural production on the already existing arable areas, the FAO estimates in the report titled 'The situation of the global land and water resources for food and agriculture'. The UN study reveals that the climate changes, together with bad agricultural practices, contribute to the reduction of productivity on the global arable areas at the time of big application of new technologies, pesticides and hybrids , which an instantly but shortly brought the increase in the crop yields. Thanks to new technologies in the agriculture only 12 percent more of the global land is sown with the crops in the period from 1961 to 2009, but the food production climbed by 150 percent. Meanwhile, the UN report shows, a growth rate in many sectors

has been fallen down and today amounts to only a half of the mentioned figure. The UN report also indicates the global water resources are becoming decreased and more salty, while the underground waters are becoming more polluted with pesticides and other kinds of poison. To meet the needs for water at the global level by 2050 it is necessary to have more efficient irrigation systems, because the current ones are under their capacity, the FAO estimates.

This organization calls for the usage of new agricultural practices and higher investments in the development of agriculture. The UN considers that by 2050it is necessary to invest 1.000 billion dollars in the development of irrigation systems in the developing countries, and yet 160 billion dollars for the recovery of the ground and the control of floods.

Problems with land utilization in Serbia

The problems with the land utilization on the global level were previously discussed. However, we have to act locally. First and foremost, we are interested in solving the problems with the utilization of arable land. Serbia officially has 5,11 million ha of agricultural and 4,22 million ha of arable land.[5]

Briefly, we will familiar you with five biggest problems:

1. *Extensive utilization of land with extensive sowing structure and reduction of number of livestock;*
2. *A small number of private households (with an average three ha), which is significant obstacle for agrarians to become more bigger the goods producers;*
3. *reduced introduction of organic substances and lower level of usage of organic fertilizers, particularly of the muckheap;*
4. *Degradation of the land. Today in Serbia water and wind mostly cause the erosion which destroys the arable areas;*
5. *The lack of the irrigation systems.*

[5] Data obtained from Republican Office for Statistics for 2008

1. Extensive production: In addition to the sciences and skills of the businessmen it could be said that in the last few decades the change of the structure towards functional and profitable intensive production has not happened. In the sowing structure there are still dominant grains (77 percent), and insufficient quantities of industrial crops, vegetables and fodder (23 percent). Intensive production makes higher profit per unit of area. Truly, it requires more capital and work, but at the same time it provides higher profitability. Apart from that the areas with vineyards are getting reduced and the existing vineyards are too old, with unequal sorts, low yield, bad quality and insufficiently profitable – which also indicator of the extension of production.

In the last two decades the number of the livestock in Serbia fell by three to four percent annually, and the meat production recorded a drop from 600.000 to 457.000 tonne.[6] The worst situation has been recorded with the breeding stock, and in the beginning of this year the number of cows and in-calf cows is less by 28 percent in relation to 1991, and of sows and pregnant sows by even 60,8 percent. The data showed in the *Table 3* indicate the changes happened in the livestock breeding in the period 2009 - 2010.

Table 3. *Change of number of livestock in Serbia between 2009 and 2010.* [1]

Livestock	2009	2010	Change in %
Beef	999.406	935.444	-6,4
Pigs	4.064.628	3.922.366	-3,9
Sheep	1.521.140	1.492.239	-1,9
Poultry	22.786.399	20.120.391	-11,7

Source: *PKS (2011).*

Long – term observation, particularly in comparison to the period 1988 – 1990 the number of beef is lower by 20,2 percent, pigs by 22,5 percent,

[6] Data obtained from Chamber of Commerce and Industry of Serbia 2011

sheep by 26 percent and poultry by 22,7 percent. In the extensive production the mineral fertilizers are insufficiently used. For instance, in the SFRY 120 kilograms of mineral fertilizers was used per hectare and then we were among the last one in the world. This consumption of mineral fertilizers is constantly falling down and today it reached 40 kilograms per hectare and according to this we are on the last position in Europe. It is the same situation with the irrigation system. In the world total of 17 percent of arable areas has been irrigated. In Serbia officially only 1,2 percent. There are irrigation systems on 70.000 hectares, while water comes to only 38.000 hectares.

This is the reason why we have low yields of all crops. For instance, in 1990 we had 4,38 ton of wheat per hectare, and in 2010 this number was between 3,2 and 3,5 tons, a year after that 4,2 tons, and in 2012 it was 3,9 tons per hectare. The wheat growing could not be profitable is the yield are below four tons per hectare.

2. Small households: Small households are the main obstacle for higher productivity in the commodity production and competitiveness. We are among the European countries with the smallest households. An average household is 3,3 hectare of arable land, and 2,6 hectare of plough fields. The reasons are in the traditional agricultural structure, non-arranged inheritance right, insufficiently created land policy. For instance, In European Union in 1957 an average size of household amounted to 4,8 hectares. In 2004, thanks to the measures of agricultural policy for the increase of household, its average size amounted to 44 hectare, in France 78 hectares, Denmark 50 hectares (Babović J. 2005). There are certain positive trends recorded in Serbia too, for example, an household of an average size 10-15 hectares has from 2,5 percent of share in 1991, in the structure of total areas, increased to near six percent in 2010. The enlargement of land is impossible without the performance of market mechanisms and planned long-term measures of the state, in other words, without their harmonized performance. It should be concern of the local self-governments, the related ministries, the associations and producers. Briefly, no enlargement of households, no rational production.

3. Reduction of content of organic substance: Organic substance plays an important role in the sustainability of tiny-crumb-like structure of land, the improvement of its chemical, biological, mechanical and physical features, being very important for the development of root system and successful plant growing. However, as it is already aforesaid, in the last

few decades the number of livestock has been dramatically reduced and thus the production of stable manure. According to the official data the number of all categories of livestock has been decreased, not only in comparison with the 1980's, but with the last five years.

Dramatically reduction of the number of livestock for fice years now resulted in negative affects on the development of agriculture and the economy of the Republic of Serbia on the whole as well as on the fertility of the land. The production of stable manure is reduced, which is important organic fertilizer whose role is to better fertility and wealth of the land. In addition to this, other kinds of organic fertilizers such are compost, green fertilizers are not used anymore.

There are yet another dramatic examples: in the last ten years the number of beefs in Serbia has been reduced by million or by 50 percent, pigs by million or by 20 percent, sheep by 1,1 million or by 40 percent and poultry by eight million or by 42 percent. The reduction of the number of livestock indicates that there is no need to enlarge the areas covered with fodder crops, also important crop improving fertility of the land, in particular, the growing of leguminosae plants. Upon terrible drought which took away 50 percent of the total yield in 2012, the slaughtering of livestock has been continued due to the shortage of fodder feed. The first estimates of drought demages are beyond two billion dollars, which is the sum enough for the construction of irrigation systems. The share of the livestock in the GDP used to be low only 30,5 percent, and now it is expected to be reduced to 25 percent. In the world this number is over 60 percent!

4. Degradation processes: These processes are caused by nature and a man. Those caused by nature are floods, underwater, erosion, winds drought. The erosion caused by water and wind are very dominant in the global agriculture. According to Stanimir Kostadinov (2000) the Total of the Serbian territory 86,4 percent is subject to erosion. The erosion causes the loss of fertile land, humus and it deteriorates its characteristics. The water and wind take away down to the rivers, seas and oceans the huge quantities of fertile soil. An annual level of the soil eroded is the highest in China (1.600 million ton), then in India (1.455 million ton), Brasil and Peru (1.363 million ton respectively), in the USA (300 million ton), Myanmar (299 million ton), Ethiopia and Egypt, Sudan (111 million ton respectively).

Taking into consideration strong degradation land processes in our country it is planned to forest near 50.000 hectare by 2010 (long-term 100.000 hectare) as well as to sow grass on near 80.000 plough fields lying on higher incline (Gulan B. 2000). However, it stayed an unfullfilled wish.

5. Shortage of irrigation systems: In Serbia only 1,2 percent of the agricultural land has been irrigated, while in the world near 17 percent of arable areas**.** In 1947 in Vojvodina the construction of the hydro system Danube – Tisa – Danube was commenced, then the largest investment in the SFRY worth 700 million dollars. It was officially finished and started to function in 1977. The system had double purpose: to drain too mush water and to supply water during the drought. The aim of this system was to drain too mush quantities of water from one million hectare area and to provide the water for irrigation of 500.000 hectares. Unfortunately, none of these aims are being met today. Namely, the irrigation of half a million hectares has never been realised, while the aim to drain too mush water from one million hectares area was met by 2003. Upon too big floods either this activity was not any more in the function. According to some estimates this system contains near 12 million cube meters of mud (it needs to be revitalized, in other words, cleaned and made ready for drain of too mush quantities of water). The situation is alarming when it comes to the channel network. Namely, the irrigation system has never been in function, while the drainage system used to work by a decade age. Therefore, If we take into consideration that Vojvodina has 22.000 kilometres under the channel network, we could irrigate near 44.000 hectares. I do not believe that it could be easily done, but a progress in that field could be made.

The data of the Republic Office of Statistics show that in Serbia in 2010 the area of total 27.246 hectares has been irrigated, while the total arable land in the country amount to near 4,2 million hectares. Therefore, in Serbia the larger areas in Serbia has been irrigated, than the statistics show, because it does not involve the irrigation in green houses. The areas irrigated in green houses amount to between 15.000 and 20.000 hectares, which means that in the country total of 40.000 and 50.000 hectares of agricultural land has been irrigated. There is a problem in Serbia concerning the neglected irrigation systems, which is the reason why water does not come to the areas needing the irrigation, indicating that the existing irrigation systems in Vojvodina could irrigate 100.000 hectares, and in Central Serbia near 60.000 hectares. In the former SFRY there

were conditions for the irrigation of 180.000 hectares, and a certain part of these channels and hydro systems in Serbia are weeded. Water is a good servant, but evil lord is the slogan popular up to date.

It is important to enlarge the areas in the country requiring the irrigation, due to the scientific analysis which disclosed that in Serbia 51 year is dry in one century, and due to the bigger production of food. No irrigation, no intensive agricultural production, and no competitiveness both on the domestic and global market. The drought caused damage in one year only, as it was the case three year ago, is higher than the total investments in the irrigation systems. In order to solve this problem Serbia will have to adopt the strategy for development of agriculture and then to pass the long-term plan for fighting the drought and the rational program of irrigation of arable areas if it wants to keep the position of important producer and exporter of food.

The analysis carried out by the World Meteorological Organization indicates that an average temperature at the global level will increase by two degrees this year, and for the last three years Serbia has had extremely high temperature in the summer periods. It has to be take into mind that in the last 100 years on the territory of Serbia each second year was dry, which is yet another evidence for solving the problem with irrigation. The irrigation could be better if the individual producers would be granted the cheap loans and without the interest rates, which would simplified the supply of the irrigation equipment, whether it is about the water aggregates or the drop-by-drop system. Therefore, the future dry period could be come over easily if the new sorts of plants would be created which will need less water for the same quantity of yields and would be more resistant to the extremely dry period. In addition to the creation of new sorts, as the most important task of the domestic agricultural experts appears the research works with a view to define best suitable irrigation system to varied types of lands and crops in the different parts of Serbia.

It is the time to revive the visionary projects dating back to the 19th century concerning the construction of the way Danube – Vardar – Aegean sea and in this way to solve with the irrigation in the Central and Southeast part of Serbia. In the future it should be thought about supplying the water for the irrigation of Šumadija, through the construction of the channel Sava - Velika Morava - Zapadna Morava.

It is mentioned the construction of the channel Danube-Morava-Vardar, which will be the biggest strategic project of the state, because Serbia should not allow others to take control over its natural resources. For instance, in April 2011 the channel network in Banat was cleaned. In the normal conditions the cleaning of the channel network should not be done in April, but in December or January, in other words, when it is not the agricultural season. In February the snow is melting throughout Europe and the river levels are getting higher. This is the reason why the channel network should be cleaned in time so as the agricultural activities would be carried out in March, April and May. In addition, once in a year or two it is necessary to subvert the soil and break the so-called plough sole which is caused due to the mechanisation and which prevents the drain of water from the fields (Tomić D. and associates, 1996). The opinion is that there are intensive processes of souring, salting and pounding of land, along with the heavy metals.

The agricultural policy directed towards the development of agricultural production and fostering of the natural resources of Serbia should be the essential priority in overall development programme of Serbia both in the economic and social and ecological aspect. The negative trends in the agricultural production are showed through an growth rate of net agricultural production which in the last decade amounted to an average 1,3 percent, and its gross value was 1,9 percent, which are lower values if compared with the same period in the 1980's. An optimal growth model counted with an average growth rate of agriculture of 3,5 - 4 percent in the following ten years. Having in mind the structure of the agricultural production in Serbia, the resources and the level of productivity reached it is estimated that the changes will have to happen in the directions to the growth of productivity, stabilization of yield and the change of the production structure in the crop production and higher livestock breeding share in the value of the agricultural production. In order to achieve all these objects we must take care and use in a better way the existing land potential of Serbia.

It is necessary to finish the registry of the agricultural land for solving the issue of denationalization and restitution as well as for the creation of the pretext for new credit lines for buying the land. Therefore, the application of the agricultural policy which must involve the part saying the ways for keeping the current land potentials, in particular the attention must be focused on the equal regional development, the credit lines granting, the non-refundable assets for the improvement of production, the

environment, the stimulation of the sale of domestic products on new markets, the development of new technology, the strengthening of competitiveness of the domestic production, the harmonization of new laws with the EU regulations, the constant increase of agricultural budget and the maximum level of subsidies. When adopting the measures in the agricultural policy it is necessary to have in mind that none of the countries made its prosperity without the development of agriculture. It is the case with Serbia too. The success and progress in the process of economic reforms in the field of agriculture depends on a growth of productivity, the increase of agricultural production and these are the key factors in the improvement of dynamic development of agricultural sector of the countries in transition. The main thing is how the land potential, which we borrowed from the future generations, of one country is used and protected.

Conclusions

Taking into consideration the aforesaid facts, the following conclusions could be made:

1. *Land is non-renewable natural resource needed to the future generations, and thus it must be the issue of the public policy.*
2. *The most favourable relation of the arable areas per capita have the transatlantic states, while the most unfavourable has the Asian countries. In the European countries and Serbia this relation is still satisfying.*
3. *A constant growth of the population on the planet and increased demand for agricultural produce intensified the agricultural production in the last century. It will happen in the future, too.*
4. *When it comes to the use of the land in Serbia, there are the problems as follows: extensive production, small households, insufficient use of organic substance and degradation processes caused by the nature and a mankind.*
5. *On the long-term bases, the solutions for the crisis in the livestock breeding in Serbia are in the regulation of financing, return to the domestic and international market and the creation of strategic solutions which would stop the negative trends in the livestock.*

6. *Global solution to the problem is in the more intensive use of land, the enlargement of households, increased use of organic substance and the reduction of degradation processes.*
7. *With respect to all climate changes, frequent droughts, on one side, and available water resources, on the other, Serbia should substantially increase the areas being irrigated in the years to come.*

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POSSIBILITIES FOR DEVELOPMENT OF SUSTAINABLE LIVESTOCK PRODUCTION AT THE TERRITORY OF THE CRNA TRAVA MUNICIPALITY

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Abstract

In the last decade great success was achieved in food production, which is result of the application of the scientific research results, and effort of the professional service. Development of biotechnology contributed to intensification of the animal husbandry, without considering the possible consequences. If adequate breeding technologies are not applied, livestock production can be very aggressive towards the environment, which imposed the need for precise definition of livestock production. Sustainable livestock production is defined as "production of livestock products that satisfies the need of human population in this moment, and which will satisfy the needs of future generations without degrading the environment and inducing environmental disturbances". Today everyone is interested in healthy food from different aspects: manufacturers and traders because of the higher price, consumers because of the health. Crna Trava municipality territory is area of unpolluted nature; therefore it is ideal area for organic healthy food production and organic livestock breeding (cattle and sheep breeding) development.

Key words: *Crna Trava, sustainable livestock production development, environment*

Introduction

Modern agriculture is characterized by numerous unknown areas in terms of directions for future development. Many authors observed and predicted many changes which have happened (de Wit *et al.* 1987; Lazić

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Branka, 1991; Bertlin, 1992; Birkas Marta *et. al*., 1995; Kovačević *et al*., 1996; Kovačević *et al*., 1997; Kovačević and Momirović, 2003). The defined concept under the name of "sustainable agriculture" is differently interpreted in the world and in our country. From ecologic starting point was mainly based on ensuring that non renewable resources are not fully exploited and towards the maintenance of the biologic diversity. Sustainable agriculture is more like system of long term principles which should be maintained and supported. When we think about sustainable agriculture we always have to have in mind its long term goal, and that is to provide stable enough production of high quality food and herbal products for other technical purpose but at the same time to preserve the basic natural resources and energy, to protect environment, and to be economically efficient and profitable for entire community.

Sustainability of agriculture systems has to be based on usage of renewable resources or on renewing of the existing resources. System which depends on resources whose time of usage is limited such as fossil fuel cannot be sustained for unlimited time. Modern humans endanger the biosphere and environment at the planet Earth in such way that it threatens to jeopardize their own survival. Water pollution, land, air and food pollution already has dramatic consequences in certain parts of the world.

Most significant form of endangering the nature is atmospheric pollution which leads to climatic changes, destruction of natural ecosystems and certain species. Large amounts of artificially synthesized polluting agents are being emitted, as consequence of higher development of industry and traffic. The increase of the greenhouse effect which influences the climatic change in terms of global warming of the planet, the sea level rising, destruction of the ozone layer and appearance of acid rains is direct consequence of sudden change of the atmospheric physical and chemical characteristics on the global level.

In order to achieve development which is in accordance with natural needs and limitations, UN conference about environment and development was held in Rio de Janeiro in 1992. On that conference it has been decided that it is necessary to provide connections between economic politics, protection politics and social communities in all economic and non economic sectors, therefore integrating them in to the modern international trends. Term sustainable development can be defined as integral economic, technologic, social and cultural

development in line with needs of protection and improvement of environment, which will provide present and future generation needs to be satisfied as well as their life to be improved. Sustainable development is concept based upon intergenerational justice, meaning, present generation cannot compromise the possibility of the future generations to satisfy their "material" needs and to enjoy in healthy and beautiful environment (Sandra S. Batie, 1989),and/or it represents the care about future generations followed by the question: "what is that, that we will leave behind for future generations to remember us for?"

Sustainable agriculture

Sustainable agriculture has been derived from the definition of the sustainable development, as part of the food production where ecologic, economic and social aspects of sustainability are in harmony. For Serbia rural areas give advantage for application of the sustainable development concept in terms of food production. Approximately 85% of Serbian territory belongs to rural areas, where approximately 45% of population lives.

In development which was taking place in recent times, these areas were neglected and devastated mainly in economic and demographic terms, however from ecologic point of view they prospered. It is up to us, now, to turn the present state of rural areas to our advantage. Therefore we need the twist towards the villages, mainly developing twist, followed by financial support, which is European trend.

Every crop has its own ecologic demands (the temperature in vegetation period, amount of precipitation, specific ground mineral composition and physical composure, etc.). Value range of some ecologic element within which is possible to grow specific crop is called ecologic valence. With change of ecologic conditions and crossing the ecologic valence limit, specific crop will disappear or completely vanish form that location. Possibility for developing sustainable agriculture on certain locations represents the determination of optimal ecologic conditions for specific crops. Methodology for determining the ecologic sphere is evaluation (solvency) of natural resources, conditions and sources.

With agriculture development specific area starts to transform from initial natural terrain to cultural terrain. These kinds of changes have to be conducted very carefully on locations which are characterized by very

sensitive natural balance (dynamic homeostasis) such as protected natural reserves (national parks, special natural reserves, areas of exquisite features, etc.). Sustainable agriculture development is not only connected to ecologic factor, because next to ecologic factor sustainable development should not be in collision with economic development, there has to be positive connection between those two.

Development technologies of past decades have supported intensive development with overuse of natural resources, also neglecting the basic ecologic postulates. That type of resource management has led to many problems regarding the environment pollution. Future generations will have to pay serious attention to that problem.

Possible alternative for development of agriculture is marked with term "sustainable development". Global way of thinking about this subject has led to the first results. Agriculture is now going towards lessening the world's conventional production, and to the elimination of the negative influence which that type of production has already created by directing it towards different alternative ways based on biologic and ecologic awareness (Kovačević, 2008., 2010).

Conventional (industrial) agriculture

Conventional agriculture has a task to provide maximal production in the terms of quantity and quality with least possible expenses. To achieve maximal production it is needed to apply numerous agro technical measures which, next to their positive effect on increase of yield can have negative effect on agro ecosystem.

Basic agro technical measures on which conventional agriculture is based are: change of natural environment, intensive land cultivation, installation of irrigation systems, growing of specific crops as mono cultures (growing one crop at same area for many years), fertilization, usage of pesticides to prevent weeds from spreading, diseases and pests etc. Each of these measures has significant effect to increase of production. Food production is observed as industrial process in which crops and animals are small factories. Their production is higher with higher intake of needed matters, productive efficiency is increased by genetic manipulation, and land or water in aqua systems is just one environment which is needed for growth of plants or animals (Kovačević, 2010).

Today we see that it is obvious that conventional agriculture production even though it provides enough food and other different products leads to great many negative ecologic, social and economic consequences.

Development possibility for organic livestock at municipality of Crna Trava territory

Municipality of Crna Trava is located in south-eastern region of Serbia in the upper and middle part of the river Vlasina basin, 66km away from Leskovac which is center of Jablanica district. Neighboring municipalities are Babusnica, Vlasotince, Leskovac, Vladicin Han and Surdulica.

Its geographic position made it isolated from main traffic corridors. The only important communication is through P.122 road via Cekovec through Vlasotince and Vladicin Han via Surdulica, through which it reaches to the national highway Belgrade – Skopje (E-75).

Territory of the municipality of Crna Trava is on 312km^2 where according to 2002 census 2.563 people resides in 25 settlements. According to population density it is least populated municipality in Serbia (8.21 residents per 1km^2). Migration process is the basic characteristic of this vital resource including the entire area of this municipality and its center. In the period of 1948 till 2002 the number of residents has been lessened 5.3 times (from 13.614 in 1948 to 2563 in 2002).

Main problem and worry is the decrease in number of residents in the last fifteen years. In the period from 1991 to 2002 number of residents has decreased by 1226 or in percent by new 32%, where female resident number has decreased by 31% and male by 34%. Highest decrease in resident number has been noted in the municipality center where it was totally 43%.

It is very important to mention that number of households in period from 1992-2002 has been lessened by 20%. Average number of household members is also unfavorable and it is 2.2 members for surrounding area and 2.50 members for municipality center.

In the census from 2011 the number of residents in the municipality of Crna Trava is 1661 now. That is by 902 residents less comparing to census from 2002. Percent of demographic decrease in last year's census in Crna Trava holds record in Serbia and it is approximately 62.

Age structure of the residents has significantly worsened. Largest number of residents in the municipality of Crna Trava ages over 60 years of age which is 44.7%, 18-60years 42.80%, 7-18 years 7.80% and 0-7years 5.05%. Therefore the age structure which is very unfavorable has very negative influence on future development of the municipality. The number of residents that participate in agricultural activities is only 8.4%, while the active part is up to 76.4%

Infrastructure and environment

Natural resources

The most significant nature resources of the municipality of Crna Trava are: agricultural land, forests, water potential and raw minerals. Largest area of municipality territory is covered with acidic, brown and podzolic soil. Over 40% of the territory is pastures and plains. Over 15000 ha is agriculture land, from which 1783ha is arable land and gardens, 347ha orchards, and rest over 13000ha is pastures (table 1).

Table 1. *Territorial structure*

N^{o}	**Territorial structure**	**Surface in ha**					
		Private property		**State property**		**Total**	
		ϕ	%	ϕ	%	ϕ	%
1.	Arable land and gardens	1645	92,3	138	7,7	1783	100
2.	Orchards and vineyards	331	95,4	16	4,6	347	100
3.	Plains	6399	83,5	1263	16,5	7662	100
4.	**Totally of arable land**	**8375**	**85,5**	**1417**	**14,5**	**9792**	**100**
5.	Pastures	1609	27,4	4266	72,6	5875	100
6.	**Totally of agricultural land**	**9984**	**63,7**	**5683**	**36,3**	**15667**	**100**
7.	Forests and crops	5762	39,3	8889	60,7	1461	100
8.	Unfertile land	180	22,9	607	77,1	787	100
9.	**Total**	**15926**	**51,2**	**15179**	**48,8**	**31105**	**100**

*Data source: “Strategic plan for development of the municipality of Crna Trava 2006-2010”.

Forest area consumes approximately 47% of municipality territory (14651ha). Water permeable ground has influenced the forming of very dense river network, with very clean water of high quality. Most significant watercourse is river Vlasina with tributary Čemernica, Preslapska, Kalanska and Gradska rivers. Moreover, Tegošničanska and Rupljanska river flow through municipality territory.

Municipality area is rich in medicinal herbs, wild fruits and forest fruits. Approximately 50 wagon loads of berries, 10 wagon loads of mushrooms, and approximately 100tons of dry medicinal plants is being sold per year. The area is very rich in different game. There are three hunting grounds. Agriculture is extensive and limited to the satisfying the basic needs of the household. There is no cooperation between households. According to the latest data number of registered farming households is 253.

Development of the agriculture

Municipality of Crna Trava has 13.537ha of natural pastures or 86.40% from total agricultural land which is at municipality disposal. It is especially rich in waters and forests; it has favorable geo morphologic terrain characteristics and preserved nature (unpolluted land, clean air) which enables the production of livestock products of high quality as well as collection of very valuable forest fruits.

For the past few years almost in all world countries the organic agricultural production is being intensively developed, and high part of it is organic livestock production. Consumer demands for healthy herbal and animal origin food produced in healthy environment was highly expressed during the eighties. ***Municipality of Crna Trava with its potential is ideal for production of healthy food.***

Condition of the livestock production at Crna Trava municipality territory

Livestock condition for cattle and sheep is shown in table2. for the period of the last 30 years. From given data from table2 it can be concluded that constant lessening of the livestock numbers at Crna Trava territory is present. Lessening of the cattle number in the period from 1975 to 1989 was approximately 44%, and for the sheep it was 39%. In same period number of heifers was decreased by 36% and for the sheep 21%. Due to known problems that occurred in 1991, since SFRJ disintegration number

of cattle and sheep is being lessened. In the period from 1989 to 1999 number of cattle decreased for 42% and sheep by 62%. In the period from 1999 to 2002 the number of cattle again decreases by 55% and sheep by 40%. Decrease of the number of cattle has continued in the period from 2002 to 2005 for new 26%, however there has been noted that decrease of the sheep number has stopped and slight improvement of 451sheep has been noted, though it is under every limit**.**

Table 2. *Livestock condition in municipality Crna Trava (heads)*

Year	Cattle		Sheep		Number per 100ha	
	Total	Females for breeding	Total	Females for breeding	Cattle/arable surface	Sheep/arable surface
1975	5595	3307	6020	3488	57	35
1976	4806	3391	6394	4276	48	37
1977	4648	3278	5493	4164	47	31
1978	4617	3066	4884	3343	47	28
1979	4869	3109	1131	2187	49	18
1980	4301	2844	2336	1762	43	13
1981	3858	2699	1913	1389	39	11
1982	3967	2631	1638	1206	40	9
1983	3566	2600	1935	1399	38	11
1984	3533	2559	2806	1810	41	17
1985	3697	2470	2620	1813	25	16
1986	3280	2556	3118	2438	39	20
1987	3501	2408	3143	2422	42	20
1988	3062	2305	2094	1648	37	13
1989	3129	2107	3675	2742	32	23
1999	1818	-	1421	-	-	-
2000	1741	-	1583	-	-	-
2001	1577	-	1364	-	-	-
2002	834	-	864	-	-	-
2005	630	-	1315	-	-	-
2011	150	-	2000	-	-	-

***** Data source Report from the municipality Crna Trava – Yearly livestock census.

In the 2011 number of cattle has come to 150 heads, compared to the 2005 the number has dropped by 480heads or 24%. Number of sheep has

increased by 615 heads and now it has come to 2000heads. At the municipality territory 200 pigs are being kept and there is also one poultry farm which has capacity of 9000 chicks. Numerous factors have influenced this very unfavorable livestock condition, only some will be cited:

1. Low prices, narrow, unorganized and unstable meat, milk and wool market;
2. Uncertain sale and non existence of long term politics to improve the livestock production which would guarantee the stability for farmers whose existence is connected to farming. Price for live animals were always in the protective price regime and without stimulation for farmers;
3. Low credit ability of the cattle and sheep breeder, insignificant investments from the banks and other companies in livestock production;
4. Inferior breed composition;
5. Slow joining process of the individual farmers;
6. Weak connection with processing industries, so that today butcheries use their capacities only around 30%, and livestock food production industry with only 34%. This situation is such because in our country we have approximately 950 butcheries, mainly new mini ones which are in the villages. According to the EU rule only one slaughterhouse can exist on every 80km, and if we wish to fulfill that condition, as well as demand for high technology, we should have only 9 to 10 slaughterhouses;
7. Drastic increase of farmer houses, which is specially expressed in municipality Crna Trava;
8. Non existence of clear and long term developing concept for livestock production has had major influence on the character of livestock production in the entire country not just in above mentioned municipality.

Milk production - We cannot discuss some serious cow and sheep milk production at the Crna Trava territory, considering that number of cattle in 2005 was 630 heads, and in 2011 only 150 heads, though number of sheep has been increased from 1.315 to 2.000 heads. Therefore, cattle and sheep production is mainly for satisfying the personal needs. To intensify the sheep

production one sheep farm has been built but its capacities are not fully utilized. Livestock condition in Crna Trava municipality is very worrying.

As it can be noted, the complete shutdown of sheep and cattle production has happened, even though municipality has 13.537ha (86.40%) of natural pastures from the total amount of agricultural surface of 15.667ha. ***Therefore, development of sustainable livestock production (cattle and especially sheep farming) should be priority for the municipality development strategy in future period.***

General characteristics of organic livestock production

One of the most significant aims of the organic livestock breeding is the providing of the life conditions which enable the natural behavior of all animals and satisfaction of the most significant ethologic needs of their organism. Increasing number of consumers who demand that food should be of high nutritional value and more natural influences that organic production products are more and more favored. Organic agricultural production and biologic agriculture do not represent new branch of agriculture. However, for one farm to be characterized as "organic" many conditions need to be fulfilled, considering that this form of livestock production differs greatly from conventional, and especially from industrial production. Main difference is because at organic livestock farms great attention is given to the protection and preservation of the environment. One of the solutions which will prevent degradation of environment is crossing from conventional to organic agriculture. Agriculture of the mountain and hilly area is very near to organic agriculture. Large part of agricultural surfaces in our country can be certified without waiting for conversion period.

For organic production main importance is given to the domestic breeds and varieties of cattle and sheep which are adjusted to certain ways of breeding. Animal reproduction should be natural, the artificial insemination is allowed. Hormonal and induced estrus is not allowed as well as application of embryo transfer, gene manipulation, also usage of the breeds and varieties which are product of genetic engineering. Facilities for keeping animals should fulfill demands for animal welfare. To preserve the health of the animals, preventive measures are very

important considering that usage of medicines and medications is brought to the minimum. Organic livestock production means that health problems are mainly solved by prevention.

Organic livestock production principals

Transformation of one farm from conventional to organic livestock production requires certain time period, so called "conversion period". This is of extreme importance as only after fulfilling all demands and achieving proposed standards in terms of organic production, obtained products can get label "organic product". After the period of conversion is over the offspring of the existing animals can be sold as organic.

According to valid standards cattle should be bread according to organic principles at least for six months before delivery in order for calves to be certified as organic. Existing cows which are in conversion status for milk production, they should be bread according to organic principles at least for 36 weeks, excluding demands for specific diet. Demands in terms of diet should be met and carried on for at least 12 weeks before ending of the conversion period. For agricultural land conversion minimum 2 years are needed. For kids to be classified as organic they should be bread according to organic principals since mating period.

Basic principles (IFOAM, 2002), which at the same time represent the most important recommendations which have to be followed at one organic livestock production farm, they are connected to:

1. Diet (breeder has to supply high quality feeds which are also produced per organic production principles);
2. Breeding methods (applied breeding technology, herd size and housing conditions have to prevent the appearance of physiologic disturbances under stress influence, as well as to obtain optimal health animal health condition but without usage of veterinary medicines);
3. Behavior and good state of animals (applied breeding methods have to enable animals to express their natural behavior patterns);
4. Preserving of the environment (applied management on the farm has to provide preservation of the environment as well as to provide natural resources from which farm depends).

Animal diet

In the feed that is used for diet of the animals on the organic farms there must not be matters that are:

1. Animal waste or farm side products;
2. Feed with added chemical matters;
3. Urea and other synthetic nitrogen sources;
4. Growth promoters and other hormonal simulative ,
5. Artificial taste, smell and color feed enhancers, etc.

It is recommended that mineral-vitamin additives should be from natural sources, except in cases when natural sources do not satisfy the quality and quantity need in needed maters.

Protection of the environment and natural resources

Livestock production is an integral part of organic agriculture. It has to be in balance with other branches of agriculture, supplying the nutritive matters for herbal production and organic matters for soil fertility. That way balance is obtained at the relation soil - herbal production, herbal production - livestock production. Main goal of livestock organic production is preserving the soil fertility, which can be obtained by growing the legumes, fodder crops and by usage of manure. Therefore livestock organic production is tightly related with soil and quality of arable land, it should contribute to the increase of the total arable land surface and its fertility. This is possible to be achieved through standards of limiting livestock numbers that are being bred on an open space.

Maximal animal number standard per surface unit prevents land pollution as well as groundwater pollution, emitting of harmful gasses in to the atmosphere. Main idea is that by respecting the maximal allowed number of animals per unit of surface, to prevent the problems such as erosion, dying of pastures, and to avoid all possible ways of polluting of the environment. Therefore, standards do not allow for pasture to be used for more than 120 days in a year. Nor do they allow that that number of animals on the pasture to exceed the equivalent to 170kg N/ha/per year. In order for certain surface to be used as pasture it is necessary for at least three years to pass after the last application of chemicals, whose usage is

not allowed by the (EEC) 2092/91 (1) regulation. By respecting the basic standards predicted for organic agriculture it is possible to achieve less pollution of the environment and to lessen the loss of the nutritional maters at farm level, which on the other hand can directly influence the economics of production.

Perspective of organic livestock production

Organic livestock production is not production system which will solve the problems that exist in livestock production. Above everything it is production system where obtained products are meant to still relatively small and choosy consumer group. For development of organic livestock production it is needed for consumer interest to be present. Specific tendencies in agricultural politics of the European Union points out that the state will gradually favor the sustainable organic agricultural production. The subvention would be connected to "ecologic performances" of each farm. This would certainly influence the market for making the additional space for products of the organic livestock farms.

Even though it will take long time for conventional livestock production to be replaced in Serbia, certain possibilities for development of organic livestock production do exist. However, for one frm to be accredited and titled as organic farm it many conditions need to be fulfilled. Often it is not possible for farmers to influence those conditions. Therefore it is needed to formulate clear breeding direction and goal, and according to organic agriculture regulatory demands all needed ecological and production conditions should be harmonized. Besides, it is necessary to give more attention to promotion of organic products as well as to creation of the space at the food market.

Regulatory measures for supporting the development of sheep farming in rural areas

In Republic of Serbia individual sector is dominant in total physical volume of livestock production. Agriculture households produce over 97% of mutton and 95% of wool. Development of sheep production has to be integral part of livestock production, to which society should give more attention in future. Its development is the chance to utilize natural resources in certain parts of the republic therefore increase the income for farmers and to revive many villages.

Conclusion

In the concept of sustainable development of cattle and sheep production at the Crna Trava territory, condition and possibilities for development were analyzed. Based on above stated following conclusions can be given:

1. Municipality of Crna Trava is of the mountain character. Therefore mountain terrain is dominant there. Municipality has 15.667ha of agricultural land out of which L 1.783ha of arable land and gardens and 347ha of orchards. Rest 13.537ha is natural meadows. Out of this it is visible that there are ideal conditions mainly for development of sheep farms and then cattle farms. From the point of natural meadows participation in total agricultural area, municipality of Crna Trava is on the first place in the republic. Besides the large pasture size it has to be pointed out that those are best pasture areas in Serbia.
2. Livestock condition for sheep and cattle at the territory of the municipality of Crna Trava is disastrous. According to yearly census of the veterinary station, number of cattle in 2011 is 150 heads and sheep 2000 heads. Migration of the young people has influenced this situation in livestock numbers.
3. Concept of modern cattle production should be based on breeding Domestic Spotted Simmental with production direction towards meat-milk or milk-meat depending on area of breeding. Also, it is possible to organize meat production with fattening at the pasture. In passive mountain areas half breeds between Busha and Brown Swiss cattle should be bred.
4. Concept of modern sheep production should be based on principle of creation of the new population (more productive) of the lighter type for dual production, meat and wool, with maintenance of the milk yield at the level of superior cattle used as maternal base. In this area Pirot refined sheep is being bred which can satisfy in the term of productive characteristics and it is well adaptable in hilly mountain areas. At the 4.000 head sheep farm only two facilities are in use and they are operating with low capacity where at the moment only 700 sheep of Pirot refined breed is. However, for quoted population it is needed to apply systematic selection as it is genetically uneven population.

5. Territory of the Crna Trava municipality is area of un polluted nature, therefore it is ideal area for organic and healthy food production through development of organic cattle and sheep farming.
6. All products obtained at the place that has specific characteristics, conditioned by climate, soil, vegetation, traditional ways of production are products of specific geographic origin, Protected Geographical Indication PGI. That is why in future period it is important to work on protection of the origin seal, Protected Denomination of Origin PGO. For example cheese produced in specifically defined area (climate, soil type, position, natural vegetation, housing and breed) with tradition they provide originality and specificity of the cheese. **Law about geographical indication** (Sl. list SRJ 15/1996) to protect geographical indication of the country, region and place of the product is very important. France has protected in XIV century sheep cheese called **Roquefort** and its name. This type of protection in our region is very popular. **Origin indication** term refers to names of the products which do not have geographical indication but are produced in one specific country, region, and place. This will by usage in specific time period become generally known and famous. To form a basis for getting **geographic indication** and **origin** indication protection for specific products, for example cheese, it is needed to fulfill certain conditions:
    - That they are manufactured from milk gotten from autochthonous breeds;
    - That they are manufactured in exact and specific geographic area (climate, soil type, natural vegetation);
    - Processing should retain traditional principles, which should be under constant monitoring which implies to building craft workshops with aim to standardize the production;
    - Autochthonous products which are produced in traditional region have exclusive right for original name, if they are produced for exporting the country name is added;
    - Indication has to be clearly marked;
    - Products which obtained geographic indication, origin indication undergo constant control of its quality, if they fail to pass that control they are being erased from the list of protected products.
7. Within sheep and cattle breeding sector it is possible to produce high quality mutton and cheese which will have geographic and origin

indication. These products should be framework for sheep and cattle farming development. Sale of obtained products can be at domestic or choosy world market. Organic food production is very significant chance for municipality as in their rural areas there are conditions for implementation and further development of the organic sheep and cattle farming, as well as for development of organic meat and milk production. Establishment of this type of production in abandoned rural areas could, in significant amount, help to bring those areas back to life. Organic production is based on lessening the number of animals per acre of land, compared to intensive production; it completely excludes usage of pesticides and mineral nitrogen. By respecting basic standards proposed for organic production it is possible to achieve lesser environment pollution.

8. All necessary preconditions for production of high quality products, ecologic products with origin indication exist on the territory of municipality of Crna Trava. Through development of above mentioned production it is possible to use existing unused natural resources which can further more influence future economic development of the municipality.

9. With aim to realize proposed programs deciding influence will be from economic measures of the agricultural politics, especially price politics, sale of breeding material, fattened animals, meat, milk, wool and their processed products. Special role will be given to the financing of the production, creation of the reserve, creation of specific social trusts, foreign trade policy and different forms of subventions. Compared to other industries, work in livestock production is hardest and most complex, and it is least valued at the market. True market criteria cannot be fully expressed in this production for two main reasons: **First** – livestock products, milk and meat cannot be kept long with producers, which is the case for plant products such are wheat and corn, but they have to be immediately sold or given for further processing. **Second** – livestock product have to reach the market at the specific time, when animal reaches specific body weight or when milk is freshly drawn. All this is not being respected by the market, but it has to be respected by the agricultural politics, by giving better economic position and certain subventions to the farmers. If adequate measures are not urgently applied there is a danger that one municipality such as Crna Trava with significant natural resources will become completely depopulated and at the end completely vanish.

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ARABLE LAND IN ORDER TO INCREASE AGRICULTURAL EMPLOYMENT IN THE MUNICIPALITES OF THE SERBIAN DANUBE BASIN

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Abstract

Arable land, in the municipalities of the Danube basin in Serbia, with 77% of participation in the total of agricultural land, has a great influence on the agrarian development. The goal of this paper is to draw attention to the lack of exploitation of the land that is uncultivated or "resting" and to the possibilities of its exploitation as a factor of increase in employment in the agricultural sector by means of analysis of arable areas. Therefore the regressive analysis of the variables "arable land", "uncultivated or resting land" and "persons employed in the agricultural sector" in the municipalities of the Danube basin is observed in the paper in order to indicate the possibilities of a more complete exploitation of land with the purpose of employment.

Keywords: *the municipalities of the Danube basin, the arable land, employment in agricultural*, *the linear regression model*

Introduction

Serbia has agricultural resources that are insufficiently exploited and therefore have a significant economic potential for agricultural and rural development. Maximal utilization of available resources is conditioned by both natural and socio-economic conditions that dictate the development of certain production branches and regional distribution of agricultural production (*Maletić and Popović, 2011*). In recent years, great importance is given to the development of agriculture and rural areas, all complied with European Union requirements. The approach to this region as a single macro-region, would help in solving many problems, such as overcoming the regional differences in economic performance, which

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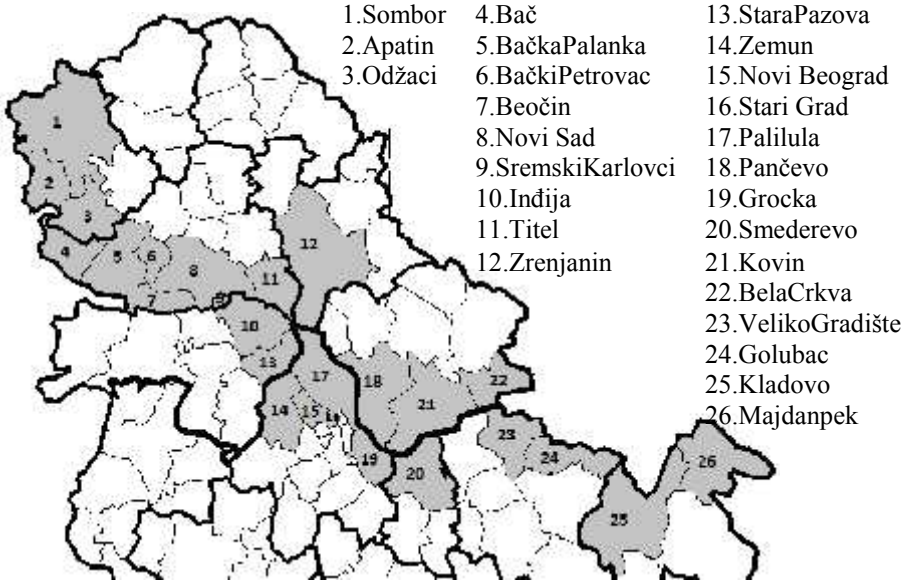
would determine the requirements of integrated development. Therefore, in September 2009, the Government of the Republic of Serbia formed a working group for cooperation with the EU in the Danube region, which brings together representatives of relevant departments and the Executive Council. Thus, Serbia was officially included in the EU Danube Strategy, which plans to finance various projects, referring the economics, traffic, environment and cultural tourism, in the countries of the Europe's largest river.

As an international river, the Danube is constantly in the center of interest on the local and international level, and therefore there is no need to emphasize how great the potentials of the municipalities of the Danube basin are, especially when it comes to agriculture. Out of a total of 2850 kilometres of this river, 588 km passes through 26 municipalities in Serbia, Figure 1.

Figure 1. *Municipalities of the Danube basin*



Source: *personal representation.*

The total area of the municipalities in Serbia since 2004 has been 11840 km^2, while previously it was 12130 km^2. A change in size occurred in 2004 when a newly formed municipality Surčin was separated from the municipality of Zemun. The area of the municipality of Zemun was decreased from the 440 km2 to 150 km2.

Table 1. *Percentage of the total area of the municipalities of the Danube basin*

Municipality	Area km^2	%	Municipality	Area km^2	%
Zrenjanin	1327	11,19	Bač	365	3,08
Sombor	1178	9,93	Bela Crkva	353	2,98
Majdanpek	932	7,86	Stara Pazova	351	2,96
Pančevo	787	6,63	Apatin	350	2,95
Kovin	735	6,20	Veliko Gradište	344	2,90
Novi Sad	699	5,89	Grocka	289	2,44
Kladovo	630	5,31	Titel	260	2,19
Bačka Palanka	575	4,85	Beočin	186	1,57
Smederevo	481	4,05	Bački Petrovac	158	1,33
Palilula	451	3,80	Zemun	150	1,26
Odžaci	411	3,46	Sremski Karlovci	51	0,43
Inđija	386	3,25	Novi Beograd	41	0,35
Golubac	367	3,09	Stari Grad	5	0,04

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia in the period 1995-2010, by Statistical Office of the Republic of Serbia, Belgrade.*

Agricultural development is not possible without a strategy to increase employment in agriculture. This would provide income for farmers and thus reduce migration to urban areas. Taking into consideration that of all agricultural areas the arable ones have a great influence on the income of agricultural population, it is significant to analyse the connection between the quantity of arable areas and the employment rate in agriculture.

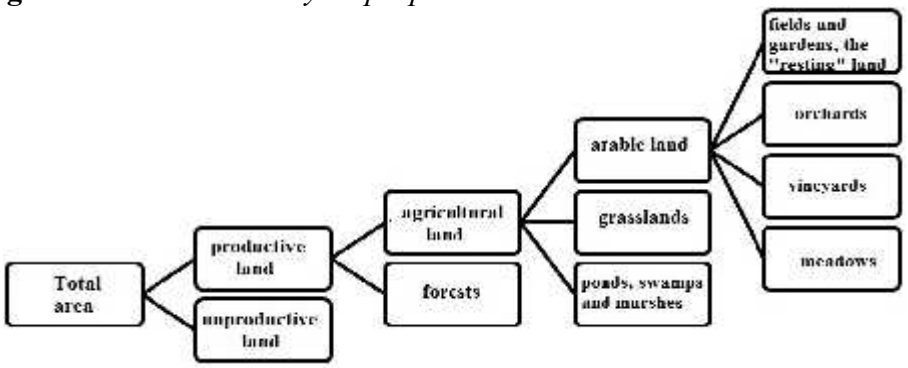
The goal of this paper is to separate the uncultivated or "resting" land from the arable land, to identify the changes in the quantity of arable land and the uncultivated or "resting" land, to identify the employment rate dynamics with regards to the active population in the agricultural sector, and then to examine their regressive dependence in the municipalities of the Danube basin in Serbia in the period 1995-2010. Note that, in the further analysis, the Municipality Stari Grad is excluded because they do not own agricultural land.

The land resources in the municipalities of the Danube basin

Land is an important natural resource and an objective requirement of agricultural production, which is an important sector of any society, regardless of its economic strength, organization or geo-strategic position. In agricultural lands, that is, those lands which can be used for farming in

accordance with their natural and economic conditions, including arable land, grassland and ponds, swamps and marshes. The division of land according to the purpose, based on the definition of the Republic Statistical Bureau, is given in Figure 2. The data in the records of *Municipalities in Serbia* are given according to this classification.

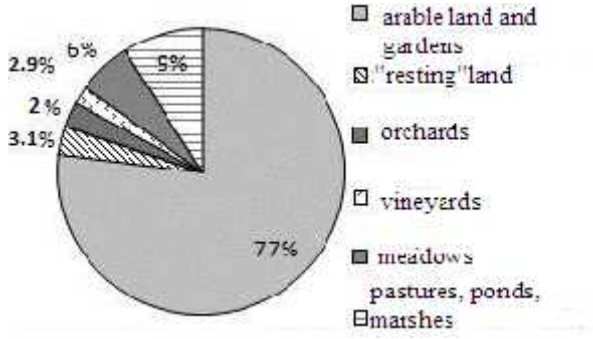
Figure 2. *Soil structure by its purpose*



Source: *personal representation.*

Out of the total agricultural land approximately 91% belongs to the arable land, while pastures, ponds and swamps account for about 9% of the total agricultural land. Most of the arable land, 77% of it, are fields and gardens, while in the second place of arable land there are meadows with only 6%. One small share of the agricultural land are orchards 2,96%, while the share of vineyards is 1,98% of agricultural land (figure3).

Figure 3. *Agricultural land structure in the Danube basin municipalities*



Source: *personal representation.*

It should be mentioned that the areas of arable land also includes the areas of land which has not been cultivated for one or more years, from any reason, or were left "to rest" (*Agriculture of Serbia 1947-1996*). Data

about this are not specially published in the records of *Municipalities in Serbia*. Since one of the goals of this paper is to determine the possibility of exploitation the uncultivated and "resting" land in the production resource, that is in the arable land that represents a potential for employment, data about this land is separated. In the period from 1995 to 2010, it was indicated that the average percent of this land, from the total of agricultural land in the Danube basin, is about 3,1%.

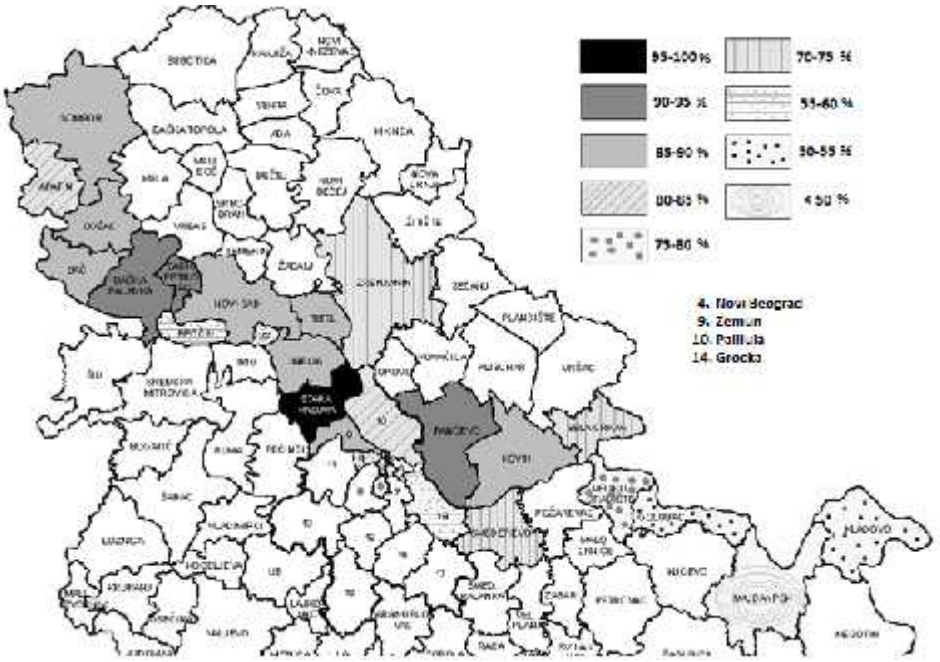
Based on the agricultural structure of land, it would be interesting to point out the Danube basin municipalities with the biggest and the smallest percent of the specific kind of agricultural land. Municipalities with the biggest percent of pastures, ponds and marshes are: Beočin 22%, Golubac 20%, Zrenjanin 16%, Bela Crkva 15%, Majdanpek and Sremski Karlovci13%. Municipality Stara Pazova has the biggest percent of arable land and gardens 97%, while Majdanpek has the smallest percent of 36%. Meadows, generally, take up a small percent of agricultural land, maximally up to 5% per municipality, but municipality with the biggest percent of meadows, by far, is Majdanpek, 42%. Then there is Kladovo with 22%, Golubac with 17% and Sremski Karlovci with 12%. Municipality Grocka with 20% is leading as the municipality with the biggest percent of orchards in the total of agricultural land, all the remaining municipalities have less than 8% of orchards. Municipality of Sremski Karlovci has the biggest percent of agricultural land is covered with vine yards and it is 14%. The biggest average percent of the area, which is uncultivated and "resting", is in the municipality of Kladovo about 12% and Smederevo about 7%. Considering the analyses that have been done so far and they involved the data, municipalities that stand out are: Stara Pazova and Kladovo. Stara Pazova with the highest percent of arable land without the uncultivated and "resting" areas, and municipality of Kladovo with the highest percent of uncultivated or "resting" land (table 2 and 3).

The changes in the quantity of arable land in the municipalities of the Danube basin

A special attention is given to the arable areas and their quantity in the municipalities of the Danube basin. Having in mind that, out of the total of the agricultural land, these areas represent the highest percentage of participation (77%), it means that they also have the highest influence on employment in agriculture. It is already emphasised that, according to the Statistical Office of the Republic of Serbia, the uncultivated land also falls into the category of arable land. From the total of agricultural land,

there is 3,06% of the uncultivated areas on the annual level, which in comparison to the orchards (2,96%) and vineyards (2,96%) represents a significant part. Therefore, for each municipality, the arable land is separated from the land that is for some reason uncultivated or "resting" and they are examined separately. This type of data separation is necessary, first of all in order to obtain more realistic analyses and results, and because of the insight into the "hidden" employment potential in the uncultivated or "resting" land.

Figure 4. *The average participation of arable areas, without the "resting" areas*, *in total of Agricultural land in for municipalities of the Danube basin, 1995-2010*



Source: *personal representation.*

From the data analysis from 1995-2010, on the average participation of arable land, without the uncultivated or "resting" land, from the total of agricultural areas (Table 2), the majority municipalities do not have significant changes throughout this period. Three municipalities are distinctive for the slight reduction of these areas: Majdanpek (-2,56% average annually), Grocka (-2,45% average annually), Kladovo (-1,11% average annually). In addition, these three municipalities belong to group of municipalities with the small percent of participation of arable land (less than 60%) of the total agricultural area.

Table 2. *Average participation and medium tempo of change of arable land, without the uncultivated, "resting „areas, in the total agricultural land in the Danube basin municipalities, 1995-2010*

Municipalities	Average % arable land	Average tempo of change (%)
Apatin	82,07	0,64
Bač	86,19	0,14
Bačka Palanka	92,44	-0,09
Bački Petrovac	93,27	0,04
Bela Crkva	70,36	0,60
Beočin	57,09	-0,23
Golubac	52,57	-0,81
Grocka	59,51	-2,45
Inđija	87,16	0,24
Kladovo	50,42	-1,11
Kovin	87,63	0,39
Majdanpek	36,02	-2,56
Novi Beograd	83,33	-0,10
Novi Sad - grad	88,04	-0,32
Odžaci	88,50	0,35
Palilula	83,08	-0,32
Pančevo	91,55	0,25
Smederevo	73,27	-0,58
Sombor	88,27	0,24
Sremski Karlovci	49,95	-0,64
Stara Pazova	97,09	-0,03
Titel	87,28	-0,04
Veliko Gradište	77,39	-0,13
Zemun	87,27	-0,63
Zrenjanin	74,28	-0,26

Table 3. *Average participation and medium tempo of change of uncultivated, "resting" lands in the total agricultural land in the Danube basin municipalities, 1995-2010*

Municipalities	Average % of "resting" land	Average tempo of change (%)
Apatin	3,87	-11,76
Bač	2,23	-22,50
Bačka Palanka	2,17	-6,42
Bački Petrovac	1,16	23,32
Bela Crkva	4,67	-7,47
Beočin	4,08	-1,54
Golubac	4,55	4,22
Grocka	4,30	9,22
Inđija	0,73	-25,40
Kladovo	11,82	3,09
Kovin	2,03	-16,72
Majdanpek	1,71	21,60
Novi Beograd	0,98	/
Novi Sad - grad	1,98	0,11
Odžaci	1,81	-6,53
Palilula	4,80	12,59
Pančevo	1,18	-10,07
Smederevo	7,31	3,31
Sombor	1,70	-4,90
Sremski Karlovci	1,55	16,09
Stara Pazova	0,18	-5,35
Titel	1,13	-19,66
Veliko Gradište	3,08	10,66
Zemun	5,04	10,16
Zrenjanin	2,45	3,04

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 1995-2010, by Statistical Office of the Republic of Serbia, Belgrade.*

Dynamics of activities of areas which was uncultivated or "resting" over the years, for the period of 1995-2010 is illustrated in Table 3. Significant changes on the annual level can be noticed. Municipalities that were increasing these areas, over the observed period, are: Bački Petrovac (23,32% average annually), Majdanpek (21,60% average annually), Sremski Karlovci (16,09% average annually), Palilula (12,59% average annually), Veliko Gradište (10,66% average annually), Zemun (10,16% average annually). On the contrary to these negative notions, municipalities that have significant decrease of uncultivated or "resting" areas are: Inđija (25,40% average annually), Bač (22,40% average annually), Titel (19,66% average annually), Kovin (16,72% average annually), Apatin (11,76% average annually), Pančevo (10,07% average annually).

Based on the previous analysis the municipality of Inđija distinguishes as the positive example of municipality, which in the observed period kept the desirable trend in the manner of land using. This municipality has a big percent of participation of arable land 87,16 % without uncultivated or "resting" land, in the total of agricultural areas. Thus over the course of time there was a slight increase of these areas, 0,24% average annually. While on the other hand, changes with land that was not cultivated over the years or it was "resting" are also positive, since these areas were decreasing, 25,40% average annually.

The municipality of Majdanpek also stands out as a negative example of municipalities. This municipality has a very little percent of participation of arable land, without the uncultivated or "resting" land, in the total of agricultural areas, barely 36,02% and over the years there has been a reduction of these areas, -2,56% average annually. Negative changes in this municipality exist with land that has not been cultivated or it was "resting" over the years. Namely, the "non-arable or resting" land had approximately increased at the rate of 21,60% on the annual level.

Bearing in mind that there is a higher possibility of turning the uncultivated areas in the municipalities of the Danube basin into arable land due to the advantages of water exploitation for irrigation purposes, it opens employment possibilities in the agricultural sector.

Dynamics of activities of employed agricultural population in the Danube basin municipalities

In this work, we observed the participation of employed in agriculture compared to the total number of employed, in these municipalities. The period covered is of sixteen years from 1995 to 2010. The biggest percent of employed in agriculture was noted in municipality of Veliko Gradište (23,61%), although municipalities of Bač and Bački Petrovac are not far. The smallest percent of employed in agriculture (less than 1%) were recognized in municipalities of Titel and Novi Beograd.

During this observed period, a decrease in participation of employed in agriculture in almost all municipalities of the Danube basin was identified. Only four municipalities are exceptions, since there was a slight increase in participation of employed in agriculture: Beočin (1,80% average annually), Golubac (3,17% average annually), Novi Beograd (5,56% average annually) and Palilula (0,27% average annually), while the biggest fall of employment in agriculture was recognized in municipality of Grocka with even 13,94% on average annually (Table 4, third column "average tempo of change").

Observing the Danube basin municipalities over the mentioned period leads to some interesting conclusions. Two municipalities are especially interesting, Bač and Grocka. The biggest fluctuation of participation of employed in agriculture is noticed in these very municipalities, and if year 2010 is observed compared to the beginning of period (1995) it is indicated that there was a decline, of 89,47%, of participation in agriculture in Grocka municipality and 73,67% in Bač municipality. The mentioned percents are not insignificant although in municipality of Grocka the participation of employed in agriculture is not somewhat important (average 3,31%) as well as in municipality of Bač (average 21,28%). Municipality of Bač had bigger fluctuation, exponential fall of 38,75% in 2000 compared to 1999, which has continued in a moderate tempo in 2005. That year a sudden growth of employment in agriculture happened for even 48,18% compared 2004. After 2005, there is a decrease in employment again, and it lasts until the end of the observed period. Municipality of Grocka had two important declines of participation of employed in agriculture, one in 1997 when it had fall of even 44,83% compared to 1996 and other in decline of participation of employed in agriculture was even bigger – 53,19% compared to 2000.

Table 4. *Average participation and average tempo of change participation of employed in agriculture in the Danube basin municipalities, 1995-2010*

Municipalities	Average participation of employed in agriculture	Average tempo of change (%)
Apatin	12,07	-5,20
Bač	21,28	-8,51
Bačka Palanka	10,12	-5,20
Bački Petrovac	21,22	-3,55
BelaCrkva	18,28	-3,29
Beočin	1,26	1,80
Golubac	9,58	3,17
Grocka	3,31	-13,94
Inđija	9,76	-10,50
Kladovo	5,17	-11,79
Kovin	13,76	-5,32
Majdanpek	2,1	-4,74
Novi Beograd	0,75	5,56
Novi Sad - grad	1,91	-2,67
Odžaci	15,11	-1,70
Palilula	4,93	0,27
Pančevo	5,49	-2,20
Smederevo	1,75	-8,23
Sombor	11,85	-4,30
Sremski Karlovci	2,51	-10,74
Stara Pazova	6,61	-12,57
Titel	0,65	-3,91
Veliko Gradište	23,61	-7,71
Zemun	11,77	-8,64
Zrenjanin	2,14	-3,78

Source: *These data were obtained as the result of author's calculations of the original data from the State Statistics of Municipalities in Serbia 1995-2010, by Statistical Office of the Republic of Serbia, Belgrade.*

Apart from municipality of Grocka, twenty-two municipalities of the Danube basin had also had decline of participation of employed in agriculture in 2001 compared to 2000. In that period, certain changes occurred in social politics of rural areas. Namely, upon the political changes that took place on of the 5th October 2000, in Serbia, an interim government was elected. The government has started the process of privatisation of about 500 companies, which has led to numerous problems. Such as: decreasing the number of employed people, lack of appropriate social programs, unfulfilling the duties concerning

investments, they obliged to etc. The majority of municipalities had one-digit percent of decline of employment, though there were ten municipalities that had decline of participation of employed in agriculture in the interval from 20,45% (municipality of Zrenjanin) to even 59,72% (municipality of Kladovo). The rest of the municipalities in the ascending order are: Novi Sad, Bački Petrovac, Beočin, Veliko Gradište, Kovin, Inđija, Grocka, Stara Pazova.

It is interesting to make a connection between the average percent of employed in agriculture and average percent of arable land. It can be concluded that those municipalities that have the biggest percent of arable areas do not have the biggest percent of employed in agriculture. For instance, the municipality of Stara Pazova stands out by 97,09% of arable areas without uncultivated or "resting" land in total of agricultural areas, while it has only 6,61% of employed in agriculture, and data about the medium tempo of change shows that about 12,57% of employed abandoned agriculture sector every year. This makes this municipality the second, immediately after municipality of Grocka, in percents of employed who abandon agriculture. Majority of municipalities, with significant participation of arable areas without uncultivated or "resting" land (above 70%, Table 2), also marks significant participation of employed in agriculture (from 10% to 24%, Table 4). Municipalities that belong to city area are: Novi Beograd, Palilula, Pančevo and Novi Sad. Their percent of arable land without uncultivated or "resting" land exceeds 83%, and participation of employed in agriculture barely reaches 5,5% (municipality of Pančevo). Poor participation of employed in agriculture, in municipalities with important percent of arable land without uncultivated or "resting" land, represents the unused potential, in both human resources and agricultural sense. Employing the active population in agriculture would contribute to improving the standard of population in rural areas, which is a benefit for rural development (*Sarić, Grujić i Nastić, 2012*).

Analysis of employment dynamics in agriculture with regards to arable areas

Based on the data about the average participation of employed in agriculture, the average percent of arable lands, without uncultivated or "resting" land and average percent of uncultivated or "resting" land , the idea is to form the simple

$$Y_i = \alpha + \beta \cdot X_i + \varepsilon_i$$

or multiple regression model

$$Y_i = \alpha + \beta_1 \cdot X_{1i} + \beta_2 \cdot X_{2i} + \ldots + \beta_k \cdot X_{ki} + \varepsilon_i$$

which best describes the dynamics of the observed phenomena in the area of the Danube basin. Variables, which play a role in regression model, are gained by calculating the average values for each municipality of the Danube basin for the period of 1995-2010.

Based on the Table 5, it can be seen that the average participation of employed in agriculture for the period 1995-2010 in the area of the Danube basin was 8.93%, while in the same period the average percent of arable land without uncultivated or "resting" land is 76,96% (table 2). The average percent of uncultivated or "resting" land in the same area, for the same period was 3,06% (table 3).

Table 5. *Descriptive statistics of the observed variables in municipalities of the Danube basin*

	Average value	**Standard deviation**
Average participation of employed in agriculture	8,93%	6,8946
Average percent of arable land, without the areas that are uncultivated or "resting"	76,96%	16,5785
Average percent of the areas that are uncultivated or "resting"	3,06%	2,5026

Based on the observed data, two models were defined: **first model (1)** represents the simple linear regression model, where dependant variable is "average participation of employed in agriculture", and independent variable is "average percent of arable land, without uncultivated or resting" land, **second model (2)** describes multiple linear regression of variable "average participation of employed in agriculture" in function of two variables "average percent of arable land, without uncultivated or resting land" and "average percent of uncultivated or resting land". In both these models free element plays part.

However, in Table 6 it can be seen that free element is not statistically important for neither of the two models, as well as both variables in the second model. For that reason, it is necessary to repeat the evaluation of

both models, without the presence of free element the situation would not change when importance of coefficient of independent variable is in question.

Table 6. *Evaluated regression model for the Danube basin municipalities with presence of free element*[a]

Model		Coefficients	Standard error	t	Significance
1	(free element)	-3,936	6,246	-0,630	0,535
	Average percent of arable land, without uncultivated or "resting" land	0,167	0,079	2,105	0,046
2	(free element)	-1,969	8,099	-0,243	0,810
	Average percent of arable land, without uncultivated or "resting" land	0,151	0,091	1,663	0,110
	Average percent of uncultivated or "resting" land	-0,236	0,601	-0,393	0,698

[a]Dependable variable: "average participation of employed in agriculture"

Evaluated regression models without the presence of free element, are presented in Table 7.

Table 7. *Evaluated regression models for the Danube basin municipalities without the presence of free element*[a]

Model		Coefficients	Standard error	t	Significance
1	Average percent of arable land, without uncultivated or "resting" land	0,118	0,016	7,299	0,000
2	Average percent of arable land, without uncultivated or "resting" land	0,130	0,023	5,620	0,000
	Average percent of uncultivated or "resting" land	-0,327	0,463	-0,706	0,487

[a]Dependable variable: "average participation of employed in agriculture"

Based on Table 7, it is indicated that without free element, coefficient with variable "average percent of arable land, without uncultivated or resting land", becomes statistically important in both models, but coefficient with variable "average percent of uncultivated or resting land" in the second model is not statistically important, hence the mentioned

variable should be eliminated from the model. This way, we can create a model which describes a simple linear dependency of variable "average participation of employed on agriculture" in function of only one variable, "average percent of arable land, without uncultivated or resting land ", can be presented on the form:

$$Y_i = \underset{(0,016)}{0,118} \cdot X_i, \quad S_e = 6,36750$$

It is necessary to check the adequacy of the evaluated model, Table 8.

Table 8. *Indicators of adequacy of the chosen model of the Danube basin*

Model	R	R^2	Adjusted R^2	Standard error of the estimate	Durbin-Watson
First	0,830	0,689	0,676	6,3675	1,780
Table of analysis of variance					
Source of variations	**Sum of square**	**Degrees of freedom**	**Mean square**	**F**	**Significance**
Regression	2160,131	1	2160,131	53,277	0,000
Error	973,083	24	40,545		
Total	3133,214	25			

Value of determination coefficient (R^2) is not high (0,689). On the other hand, Table variance analysis shows the significance of evaluated regression. Adequacy of evaluated model was confirmed by the absence of autocorrelation, Durbin-Watson's statistics value is close to value 2 (*more on the subject - Mladenović and Petrović, 2007*). Concluding on all the presented facts, evaluated model is relatively acceptable.

Interpretation of this model is the following: if the average percent of arable land increases for 1%, average participation of employed in agriculture will be increased in average for 0,188%.

One of the possibilities for the increase in the arable areas is turning the uncultivated land into arable. Taking into consideration that approximately around 3,06% of the uncultivated or "resting" land (table 5) is registered in the territory of the municipalities of the Danube basin in the observed period, it would mean that the employment rate in the agricultural sector, without changes in observed values, could be increased for 0,564%.

Conclusion

Based on the analysis regarding the quantity of arable land and the rate of employment in the agricultural sector in the municipalities of the Danube basin in Serbia, for the analysed period of time it can be said that:

- the municipalities of Stara Pazova and Inđija have a great percentage of arable land and a small percentage of uncultivated or "resting" land, and a great decrease in employment in the agricultural sector of 12.57% and 10.50% respectively.
- municipalities that represent urban areas (Novi Beograd, Zemun, Pančevo and Novi Sad) stand out with the percentage of arable areas exceeding 83%, while the share of employment in agriculture barely reaches 5.5%, which indicates an exceptionally low level of utilization of manpower and agricultural resources in these municipalities;
- in the observed time interval, there was a decline in number of employees in agriculture in almost all municipalities in of the Danube basin, except Beočin, Golubac, Novi Beograd and Palilula, while the biggest decline in agricultural employment was recorded in the municipality Grocka (13.94%);
- regression model has been defined and tested; it describes the linear dependence of the "average share of employment in agriculture" in the function of a variable "average percentage of arable land without areas that are resting", this model clearly indicates that if the average percentage of arable land in the municipalities of the Danube basin increases by 1% on average, the average share of employment in agriculture will increase by 0.188%.

If the municipalities of the Danube basin are considered as a whole, a small percentage of participation of agricultural population, out of the total of active population, is observed, not more than 8,93%. Defining of the agrarian policy towards turning uncultivated land that amounts approximately to 3,06% into arable land would, on the basis of the estimated regressive model, lead to an increase in the employment rate of the population from the rural regions in the agricultural sector for 0,569%. Although the observed model indicates a small increase in the percentage number of employed persons in the agricultural sector, this could contribute to a decrease in migrations to urban regions, and consequently to a higher level of development of rural regions, as well as to the increase in income and quality of living of agricultural population.

During the data analysis, certain municipalities such as Stara Pazova, Inđija, Bački Petrovac, Majdanpek, Kladovo, Veliko Gradište became prominent as either positive or negative examples in certain regions. In future studies it would be interesting to apply the linear regressive analysis for each above mentioned municipality separately and compare the obtained results.

Acknowledgements

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SCIENCE AND ECONOMY

Danica Micanovic, Veselinka Zecevic[1]

Abstract

Knowledge, education and innovation drive economic development and lead cultural, social and economic prosperity of society as a whole. Legislation in the field of scientific and technological development, innovation and intellectual property activities in Serbia, is harmonized with European Union legislation, and provides the conditions for the creation, development and implementation of innovations and new technologies in the economy. This created the basis for the promotion and improvement of industrially applicable idea, raising the competitiveness of our products and to attract foreign investors. However, the connection of science and industry in Serbia has come to life and is quite flimsy. Small number of technology solutions, research results, the projects financed from the budget of the Republic of Serbia finds application in industry. The market valuation of creativity is a prerequisite for improving the level of technological development of the country, and it is therefore necessary systemic regulation of this area in Serbia.

Key words: *knowledge, science, knowledge and technology transfer, industry*

Introduction

The European Community and its underlying research in the last ten years, predicted the global economic crisis. Adoption of the Lisbon Treaty, and the choice to create knowledge-based economy, paving the way for possible solutions to the problems caused by the evident economic and climate crisis. The accepted view is that with the

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inventiveness and creativity may be needed solutions, paving the way for the development of a knowledge society, and this means that the conditions for the creative potential that can be directed towards finding innovative solutions, products and services with the aim of ensuring the long-term and stable economic growth (2).

Accordingly, the EU's Innovation Union formed to support the development and implementation of new technologies and innovation in the economy, and increase spending on research and development to 3% of GDP (3).

Republic of Serbia, is also realized the opportunity for economic prosperity of society by focusing on the intellectual potential of Serbia to improve the level of technological development of the country, with a focus on creating an innovative society (10). Adopted a number of strategies and legislation, with the aim of increasing spending on R & D from 0.35% to 3% (15), and raising the competitiveness of the Serbian economy in the European and world market.

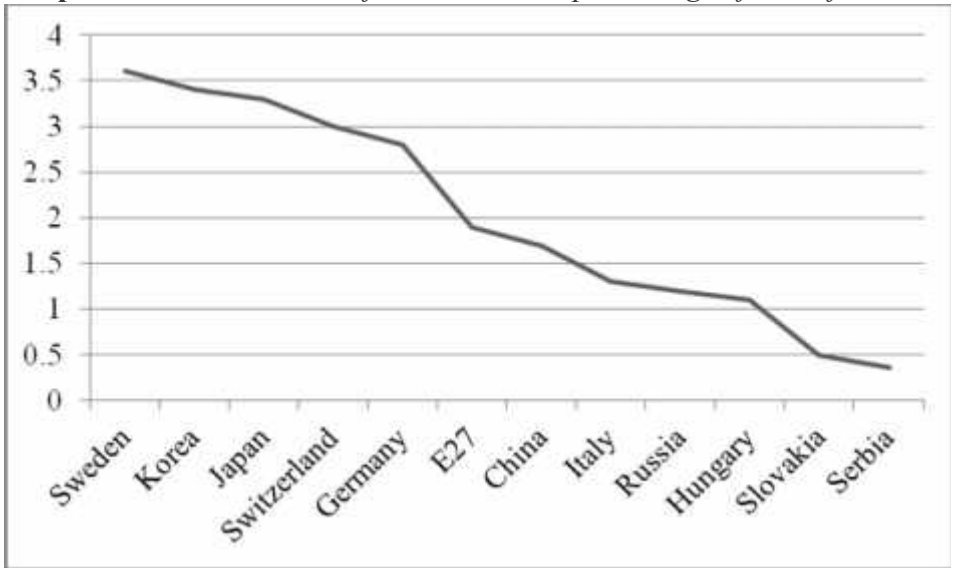
According to the latest report of the Innovation Union spending on R & D in the EU amounted to 1.9%, while in Serbia are still 0.36% (11). A lot of progress has been made in the EU in contrast to Serbia, which points to the need for a serious approach to system planning primarily in the area of Serbia. It is necessary to create a national innovation system, in order to use knowledge and innovation potential not only to run but also the promotion of economic development of the country.

Expenditure on Research and Development

An allocation in Serbia is quite low and does not exceed 0.4% of GDP (Graph. **1**). The problem is that this tendency is displayed for a long time. There was no increase is not expected to change in the share of new rebelans budget for 2012. Year. However, an additional problem is that the separation of the private sector is quite low, and do not exceed 0.02%. The countries at the top of the charts competitiveness, with the strongest and most developed economies, according to the latest data, with the largest allocations for R & D, Sweden, Germany, Switzerland, China led them to 2/3 of the economy, while the allocation to Japan countries reached 0.75% of the budget of the company (18).

During the privatization process in Serbia share of private sector investment in research and development has declined severely since the investment was more focused on raising productivity. Today these are mainly focused on the allocation of investment in infrastructure and the purchase of machinery and equipment (14).

Graph. 1. *Total allocations for science as a percentage of GDP for 2011*



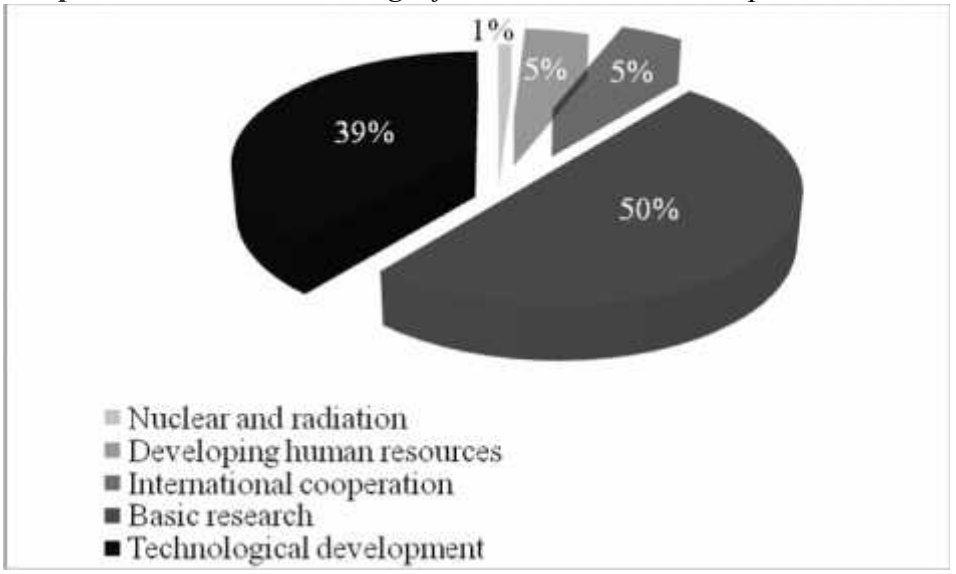
Source: *OECD Science, 2012.*

In addition, in Serbia are not sufficiently recognized and supported research that have market application, and for basic research accounts for more than 50% of the budget (Graph. 2). If we want a society of knowledge, then it is necessary to encourage more investment in scientific research programs oriented to commercial application, the promotion and development of applied sciences in the creation of technological innovation. Innovative society requires innovative economy, and that without the cooperation of the scientific quality and the manufacturing sector is not possible.

Serbia's potential in high-quality technology and technological processes and innovations from universities, institutes and other scientific research organizations, the development of production and research centers, innovative companies, inventors of organizations and individuals, is very significant.

One of the strategic goals of the Republic of Serbia is the creation of the modern Serbian economy based on knowledge (10). Knowledge is one of the most important resources in Serbia that is not used enough. Knowledge, education and innovation initiate economic growth and inevitably lead to cultural, social and economic prosperity of society as a whole. However, very few of these innovations are market-valorized, although the innovation are entry to the market (16).There is a gap between science and industry. Economy is not at such a level that can involve large number of solutions. Therefore, it is necessary to improve systematically this area in Serbia. Also, the National Innovation System has to be improved, to put the innovation potential in the function of improving the level of technological development of country (8).

Graph. 2. *Redistribution budget for research and development*



Source: *Ministry of Education, Science and Technological Development of Republic of Serbia, 2011.*

Innovative economy

Serbia according to an analysis by the World Economic Forum (18) is one of the countries that are on the second level of development, with an economy that is based on efficiency rather than innovation (Tab. 1). Government priorities in these countries are focused on infrastructure development, development of an efficient legal system and business environment. The problems of these economies are reflected in the

dominant import of technology, low level of innovative activity, competitive advantages, which are based on low costs, mainly labor. So We needed a large number of programs and support measures to improve the level of technological development of the country and raise the level of innovation.

On the other hand, according to research by Thomson Reuters, Serbia is the third year in a row, isolated as a rising star in the number of published scientific papers (Graph. 3). Domestic scholars have pointed out in the fields of science: agricultural sciences, biology and biochemistry, chemistry, clinical medicine, computer science, engineering, materials science, mathematics, neuroscience, pharmacology and toxicology, physics, and, finally, space science.

Table 1. *The level of economic development*

The level of development	**The basic demands**	**Increase of productivity**	**Investments and sophistifictation**
Resource based economy	50%	40%	10%
Efficiency based economy	40%	50%	10%
Innovation based economy	30%	40%	30%

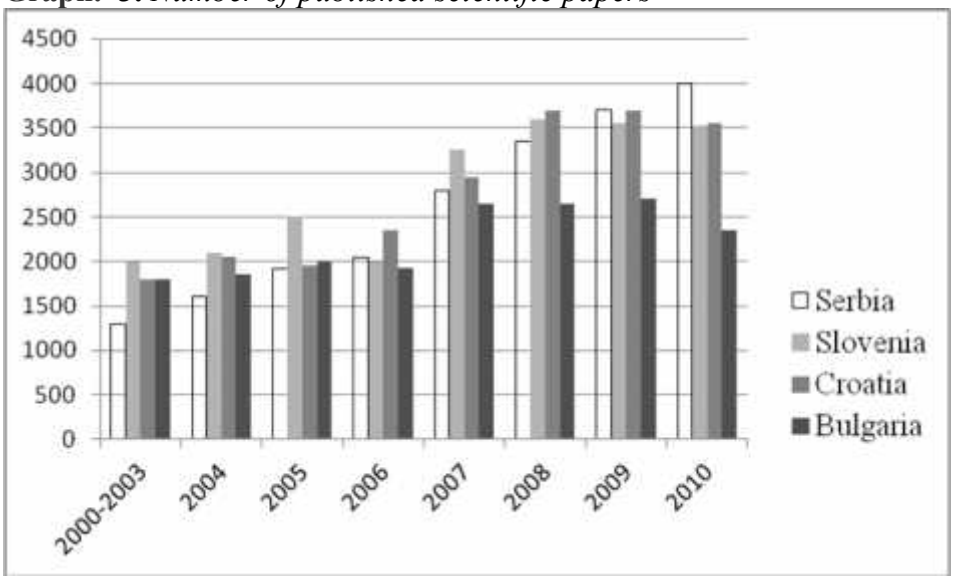
Source: *Notebooks Economic Forum report, 2011-2012*.

A significant step forward in the publication of scientific papers has been made in most of these areas, while the agrarian science this year, appearing in the first place. Serbian third consecutive overall most scientists quoted in several scientific fields.

However, very few of these results has been applied in the economy. There is a gap between science and the economy that is difficult to bridge. It's not only the case in Serbia, such a tendency is in developed countries. In order to support the transfer of knowledge and technology have made amendments to the Law on Innovation (1). Through innovation projects funded prototyping and pilot plant and is governed by an intellectual property right. So it was increasing the number of innovative subjects in 2011. year (Graph. 4).

However, due to the postponement of funding innovative companies and the lack of continuity that trend did not continue.

Graph. 3. *Number of published scientific papers*

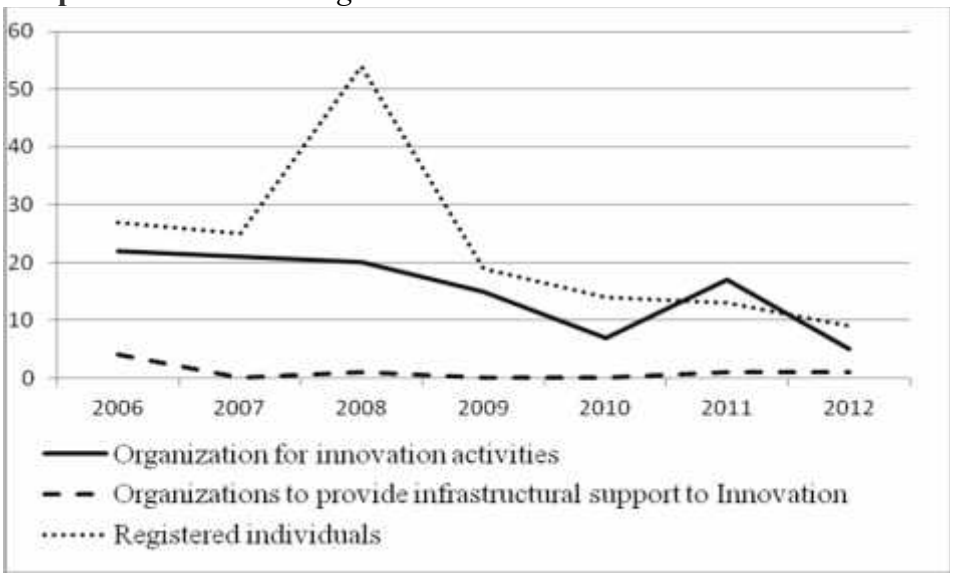


Source: *Ministry of Education, Science and Technological Development of Republic of Serbia 2010.*

But the latest report Global Innovation Index, published by the World Intellectual Property Organization (WIPO) and the organization INSEAD, in collaboration with partners Knowledge Partners, Alcatel-Lucent, Booz & Company and the Confederation of Indian Industry (CII), Serbia is ranked high 7 . place on innovation efficiency (top two occupied China and India). Serbia's was scored as a country with strong despite weak manufacturing innovation Innovation environment (19).

As for the best countries in innovation performance, for the second consecutive year, this group led by Switzerland, Sweden and Singapore The report ranked 141 economies based on innovation capabilities and results. Behind these three countries are Finland, Great Britain, Holland, Denmark, Hong Kong (China), Ireland and the United States. Developed countries should continue to strengthen and develop the relationship between the participants in the innovation cycle in order to maintain an advantage in strategic sectors. Also, developing countries need to establish a national model that maintains coherent links in innovation system.

Graph. 4. *Innovation registered entities*



Source: *Ministry of Education, Science and Technological Development of Republic of Serbia.*

Appropriate policies and with good coordination of efforts of all parties, the coherent links would contribute to further development of innovation processes (18).

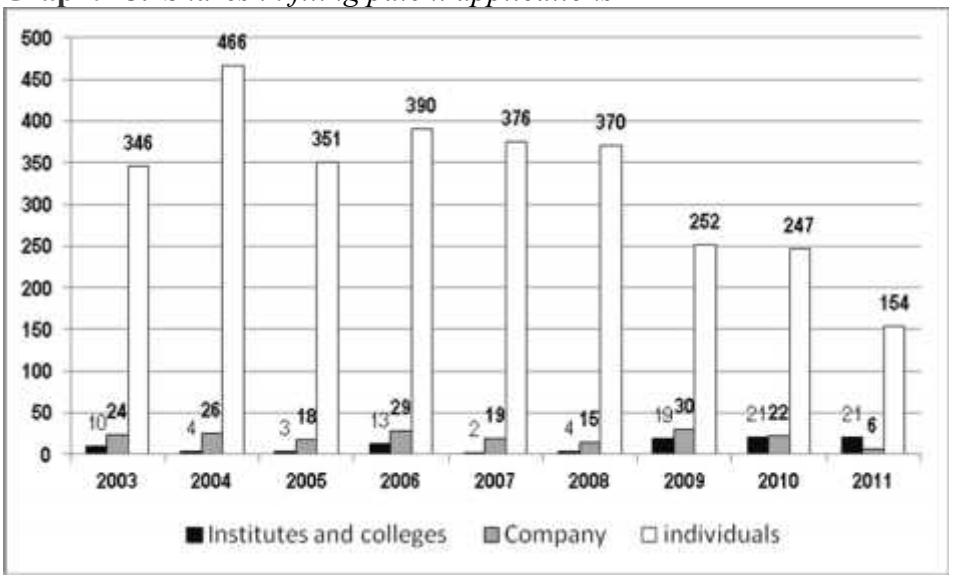
Intellectual Capital

And awareness of the importance of intellectual capital in Serbia is low. However, the new development strategy of intellectual property since 2011. by 2015. The development is compatible with the interests of the country, which were designed in the strategy of sustainable development and has significant activities for the promotion of innovation in Serbia. The strategy Serbian himself as a country that recognizes the importance of innovation and intellectual property, to the way it was done in the European strategy for smart, sustainable and inclusive growth - Europe 2020, adopted by the European Council 17th June 2010. year.

Serbia became a member of the European Patent Organisation 01 October 2010. year and thus facilitated their nationals acquiring high-quality care in all member states of the EPO and patent agents in Serbia has given new opportunities.

Membership in this organization, which includes 38 states, as well as Montenegro and Bosnia and Herzegovina, as well as associate members, enjoys a good reputation in terms of quality of patents, provides investment security in our country, the transfer of knowledge and technology and tighter linking science and industry (4,12,8).

Graph. 5. *Shares in filing patent applications*



Source: *Intellectual Property Office of RS, 2012.*

Based on the data from Graph. 5 we can conclude that a very small number of patents have with institutes and universities (4). So to raise awareness about the importance of innovation and intellectual property in national companies, to base the economic strategy of the company on innovation and intellectual capital, which contributes to their added value, greater stability and security in the business, and to attract foreign investors is a priority activity.

In transition countries, such as Serbia, intellectual property law has one additional characteristic function which, from the point of view of current economic policy, sometimes in the foreground. It is the function of attracting foreign direct investment. Effective legal protection of intellectual property rights undoubtedly encourages overseas companies to bring manufacturing into the country, and services based on new technologies, well-known trademarks, service marks, and creative industries.

An effective system of intellectual property protection is an integral part of the business environment, which has a positive effect on the development of knowledge-based economy, acts as a disincentive to research projects and development of the new economy. In this way, the Serbian economy can net the predominant users of the protected intellectual property, become their net lender, the medium and long term can profit from the performance of its foreign trade.

One of the key activities of the Serbian Chamber of Commerce and Industry is promoting awareness of the significance of innovations and intellectual property in national companies. In doing so, it hopes to encourage the companies to base their corporate economic strategies on innovation and intellectual capital to achieve added value, greater stability and business safety, and to make themselves more attractive to foreign investors.

Active involvement with the Intellectual Property Commission of the International Chamber of Commerce and WIPO has led the Serbian Chamber of Commerce and industry to begin work on the harmonisation of national legislation in the area of innovative activities and intellectual property with EU regulations and WIPO documents.

The SCCI has played a significant role in the development of intellectual property policy and in promoting awareness of the significance and value of intellectual capital, both in Serbia and the broader region. By cooperating with the Intellectual Property Office with the aim of increasing general awareness and promoting the development of professional capacities in the area of intellectual and industrial property rights to enable Serbia to achieve the level of IP right enforcement required for integration with the European Union. It has contributed to these efforts by participating in the drafting of the national intellectual property strategy and via its members and innovative companies in its implementation, as well as by networking with the regional chambers of commerce (8).

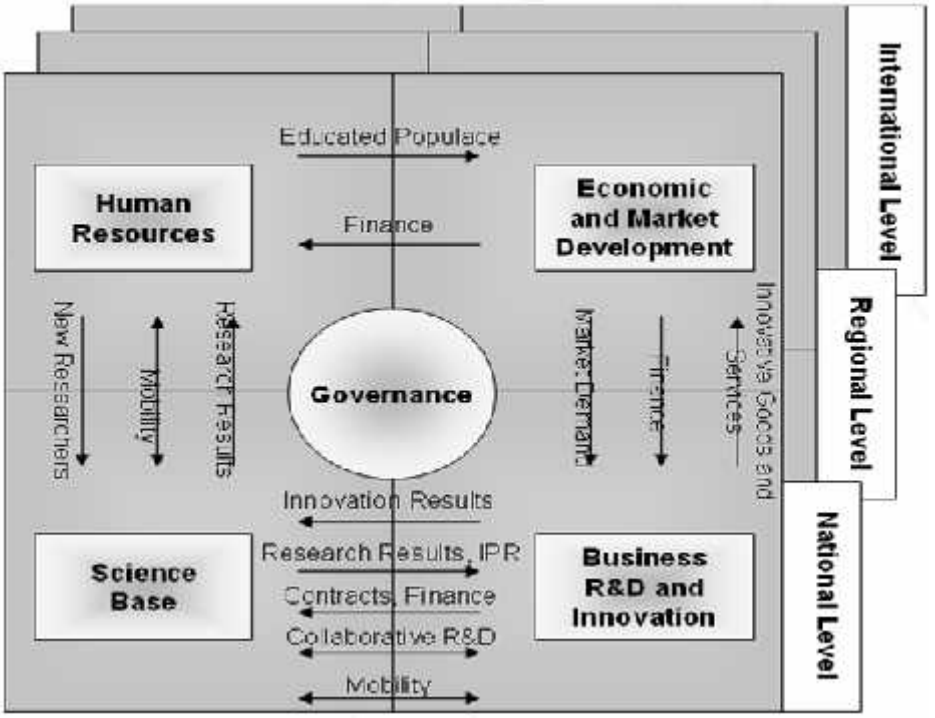
The role of SCC in strengthening the ties of science and industry

SCCI is a national association of Serbian businessmen that their 150 year tradition and experience, knowledge and expertise, began to operate at increasing the competitiveness of the Serbian economy, on the domestic and internatinal level. Recognizing the importance of innovation, knowledge

and education, and to launch economic development, active participation in policy and strategy for scientific and technological development, innovation and intellectual property business has positioned itself as one of the most important actors of the national innovation system. Formation of a national innovation system involves a complex package of stimulus legal and institutional conditions for the creation of new intellectual property, their transfer and use in the economy, Fig. 1.

SCCI organizes, initiates and supports all forms of innovation and creativity that contributes to improving the level of technological development of the country, and the creation of the modern Serbian economy based on knowledge.

Fig. 1. *National Innovation Sistem*



Source: *UNESCO.*

Consequently, the system is defined by the SCCI support the development of innovative companies. First of all, protect and represent the interests of all creators, whether from the academic, scientific, business or inventive community, and for the inclusion of creative potential in solving concrete problems of development of the economy. Initiatives, make proposals, to

participate in the provision of system conditions for the creation, development and implementation of innovations and new technologies, and creating an enabling environment for the promotion of industrial and applicable ideas to attract foreign investors.

SCCI has developed a model for the implementation of new technology and innovation in the economy and for direct transfer of knowledge and technology (8). Provides quality and timely information, advisory and consultancy services to artists, through educational programs provide training and preparation of the company to adapt to European standards for participation in the European and world markets. In addition, the training is done and all national stakeholders in the field of innovation activity and intellectual property rights, in order to raise awareness about the importance of innovation and intellectual property rights as well as the overall development of human resources. It also works to strengthen the links between education, research institutes, innovation and technology centers, technology parks and commercial sectors, the concurrence under-oriented research programs on commercial application of knowledge and technology.

SCCI provides support for the development and implementation of high technologies through the establishment of high-tech firms (6). We believe that one of Serbia opportunity to increase competitiveness in the formation and development of high-tech firms. There are low-tech industries, but there is low use of technology in certain industries. The development and implementation of new technologies intellectual capital in the creation of new products with high added value is the net potential that Serbia has to be exploited (8). Its position and competitiveness in the international arena should be built through the acceptance of theoretical principles of macroeconomics and experience of successful small but efficient economy based on knowledge (5).

SCCI's partner for eight years in the National Competition for the best technological innovation of the Ministry of Education, Science and Technological Development of Republic of Serbia implemented by the Faculty of Technical Sciences in Novi Sad.

Participate in the contest with inventive and creative people who have ideas, technology and wish to translate into a market worth of innovation (11). Through free training and workshops to educate athletes for business planning, business based on innovation and creating a market. So far, over

5000 participants passed the Competition, conducted 450 business plans, and as a result of high-tech innovation established 65 companies, which operate on the basis of their own knowledge (9).

Under the project participansts of the project organized Innovation Fair at SCCI, where innovations are made available to the public and the jury. Finalists from the public, live on national television, and thus affirm the knowledge, help the realization of innovations, mobilize and motivate new participants of the competition. Through the promotion of products and technologies, CCSI for their implementation in the economy and helping their market valuation. In order to direct transfer of knowledge and technology in the economy.

One of the key activities of the SCCI is the internationalization of knowledge. Serbian Chamber of Commerce amd Industry has organized and supported in 2011. year 8 fairs and exhibitions innovation and new technologies at the national level, and the potential for innovation represented Serbia at 5 international exhibitions. Fairs and Exhibitions innovation and technology are one of the most significant opportunities for the implementation of innovation in the economy (17). A growing number of institutes and universities are involved in our activities with the project results that have market value.

The largest number of innovations in the field of agribusiness. The spectacular development of biotechnology during the last two decades marked the beginning of a new era in the development of agriculture. So creating Farming in gross state product accounts for 15 percent, but if you take the overall contribution of agriculture to other sectors of the economy, especially the producers and processors of raw material inputs and its share in GDP as much as 40 percent.

So it is with the Serbian Chamber of Commerce Novi Sad Fair, Novi Sad University and organized a series of events in which it promoted education, science and technology development within the 79-th International Agricultural Fair 2011.

There was also Agroinovation exhibition, featuring more than 60 innovations in agriculture, in order to entertain the public significant advances in the field of agriculture, and to help artists to realize their innovations. In recent years, the export of agricultural products is dominated by raw materials and products from higher levels of processing

less frequent, so that the creation of products with higher added value is of great importance.

It's a long way from idea to market, at the end of a difficult and uncertain, but animimiranjem scientific workers, and strengthening cooperation between science and industry, the path to the goal is a safer and more stable. Cooperation with science has resulted in many projects in partnership with institutes and universities from Serbia and abroad, which contributes to raising the competitiveness of national companies and the independence of other people's technology.

Partnership in projects

Institute Gosa: Participation in the project RSEDP2 EU. Center for innovation and technology transfer in welding, materials science and engineering application software, 756 000 euros (University of Technology, Trondheim, Norway, University of Belgrade, Jozef Stefan Institute, Ljubljana, National Institute VUZ, Slovakia, National Institute of ISIM, Romania), 2011-2013.

Institute of Physics: Participation in the integral interdisciplinary research: nanodimenzionih optoelectronic systems - the path to the application, the project with the Ministry of Education, Science and Technological Development of Republic of Serbia, 2.3 million dinars, 2011-2014.

Ministry of Education, Science and Technological Development of Republic of Serbia: Participation in the project: The competition for the best technological innovation implemented with Novi Sad FTN and SCC, 2005-.

IPA Project Ideas BLE-NO: Young Innovators Network for Sustainable Ideas in the Agri-Food Sector, ARTI Puglia (Regional Agency for Technology and Innovation, 2.4 mil. euros., 2012-2014.

Detabase of innovation and technology SCCI

In order to exploit the innovative solutions developed database technology innovation and SCCI, in cooperation with the Ministry of Education, Science and Technological Development of Republic of Serbia, in order to support market evaluation of innovative solutions

(Fig. 2). In addition, support is given to invention inventors through organizing meetings, strengthening in-formisanosti inventors and entrepreneurs through in-formación system, the development of information networks on-going innovation and invention, and joining international innovation networks (13).

The base is made:

-Data Entry Forms
-Admin application
-Forms to display and search of innovation, new technologies

Form for data entry:

-Form-logging
-Form data entry on innovation
-Form-input data on the state of
-Form-input data on business intentions
-Form data entry on the carrier

Awareness of the importance of knowledge for the prosperity of society is at a very low level in all communities. In addition to the classical, fundamental and applied knowledge necessary to find time to study modern knowledge that are important for the development of an innovative society. One example of linking education and economic aspirations of the country is fostering an innovative and entrepreneurial spirit that's supposed to be present to a greater extent, in order to later appeared in the world of work.

An important facet of the education and awareness of the importance of innovation and intellectual capital, and the operations of the economy and the implementation of these strategies in business and economic strategies of companies, which provides economic stability to the operators and provides security for investors. Innovations are more than scientific discovery and they have practical value which is measured by the market (7).

The potential of the Republic of Serbia has been increased through the process of liberalization of trade relations of Serbia with the world, so that the overall market increased to 1 billion people.

Fig. 2. *Real innovation and technology SCCI*

Source: *SCCI.*

This year the Republic of Serbia chairs CEI, JII, and assumed the presidency of the BSEC, and a member of all major international chamber associations, and regional initiatives in the economic realm. If we add to the network of chamber system of Serbia, then the possibilities for knowledge transfer and building a good model for the implementation of innovation and technology in the economy multiplied.

Conclusion

With the increase in the GDP share of R & D are needed for greater separation technology sector and applied research. In addition to introduce vouchers for cooperation of science and industry, and to reduce the fees for filing and maintaining patent applications. Through exhibitions and fairs to work on the inclusion of scientists in the international network, and work on activating intellectual potential of institutes, universities, innovation and development centers in the commercial application of research. You should also work on improving the model for the transfer of knowledge and technologies in the industry and active participation in all activities of the creators of the knowledge economy.

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EMPLOYMENT IN AGRICULTURE AND LIFE IN RURAL AREAS? MIGRATION PREFERENCES OF AGRICULTURAL STUDENTS

Dejan Janković, Marina Novakov[*]

Abstract

This paper analyzes data from an empirical study that was conducted on a sample of 457 students of the Faculty of Agriculture in Novi Sad. The aim of this paper is to present demographic and migration problems in Serbia, main theoretical frameworks for understanding rural development and migration processes, respectively, complex relationships of various factors that may imply a decision regarding permanent or temporary migration of young people (students), and especially rural (student) population. The analysis is focused on the agricultural student population, their individual socio-economic characteristics, reasons for admission to study agriculture, expectation regarding employment, plans for permanent migration and others.

Keywords: *young people in rural areas, migration, rural development*

Introduction

An analysis of migration preferences of young people in general and young people in rural areas cannot be considered independently of the negative trends and processes that take place in Serbia, especially in rural areas. Main assumption is that rural areas can develop only if there is sufficient population of younger and more educated people in those areas. Paradoxically, educational aspirations of young people in rural areas can be met only by migration to larger urban (university) centers, whereby with education they also acquire a "rural different" attitude and preferences in relation to employment, further education, career, housing,

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family etc. Thus, educated young people often do not return to rural communities from which they originate and this impacts their regeneration and long-term vitality. The mixture of structural and individual-motivational factors has resulted in such social tendencies. In the first part of this paper we will point out the global and rural context of Serbia as a basic framework for the analysis of several complex interactions that have been identified in empirical research of students of the Faculty of Agriculture in Novi Sad. After that we will focus on the role of highly educated people in the agricultural and rural development, particularly in the context of what is called the theory of endogenous rural development. The final part will associate theoretical knowledge on the issue of migration from rural areas and the results of the mentioned empirical research.

Global and rural context of Serbia

The issue of depopulation of rural areas is for decades one of the central issues associated with rural areas in Europe and in Serbia, as well. Within this complex issue, there are many "hot spots" such as youth migration, unemployment in rural areas, urban concentration and the like. These questions represent some of the central issues in the European Union, where unemployment (especially of youth and rural youth) appears to be very important. The share of unemployed young people in the EU in 2011 is about 9% (EUROSTAT). According to the Labor Force Survey 2011 observed regarding the total number of unemployed, 18.2% of the population aged 15-24 was unemployed in Serbia which is twice more in comparison to EU data. If we add the category 25-29 years (which is interesting because of the relatively longer average period of study in Serbia), the percentage increases to 33.8% (ARS 2011: 81). Official data show that unemployment rate in Serbia (April 2012) was at the level of 25.5% (RZSa 2012).

Some other data from the national statistics indicate global trends in Serbia that reflect the situation in rural areas. The first data from the last Census in 2011 (RZS 2012b) indicate an absolute decrease of 377 000 inhabitants compared to census in 2002. Population growth occurs only in Belgrade region, while in all other regions an absolute decline is recorded. Besides pessimistic vital statistics, there are clearly visible migration trends that speak in favor of urban concentration primarily in region *Serbia North* in Belgrade area (Belgrade) and Južnobačka area (Novi Sad), while in regional terms (the Vojvodina region that has an absolute decline in the number of inhabitants) only Novi Sad has an increase of

population in Vojvodina. In some of the cities of the region *Serbia South*, there is a growing population for example Kragujevac, Niš, Jagodina, Novi Pazar, Kraljevo ... but from the regional aspect, the Region of Šumadija and Western Serbia and the Region of Southern and Eastern Serbia, have an absolute decline in population (RZS 2012b). For decades (especially the last two), Serbia faces intensive concentration of population in a few major cities (Belgrade, Novi Sad, Niš, Subotica, Kragujevac) and severe depopulation of the villages, even more, depopulation of the small towns in rural areas. According to the Law on Spatial Plan of the Republic of Serbia 2010- 2020, there is a particular problem of the spatial development in terms of distinct regional polarization between Belgrade and Vojvodina Region and the rest of the country. According to the indicators of development of the real sector, there is a domination of the Belgrade Region (41% of firms, 40.2% of employees and 48.6% of the total revenue of Serbia) and the Region of Vojvodina (26.1% of firms, 24.6% of employees and 28.5% of the total revenue of Serbia). Belgrade generates about 40% of the total investments of the Republic of Serbia, and the level of investment *per capita* in Belgrade is 2.5 times higher than the average of the Republic of Serbia (Vlada R. Srbije 2010: 226).

The situation in the rural areas of Serbia is further complicated if we take into account high percentage of unemployment at the national level, social position and unemployment of young people, long-term social crisis and bad economic situation etc. Within this national context, situation in rural areas of Serbia – that comprise 85% of the territory and 55% of the population (with a density of 63 inhabitants/km^2) – is very difficult according to many relevant indicators. There are many problems in rural areas and it is hard to break out from a vicious circle of underdevelopment and poverty, especially in the context of the lack of relevant policies and declining number of farmers that, as a process, still has (and always has had) its' economic, social, demographic, cultural, political, and other dimensions. Lack of competitiveness of Serbian agriculture and agrarian population crowding out "agribusiness market arena" in Serbia, together with undeveloped rural economy and underdevelopment of many of rural areas, further complicates the picture of current and future development and survival of Serbian villages. Poverty rates of rural areas in Serbia are double so high comparing to urban. The employment rate in agriculture is among the highest in the EU (about 23%) and reflects a pervasive importance of agriculture in the national economy and low level of diversification of economic activities in rural areas of Serbia which results in a lack of employment opportunities (MPŠV R. Srbije 2009: 6). According to some analyzes

(Cvejić et al. 2010; Bogdanov 2007; 2008) rural agricultural population is by far the poorest socio-economic category in Serbia, and there are large regional differences, for example, over 43% of the rural population in South-eastern Serbia is jeopardized by poverty, compared with 11% in Vojvodina. One of the main causes of rural poverty is high dependency of rural economy on agriculture and insufficiently diversified economic structure. Half of the employees working in rural areas are engaged in agricultural activities within the family farm, and unemployed in rural areas (half of which used to be employed outside the household) have a very high share of long-term unemployed (more than a half). They are not only excluded from the labor market, but also from the measures of the population employability improvement. 38.4% of the population is facing with financial poverty and 35% with material deprivation. Vojvodina has the smallest percentage of the population faced with deprivation in the settlement (1.7%), and Western Serbia the highest (12.5%). The population of agricultural households has the highest percentage of financial poverty and high percentage material deprivation (Cvejić et al. 2010: 10-16).

Agricultural and Rural Development: a review of the role of young high educated professionals in agriculture

Young people in rural areas in Serbia are one of the most important factors for rural development (further R.D). This thesis in a logical sense is not controversial, but requires additional clarification in line with how R.D. is understood in general and with the factors that may influence the complex processes of R.D. that is taking place in a particular society. In approaching R.D. it is necessary to accept it as a long lasting social process that obviously should be quite different from the previous simplified model of centralized planning. It is closely related to issues that are current in present social theory: regional development issues and decentralization, that is, issues of (neo)endogenous territorial development, the sustainable development of socio-economic, environmental and other sense, networks of relationship of relevant institutions and stakeholders; different livelihood strategies of farms and households (farm systems); issues of level and ways of participation of rural population, the role of civil society, social capital, importance of social inclusion, strategies for reduction of (rural) poverty and the like (Janković 2012: 629).

Although it is difficult to define R.D. we can start from a few key elements (dimensions) of that process: economic, socio-cultural, environmental and political (institutional). All these dimensions are

interrelated, however, debate on the role of the rural population reveals the significance and characteristics of human capital (who bear development process). In this context, a debate about young people in rural areas makes sense, if we bear in mind that this is the most vital part of rural population who often leave rural areas and affect their long-term vitality. Basic assumption of the concepts of endogenous R.D. is that they can develop only if there is sufficient number of younger, more vital and more educated people who represent dynamic and innovative development factor. As mentioned, the paradox lies in the fact that acquisition of higher education qualifications of rural youth can only be achieved by migration to university centers. During that process, they meet the needs that could not be met in rural areas and thereby they establish "rural different" attitude and preferences. These preferences - which affect the decision on permanent migration to the cities – are mostly related to employment, further education, housing, family, etc. It is assumed that there are many other factors that are positively correlated with decisions about continuing or return migration to rural areas of origin.

Given that policy and practice of R.D. is not the primary objective of the present study, they should at least be placed in relevant theoretical frameworks regarding endogenous and exogenous factors of R.D. Exogenous aspects of existing models of R.D. are evident and reflected in centrally planned measures and their implementation, control and management of these processes (mostly by ministries of agriculture and similar). In rural areas, this usually refers to the process of modernization of agriculture or any other sector, industrialization and urbanization. These processes - by their nature exogenous to the rural areas - have led to a series of social changes in rural areas and agriculture (both positive and negative). Concepts of endogenous rural development are based on the ideas developed in late 20th century, within the criticism that was - in theory and practice of R.D. - addressed to sectoral, centralized and exogenous approaches. These ideas generally criticized modernization of agriculture and other exogenous approach to R.D. which, according to some authors (Lowe 2003), in many cases represented "dependent, distorted, destructive and dictated development". In duality of development models, endogenous development is determined by internal forces and resources, endogenous initiation of the process, participation of local population in decision process and determination of direction and dynamics of development. Its key principles are based on the fact that specific resources (human, economic, cultural, ecological) form the basis of sustainable development. Consequently, in the context of our research, human resources/capital is one of the central aspects of endogenous

development[1]. However, "continued out-migration and depopulation are not compatible with endogenous development" (Stockdale 2006: 354).
In conditions of insufficient modernization of agriculture, its lack of competitiveness in comparison with developed countries, huge importance for national balance sheets, but also importance for the life of big share of rural population, it is clear that the role of knowledge and education in the Agricultural knowledge and information system (besides number of other factors) is very high. Important place in this system certainly has high education in agriculture, *i.e.* agricultural colleges which should educate professionals in agriculture and contribute to their innovative role in the creation, dissemination and application of scientific knowledge. The traditional role of agricultural colleges and universities in developed countries around the world has already been analyzed (for e.g. see, van den Bor, Bryden and Fuller 1995) in the context the agrarian and rural sector of those countries. Conditions in developed countries, in short, have led to a critical consideration of the role of agricultural colleges/universities in the context of education of professionals who should take place in the division of labor in the agricultural sector. This role should be reviewed in the context that prevails in rural areas of these countries: small number of farmers, high competition, mass production and market surpluses, environmental problems, problem of a small number of large farms that produce most of the agricultural products, different adjustment strategies of a large number of family farms, issue of diversification, employment in non-agricultural sectors, development of rural economy, migration and depopulation of rural areas and issues of R.D. in general (see, van den Bor, Bryden and Fuller 1995).

Conditions of the agricultural and rural sector in Serbia are largely different from those in developed countries. Their comprehensive and systematic elaboration in this paper is simply not possible, but generally speaking they certainly concern insufficient degree of modernization and competitiveness of agriculture, many problems in reform of agricultural structure (share of population in agriculture, land reform policy, efficiency and stability of agricultural policy system and state support, institutional (non)regulation of the sector etc.), problems related to rural population (underdevelopment of many villages, migration, ageing and

[1] It is important to note that the endogenous-exogenous distinction is an ideal type and that the idea of endogenous development came on the wings of exogenous criticism, but rather as "an idealized descriptive contrast to frequently observed patterns and processes of development" (Slee 1994: 193, 194), rather than as model of development with clearly identified theoretical roots. For these reasons, many authors (e.g. Ray 2000, 2006, Lowe 2003) in fact emphasize the *neo-endogenous* development. Elaboration of endogenous-exogenous relationship is very complex and in this paper we can not elaborate on.

depopulation of villages etc.). In this context, the role of agricultural universities in Serbia is dual: on the one hand, they need to educate professionals in agriculture in the sense of their future role in a rapid modernization of the sector, and on the other, they need to educate qualified and innovative professionals that will enhance the potential of rural areas to respond to a global change in a different way. It means that they must be able for innovative contributions (solutions) to the processes that are inevitable in the development of the rural economy: diversification of activities and farm income, developing market niches, creating non-agricultural jobs in rural areas, encouragement of self-employment and entrepreneurship, development of local and regional R.D. strategies, development of agro- and rural tourism etc. In short, their dual role reveals itself in the inevitable modernization of the agricultural sector but also in "recondition" of the consequences of modernization in agriculture (deagrarization), which might be named as one of the functions of R.D. Comprehended in this sense R.D. should be a response to the consequences of modernization, an attempt for better use of all resources in rural areas and "*reposition the rural within the wider society, by making it more attractive, more accessible and more useful for society as a whole" make it more valuable, more attractive, more accessible and useful to the society as a whole*" (van der Ploeg et al. 2008: 3). Regarding the professional orientation of agricultural students, Bor, Bryden and Fuller (van den Bor, Bryden and Fuller 1995: 34) distinguish several of their roles, i.e. five different groups of their future profession: *creators of knowledge* (e.g. scientific research), *managers of knowledge* (intermediary role between creators and users, e.g. agricultural educators, extensionists, journalists), *users of knowledge* (e.g. farmers, rural entrepreneurs, researchers), *facilitators of knowledge* (the role of facilitating and providing funds to carry out and disseminate research e.g. governmental and non-governmental sector, industry, professional organizations, the scientific foundations), *decision-making supporters* (assistance to individuals and groups in the development and adoption of professional decisions). Through these five groups, mentioned authors summarize the range of possible potential role of agricultural students in widely understood agribusiness sector.

Young people in rural areas of Vojvodina: a view on future stakeholders in agriculture and rural areas

From the previously mentioned, it is clear that high education in agriculture is a very important factor in the agricultural and rural development. The problem lies, however, in the necessity of youth migration from rural to urban areas in order to get education and, in the

future, their contribution to the regeneration of rural areas. In the context of intensity of deagrarization (and in line with the market and other factors), arises the question of the role and capabilities of future employment of highly qualified staff in the agricultural sector. More importantly, the question is how employment opportunities influence decisions about permanent migration to urban areas. Among the key factors that influence this decision are definitely: 1. possibility of finding employment in rural areas (any job), then 2. employment in certain profession (agricultural employment for highly educated staff), 3. career development (professional challenges and opportunities for promotion), 4 expected income (wages of highly educated professionals in agriculture). These are just some of the factors that are directly related to employment decision and permanent migration from rural areas to cities, taking into account the context of rural Serbia and underdevelopment of agrarian sector. In addition to these, the decision to migrate is certainly influenced by a number of other structural and individual motivational factors (external and (or) internal). These factors will be discussed later.

In the above mentioned empirical research respondents were students of the Faculty of Agriculture in Novi Sad. The survey was conducted during the academic 2010/2011 and 2011/2012, on a sample of 457 students of the faculty (mostly first-and second-year students). The sample included all departments of Faculty of Agriculture in Novi Sad, actually an entire one generation of students. Why were these students interesting research group? First of all, we wanted to analyze who has approached agricultural faculty, wherefrom did students originate, what were the reasons for education in agriculture, what were the expectations regarding future employment and place of residence etc. Also, this group of students is interesting because students (temporarily) and graduated young people (from rural areas) often permanently out-migrate from rural areas in Serbia. Present trends of urban centric development of Serbia support those conclusions (of course, taking into account other categories of rural population). However, students of agriculture represent a specific group that is by the nature of their work more or less directly related to agriculture and rural areas. Simply put, their future profession (according to their orientation when choosing a faculty) is logically associated with rural areas within agriculture (as an activity) takes place. Our interesting research task was to investigate the attitudes of our students on a range of issues that are discussed previously, *i.e.* we set the rhetorical question: if agricultural students are not interested in working in agriculture and living in rural areas, who is? Considering their place of residence, the results from our sample show that the share of students who originate from villages and towns are equally distributed (rural 48.8%, 50.8%

urban)[2]. This is interesting information with regard to the usual perception of linkage of agriculture studies with rural, which might have been expected particularly in relation to certain study programs (for example, crop breeding, animal husbandry, or landscape management).[3] More interesting, and perhaps more important are the data regarding students' attitudes regarding the reasons for enrollment at Faculty of Agriculture in Novi Sad. According to these data (Table 1), nearly 38% of our sample of students enrolled in agricultural studies for other reasons, not out of a desire to study selected study program.[4] A significant share of these responses is in line the overall impact of deagrarization process and the general decline of interest in the study of agriculture, which takes place more or less in all the developed countries, but it may also be related with the youth perceptions of agriculture as a profession.

Table 1. *The reasons for the study of agriculture*

Reasons for the study of agriculture	**No. of students**	**Percentage**
I wanted to study at agricultural faculty	281	61.5
I enrolled the agricultural faculty due to influence of parents/friends	21	4.6
Due to ease of entrance exam/no study fees	66	14.4
This was an alternative / I wanted to study at some other faculty	49	10.7
Other reasons	37	8.1
T o t a l	454	99.3
Missing cases	3	0.7
T O T A L	**457**	**100**

Source: *authors' original research results.*

However, in the current crisis and the costs of education in Serbia in general, as well as the state of the agricultural sector, agricultural faculties should be commended regarding the efforts in market competition for

[2] It should be noted that the students of the Faculty of Agriculture in Novi Sad, mostly come from Vojvodina, but also from other parts of Serbia (significantly less), and that a certain number of students comes from the Republika Srpska.

[3] In relation to the enrolled study program, data from a sample didn't show a statistically significant difference in the choice of study program according to students residence ($\chi^2 = 14.622$, p=0.2).

[4] The qualitative analysis of responses to the question *why a particular study program has been chosen* shows that from the total number of responses about *57% answered that the reason was that they liked the study program (*interest*)*, 26% that it was because of a good employment opportunities (good perspective), about 8% that this was a decision due to continuation of a family business, approximately 5% noted that they haven't chosen study program they had wanted, about 3% choose particular study program because of study expenses (no study fee), and about 2% that the study program had been recommended by others.

admission of students (in comparison with some attractive faculties), that is, to what extent is (for various reasons) study agriculture still attractive to potential students. This is certainly an issue *per se*, but it is also in line with the efforts of the Faculty of Agriculture Novi Sad to raise the quality of education, modernize and introduce of new study programs.[5] In Vojvodina, as the agricultural region, a choice to study agriculture clearly has its justification.

One of the important questions is whether the families of our respondents are engaged in agriculture. Of the total number of students in the sample 41.6% reported that their families were engaged in agriculture (only 15.5% reported that they were engaged in some kind of livestock production). Cross-tabulation of the data on the reasons for study agriculture and data on family farming (and livestock production), showed that these two parameters are not mutually dependent ($\chi^2 = 8.866$: $p = 0.065$ agriculture, livestock production $\chi^2 = 15.283$ $p = 0.054$)[6], that indicates the diversity of students' "backgrounds", and, thus, the diversity of reasons for the study of agriculture. However, if we consider only students who reported "family farming background", the share of those who wanted to study agriculture is 68.9% (in the case of livestock production, 77.5%). This certainly does indicate the expected relationship between family farming background and wishes for studying agricultural faculty. The size of family farm (size of used land for (plant) production) of our students' families, apparently points to large differences compared to the official statistics in Serbia (which has a dominant share of farm up to 5 hectares of property land) (Table 2).

Table 2. *Size of the land cultivated by students' families*

Size of the land cultivated by students' families	No. of students	Percent
1 – 3 ha	22	12.6
3 – 5 ha	24	13.8
5 – 10 ha	43	24.7
10 – 20 ha	34	19.5
> 20 ha	51	29.3
TOTAL	**174**	**100.0**

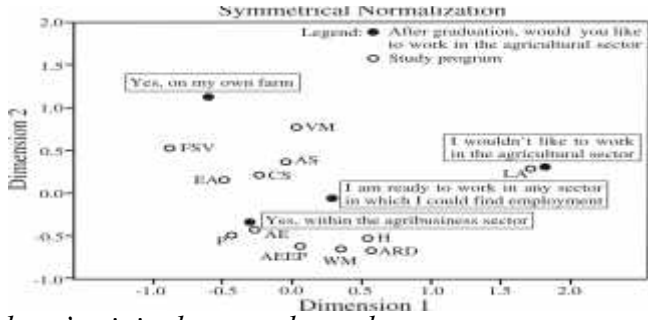
Source: *authors' original research results.*

[5] In response to another question in the context of future plans of students, it is encouraging that 95% of students plan to study at and graduate from the Faculty of Agriculture in Novi Sad, about 3% plan to continue their studies at another college, less than 1% plan to leave studies and go to work, and about 2% have other plans.

[6] Also, cross-tabulation of students' residence (rural / urban) and reasons to study agriculture shows that there are no statistically significant differences in the reasons for studying agriculture and students' residence ($\chi^2 = 2.680$, $p = 0.613$).

If we look at total share of the group over 10ha, their participation was even 48.8% of students in the sample. This supports the hypothesis that farms which are medium-sized and large farms show a clear intention to educate its younger members in agriculture in order to continue engagement in agriculture. Of the total number of students whose families were engaged in agriculture, they were divided regarding the question whether one could live only from agricultural income (54.1% *yes*, compared to 45.9% *no*). However, cross tabulation of the size of cultivated land and this question, showed that there exist a statistically significant correlation ($\chi^2 = 20.524$ $(p = 0.001)$; values of contingency coefficient C=0.710 and Kramer's test V=0.713 point to strong effect size). Those who cultivate lager size of the land in a relatively higher number considered that family could live only from agricultural income.[7] In that context we should also observe answers to the question if students (after graduation) would like to work in the agricultural sector: 14.5% wanted to work on their own farm, 50.4% wanted to work within the agricultural sector, 8,9% would like to work in some other sector and 26.1% was ready to work in any sector in which they coul find employment. Observed in relation to study program, correspondent analysis (see, Čobanović, Sokolovska, Nikolić-Đorić 2009) showed that the highest deviation toward future careers in agriculture was expressed by the students of landscape architecture who wouldn't like to work in the agricultural sector (Diagram 1).[8]

Diagram 1. *A two-dimensional diagram of dependency of attitude regarding the engagement after graduation and the study program*



Source: *authors' original research results*.

[7] Of the total number of students who answered that family could live only from agricultural income, the share of those who cultivated more than 10ha was 64%.

[8] Investigated study programs at the Faculty of Agriculture Novi Sad: Crop Science (CS), Veterinary Medicine (VM), Landscape Architecture (LA), Fruit and Viticulture (FSV), Animal Science (AS), Agricultural Engineering (EA), Horticulture (H), Agricultural Economics (AE), Agro ecology and Environmental Protection (AEEP), Agro tourism and Rural Development (ARD), Phytomedicine (P), Water Management (WM).

As already mentioned, one of the main causes of rural poverty in Serbia is high dependency of rural economy on agriculture and insufficiently diversified economic structure. Half of the employees working in rural areas are engaged in agricultural activities within the family farm, and unemployment in rural areas is characterized by a very high share of long-term unemployed. In addition to employment, there are a number of other structural factors (depending on the local context of rural communities) that may have influence on migration decisions: general socio-economic underdevelopment of the local community, underdeveloped (transport, communal, telecommunication, public services etc.) infrastructure, lack of transportation (for example, bus or train lines, lack of cars – especially for young people), remoteness, lack of activity in the local community (aging population, lack of cultural and entertainment facilities, apathy, lack of local dynamics etc.), greater exposure to natural disasters and so on. Theoretical aspects of the problem of migration from rural areas have long been recognized through the influence of so-called *push* and *pull* factors. One of the systematization in rural sociology shows this in following way:

Table 3. *Reasons for rural – urban migrations: push and pull factors*

Rural (push factors)	Urban(pull factors)
Lack of available (arable) land, (hidden) unemployment, lack of skilled jobs, low income and wages levels, poor working conditions, lack of career opportunities, social control and dependency, limited opportunities for family grounding, limited opportunities for education, lack of cultural offer, monotony and boredom, lack of diverse supply of goods and services, inadequate public services, political isolation, low social status	Better prospects for survival, greater offer of jobs, diverse working opportunities, higher level of wages, better chances of success, greater offer of easier work, better career prospects, anonymity, pluralism of behavior patterns, income generating opportunities for women, better educational institutions, stimulating spiritual/intellectual atmosphere, a variety of socially accepted behaviors, better housing conditions, diverse range of goods and services, satisfying public services, possibility of participation in political life, higher social status

Source: *Planck und Ziche 1979:68.*

In addition to these there are other push and pull factors that may affect migration decisions, but it is very important to understand them in their mutual relations, as well as in the specific context of a particular geographical environment (community, region) and individuals (and their household). Geographical position of the community, its position in the network of settlements, structure of the economy, population, nature and intensity of the relationship with the urban environment, local institutions and organizations and a number of other factors on the level of local community determine framework for understanding migration decisions in local community. For example, social profile of potential migrants

certainly determines reasons which might be perceived as important (migration of young or old people, economic active or inactive, employed or unemployed, with or without a family, women or men, etc.). The influence of structural and individual factors is complex and it is difficult to determine precisely which are the key factors that determine the migration decision.[9]

Migrations of rural youth are associated with migration in relation to education (temporary migration), *i.e.* observed in a long run, employment, career, the desire for urban lifestyle and the like. One of the assumptions is that rural youth may be considered as a specific social group that deals with structural factors, many more than young people in the cities. Among other things, the transition period between adolescence and maturity of rural youth who aspire to (higher) education, involves greater so called "transaction (migration) costs" (Böheim and Taylor 2002: 371). They are reflected not only in direct costs such as costs of frequent travel, housing and general cost of schooling (study) in the cities, but also in "costs" related to loss of specific human capital (e.g. of their households), loss of information networks and contacts, psychological costs associated with a life in a new environment, lack of physical close of family and friends support etc. In general, one may generally speak about substantially more "sacrifice" that rural youth must submit in order to be educated and to have qualifications to compete on the national labor market with young people from the cities. In this context, they are often faced with many risks and situations "which were largely unknown to their parents"... this includes less certainty around labour markets and an increased demand for education and an educated labour force… that includes an effective mobilization of their capacities" (Furlong and Cartmen 1997, according to Looker and Naylor 2009: 43). That also implies that at an individual level, young people must consequently engage "in a reflexive confrontation with the likely consequences of their choices and actions" (Lehman 2004, according to Looker and Naylor 2009: 41). These authors believe that experiences of rural youth are insufficiently theoretically grounded and that, in comparison with urban youth, they have higher risks (including greater uncertainty,

[9] There are attempts to create typology of migrants from remote rural areas depending on the motives (Stockdale 2002: 359): education-motivated migrants (career aspirators), employment-motivated migrants (temporary, single, families), personal motives: escapees through education and home community escapees (urban-oriented, experienced community as claustrophobic etc.), other motives/quality of life seekers (mostly families).

fragmentation of and increasingly individualized life-course transition processes).

On the other hand, there are views that consider that young people from rural and urban areas have similar needs and that it is not necessary to put emphasis on the rural youth, but on the *local rural communities* in which they live, and which are mainly carriers of limiting structural factors that influence individual motivation factors for migration (living or return to the local rural community may be perceived as a failure). They consider as important to pay attention to *social and spatial identity* that forms as a result of life in local rural communities, due to the fact that young people "move from a situation in which their identity is ascribed or derived from their families of origin, to a situation where identity is negotiated between self and the other" (Jones 1999: 2). In that sense, social identity is the result of „the internal-external dialectics of identification", and thus „at the hearth of the relationship between the agency and structure" (Jenkins 1996, prema Jones 1999: 3).[10] In this example, we actually see a more complex relation of push and pull factors, respectively, relation of agency and structure. This author concludes that one of the key problems for migration research "lies in explaining not why some people leave, but why some people stay. This involves moving beyond an exploration of structural causes to a closer role of the agency" (Ibid. p. 4).[11]

Our study couldn't take into account the complexity of all these factors, but the data show an interesting situation: of the total number of students of the Faculty of Agriculture in Novi Sad after graduation 76.3% perceive its future in the city and only 23.7% in rural areas. By crossing the variables of residence and students' attitudes about perceived future residence we obtained the following results (Table 4).

[10] Actually the issue is „how do young people define themselves in relation to communities in which they live, and how does this definition affect behaviour... might such localism be a motivation for staying on, and if so, how is it constructed? (Jones 1999: 3).

[11] In one extensive British study of migration, (see, Böheim and Taylor 2002) authors came to very interesting results that take into account the relationship between a number of different factors: the dynamics of the markets, house ownership and residential mobility (employment status, nature of work, family situation, employment of spouses, changing of jobs, household income, house ownership, number of persons per room/square meter, length of residence in the community, sex, ethnicity, education, number of children, reasons for migration and economic characteristics of the region and of the labor and house market etc.).

Table 4. *Cross tabulation of students' residence and attitudes regarding perceived future residence (after graduation)*

		After graduation I perceive my future life in...		
		City	Village	Total
Residence	Rural	132	85	217
	Urban	206	20	226
TOTAL		**338**	**105**	**443**

Source: *authors' original research results.*

The most "disturbing" fact (Table 4) is that of the total number of students who originate and have residence in rural areas, 60.8% perceive their future in the city, indicating a large migration preferences of agricultural students who originate from rural areas.[12] Of the total number of students whose families are engaged in agriculture, 73.2% have residence in rural areas. However, the situation is even more interesting in cross tabulation of the information on whether the family is involved in agriculture and where they perceived the future residence: of the total number of students with farming family background (including both students from the city and from the rural areas), 61.1% perceived their future in cities. However, if we consider *only students who originate from rural areas and intersect the variables of family farming and the perceived future residence*, results indicate that 51.5% of students (who originate from rural areas) and whose families were engaged in agriculture showed a preferences for a migration to the cities. Of the total number of students from rural areas, and whose families were not involved in agriculture, 76.5% perceive their future in urban areas ($\chi^2 = 13.308$, p = 0.00, indicates that there is statistically significant dependence between these variables; values of contingency coefficient C=0.241 and Kramer's test V=0.249 point to weak effect size). Given that female population often migrates from rural areas, it was expected that female students have a higher preference to

[12] From the respondents have also received attitudes regarding the prospects for employment in the community they come from: 60% consider them as poor employment prospects, while 6.2% answered that there were no employment prospects as all, while only 33.3% considers the employment prospects as good. At this point there were no statistically significant differences between rural and urban students. However, the cross tabulation of the answer to this question, students residence and expectations regarding future residence showed a statistically significant dependence in relation to rural as a students' residence, expectations of future employment in the local community and attitudes regarding perceived future residence ($\chi^2 = 18.575$, p=0.00); values of contingency coefficient for rural as a place of residence C=0.284 and Kramer's test V=0.296 point to weak effect size). In percentage, of the total number of rural students who perceive their future in the cities, 83.3% considers their employment prospects in their local communities as bad or non exsisting at all.

urban life: of the total number of respondents, only 14.7% of female agricultural students perceive their future in rural areas. If we consider only respondents from rural areas, 23.8% of rural female students perceive their future in rural areas, and if we also introduce the variable of family farming, out of 134 rural respondents (of both gender) whose families were engaged in agriculture, only 17 rural female students (12.7%) perceives their future in the village.[13] These results may be related with traditional cultural patterns in rural areas by which farm, continuation of farming and even whole (land) property is inherited by the male successor. The qualitative analysis of the responses regarding the reasons for young people to leave the rural areas, showed that about 32% of respondents blames unemployment, 27% poor living conditions in rural areas (infrastructure, lack of perspective, a hard life, underdevelopment, and gossip and social control etc.), 21% consider better socio-cultural life in the city as main reason, 9% consider that rural youth is running away from agriculture as a profession (hard work), and 11% considers education as a key reason. These attitudes of agricultural students in our sample were largely in line with the abovementioned influences of push and pull factors in migration preferences of young people from rural areas.

Conclusions

Theoretical knowledge regarding to the migration of young people from rural areas and regarding the R.D. in general, show that a range of factors may have an impact on whether or not young people will leave or stay in rural areas. Decades of neglect of R.D. in Serbia and present consequences in rural areas of Serbia only indicate the necessity in orientation to the concept of *rural policy*. Besides the stabilization of the agricultural sector and its rapid modernization, such concept of rural policy will have to be dedicated to R.D. in its total interdependence of all aspects: socio-economic, demographic, environmental, cultural and even political. We consider that only setting of the rural policy as a one of national priorities (taking into account the consequences of demographic development, urban centric growth and devitalization of the whole parts of the national territory and society) would contribute to a full utilization of all potential resources in the rural areas of Serbia in order to make

[13] $\chi^2 = 15.088$, p=0.00 point to a statistically significant dependence of perceived future residence and place of origin, gender and family farming; values of contingency coefficient for rural female respondents with family farming C=0.318 and Kramer's test point to medium effect size.

them more useful, more attractive and more accessible to the society in whole. Achievement of these goals is a very difficult task if there are not enough young and educated people in rural areas who could contribute to the local and regional development with innovative, dynamic and creative solutions. Results of our study have shown that the overall context of agricultural sector and of rural areas in Serbia (Vojvodina) in general, influences the migration preferences of young (future) professionals in the field of agriculture. We consider them to be reasonably specific social group which is, at least, by the nature of their calling, directly or indirectly related with the agrarian and rural. A significant proportion of students in our sample (38%) studies agriculture for reasons not related to the explicit desire for this specific study, except one part of students whose families are engaged in agriculture (and livestock production). On this line are the results that indicate that even 76.3% of the total number of agricultural students perceive their future in the cities (not in rural areas), including those students who originate from rural areas and who have farming family background (51.5%). In accordance with, unfortunately, well-known migration preferences of females, only 14.7% of the female student population from our sample perceives their future in the rural areas, only 23.8% of total rural female population feels the same, and taking into account only rural females with farming family background, only 12.7% of the total with family background in rural areas perceive their future in rural areas.

Results of the logistic regression (see, Agresti 2002) show that it is more likely for male students to see their future in rural areas. In addition, a greater chance of rural life is in the group of students who come from rural areas, who believe they have a good prospects for employment in the community they come from, who are (after graduation) determined to stay in Serbia and who have family farming background. Urban life preferences are more related to students who expect career advancement after graduation. These results are consistent with the reasons for out-migrations from rural areas, given by the students in our sample, and which have been identified in theory and numerous studies of youth from rural areas.

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COSTS OF COLLECTION OF THE CORNSTALK AS THE SOURCE OF ENERGY*

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Abstract

Biomass, as one of the sources of renewable energy, is an organic matter of vegetable or animal origin, which is used in the combustion process or in the converting process in the systems which produce other types of energy (electric, thermal). The research is oriented towards the establishment of costs of collection of the cornstalk as one of the criteria for evaluation of the economic aspects of production of energy from the cornstalk as biomass, and establishment of costs of collection of this type of renewable source of energy, which represents initial raw-material in the process of pellet production. The Autonomous Provence of Vojvodina, as characteristically agricultural area within the Republic of Serbia has great potentials for production of the energy from agricultural biomass.

Key words: *biomass, renewable sources of energy, the cornstalk, agriculture*

Introduction

Biomass, as one of the sources of renewable energy, is an organic matter of vegetable or animal origin, which is used in the combustion process or in the converting process in the systems which produce other types of energy (electric, thermal). Also, biomass is used in production of liquid and gaseous types of fuel (biodiesel, bio-ethanol, biogas). The Republic of Serbia, by conclusion (2005) and ratification (2006) of the Agreement on Establishment of Energy Community of South-Eastern Europe, accepted the regulations concerning increase in consumption of renewable sources of energy. In that sense, the Decree on amendments of

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the Decree on Establishment of the Program of Realization of the Strategy for development of the sources of energy in the Republic of Serbia by 2015, defined the objective which requires increase of share of the electric energy produced from renewable sources of energy, 2012, and for 2.2 %, as compared to the total national consumption of the electric energy in 2007. Apart from the said Decree, during 2009, the government of the Republic of Serbia adopted the Decree on Conditions for acquisition of the status of the privileged producer of the electric energy and criteria for assessment of fulfilment of those conditions, as well as the Decree on measures for stimulation of production of the electric energy through exploitation of renewable energy resources and combined production of the electric and thermal energy. During 2009 and 2010, the Action Plan for biomass in 2010 – 2012, for the republic of Serbia was produced and adopted, and which defines the strategy for exploitation of biomass as the renewable source of energy, and in conformity with applicable domestic and European regulations (Directive 2001/77/EC). Realization of this plan will be monitored by the National Council for Sustainable Development. This plan quotes that out of the total potentials of bio-renewable sources of energy in the Republic of Serbia, biomass makes 63 %. Within this potential, approximately 2/3 refers to biomass originating from the agriculture, whereby this potential can be increased by expanding the production through purposeful cultivation of the biomass, apart from crop production residues, and such purposefully produced biomass will not make competition to the food production (for e.g. cultivation of genetically modified plants on less fertile soils, like soya cultivated for production of diesel). Also, this plan, on the basis of analyses of the studies performed so far, states that the most promising opportunities for exploitation of biomass in Serbia include the following:

- Heating of households and buildings, by using of pellets and briquettes made of biomass,
- Co-combustion or total replacement of heavy fuel oils or coal used in heating plants,
- Production of electric energy from crop and wood residues,
- Production of transport bio fuel,

Conclusion of the aforesaid agreements and enactment of legal and other acts relating this issue represents the first group of factors which stimulate exploitation of renewable energy resources. The second group of factors represents the need to change the structure of the energy balance in order

to substitute the import of energy substances and reduce energy dependence of the country. Apart from increase of share of own energy sources in energy balance, another significant measure imposed in order to reduce the energy requirements due to increase of economy activities is to increase the energy efficiency. The purpose of improvement of the energy efficiency is to mitigate the increase of energy consumption resulting from expansion of business activities which comes as a consequence of economy development.

Changes in approach and realization of the concept of production and consumption of energy in Serbia are just to take place, which is mainly conditioned with providing of the necessary energy and need to protect the environment. Regardless the economic results from production of biomass at this moment, the increase of energy prices and increased need for the energy indicate that the production of the biomass will have long-term prospects. Having on mind all mentioned factors and the need to make changes in energy balance and in order to decrease the share of conventional energy sources, the Republic of Serbia should orient towards the exploitation of renewable sources of energy, and those are the sources which are the greatest potential on disposal of the country, as well as exploitation of renewable sources which have the best economic justification and/or which require the lowest economic investments and which require the lowest exploitation costs.

Experience of other countries indicates that the share of bio-renewable resources, especially the biomass, can be increased to significantly higher level. According to the data of the International Energy Agency (IEA), 70% of domestic energy production in Austria originates from renewable sources of energy. Out of the total primary supply of energy in Austria, biomass provides 11.2%, while 21% of the produced thermal energy is obtained from biomass. Having on mind the trends in energy sector in the region and respecting the fact that Serbia has on its disposal significant resources of the biomass, the biomass can be put in line with the most significant energy sources for our country.

Economic evaluation of the process of production of the energy from the cornstalk, as well as other crop residues should include two effects of this process:

1) Production of energy,
2) Protection of the environment.

Crop residues, as different to coal, contain almost no sulphur and have very low ash content (2 to 8%) (Brkić, 1982). Being familiar with the existence of the environmental disaster and global climate changes in Earth, this fact is very significant. From the point of the global climate changes, the biggest problem is enormous emission of CO2, than SO2, and which is the product of combustion of fossil fuels.

The aforesaid facts provide very positive image of the ecological aspect of application of this fuel, although this data cannot be interpreted one-sidedly. The conclusion about the total ecological advantage of such exploitation of crop residues should be made according to analysis, and which would primarily include protection of the soil fertility, and protection of the atmosphere. The problem of the atmospheric pollution is the issue which cannot be solved only from the aspect of agricultural production. Regardless the aforesaid, agriculture is a very significant factor, and requires control in order to mitigate negative processes relating the climate changes.

Thus, apart from energy production, this process contributes to reduction of environmental pollution, if it would be burned on the lot, because of easier ploughing in and cultivation of the soil, which contributes to economic justification of exploitation of corn stalks for this purpose. Regardless the results, it is necessary to have on mind the fact that the significance of the research of possibility of energetic exploitation of crop residues is higher than the simple technological improvement, because it represents an alternative direction of development, which must be followed by undeveloped countries. In order to achieve the correct following of the direction, it is necessary to create, as technically-technological so the economic base for development, assessment and implementation of alternative technologies. Special attention should to be paid to solutions for energy exploitation of the biomass. The focus should be on technical solutions which would enable exploitation of the biomass on the existing or modified equipment. Such solutions would significantly reduce the initial investments and directly influence the profitability of energy exploitation of the biomass. Realization of these objectives is possible to be achieved only through the measures of stimulation imposed by appropriate governmental institutions. The government should stimulate domestic industry in its direction towards the production of the equipment for energy exploitation of the biomass (Zekić, Jovanović, 2006).

Material and Method

The research is oriented towards the establishment of costs of collection of the cornstalk as one of the criteria for evaluation of the economic aspects of production of energy from the cornstalk as biomass, and establishment of costs of collection of this type of renewable source of energy, which represents initial raw-material in the process of pellet production. Based on the said, the research included methods of qualitative analysis and/or synthesis, descriptive, then comparative method, logical method, as well as methods for establishment of potentials, while, for establishment of collection costs, we applied the method of analytic calculations. In order to achieve satisfactory accomplishment of the aforesaid goal, it is necessary to find out solutions for several methodological issues. We used the data and cognitions about the production technology and we applied the principle of calculation of costs established for selected machine aggregates. Also, it is necessary to emphasize that the research completely comprised the problems of practical application, for selected machine aggregates, which, to a certain extent, can potentially lead to inaccuracy in interpretation of the results in case some other method of the cornstalk collection is applied.

The purpose of the research was to evaluate, according to the established potential for production of the energy from cornstalk as biomass, maximal economic effects and the role of this production area in agriculture. The work included official statistical data, as well as the data published in other literary sources about the sowing structure by achieved yield and volumes of this type of biomass in AP Vojvodina. Also, we used literary sources relating establishment of regulations in the process of collection, and which relate collection losses. At establishment of costs of collection of corn crop residues we used the data obtained from collection of the said at the territory of Sombor, Apatin and Kula municipality.

Results and Discussion

The Autonomous Province of Vojvodina, as characteristically agricultural area within the Republic of Serbia has great potentials for production of the energy from agricultural biomass. According to the official data on sowed areas in Vojvodina, corn has the largest share in the structure of sowing in the area. In the period from 1980 to 2010, the corn in Vojvodina occupied 629.410 ha to 722.000 ha out of the total arable area of 1.578.000 ha. Because of the aforesaid fact that this work evaluates potentials of the cornstalk, as a side product in crop production, in terms of possible maximal

volumes and their collection costs. According to the decisions of the Government of Vojvodina, two councils were established in order to coordinate proceedings and undertake activities in implementation of biomass at the territory of AP Vojvodina, as follows:

1. Council for exploitation of the biomass and residues for energy purposes at the territory of AP Vojvodina and
2. Council for bio-fuels at the territory of AP Vojvodina.

According to the data listed in Energy Balance of AP Vojvodina for 2011, biomass from agro-complex is exploited for heating of the individual farms, and exploitation of biomass in industry has been noticeable lately as well. The most important installed boilers which consume agrarian side products include the boiler in »Mitrosrem« enterprise, Sremska Mitrovica (Zekić et all, 2007). Also, several boilers which use the waste biomass of agricultural origin (food industry waste) have been installed. Boilers which stand out are the boilers for combustion of sunflower shells, installed in factories for production of edible oil in Sombor, Zrenjanin, Nova Crnja and Šid. According to the data listed in this document, the industry currently uses around 800 TU (thermal units) of the thermal energy produced from thermal biomass originating from industrial processes, which makes 2,3 % of the total estimated available potentials of biomass which can be used for energy purposes. Also, we should point out that bio-renewable sources of energy participate with only 0.7 % out of the total energy needs of AP Vojvodina.

Encouraging fact is the data that lately, of certain local self-governments showed an emphasized interest for utilization of the biomass in production of the thermal energy, in district heating system. The problem occurring in realization of such projects reflects in inexistence of the adequate legal frames arranging the issue of public-private partnership as the base for providing of the necessary investments by interested investors. Certain local self-governments made the feasibility studies relating the establishment of the combined plants for production of thermal and electrical energy (Bačka Topola, Sremska Mitrovica, Novi Sad - Petrovaradin). The aforesaid data indicate to the fact that the exploitation of the biomass originating from agrarian production is on the very low level, regardless the great potential available at the territory of AP Vojvodina. The issue of exploitation of the biomass as a source of energy, as well as use of the cornstalk for this purpose, was, in the previous period, elaborated by many authors. This issue is also popular at the moment, having on mind the fact that in the following period, it will be possible to increase the utilization of the biomass and cornstalk in this purpose, so this issue will continue to be the subject of

scientific observations. Also, the improvement of technically-technological solutions in the process of exploitation of the biomass from the stage of collection, through the transport, handling, storing, keeping until final processing into the required form used for the purpose of energy production impose the need for permanent studying and analysis of this issue, as in terms of possible application so in terms of economic and other aspects which characterize this issue.

Perunović *et.al.* (1983) considered general possibilities for exploitation of the biomass as a fuel for production of the thermal energy, which would provide for energy needs mainly in agriculture. They also considered characteristics of the biomass which have significant influence on the method and economy of its use in energy purposes, with special reference to agricultural residues, supported with the results of own researches. Further, they pointed to physical characteristics of the biomass, especially the forms of use which influence economy and efficiency of energy production. They quote that our country has relatively high rate of growth of energy consumption, while our reserves of the primary energy are approximately six times lower as compared to the world average, which should be another motivation for the rational use of even the smallest volumes of the waste fuels. Also, this work emphasizes the fact that, if we consider the characteristics of the agricultural residues, time and place of their origin, it can be claimed for sure that they represent potential fuel mainly for production of the energy in agriculture, which means in the vicinity of their origination. Actual consumers of the energy obtained from combustion of agricultural residues are drying plants, farms, economies, greenhouses, etc. In order to provide the complex review of justification of use and selection of the appropriate equipment for utilization of the biomass in energy purposes, it is necessary to have a whole range of data, such as: quality, availability, price of previous preparation etc. **Tadić (1984)** was researching the application of various systems for straw preparation. On the basis of the results of the research he concluded that the side-products of the arable farming represent, first of all, organic matter for the soil, for the cattle breeding needs, but are also becoming increasingly significant as the raw material for production of energy. Selection of the appropriate equipment and mechanization for collection and preparation of the biomass requires prompt and purposeful balancing of the biomass, as for AP Vojvodina so for the whole country, which is the base for selection of the appropriate equipment. Implementation of the line with machines »*roll-baler*« and »*big baler*« manifested certain advantages in terms of operation productivity and the cost price of collection of the mass, as compared to the conventional

methods of work. Also, the recommendation of the research is that the biomass collected from the larger areas je (over 200 ha) is executed with the high capacity machines, such as aforementioned pressing machines. **Potkonjak *et.al.* (1998)** were analysing various methods of preparation of the cornstalk and storing of the bales with natural and artificial drying. Baling was performed in two ways: 1.Chopping up with a grinder, collection of the chopped mass into bands and baling with the pick-up pressing machine, 2.Directly, with adapted grinding press, instead of the pick-up machine. The results of the research indicate that the energy consumption was lower in the process performed with the grinding press, whereby, with the operating speed of 4.11 km/h, the consumed driving power was 56.12 kW. In operation with the pick-up press (the first option) and with the operating speed of 3.69 km/h, the driving power was 75.82 kW. In order to achieve the safe storing of the bales, dried in natural way, bales should have the humidity content below 25 %, otherwise it will necessary to dry the bales by means of active ventilation. Bale density, in both cases, should not exceed the value of 120 kg/m3. **Zekić *et.al.* (2010)** quoted that Vojvodina has on its disposal 3.178.789 tonnes of the cornstalk which could be utilized as biomass. The same authors confirmed that in Vojvodina, the share of the cornstalk in the total volume of crop residues makes 56.51 %. Also, they quote that the corn production in Vojvodina, in a period from 1990 to 2009, has been growing with average annual rate of 1.54 %.

The basic prerequisites for utilization of some matters in economically profitable production of the biomass include: 1) sufficient volumes on disposal, 2) composition which enables efficient and economic energy production and 3) appropriate percentage of humidity as a necessary condition for economic storing, keeping and processing. Corn hybrids are divided into so called FAO groups of ripening (100 – 1000). In Serbia-Vojvodina, significant groups of ripening include 300 – 700. Ripening group (200 – 300) has the length of the growing season of 100 – 120 days, 13 – 15 leaves, corn ear positioned on 60 – 80 cm, and usually, at the moment of gathering, has 15 – 20% of humidity. The plant is roughly 260 cm high. Middle-early maturing hybrids (400 – 500) – length of the growing season is 120 – 130 days, number of leaves 15 – 17, corn ear 80 – 100 cm, humidity 20 – 25%. The plant is 260 cm to 280 cm high. Middle-late hybrids (600 - 700) – length of the growing season is 130 – 140 days, 17 – 19 leaves, corn ear height 100 – 120 cm, humidity in the moment of ripening 25 – 30%. The plant is 280 cm to 300 cm high. Cornstalk collection includes two stages:

- The first stage is collection of the biomass and/or the cornstalk from the seed corn, where the harvest, under optimal conditions, starts from 25th August, and lasts until 25th September.
- The second phase is collection of the biomass from mercantile corn, where the harvest, under optimal agro-technical conditions, starts from 20th September and lasts until the end of October, sometimes even until the end of November.

The number of harvesting days moves in the span of 60 to 100 days, and is conditioned with climate factors (it is impossible to harvest during the rainy periods). The beginning of the harvest depends on waxy maturity of the seed. Collection of the biomass starts immediately upon beginning of the harvest of the seed corn, and ends in the late autumn by the beginning of the ploughing. The very cycle of collection of the corn crop residues, as a source of energy, is divided in three phases:

1. Gathering or harvesting of corn
2. Collection of the biomass
3. Combustion of the collected biomass

The procedure of corn gathering or harvesting is performed with the harvester or the corn picker, whereby one part of the biomass passes through the harvester (20% to 30%) and that part of the biomass is thrown out behind, while another part passes below the header, where it is chopped and stays on the ground. It is important to point out that this agro-technical operation is executed independently from the organization of collection of the biomass, and is not included in calculation of costs of collection of the biomass, but it charges costs of production of the main product (corn grains). Yet, it is significant for the process of collection of the biomass, because only upon completion of the process of seed gathering the collection of the biomass can be started. The process of collection of the cornstalk includes the following field works:

1. Raking
2. Baling
3. Collection of bales
4. Loading and transport of bales, and unloading.

Raking is the operation which includes collection and arranging of the cornstalk, all across the field. It is performed between the processes of

harvesting and baling. The aim of this operation is to concentrate the cornstalk in lines or tracks, and in order to collect it with the baling press thus reducing the losses resulting from the baling process and/or in order to collect as much mass volumes per unit area as possible. This working operation was performed by means of the aggregate which consists of one tractor of the power of 85 KW and rakes of the operating grip of 7 to 9 m. Calculation of costs of this operation included the following data, obtained from the collection of the stalk from the following locations:

Table 1. *Review of the data relating the calculation of the raking costs*

Performance (ha /day)	from 60 to 100ha
Fuel consumption (l/ha)	7
Number of tractors (85 ks)	1
Number of connected machines	1
Number of engaged labour force	1

Source: *Own research*.

After the raking process and collection of the crop residues (the cornstalk) into one band, the process of baling starts.

Table 2. *Review of the data relating the calculation of the baling costs*

Performance (bale /day)	from 200 to 300 piece
Performance at 6-9 t/ha of the corn yield	from 100 to 200 t
Fuel consumption (l/bale)	0.8-1
Number of tractors (220 ks)	1
Number of connected machines	1
Number of engaged labour force	1

Source: Own research

Collection of bales is performed only with the loading trailer. The procedure runs in the following way: the tractor moves over the baled field, finds a big bale, approaches the bale and loads it onto the trailer. Bales are mechanically piled up onto the trailer and when it is packed, the trailer goes to the central storage. The task of this procedure is direct transport of bales from the field to the central storage. Self-loading trailer is towed with the higher speed vehicle, in order to make more turnovers in 24 h. In the season, this operation can be organized continuously within 24 h, because it does not require optimal working conditions. It is

important to point out that this trailer can perform mechanical unloading of bales in the place of storage which is conditioned with the humidity content of the cornstalk.

Table 3. *Review of the data relating the calculation of costs of loading and transport*

Performance (t /day)	250
Fuel consumption (l/km with the field)	45
Number of tractors (150 ks)	1
Number of connected machines	1
Number of engaged labour force	1

Source: *Own research.*

Based on the given standards, we made a calculation of costs of the cornstalk preparation. It was performed in accordance with the certain stages of its preparation. The calculation of raking costs is given in the table 4.

Table 4. *Raking costs per tonne of collected cornstalk mass*

No.	Description	Unit of measure	Value
1	Number of workers		1
2	Number of daily working hours	h	10
3	Gross price of one working hour of the tractor driver	€/h	1,27
4	Total daily gross wage workers	€/day	12,7
5	Daily performance	ha	80
6	Biomass yield	t/ha	6
7	Total daily volume of the collected mass arranged in bands	t	480
8	Total gross workers' wage	€/t	0,026
9	Number of aggregates with tractor of 80 ks	piece	1
10	Number of daily working hours	h	10
11	Gross price of one working hour of the aggregate	€/h	28,79
12	Total daily gross remuneration for the aggregate	€/day	287,9
13	Daily performance in ha	Ha	80
14	Mass yield	t/ha	6
15	Total daily volume of the collected mass arranged in bands	T	480
16	Total daily gross remuneration for the aggregate per tonne of the mass	€/t	0,600
17	Total price of raking per tonne of the mass	€/t	0,626

Source: *Authors calculation.*

Baling was performed with "Big baler" press and represents, following the order, the latest technology applied in the process of preparation of the straw and the cornstalk. The advantages of this system, as compared to other similar systems, can be numerous and quickly noticed in practice. Presses for making big square bales, because of their high capacity, demonstrate advantages, primarily within the large farms, because of their high performance and low number of engaged machines and vehicles. This system enables completely automated process of bale production, loading, transport, storing, removing and distribution. All that requires very low expenditure of human labour force, but initial investments and costs are quite significant. Calculation of the total costs is presented in table 5.

Table 5. *Baling costs per tonne of collected cornstalk mass*

No.	Description	Unit of measure	Value
1	Number of workers		1
2	Number of daily working hours	H	10
3	Gross price of one working hour of the tractor driver	€/h	1,27
4	Total daily gross wage workers	€/day	12,7
5	Daily performance	Ha	25
6	Mass yield	t/ha	6
7	Total daily volume of the baled mass	T	150
8	Total gross workers' wage	€/t	0,085
9	Number of aggregates with tractor of 220 ks	Piece	1
10	Number of daily working hours	H	10
11	Gross price of one working hour of the aggregate	€/h	87,95
12	Total daily gross remuneration for the aggregate	€/day	879,5
13	Daily performance in ha	Ha	25
14	Mass yield	t/ha	6
15	Total daily volume of the baled mass arranged in bands	T	150
16	Total daily gross remuneration for the aggregate per tonne of the mass	€/t	5,863
17	Total price of raking per tonne of the mass	€/t	5,948

Source: *Authors calculation.*

Transport costs for straw, baled in big square bales, include loading and transport from the lot to the economy yard, or some other location where

the straw will be stored. Transport is performed by means of specialized tractor trailers, towed by tractor of the power of 150 kw. In this concrete case, the process of loading and transport is performed with special self-loading trailers. In accordance with that, other transport/handling related operations are performed by means of self-loading trailers as well.

The mentioned trailer has maximum carrying capacity of 16 bales. If the quoted number is multiplied by the planned bale weight of 500 kilograms, we get the total carrying capacity of 8.000 kilograms. The performance of transport depends on transport distance, road conditions and other factors. Calculation of costs includes costs of tractor, use of the trailer and operator's wage (table 6).

Table 6. *Costs of loading, transport and unloading per tonne of collected cornstalk mass*

No.	Description	Unit of measure	Value
1	Number of workers		4
2	Number of daily working hours	H	24
3	Gross price of one working hour of the tractor driver	€/h	2,12
4	Total daily gross wage of workers	€/day	50,8
5	Daily performance	Ha	50
6	Mass yield	t/ha	6
7	Total daily volume of the baled mass	T	300
8	Total gross workers' wage	€/t	0,169
9	Number of aggregates with tractor of 150 ks	Piece	1
10	Number of daily working hours	H	24
11	Gross price of one working hour of the aggregate	€/h	71,28
12	Total daily gross remuneration for the aggregate	€/day	1710,7
13	Daily performance in ha	Ha	50
14	Mass yield	t/ha	6
15	Total daily volume of the collected mass arranged in bands	T	300
16	Total daily gross remuneration for the aggregate per tonne of the mass	€/t	5,702
17	Total price of loading, transport and unloading per tonne of the mass	€/t	5,872

Source: *Authors calculation.*

Calculation of the total costs requires summing up of all stages in the process of cornstalk preparation. It is presented in table 7.

Table 7. *Total price of cornstalk preparation*

No.	Description	Value (€/t)
1	Total price of racking per tonne of mass	0,626
2	Total price of baling per tonne of mass	5,948
3	Total price of loading, transport and unloading per tonne of mass	5,872
4	TOTAL	12,446

Source: *Authors calculation.*

Conclusion

The share of energy produced form the biomass obtained from the collected cornstalk can be quite significant in the balance of the country. This increase can be achieved through the processing of the major part of available raw-material. In case of some producers, the production of the biomass can cover significant part of energy requirements thus increasing energy independence. Overview of the economy aspects of collection of the cornstalk as biomass should be based on application of the analytic calculation. Following this direction, it is possible to test each observed solution in changeable conditions and to monitor changes within the costs. Such result can be analysed on the level of the society and valued through the financial support, which, in exploitation of renewable sources, must be provided by the government through the whole range of stimulation measures.

Through the calculation of costs, it was established that the price of preparation of one tone of cornstalk makes 12.45 €. If we consider the ratio of replacement of 1.38 tonnes of the cornstalk with 1 tonne of coal, where the purchase price of coal would be calculated at market price of 32 €, it is possible to conclude that the cornstalk has great potentials as the energy substance. Nevertheless, the final price must also include costs of storing and energy conversion.

Because of the fact that high investments are required in order to enable exploitation of the energy from the cornstalk, introduction of such technologies into the energy production can be achieved only through the

simultaneous performance of activities from various fields. On one hand, it is necessary to develop appropriate technical solutions and establish a relation of prices of energy substances which will not give priority to imported energy substance and electric energy in relation to the biomass. In the process of development of technological solutions, the priority must be given to those technological solutions which are already widespread in practice. This is, first of all, conditioned by low investment power of the agricultural sector, and low qualification structure of the employees. Such complex goals can be reached only through the stimulation measures provided by the competent governmental institutions. On the other hand, increase of energy utilization of the biomass would have positive effects on development of the rural regions and employment of the local population. The assumption that there would be an increase of energy production in the rural regions, due to exploitation of the biomass, would create conditions for keeping of the working-age population. The government should stimulate domestic industry towards the production of the equipment for energy exploitation of the biomass. Besides, it is necessary to acquaint potential consumers of biomass with the possibilities of utilization of the biomass as an energy substance.

The initial step in energy exploitation of the biomass is creation of conditions in which the agricultural farms will increasingly use their own side-products for production of the energy and/or stimulate organization of energy independent farms. In this case, the costs of transport of the biomass residues will be relatively low, which represents significant condition for profitability of the entire process.

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PROMOTION OF „GREEN MANUFACTURING“ IN AGRIBUSINESS OF THE DANUBE REGION RURAL AREAS

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Abstract

The education for environmental protection, in addition to timely and credible information, legislation and environmental eligible investments, rises as an important task, since it most directly affects the creation of environmental awareness and ecological behavior. The second pillar of the Danube Strategy - Protecting the environment in the Danube Region - focuses on the region's environment, closely monitoring the progress made in environment-related projects and activities. Cleaner production requires changes in behavior, responsible environmental management, development and implementation of appropriate policies and constant evaluation of different technology options.

Keywords: *Cleaner production, Danube region, Agribusiness, Eco Marketing*

Introduction

The Republic of Serbia played an active role in developing the EU Danube Strategy and its related Action Plan. This has helped boost the country's economic potential, integrate its sector policies into EU development programs and plans and promote its bilateral and multilateral cooperation with all Danube basin countries. Because there are a large number of industrial risks sites in the Danube Basin Region which pose a constant threat to the environment and the population, environmental risk management is an inevitable priority under the heading of environmental protection.

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Today's civilization was developed on the paradigm of continuous material growth and achievement of the unscrupulous use of natural resources. On the one hand, industrialization enables the improvement of the living standards of a large number of people on Earth, but on the other hand has a negative impact on the environment and human health. The man has finally realized that the issue of the future survival strategy is related to a different approach to the environment. In essence, the ecological crisis is an inseparable part of the great civilization events. First of all, a deep crisis of a mode of production, consumption patterns and economic growth, with a loss of basic human values. Such life took a man out of balance with nature, of which he is only a part, and it can be recovered only with basic socio-cultural alternatives in the way of production and consumption.

In a time of global environmental crisis, the education for environmental protection, in addition to timely and credible information, legislation and environmental eligible investments, raises as an important task, since it most directly affects the creation of environmental awareness and ecological behavior. The main elements of the theoretically and empirically acquired environmental awareness are ecological knowledge, evaluation of the ecological situation and ecological behavior. In addition, the environmental awareness does not consist just of the knowledge of the relationship between nature and society, the disruption of the ecological balance and the need to protect the environment, but also the conscience, or the willingness of individuals and social groups to engage in the protection and to act ecologically responsibly and reasonably concerning the environment in which they live. Education for environmental protection is not just about exploring the natural and social sciences necessary for understanding and solving environmental problems and environmental pollution, it also includes upgrading moral principles and the establishment of a new value system of man in relation to nature and the environment: man can and must be only a user of nature and not its absolute master. If nothing else, for his own sake, man has to take care that he do not destroy his own environment, and thus himself. Former anthropocentrism must be replaced by the bio (eco) centrism.[3]

[3] OECD (1990): *Teaching for sustainable development*, Report on a workshop at Veldhoven, Netheralnds 23rd - 25th april 1990, Paris.

The promotion of education for sustainable development

Thanks to the UN and other international organizations and research interests of theoreticians who have addressed the problems in this field from their point of view of their scientific and theoretical orientations, this debate experiences the culmination, and the education in this field a specific development and qualitative affirmation. Seriousness of environmental problems, the need for environmental protection and management of environmental risks represent an impetus for a focus of social development ("sustainable development") and the related different conception of educational policy in the way of the formation and development of "sustainable society". Observed in the world level, there is a general tendency that modern education is seen and thought in the context of sustainable development strategy and the concept of lifelong education. The central issue that arose in the criticism of the current and the search for a new concept of development of the modern educational system is in need of its greening and humanization as a new direction, improvement and development trends of the education system facing the future. It is, in fact, the design of such an educational system that will conceptually take into account and didactically and methodically will adequately meet and continuously will develop the educational needs in the field of environmental protection.

The largest conference on environment protection and development, held June 1992 in Brazil, resulted in a document ("Rio Declaration", the Convention on the climate, the Convention on Biological Diversity and Agenda 21 for the 21st century) in which the international community is committed to sustainable (adjusted) development based on ecological principles and by which is implied the wise management of natural resources, biodiversity and nature's self-reproduction protection, rational consumption and conservation of energy and natural resources, especially non-renewable, recycling and so-called Clean technologies, taking measures to protect the environment, in order to meet the needs of present and future generations.[4] The idea of sustainable (adjusted) development in the modern sense of the word began to be used in the eighties in the World nature conservation strategy, adopted by the International Union for Conservation of Nature (IUCN) and the Report of the UN Commission for Environment and Development (Brundtland

[4] Savezno ministarstvo za razvoj (1992): *Napori Ujedinjenih nacija za bolju životnu sredinu u 21 veku*, Beograd.

Commission) entitled "Our Common Future" disclosed in 1987. For education for the protection of the environment from all international conferences a special importance is given to the conferences in Stockholm (1972), Belgrade (1975) and Tbilisi (1977), Congress in Moscow (1987), the Rio Conference (1992) and Thessaloniki (1997) where it is emphasized that education is the key to survival and hence the new name - education for survival.

Globally, in 1975 was prepared the first 'International education program for the protection of the environment" (UNEP and UNESCO), and after the Rio Conference, 1993, it was amended in order to re-orientation of education of the population on the planet for sustainable (adjusted) growth. It defines the main goals of education:[5]

- To enable each individual to reach awareness, knowledge, skills necessary to actively participate in the protection and improvement of the environment and achieving of balanced development.
- Create a new, environmentally desirable behavior and lifestyle.
- Development of environmental ethics and environmental culture.
- Strengthening the Education of Environmental Protection for all.
- Improving the quality of life.

Education for the environment, that is, education for survival, that is, education for sustainable development:

- Must include all levels of education, from preschool through elementary to the university, postgraduate and continuing. It should be implemented in all forms of teaching in the school, in multiple activities outside of school and student organizations;
- Must continue in work organizations, through the training of workers in certain work positions, in order to reduce the chances of endangering the environment in the work process;
- It cannot be reduced to training people for passive protection, but it should be directed towards a positive attitude, the training of citizens for planned development of the environment with all its resources and human creations;

[5] UNESCO – UNEP (1993): *International environmental education program*, Paris.

- Knowledge and understanding of the environment must be exposed in all school subjects where possible: nature and science, biology, chemistry, physics, geography and others. This education is essentially multidisciplinary and inter-sectorial and provides an integrative approach in the process of education.
- The curricula should include the issue holistically, emphasizing the historical and developmental approach. It is imperative to understand human destructive powers, limitations of fuel, mineral resources and land, and to learn about the specific consequences, which are caused by some human activities in regional and planetary scale.

The Danube region and the environment

With its great potential, the Danube is a starting point for many European developmental concepts and integration trends. On a political initiative launched by Austria, Romania and Germany (Baden-Wuerttemberg), in June 2009 the European Council formally asked the European Commission to prepare a common, comprehensive strategy for the Danube basin. This request initiated the drafting of the EU Strategy for the Danube Region (Danube Strategy). By late 2010, when the process was near completion, extensive consultations were held with a large number of stakeholders playing an active role (state representatives, the EU, regional and international organizations, civil society etc.). Several conferences were organized: Ulm (6 May 2009 and 1-2 February 2010), Budapest (25-26 February 2010), Vienna and Bratislava (19-21 April 2010), Ruse (10-11 May 2010), Constanta (9-11 June 2010) and Bucharest (8 November 2010). The most important aspect seems to be the fact that non- EU member states from the Danube basin were involved on an equal footing in the consultation process alongside EU member states. The key messages resulting from the consultation process include the following: "(1) this is a welcome initiative to reinforce the integration of the Region in the EU; (2) Member States and Third Countries (including candidate countries and potential candidates) commit themselves at the highest political level; (3) the Commission is key to facilitating the process; (4) existing resources can be much better used for Strategy objectives and (5) the Strategy must deliver visible, concrete improvements for the Region and its people."[6]

[6] EC (2010): *COM(2010)715/4, Strategija Evropske unije za Dunavski region*, http://www.dunavskastrategija.rs/sr/?d, (11/09/2012)

The Serbian Government joined the Strategy development process and set up a working group for cooperation with the EU in the Danube basin which drafted a document entitled Participation of the Republic of Serbia in the Development of an Overall European Union Strategy for the Danube Region.[7] The new concept of macro-regional cooperation, which emerged during the Strategy's development, was recognized as an opportunity to further promote Serbia's cooperation with both neighboring states and other European countries. Moreover, the EU Danube strategy is a major instrument for the Republic of Serbia to strengthen its institutional and human capacity by developing local, regional and national potential. Efficient synergy between different key players in the public and private sectors, NGOs, associations and the media, results that are concrete and accessible to the public at large, as well as the will and skill to apply EU rules and procedures in carrying out specific activities are the most important challenges and benefits for Serbia. In a broader context, the Republic of Serbia thus contributes to strengthening democracy, the rule of law, economic prosperity and progress in the region.

The main objectives (pillars) of the Danube Strategy include the following:

- connecting the Danube Region;
- protecting the environment in the Danube Region;
- building prosperity in the Danube Region, and
- strengthening the Danube Region.

The second pillar of the Danube Strategy - Protecting the environment in the Danube Region - focuses on the region's environment, closely monitoring the progress made in environment-related projects and activities. Europe's second-largest river runs through the center of the Region and flows into the Black Sea through a vast delta, which boasts the richest biodiversity in Europe. Consequently, this pillar of the Danube Strategy focuses on the following three priority areas: to restore and maintain the quality of waters, to manage environmental risks and to conserve biodiversity, landscape and air and soil quality.

[7] Vlada Republike Srbije, *Pozicija Republike Srbije za učešće u izradi sveobuhvatne strategije Evropske unije za region Dunava*, http://www.dunavskastrategija.rs/sr/?p=32, (11/09/2012)

The restoration and maintenance of water quality is a central issue for the Danube Region, it includes issues of the quality and quantity of water. The management plan and the primary examination, monitoring and analysis of the Danube basin identified four main problems concerning water quality. The primary issue is organic pollution, the discharge of partially processed or unprocessed wastewater from built-up areas, industry and agriculture. Pollution from nutrients is caused by phosphates and nitrogen from agriculture (mineral fertilizers) or cattle breeding (manure), and the discharge of unprocessed wastewater by industries or urban areas. Pollution from hazardous substances is mainly caused by industrial wastewater, substances produced by mining activities or accidental discharges. Hydro morphological changes in rivers and lakes cause interruptions in the river and its habitat continuity; separation of neighboring marshes or flood-prone areas and hydrologic changes significantly affect water quality.

By implementing activities under this priority aimed at strengthening cooperation both for prevention of and as a response to natural and man-made disasters, such as heavy floods or industrial disasters, reduces the risks of adverse effects on the environment and biodiversity and also saves lives and reduces economic damage due to natural disasters. This priority also pays special attention to the issue of climate change and its potential consequences for the Danube Region. In this area, the Danube Strategy will identify various possible climate change scenarios in a timely manner and, consequently, develop meaningful and effective responses at a basin-wide level. A comprehensive transnational, integrated approach to climate change is of the essence, as climate change can affect a large number of sectors. The Danube climate change adaptation strategy will be based on further joint research in this domain in the nearest possible future.

The preservation of biodiversity, landscapes and air and soil quality is the last priority under the pillar dealing with environmental protection. There are large areas of unspoiled nature in the Danube Region and its many tributaries are vital to the ecosystems, flora and fauna all over the EU. However, intensive industrial development, deforestation and air and soil pollution pose a threat to biodiversity in the Danube Region. The region's biological and ecological diversity is gradually diminishing, plant and animal species, habitats, marshes and floodplains are disappearing. The excessive exploitation of natural resources where environmental infrastructure is underdeveloped and an insufficient awareness of

environmental needs make it necessary to accelerate cooperation between Danube basin countries, to share knowledge and to employ the best practices in this field.

Eco marketing and Cleaner Production

"Eco Marketing", "Marketing Environment" and "Green Marketing" are some of the terms that are used for marketing of products that are beneficial to the environment. The nineties of the last century were called "Environmental Decade" or the "Decade of the Earth", because the environmental and social concerns significantly affected the purchasing decisions of consumers. The concern for the environment we live in and, in accordance with that, the needs of customers for green products has led to the development of green marketing. The definition of this type of marketing creates a challenge in itself, because its definitions in the commercial, social and environmental terms have somewhat contradictory meanings. Marketing of products that are presumed to be safe for the environment is a commercial definition, development and marketing of products that are designed to have minimal adverse impacts on the environment or to improve its quality is the sociological definition, and the environmental definition concerns the effort of organizations to promote, pack and produce products that are appropriate and acceptable for the environment.

Green marketing covers a wide range of activities that include modification of products, production process, packaging and advertising. But first we must locate and identify target consumers, then assess how the group was informed and what additional training is needed for it to be expanded and strengthened.[8] If we observe the demographics of buyers of environmentally friendly products, women are more interested in the environment than men, more likely to buy organic products and more concerned with sorting waste for recycling. However, men and women are equally represented in the activities of preserving the environment in which we live. Also, people with a higher pay scale and level of education, and therefore greater access to information, often pay more attention to organic products and the environment. Psychological indicators of consumers tell us that people with conservative values do not want to complicate life with the changes or do not want to be part of

[8] See: Vujović, Nataša (2009): *Zelena revolucija. Kako je marketing postao zelen?*, Exporter, 14, October 2009, pp. 24-25.

something that is not in accordance with the basic norms and thus they are not open to changes in purchase standards and green products. On the other hand, people who buy organic products place greater emphasis on internal values such as happiness and personal achievement, while those who are not inclined to purchase this type of products prices more the external values such as the sense of belonging, respect and security.

Observing the behavior of buyers who use green products has largely proved that other people's opinion has a major influence on them, as well as the opinion of the state and environmental groups, they also have a strong identity and a high degree of concern for the environment. Unlike them, the customers who are hard to buy green products are of the opinion that these products are difficult to find in the market. Group of customers under the popular name "Green activists" are definitely the target group, because the highest level of education, working in highly skilled jobs (middle and senior management, intellectuals, scientists and artists) and have the highest incomes. We should make sure that they also show great skepticism concerning the promotional and marketing claims.

Generally, customers in the world do not base purchasing decisions on their position concerning the environment, although that item is present to some extent. Certainly if the target audience is more informed about the problems in the ecology it is the greater influence on the purchase, but in Serbia that awareness is relatively undeveloped and the sale should not be based on this argument, but only as a part or bonus in existing features.

Cleaner production requires changes in behavior, responsible environmental management, development and implementation of appropriate policies and constant evaluation of different technology options. Cleaner production is focused on the causes of the problems related to the environment, rather than on the consequences and not only deals with the processes of production, but can also be applied to the entire product life cycle, from the beginning of its development, the consumption to the disposal phase. CP task is to ensure the conservation of resources, elimination of hazardous materials and waste reduction. Five basic techniques of implementation of cleaner production are responsible business, process optimization, substitution of raw materials, new technology and new product development. Cleaner production protects the environment by preventing the inefficient use of resources and the waste that can be avoided. Companies that implement cleaner production should gain an economic advantage by reducing labor costs, reduced

volume of waste treatment, reducing disposal costs, reduce environmental pollution and so on. Investing in cleaner production has a long term impact on better economic results of enterprises and reduces costs in relation to the implementation of solutions for the treatment of the already existing waste. Cleaner production, in addition to the high investment, requires that a company operates in terms of constant change. Such a dynamic situation requires a different and more expensive technology and human resources. These conditions disrupt the stability that is necessary to safely achieve mass production, which is essential to make profits in a market economy. Application of cleaner production thus potentially causes major changes in the organization and management of the company. Company which applies cleaner production can never be static.

It can be generally said that in developed countries operate industrial enterprises which have put their pollution under control: either with treatment of pollution at the end of the process, or with cleaner production. In developing countries, there are companies that do not have their pollution under control, those which did it partially and some that introduce the concept and practice of cleaner production. A large number of industrial facilities from developed countries in recent decades moved into developing countries so that international companies can continue to make profits, primarily because of cheap labor, but sometimes without the costs associated with environmental pollution. This process of migration of "dirty technologies" continues in the direction of less developed countries.

Many authors wrote about the results of the search of national strategy and methodology for achieving sustainable development in our country.[9] In the methodological approach to achieving sustainable development the most important instrument for the realization are the principles of CP (Cleaner Production). UNIDO (United Nation Environmental Protection) (2002) defined Cleaner Production as follows: CP is the continuous application of an integrated preventive environmental strategy to processes, products and services to increase overall efficiency and reduce risks to humans and the environment. Cleaner production can be applied to industrial processes, products and services. In the production processes CP derives from one or more of the savings of raw materials, water and

[9] Zlatković, B., et al. (1997): *Mogućnosti smanjenja potrošnje energija u biotehnološkim procesima*, Zbornik radova Savetovanje Ekotehnologija u prehrambenoj industriji i biotehnologiji, pp. 79–89.

energy, eliminating toxic and hazardous materials, reducing the amount and toxicity of all emissions and waste in a formation during the manufacturing process.

In terms of products CP's mission is to reduce the environmental, health and safety impact of products throughout the life cycle, from raw materials, through processing to final disposal. For services it incorporates environmental requirements in the design and delivery.

When it comes to ecology it has been shown that the media have an individual and social significance. They affect both the development of environmental awareness and ecological culture of the individual and the raise of environmental awareness and the culture of the whole society. The media contribute to greening and humanization of society. As one of the special properties of the media it is often mentioned the unlimited space control and the ability to fit in this space a huge amount of information that contribute to the learning process. Modern technology has eliminated both time and spatial distances. The media pay attention to issues of environmental protection. The press, radio, television and Internet inform about activities related to environmental protection. This way is performed a non-formal environmental education. However, we can bring up the question of quality, quantity and content of information transmitted by the media. It often indicates a lack of systematized, designed and purposeful engagement of the media in the development of environmental awareness and ecological culture of the society.[10] The media are mostly oriented towards the information about specific events and less oriented towards a fundamental education. In order to increase the rate of audience media often report on environmental disasters and scandals. In this way, feelings of fear, helplessness and negative expectation of the future can be created in humans, rather than to encourage a change in behavior and the actions to conserve the environment. In this sense, the educational impact of the media in the field of environmental protection largely depends on the method and content placed by the media, as well as the professionalism and expertise of their staff.

In the recent literature on the media, besides the term medium we can see the term “new media” as well. It is difficult to draw the line between

[10] Kundačina, M. (2006): *Činioci ekološkog vaspitanja i obrazovanja učenika*, Učiteljski fakultet, Užice.

“media” and “new media”, but under the “new” we may consider those which operation can thank to the mainstreaming of microprocessors and electric grid that serves the function of the central unit. On the list of media that influence the attitudes of young people about sustainable development would certainly be personal computers, portable computers, satellite and cable television, radio and all types of other sound carriers. When it comes to personal and portable computers it should be indicated the possibility of their online use, the use of a variety of auditory, visual, text, multimedia and hypermedia records, as well as the possible use of multimedia and hypermedia stored on a CD or DVD. Talking about the media's role in achieving the goals of education for sustainable development means to expose everything we know about didactics and media didactics of teaching young people and adults. From different projects we can see that the mainstream media (Internet, satellite TV, etc.) understood the power of influencing the service users. We conclude that the possibility of the Internet, multimedia and satellite television in the field of education for sustainable development, which is the formation of attitudes and impulse to act, have not been sufficiently explored or exploited.

Internet has tremendous potential to create an environment that fosters the growth of the number of lifetime learners. Internet resources can be an important component of engaged learning in which students can organize their learning within multiple project-oriented curricula, which is related to the problems of real life and the use of the most recent news, data and information. New social and economic paradigm of the Information Age, restructure the traditional dimensions of time and space, providing the opportunity for a radical reshaping of almost every segment of our lives. Most people today who surf the Internet will characterize themselves as environmentally conscious. After all it is logical - Information Society is opposed to the ideals of the old industrial society. Information society is not acting aggressively, overpowering the environment, but trying to find new forms of coexistence and reduce its harmful effects. Modern ecological approach does not mean a return to the old - the rejection of the achievements of modern technology and return to pure and unadulterated country life, but just the use of technological advances to achieve a mutual quality coexistence with nature.

Potential instruments to finance "green manufacturing" in the rural areas of the Danube region

It is evident that a number of different funding sources exist in the Danube region – EU funds, different banks, international organizations and other entities and programs. However, these funding sources are not evenly distributed across thematic units. The Danube Strategy and all the Danube region countries do not have equal access; bear in mind that four out of 12 countries in the Strategy are not EU members. The Danube Strategy does not have additional funds from the EU, it relies on the efficient use of existing financial instruments and funds. For this reason, Priority Area 10, which deals with institutional capacity and cooperation, includes examining the feasibility of a Danube Investment Framework among its activities.

The following EU programs and EU Cohesion Funds are available to EU member states:

- The European Regional Development Fund;
- The Cohesion Fund;
- The European Social Fund.

Candidate countries and potential EU candidate countries have the following EU funding sources at their disposal:

- The Instrument for Pre-Accession Assistance - IPA16
- EU programs;
- Bilateral donor funds.

According to the 2007-2013 financial perspective, 43 percent of the total EU budget goes to rural development and the implementation of EU agricultural policy. Given the complexity of the Common Agricultural Policy, EU supports candidate countries in the adaptation of the agricultural sector and rural areas, as well as the implementation of EU legislation in the framework of the Common Agricultural Policy. Component relating to rural development is intended for candidate countries in order to prepare for the implementation and management of the Common Agricultural Policy.

Implementation of assistance under this component contributes to the sustainable development of the agricultural sector and rural areas, as well as an improved implementation of the *acquis communautaire* in the field of the Common Agricultural Policy. Also, through the process for using this component of IPA, the candidate countries for EU membership are prepared to use funds from the European Agricultural Fund for Rural Development.

According to the IPA Implementing Regulation 718/2007, which regulates the rules and objectives of the use of the IPA, the help from the component intended for the rural development contributes to the achievement of several goals, including:

- improving market efficiency and implementation of Community standards;
- preparation for the implementation of agro-environmental measures and local rural development strategies;
- the development of the rural economy.

The stated aims of the component are realized through implementation of the following measures:

Investments in agriculture with the goal to restructure and upgrade to Community standards through investments in agricultural holdings. Assistance under this measure may be granted to individuals and corporate entities in order to achieve economic feasibility of the investment at the end of the realization of the investment, with a condition of minimum national standards related to environmental protection, public health, animal and plant health, animal welfare and occupational safety. Examples of these measures are realized through the construction and rehabilitation of facilities, storage facilities, equipment (milking machines, coolers, etc.), and more.

Support in order to facilitate the establishment and administrative operation of producer groups with the aim of adapting the production and performance of members of producer groups to market requirements, jointly placing goods on the market (preparing for the sale, the sales centralization and delivery of large quantities of goods to customers), as well as establishing common rules on production information. The help, according to this measure, is not awarded to producer groups which are

officially recognized by the relevant national authority of the beneficiary country before 1 January 2007. It is given as a flat-rate aid in annual installments for the first five years of the date on which the producer group was recognized.

Investments in processing and marketing of agricultural and fishery products with the aim of reconstruction of these activities and upgrade to Community standards, provided that investments in retail level are not included in the help system. Assistance may be awarded in the form of investments in companies employing less than 250 employees and have an annual turnover not exceeding 50 million euro, and/or annual balance not exceeding EUR 43 million, giving priority to investments that aim to comply with all relevant standards of EU. In addition to these businesses, the opportunity of using the aid is entitled to entities that employ less than 750 employees and have an annual turnover not exceeding EUR 200 million, which is the purpose of the investment that the business itself gets into line with the relevant EU standards. The Commission may, upon proper request from the beneficiary country, decide that assistance can also assign the companies that do not meet these criteria for the investment required to meet specific standards of the EU, which includes costly investments. Examples are the construction and reconstruction of facilities, equipment, and so on.

Activities to improve the environment and nature, through the implementation of pilot projects in order to develop practical experience in the implementation of actions to improve the environment and nature, both at the level of administration, and the level of agricultural holdings. Examples include organic farming, crop rotation, reducing the use of fertilizers, etc.

Improvement and development of rural infrastructure by reducing regional disparities and increasing the attractiveness of rural areas for the development of entrepreneurship and providing conditions for the development of rural economies. Priority in this program is to measure the investment in water and energy supply, waste management, local access to information and communication technologies, local access roads of particular importance for local and economic development, as well as infrastructure and fire protection because of the risk of forest fires.

Improving the training in order to contribute to the improvement of professional skills and competence of persons engaged in the agricultural,

food and forestry sectors and other economic actors employed in the fields covered by this component (but keep in mind that the funds will not be awarded for training courses that form part of normal education programs or systems at secondary school or higher levels).

Technical assistance is a measure which is related to the assistance to the public administration in the implementation of IPARD operational program. This measure is aimed for helping to establish the IPARD Monitoring Committee, conducting monitoring and evaluation activities, seminars and meetings, and so on. It is also important to note that the administration and organizations active in the field of rural development, established in the beneficiary countries under this IPA, have access to the European network for rural development. Through participation in this network a user can have an easy way to establish cooperation with relevant actors in the field of rural development in the EU member states and thus to further improve the agricultural sector and the protection of their interests at European and global level.

Also, the measures that are particularly relevant to the topic of this paper are:

Encouraging the diversity and development of rural economic activities through the launch of economic activity, creating employment opportunities and through diversification into non-agricultural activities. Priority is given to investments for creating micro and small enterprises, crafts and rural tourism in order to improve the development of entrepreneurship and economic production. In areas where the local rural development strategy is already determined, the investment under this section shall be in accordance with these strategies.

Preparation and implementation of local rural development strategies through the preparation of projects of cooperation in accordance with the priorities of rural development and management of local public-private partnership by establishing so-called “Local action groups”.

The start of using IPARD funds in Serbia is important for agricultural production in Serbia for many reasons. First of all, the EU funds for agriculture are increased by tens of percent, and funds intended for rural development several times. The most important goal of all the candidate countries is to increase consumption of IPARD funds to the maximum in order to qualify for more funds from the funds after accession to the EU.

Also, the measure of success using IPARD funds will be determined by a measure of success in establishing efficient and organized institutions do implement IPARD, so it is necessary to pay greater attention to building and strengthening of institutions.

Conclusion

Industrialization enables the improvement of the living standards of a large number of people on Earth, but it has a negative impact on the environment and human health. Education for environmental protection is not just about exploring the natural and social sciences necessary for understanding and solving environmental problems and environmental pollution, it also includes upgrading moral principles and the establishment of a new value system of man in relation to nature and the environment.

With its great potential, the Danube is a starting point for many European developmental concepts and integration trends. Protection of the environment in the Danube Region focuses on the region's environment, closely monitoring the progress made in environment-related projects and activities. The excessive exploitation of natural resources where environmental infrastructure is underdeveloped and an insufficient awareness of environmental needs make it necessary to accelerate cooperation between Danube basin countries, to share knowledge and to employ the best practices in this field. Cleaner production protects the environment by preventing the inefficient use of resources and the waste that can be avoided. Companies that implement cleaner production should gain an economic advantage by reducing labor costs, reduced volume of waste treatment, reducing disposal costs, reduce environmental pollution and so on. Investing in cleaner production has a long term impact on better economic results of enterprises and reduces costs in relation to the implementation of solutions for the treatment of the already existing waste. When it comes to ecology it has been shown that the media have an individual and social significance. They affect both the development of environmental awareness and ecological culture of the individual and the raise of environmental awareness and the culture of the whole society.

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THE IMPACT OF ENVIRONMENTAL REPORTING INSIDE THE FINANCIAL AUDIT PRACTICES

Florin Dobre[1], *Oana Georgiana Stanila*[2]

Abstract

The scope of an audit of financial statements is to provide more pertinent information for decision making. This tendency develops in terms of a business environment continuously asking for more complex information. We have to acknowledge nevertheless, that some entities operate in domains where the environmental issues could lead to material impact on the financial statements. This happens not because the company is interested in protecting the environment, but because of the negative effects of not doing so. Therefore, the importance of an environmental matters analysis can not be denied, considering their impact on the financial statements and the audit mission. Our intention is to explore the involvement of audit profession in the environmental issues, as well as that of accounting professionals in this particular type of auditing, based on the assumption that there is a connection between the environmental reporting and the financial statements audit. We also plan to analyze the way the auditor reacts to specific environmental risks.

Keywords: *environment, financial statements, financial audit, accounting*

Introduction

The traditional accounting that provides information, put together as reports of profits, expenses, periodically and departmental budgets, controllable and non-controllable expenses, tends to adopt a new approach. Accounting professionals need to support companies in developing ways to measure the actual processes involved in converting to a quality system. These are the premises for a total quality management, designed as a system for creating competitive advantage by focusing the

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organization on what is important to the customer (Dumitrana et al., 2007). The environment concept can be defined from three points of view:

1) The environment represents the assembly of natural resources;
2) The environment represents the interaction between natural resources and human activities;
3) The environment is the assembly of all available resources (Tabara and Nuta, 2007).

According to the above mentioned points of view, Dumitrana et al (2009) propose a possible structure of environmental accounting based on the following hypothesis:

1) Accounting will take into consideration only the expenses and investments related to the natural resources protection;
2) Accounting takes into consideration, besides the expenses and investments regarding the environment protection, a series of additional activities that can directly or indirectly compete with the creation of impacts such as: expenses and investments regarding the transports, global warming, urbanization, agriculture and the raise of animals;
3) The accounting system is radically changing; therefore an environment/social balance sheet is imposed, in order to show all the flows of expenses destined to supporting the sustainable development of the aria.

Financial statements are expected to provide information on the financial position, performance and cash flow, useful for decision making and assessment of resources allocation. However, we must take into consideration that environmental issues have a major impact on various interest zones, such as managerial accounting, financial accounting, informatics systems and others. What is environmental accounting? An answer can be given to this question starting from the identification of the main aspects this domain refers to, such as:

- Recognition and search for ways of avoiding the negative effects of conventional accounting practices on environment;
- Separate identification of environment related expenses and revenues inside the accounting systems;
- Elaboration of new financial and non financial accounting systems, as well as controlling systems in order to encourage the environmental managerial decisions;
- Development of new forms of reporting and assessment of performance measurement for internal and external purposes;

- Identifying, examining and searching conflicting situations between environmental and financial criteria;
- Experimenting ways in which sustainability can be attributed and incorporated inside the organizational order.

Dumitrana et al (2009) consider that the environmental accounting should be analyzed based on the classification of accounting users into two categories:

1) Environmental Accounting (EA) as an accounting for external users that had to be informed in monetary units once also in physical units;
2) Environmental Management Accounting (EMA) organized in the benefit of internal users in monetary units and in physical units.

In another research in this scientific area, Dumitrana, Jianu and Popa (2008) bring into discussion a new form of accounting named *green accounting*, deriving from the integration of the variables regarding the environment of financial and managerial accounting. Lafontaine (2003) describes the environment accounting evolution on three levels depending of its evolution in time. According to the first level, the role of environment accounting is to systematically take into consideration facts related to environmental protection and reconstruction of natural environment. This happens in terms of respecting the traditional role of accounting that is to take into account the flows and risks related to natural environment in order to ensure a fair view for financialo reporting users. According to the second level, environmental accounting is supposed to take into consideration both recording the company's activities consequences on natural environment after they are produced, and administration of the company's actions for their avoidance. The third level increases the fields of action and considers the environmental accounting more that a passive instrument of recording the immediate or future, certain or potential flows, but also a leverage for inciting the companies towards activities and strategies which are subscribed to the logic of sustainable development.

A careful monitoring of the situation must be done because of the environmental agenda. Coding the entity's attitude towards environment is the result of an environment policy document, which can be internally adopted by a general accepted standard. Among the identified issues there are: sustainability of natural resources, reducing and eliminating wastage, rational usage of energy, promoting safe products and services,

compensating damages, providing information, environmental issues management, annual assessment and auditing.

What is environmental audit? Auditing can be considered a key tool to the financial accounting profession, being in the same time a primary means of communication with the stakeholders. The auditor expresses an opinion whether the financial statements are prepared, in all material respects, in accordance with an identified financial reporting framework. In environmental audit, when forming an opinion on the financial statements, the auditor considers whether the effects of environmental matters are adequately treated or disclosed in accordance with the appropriate financial reporting framework. In addition, the auditor reads any other information to be included with the financial statements in order to identify any material inconsistencies, for example, regarding environmental matters (IPSA, 1998).

This type of audit assesses the business impact on the environment. It is a systematic examination of the interactions between the company's activities and the environment. The audit covers a wide range of domains and involves the performance of various tests. Its objectives mainly depend of the company's type. In International Auditing Practice Statement 1010 issued by International Auditing Practices Committee (IAPC, 1998) environmental matters in a financial audit are described as:

a. Initiatives to prevent, abate, or remedy damage to the environment, or to deal with conservation of renewable and non-renewable resources (such initiatives may be required by environmental laws and regulations or by contract, or they may be undertaken voluntarily);
b. Consequences of violating environmental laws and regulations;
c. Consequences of environmental damage done to others or to natural resources; and
d. Consequences of vicarious liability imposed by law (for example, liability for damages caused by previous owners).

Literature review

Globally, the audit services market is characterized by permanent adapting and changing to the worldwide conditions. For many years, words such as eco-audit, environmental audit, environmental impact assessment (EIA), waste and emissions audit, and cleaner production assessment were given different meaning or were used interchangeably in

various parts of the world. Those audits sought primarily to check compliance with environmental regulations and their results were intended for a company's eyes only (Desgagnes and Gabel, 1996). Environmental audit began latter as a response to rising environmental worriers (Desgagnes and Gabel, 1996).

Following the Conference in Stockholm in 1972, the awareness of environmental threats has included a large scope of the population and enterprisers. The specialized literature confirm that the first environmental audit was conducted in the 1970s in the United States of America in large US firms such as US Steel (in 1977), Allied Chemical (in 1979), General Motors and ARCO and subsequently this concept has grown and was performed by a growing number of entities, especially in developed countries. In the 1980s, the practice of environmental auditing spread further, particularly across the chemical industry, under the public and regulatory impact of the Bhopal disaster and new insurance contracts linking insurance fees to environmental risks and pollution. In 1988, the US and Canadian Chemical Industry Associations jointly adopted the Responsible Care Programme, which was the first significant multi-firm initiative that specified environmental audits. (Desgagnes and Gabel, 1996). At European level, the EU Eco-Management and Audit Scheme (EMAS) is a management tool for companies and other organisations to evaluate, report and improve their environmental performance. The scheme has been available for participation by companies since 1995 and was originally restricted to companies in industrial sectors.

A short examination of environmental audit is useful while examining the auditor's role in this domain. Initially, according to Todea, Stanciu and Joldoş (2011), the environmental auditor focused on technical problems and on issues of compliance with the legislation, and was a role generally undertaken by professionals from outside accounting and from outside the entity. Presently, he provides a mean for improvement, being recommended to conduct it regularly in order to avoid the risk of failure to comply with environmental regulations in force. Chiang (2010) draws attention that environmental matters may impact the financial reports, leading to potential risks of material mistakes, including inadequate disclosure. Nevertheless, the author points out those auditors are not presently sensitive to environmental matters in exercising their profession. Previously, in 2006, Chiang agreed that the mechanism for translating the consideration of environmental issues into audit practice needs improvement before auditors can become confident and fully engaged in

their consideration on environmental matters in financial audits. According to Desgagnes and Gabel (1996), international standards for environmental auditing are being actively promoted by public authorities and adopted by private firms. They underline that the audit report should include, among others, an analysis of corporate policy statements, management control systems, process controls, inspection and record-keeping procedures, agreements with waste contractors, training activities, and emissions records. Environmental auditing is considered an integral part of broader environmental management systems.In the context of changes in societal attitudes towards audit, Hanlon (1993), as cited by Chiang in 2000, observes that in accountancy the client for auditing services is increasingly viewed as the company managers rather than the shareholders, the public or the state.

Duflo et al (2012) emphasize that a solution to enforce regulation or otherwise verify quality is third-party auditing. They bring as exemple the SEC which requires public companies to file independently audited annual financial statements. In opinion of researchers like Potoski and Prakash (2005) or Bhattacharyya (2011), cided by Duflo et al (2012) third parties are important in the enforcement of various environmental, standards including ISO 14001 certification and the verification of carbon abatement in the carbon offset market. Dixon et al (2004), as referred to by Todea, Stanciu and Joldoş (2011), discusses about two categories of factors limiting auditors' participation in environmental audit, as follows:

I. Factors related to auditors and the auditing profession:

- Accounting education;
- Ethical and social aspects in accounting education;
- Research in accounting and auditing profession;
- The experience, skills and training of the financial auditor;
- Professional guidance on environmental matters;
- Auditors' view towards involving in environmental auditing.

II. Factors related to the companies' lack of demand for environmental reporting:

- Environmental data information;
- Environmental indicators;
- Environmental reporting;
- The need for independent verification;
- Professional standards and principles of environmental;
- Limited public demand for environmental reports;
- Nature of the demand for environmental reporting.

As a result of his research, Ienciu (2009) created *the responsible model for environmental impact presentation* represented as follows:

- The model is based on environmental management accounting, functioning within an environmental management system, on which an internal environmental audit should be adequately performed;
- The second pillar, within the model, should be represented by traditional financial accounting, financial statements being subject to financial audit;
- The third pillar should be represented by environmental reporting and auditing thereof within the external environmental audit.

Approaching from another angle this subject, Gray (2000) points out the essential desirability of social, environmental and sustainability reporting as a crucial element in any well-functioning democracy as a given can be achieved by professional accounting and auditing education and training. He makes a call for a substantial re-think of accounting education and training.

Research methodology

In defining concepts like *environmental reporting* or *environmental audit,* as well as in analyzing their impact on accounting reporting and on financial audit, our scientific approach is based on national and international sources of information. Among objectives is the one of presenting the degree financial auditors get involved in environmental audits in Romania. In order to achieve the planed objectives, we turned to a positive research through documentation, analysis, synthesis and comparison.

We base our research on the belief that companies must prepare statements based on which environmental indicators can be computed in order to use them for the benefit of sustainable development. Environmental audit is designed to be a useful tool in the accomplishment of reporting and managerial objectives, as well as in controlling environmental practices, fully complying with specific regulation and internal practices. We are aware that environmental issues are a relatively recent challenge for accounting professionals and auditors in the same time, regardless of the fact that the responsibilities are voluntarily set or by law.

The involvement of accounting professionals in environmental auditing

As environmental audit evolved, it was acknowledged that the role of the environmental auditor extends beyond legal compliance going all the way to the management mechanisms in an entity, and there's a growing pressure for them to be revised internally on a regular basis (Power, 1997), cited by Todea, Stanciu and Joldoş (2011). Internationally, accounting profession often requires accountants and auditors to get involved in organizing and performing environmental audits. Accountants and auditors are reluctant to get involved in such a mission, due to the lack of mandatory requirements. They rather choose to operate in fields where there is a generally accepted framework, such as financial audit, internal audit, financial consultancy, evaluation, legal and extra judicial expertise. An environmental audit and the production of an environmental report are useful tools in the responsiveness to various sources of pressure. Despite the fact that the production of such a report is usually voluntary, it ensures that the entity is able to collect data that can also be used in its environmental reporting.

As Dumitrana et al. (2009) show, an environmental report is often associated to an annual financial report, because it is usually a part of it. That is because, initially, it was the responsibility of the accountants. Therefore, the financial aspect was dominating by disclosing the expenses done by the company for the natural environment. Nowadays though, they overcame the strictly financial aspects in order to supply qualitative, as well as quantitative information on the management system of the natural environment, as well as on the results and performances on the company's natural environment.

Besides that, Dumitrana et al. (2009) considers that the financial position might be divided in two parts: a financial position and an environmental financial position. Likewise, the global performance can be separately reported as a financial performance and an environmental performance. Therefore, the set of the financial statements must contain additional forms for the environment, such as an Environmental Balance Sheet and an Environmental Profit and Loss Account, with some "green" lines.

If we take Romanian case, presently, the Romanian companies don't know the advantages of environment accounting, therefore they don't organize such an accounting and they don't disclose information about

the environment. The state is the only involved actor in a policy of environment protection. There is a gap between the means used for the environment protection in Romania and those from European Union which can be reduced by applying the environment protection projects towards the local authorities and the commercial companies and by attracting European and internal funds. In Romania, the environment protection has appeared in 1990 when it was for the first time set up by the Ministry of Environment (presently the Ministry of Environment and Sustainable Development) as an independent domain of the national policy. After 2002, the real protection policies were centrally and locally adopted. Therefore, based on the "polluter pays" and "the responsibility of the producer" principles, Romania has set up a Fund for the Environment in order to solve the protection problems. According to the Directive no. 2003/4/CE, Romania, through its public authorities, must take all the necessary measures for ensuring the organization of the information regarding the environment to be disclosed to the public. At Information about the state of the environment refer to elements like: air and atmosphere; water; soil; land; landscapes and natural sites, including the humid arias; biological diversity and its components, including the genetically modified organisms and the interaction between them or factors like: substances; energy; noises; radiations or losses that affect or is likable to affect the above mentioned elements; measures (including the administrative ones) like policies, legislation, plans, programs, environment agreements and activities that affect or they are likely to affect the elements or the environment factors; reports about the appliance of the environment legislation; costs and benefits analysis, as well as other economic analysis and hypothesis used in the case of the measures and/or the environment activities; the human health state and security, in the extent in which they are or could be affected by the environment elements state.

This a good context in which environmental audit can develop. The auditor faces though numerous types of information contained in such a reporting, the final quality being much diversified (Gallez and Moroncini, 2004). The auditor of the entity's financial statements may consider using the findings of "environmental audits" as appropriate audit evidence.

Impact of risks on environmental audit

According to Campbell (2009), one area of audit activity that has grown in recent years is that of social and environmental audit. The social and

environmental accounting 'movement' began in the 1980s, when it was first coherently argued that there was a moral case for businesses, in addition to reporting on their use of shareholders' funds, to account for their impact on social and natural environments. While accounting instruments already existed for reporting financial performance, there weren't any for accounting for costless impacts. This situation gave rise to modern social and environmental accounting.

Stakeholders become more interested in the relationship between environmental features of the organization and its economic performance. As Popa, Oancea- Negescu and Popescu (2012) point out, the role of financial communication is underpinned based on the belief that an efficient communication is essential inside the company – stakeholders relationship. Therefore, stakeholders' interests are of great importance in financial reporting in general, and environmental reporting in particular.
Some examples of environmental matters affecting the financial statements are emplasized by IAPS 1010 *The consideration of environmental matters in the audit of financial statements* issued by International Auditing Practices Committee (IAPC, 1998):

- The introduction of environmental laws and regulations may involve an impairment of assets and consequently a need to write down their carrying value.
- Failure to comply with legal requirements concerning environmental matters, such as emissions or waste disposal, or changes to legislation with retrospective effect, may require accrual of remediation, compensation or legal costs.
- Some entities, for example in the extraction industries (oil and gas exploration or mining), chemical manufacturers or waste management companies may incur environmental obligation as a direct by-product of their core businesses.
- Constructive obligations that stem from a voluntary initiative, for example an entity may have identified contamination of land and, although under no legal obligation, it may have decided to remedy the contamination, because of its concern for its long-term reputation and its relationship with the community.6
- An entity may need to disclose in the notes the existence of a contingent liability where the expense relating to environmental matters cannot be reasonably estimated.
- In extreme situations, noncompliance with certain environmental laws and regulations may affect the continuance of an entity as a

going concern and consequently may affect the disclosures and the basis of preparation of the financial statements.

Campbell (2009) considers that there are three sources of pressure for this:

- a growing belief that environmental issues represent a source of risk in terms of unforeseen (or foreseen) liabilities, reputation damage, or similar.
- the ethical performance of a business, such as its social and environmental behavior, which is a factor in some people's decision to engage with the business in its resource and product markets.
- an increasing number of investors which are using social and environmental performance as a key criterion for their investment decisions.

Audit and assurance is a concept that extends beyond statutory financial audit. In addition to the widespread use of internal audit, there is a wide tendency manifested by organizations of adopting risk auditing and environmental auditing in order to increase the investors' confidence and to respond to other stakeholders' demands. Regardless that these reports are a part of the internal control or separate activities, they are based on auditors assessments. The philosophy applied in avoiding risks is to keep improving the environmental quality of an organization. Four keys define it:

- Plan: Design or revise financial audit stages inside planning the mission for improved results;
- Do: Implement the mission plan and measure its performance;
- Check: Assess the testing and evidence gathering, evaluation and reporting procedures and report the results to decision makers;
- Act: Decide on changes needed to improve the environmental audit process.

Discussions and implications

As Sylph pointed out in 2005, in order to meet new marketplace needs professional accountants and their firms have expanded the range and types of business services they offered their clients well beyond the traditional attest and assurance and taxation advice. These changes, when combined with major public company failures involving inadequate corporate governance and perceived or adjudicated shortcomings in auditor performance, resulted in a widespread conviction of the need for reexamination of accounting regulation and standard-setting structures.

Regulation of the audit profession has typically been included as part of the overall regulation of the accountancy profession and has covered the following areas:

- Education and admission standards;
- Audit standards;
- Ethical standards; and
- Disciplinary action.

As shown in Sylph (2005), a key change in the regulation of the audit profession in recent years has been the move to increased regulation of the performance of auditors and/or the performance of the professional accountancy bodies. So there are now two additional areas of regulation. These are:

- monitoring of audit quality, for example, audit inspections; and
- monitoring the self-regulatory activities of the professional accountancy bodies as they apply to audits and auditors."

In the wake of accounting firms' transformation, regulators became increasingly concerned about the interplay between auditor independence and the provision of non audit services (NAS) to audit clients. In his highly publicized testimony before the U.S. Senate on September 28, 2000, then–SEC chairman Arthur Levitt expressed his concern that "as auditing becomes an ever-smaller portion of a firm's business with an audit client, it becomes harder to assume that the auditor will challenge management when he or she should, if to do so might jeopardize a lucrative consulting contract for the auditor's firm."

In all audits a sufficient knowledge of the client's business is needed to enable the auditor to identify and understand matters that may have a significant effect on the financial statements, the audit process and the audit report. In obtaining a sufficient knowledge of the business, the auditor considers important conditions affecting the entity's business and the industry in which it operates, such as environmental requirements and problems. In case the auditor decides it is a case of environmental audit, important criteria are to be considered (IAPS 1010, IAPC 1998):

- The impact of the results of the environmental audit on the financial statements;
- The competency and skill of the environmental audit team and the objectivity of the auditors, specially when chosen from the entity's staff;

- The scope of the environmental audit, including management's reactions to the recommendations that result from the environmental audit and how this is evidenced;\
- The due professional care exercised by the team in the performance of the environmental audit; and
- The proper direction, supervision, and review of the audit.

Both financial audit and environmental audit have the same structure. In the case of social and environmental auditing, in addition to providing management information, the data might also be used to provide content for external environmental reporting (IPSA, 1998). The results of a research conducted by Ienciu (2009) and continued by Todea, Stanciu and Joldoş (2011), regarding the implication of Romanian financial auditors in environmental auditing showed that their involvement is still little due to the lack of a general framework that stipulates these aspects and the lack of technical knowledge. Engineers represent the profession that performs most of the environmental audit because of their technical knowledge in the field. There results are correlated with the attitude of Romanian entities which don't give significant importance to environmental aspects. The provided information is insufficient and irrelevant to reflect the environmental impact of the entity's activities.

Conclusions

A common method of communication on environmental performance and its impact on the stakeholders is the environmental report. The auditor should not be expected to know more than the management or the environmental experts, but in documenting its work, he is expected to bring into discussion environmental issues, such as costs, impacts or outcomes. These expectations put pressure on auditors, as well as on accountants and even on managers, to correctly assess and report these issues.

It is a confirmed fact in practice that a convincing instrument for auditors to adapt and change their practices is the demand for reporting on environmental issues effects coming from the public and investors. The auditors must be aware of possible accounting developments, such as new assets recognition – environmental ones. Among other steps to be taken we can mention encouraging the clients to chose the rules to be adopted according to their needs and, in the same time, to improve financial reporting and information disclosure including environmental, social and

ethical issues. The aspect of a company's required disclosure that can provide insight into its environmental reporting and accounting practices can include the following:

- Whether the company or the auditor are aware of the impact of environmental related disclosures;
- The type of opinion issued within the past two years – whether environment influences were considered;
- Any disagreements in accounting principles in terms of environment matters;
- Any internal control weaknesses or deficiencies, or any reference to the company's ability (or inability) to meet particular environmental requirements;
- The auditor's inability to rely on management's representations in terms of environmental issues;
- Reference to illegal acts;
- Any prior consultation with the new auditor about accounting principles, the type of audit opinion that might be issued or ; and
- Whether the auditor agrees with the company's statements.

In order to bring a significant and useful contribution to environmental reporting, both auditors and accounting professionals should provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity. It is a reality though that not many companies presently provide adequate disclosures, due to the fact that financial statements are incomplete or insufficient in order to reflect an accurate image of the company's environmental impact. As we presented before, environmental management accounting and the environmental accounting represent means of supplementing the shortcomings of the traditional financial accounting system as far as company's environmental impact is concerned.

According to the Conceptual Framework for Financial Reporting, issued by the International Accounting Standards Board (IASB), if financial information is to be useful, it must be relevant (ie must have predictive value and confirmatory value, based on the nature or magnitude, or both, of the item to which the information relates in the context of an individual entity's financial report) and faithfully represents what it purports to represent (ie information must be complete, neutral and free from error). The usefulness of financial information is enhanced if it is comparable, verifiable, timely and understandable. A change in the accounting

environment will lead to a quicker adoption of the new developments in audit practices. Based on legal requirements or not, it is a reality that more information on any aspect of governance is better than less.

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ORGANIC FARMING IN BULGARIA: SOME RECENT EVIDENCE AND CONTRIBUTION

George Zheliazkov[1], *Darina Zaimova*[2]

Abstract

The vision recently promoted by the concept of sustainable economics has spurred some intensive debates and prominent research in various fields of social and economic life. It has become increasingly apparent that issues related to the growing world population and the increased demand for a quality food supply; sustain considerable challenges for policy-makers and public authorities, research community and society. This problem is two-fold since it calls for a renewed attention both towards practices of sustainable agriculture and enhancement of a knowledge-based economy. The present paper aims to shed light on organic farming in Bulgaria, following the recent tendencies in the legal framework and production conditions. Given its ability to effectively combine economic, social and ecological goals, organic production needs to be clearly recognized in terms of scope, performance and contribution to the sustainable consumption model.

Key words: *organic production in Bulgaria, support policies, market regulation*

Introduction

"The transition to a sustainable knowledge-based bio-economy utilizing renewable plant resources for both food and non-food products is as inevitable as it is desirable"
(Philippe Busquin, European Research Commissioner)

The various suggestions put forward as an efficient response to the environmental problems have come to the agreement on the necessity of a consistent approach which has the potential to embrace issues such as: limited availability of land, climate change and seasonal instability. In

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this line European strategic priorities have been identified in the following set of implementation: quality production, healthy food and improvement of quality of life; environmental and agricultural sustainability, enhancement of competitiveness of European agriculture, industry and forestry.

The general overview of the agricultural sector signifies for its huge importance all over the world in terms of turnover, employment and related industries. In the 15 older European member states (EU 15) there are nearly 7 million farms with an average size of 18,4 hectares employing 15 million people. After the enlargement in 2007, the number of farms has more than doubled up to 17 million, and the proportion of farmers in the work-force has grown around 4 per cent to nearly 8 per cent (EU 25). The food and drink industry is the leading European industrial sectors with close to 700 billion euro annual turnover and employing about 3 million people. In this dynamic picture, Europe currently accounts for only 10 per cent of the fast growing world markets for crop-derived fibers and raw materials, which increased globally from 50,9 to 70 million tones over the past five years. Advances in plant technology research would have strong impact and promising effect on future competitiveness and sustainability of these important European industries.

For the EU 27 member states, acceding after 2004 (new member states) – essentially Czech Republic, Hungary, Slovenia, Slovakia, Lithuania, Estonia, Latvia, Cyprus, Malta, Romania and Bulgaria – the particular direction of bio-product industry sustains significant potential to create a wealth of employment opportunities, predominantly in the agricultural sector. Under a case scenario, 124000 decadal aggregated jobs are expected to be created in the new member states and in the bull scenario - 148000 (Bloomberg New Energy Finance, 2010). The reported total number of biological farms in the European Union is close to 160000, of which the greatest share is in Italy, Greece, Germany and Spain.

Apparently an accurate assessment of biological agriculture is needed to bring about its intrinsic characteristics and advantages which differentiate it from the conventional agricultural systems. As terms biological, organic and ecological farming often receive common use. Both biological and ecological farming, when used in the broader sense, are encompassing various practices and techniques of farming sustainability. Although these terms are widely accepted as interchangeable, some distinction should be

made between them. As a rule, by biological or organic agriculture is usually addressed environmentally friendly farming with no use of chemical interventions. According to the International Federation of Organic Agriculture Movements "*it is an ecologically, socially and economically sustainable agricultural production system which promotes safe products minimizing environmental adverse consequences and the use of non renewable natural resources*" (IFOAM, 2011). This definition represents an entire systematic approach, based on the system of processes, which sustain ecosystems, preserve food and its nutritious values, and social equity. Regarding the geographical aspect a clarification is provided by the specification that "*in Europe (e.g., the Netherlands), the term biological often refers to organic farming, whereas the term ecological refers to organic plus environmental considerations such as on-farm wildlife management (i.e., the relationships between parts of the agro-ecosystem)*" (Norman D., et al., 1997).

The "Codex Alimentarius" established by FAO and WHO accentuates that biological agriculture is a system for management of production, which encourages and enhances sustainability of ecosystems, including biodiversity, biological cycles and soil biological activity. One distinctive feature of biological production is the sustainable usage of energy and natural resources, maintenance of biological diversity and local ecological balance. According to the principal guidelines for organic production, its widely recognized feature is the use of materials and practices that enhance ecological balance of natural systems and that integrate the parts of the farming system into an ecological unity. *"Organic agriculture practices cannot ensure that products are completely free of residues; however, methods are used to minimize pollution from air, soil and water. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people."* (NOSB, 2012). This definition implies implication of management practices rather than relying on incoming investments taken outside from the farming system, and respecting the regional specific conditions which need local adapted systems.

Organic farming is also defined as a production system based on crop rotation, recycling of crop residues and animal manure, green manure, reasonable use of agricultural machinery and biological control methods (EL/2004/B/F/PP-148258). This effect could be achieved by organic farmers with no need to resort to synthetic chemicals (Vlontakis, Desyllas

and Bisti, 2003). For comparison - biological farming is addressed as "*a system of crop production in which the producer tries to minimize the use of 'chemicals' for control of crop pests*" (Pesek J., 1983).

For market purposes, a strict definition of organic agriculture is additionally required to protect both producer and consumer interests. The European law stipulates that nobody can sell products under the name "organic" while using cheaper practices which are not allowed under organic management. At the same time, standards indicate clearly to the consumer what the conditions are under which the products are grown. An appropriate definition of organic food was also developed by the USDA National Organic Standards Board (NOSB): "*Organic food is produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generation. Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation*" (USDA, 2009).

To sum up organic agriculture is best known as a method of agriculture where no synthetic fertilizers and pesticides are used. This description does not mention the essence of this form of agriculture, which is the management of farms. Under the organic system, the focus is on maintaining and improving the overall health of the individual farm's system (a holistic approach), which affects present and future yields. The emphasis in organic agriculture is on the utilization of inputs (including knowledge) in a way whereby the biological processes are encouraged to maintain farm productivity.

Organic legislation and policy support in Bulgaria

Legal framework, adequate market regulations and policies, and sufficiently developed management practices are the backbone of organic production in Bulgaria, especially in the framework of country's membership in the European Union. Consequently the regulation adopted is relatively similar to the rest of the Union members, considering that since 2007 legal texts tend to synchronize Bulgarian legal framework towards European requirements and tendencies in organic production.

Requirements and criteria for biological production, laid down in Regulation 2092/91, were introduced in Bulgaria by Ordinance 15 (SG 75/24.08.1999) on organic production of agricultural products and

foodstuffs and indications referring to organic production. By the end of 2001 the important issues related to organic production, preparation, marketing, labeling, inspection and import of organic products were fully reflected and enlightened by two Ordinances:

- Ordinance on organic production of plants, plant products and foodstuffs of plant origin and indications referring to the organic production methods; and
- Ordinance on organic production of livestock, livestock products and foodstuffs of animal origin and indications referring to the organic production methods.

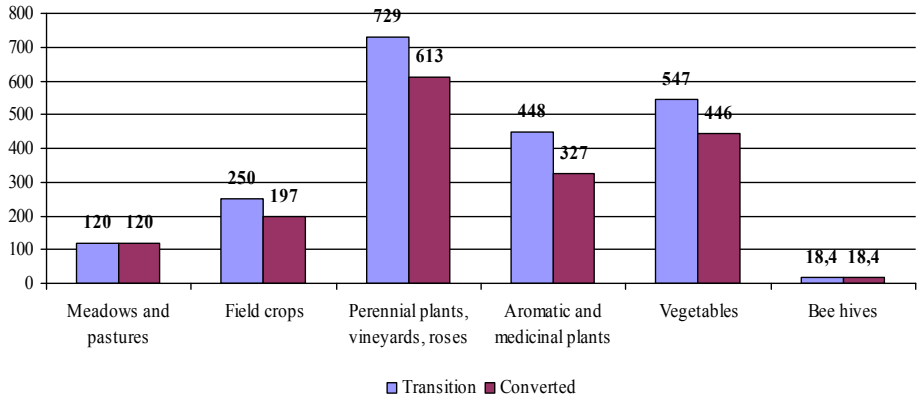
Bulgarian policy towards promotion of sustainable forms of agricultural production and consumption was prompted by the directed full integration of the environment and management of the natural resources – energy, industry, transport, agriculture, and social policy. In the recent years the efforts in the policy area with the adoption of legislative acts and introduction of financial schemes were aimed to encourage innovations, clean-tech industries, "green" jobs and "green" procurement. National legislation gives clear direction and prescripts for performing biological production and enables the balance between Bulgarian production sector and European competitors. Legal texts classify biological production as spare for the environment and furthering biological diversity and preserving ecological systems.

Furthermore food retailing in Bulgaria is regulated by the Law of Implementation of Common Organization of Markets of the European agricultural products, accepted and published in 2006. According to its legal texts, the Ministry of Agriculture maintains policy for quality, which includes rules for protection of geographical marks, for acknowledgement of the traditional specific character of particular foods and products, and for biological production of agricultural products and food. The conditions for import and export for biological products are defined to play a key role for limiting the import of uncertified and harmful products, as well as ceasing practices of unfair competition.

Government support is limited to financially supporting certain crops for a period of five years (Graph 1). Financial mechanism, aimed to support agricultural producers, who have adopted environmental friendly production practices, including biological production, is defined and realized on the base of Measure 214 "Agroecological payments" from the National Plan of Rural Development for the period 2007-2013. The main priorities relate to the limited number of biological farming systems,

insufficiently diverse biological production, and last but not least, the absence of official statistical data regarding the state and development of biological agriculture in Bulgaria.

Graph 1. *Government support (euros per hectare, 2010)*



Source: *Ministry of Agriculture, Bulgaria, 2010.*

More specifically the following practical goals are focused towards bio-production:

- Increasing the areas, in which the main methods for biological production are applied and increasing the number of biological farms;
- Enhancing development of mixed farms;
- Support of production of traditional Bulgarian products, produced biologically;
- Support to agricultural producers in transition from conventional to biological production;
- Increasing the availability of seeds and saplings that are produced biologically;
- Increase of competitiveness of biological products both on national and abroad markets.

By the end of the period it is expected that 3 per cent of the total foodstuffs sold on the market will be with biological origin; and 8 per cent of the utilized agricultural land will be cultivated biologically. In addition the National Action Plan promotes green public procurement for the period 2012-2014 by setting the environmental protection and services in ten priority areas – construction, transport, electrical energy, etc.

Organic agriculture: background and recent trends

Unique biological resources in Bulgaria have been decreasing in the recent years due to the intensive changes of the way the land is cultivated and in general the changes in agricultural policy. The extinction of local types of technical and bread production types has started with the introduction of methods and practices of intensive agriculture and new types of plants. This process has been accelerated by the enlargement of the land and collectivization of agricultural production.

Transformation from conventional to bio-farming is a process which goes beyond some particular interventions such as changing an irrigation system or turning to stall feeding. As already mentioned it implies developed mechanism and strategy that would involve significant aspects of the social, economic and political environment. In this context one important factor for biological farming in Bulgaria and its preservation is the change of the land ownership. Land restitution is a complicated process which has effect on 4,6 million ha or 40 per cent of the total land in the country. The previous ownership structure condemned agricultural sector to inefficient utilization of inputs, limited attempts for modernization and technological innovation. The situation was even more complicated by disorders in land reform, absence of experience and resources to perform agricultural activity and to some extend often quoted historical alienation from agricultural production and utilization of land resource.

Most observers do not consider the restitution as a source of danger for biodiversity; even they have found a positive relation between land reform and organic farming (BG/06/B/F/PP-166012). In fact at the very beginning of the process the expectation was that it would bring a positive effect over the regions with prevailing mono-cultural agriculture and animal breeding. These positive reactions were based on the new ways for cultivating land which are beneficial towards biological diversity. At the same time it brings the potential opportunity to directly involve the society into environmental friendly activities. Statistic shows that since 1989, usage of agro-chemicals in Bulgaria has been steadily decreasing. Lack of resources for intensive production and pesticide treatment allows farmers to grow bio-products. 90 per cent of farming land in Bulgaria is reported as suitable for organic farming. This fact constitutes a purely new market niche on the European markets (European Center for Education and Development, 2002).

Indeed, the positive expectations towards land reform did not prove as realistic. The weakened opportunity to protect social interests in the privatized land, especially in the land outside the protected territory was due to detachment of the land owners to manage and cultivate their land. The land reform was conducted in the absence of appropriate legal framework which increased of the difficulties, including the costs to include the private lands within the network of protected territories. As additional obstacles is revealed the increase of the usage of chemicals and decrease of the stimuli for long-term investment in forest, sustainable agriculture and other sustaining practices for land usage. Last but not least are the difficulties to conduct research in private land.

Nowadays agriculture remains the main income source for 25,6 per cent of Bulgarian population and has proven through the years as a factor furthering employment opportunities with significant economic and social importance. In general, of the overall territory of Bulgaria, 62 per cent of the land - or 6,85 million ha are used for agricultural production. The total land cultivated is 4,6 million ha which is distributed as follows: for production of cereals, vegetables - 3,85 million ha; for grass and plants - 0,49 million ha; for wine and fruits - 0,3 million ha.; pastures occupy 1,5 million ha; and the rest of the land is used for other agricultural production. Migration of the population from villages to the cities has changed dramatically the age structure of the population involved in the sector. At present less than 15 per cent of the farmers are below 40 years. The number of the small and medium farms is the prevailing one, and only 0,2 per cent of them are more than 10 ha. The average size of the utilized agricultural area by private farms is between 1,5 and 2 ha. Agricultural farms need significant investments to adapt their production to the hygienic, veterinary and ecological requirements of the European legislation.

Recent statistics show that the biological agriculture in Bulgaria is still far from its potential – the relative share of the agricultural land under biological production is the lowest share of the total utilized agricultural area (Table 1). Greater part of the agricultural products produced in biological way is exported, which follows the opposite trend of the rest countries from the European Union, where more than the half of bio-production is intended for national and local markets. Statistics indicate that for the period of 2005-2006 close to 80 per cent of produced certified production is mended for export.

Table 1. *Organic area in Europe*

	2010		2009		2008	
Country	Organic area (ha)	% organic	Organic area (ha)	% organic	Organic area (ha)	% organic
EU -15 total	7 078 264	5,50%	6 639 256	5,20%	6 154 359	4,80%
EU -12						
Bulgaria	25 648	0,80%	12 320	0,40%	16 663	0,50%
Malta	24	0,20%	26	0,30%	12	0,10%
Cyprus	3 575	2,40%	3 575	2,40%	2 322	1,60%
Romania	182 706	1,30%	168 288	1,20%	140 132	1,00%
Poland	521 970	3,40%	367 062	2,40%	313 944	2,00%
Lithuania	143 644	5,40%	129 055	4,90%	122 200	4,60%
Latvia	166 320	9,40%	160 175	9,00%	161 625	9,10%
Slovakia	174 471	9,00%	145 490	7,50%	140 755	7,30%
Hungary	127 605	3,00%	140 292	3,30%	122 816	2,90%
Slovenia	30 696	6,30%	29 388	6,00%	29 838	6,10%
Estonia	112 972	12,50%	95 167	10,50%	87 346	9,60%
Czech Republic	448 202	10,50%	398 407	9,40%	341 632	8,00%
EU -12 total	1 937 833	4,00%	1 649 246	3,40%	1 479 285	3,00%
Total	9 016 097	5,10%	8 288 502	4,70%	7 633 644	4,30%

Source: *FiBL-Survey.*

The export of biological agricultural products and food is released in three ways - from agricultural cooperatives; individual producers who can offer enough quantity of own production; and companies that buy biological products from agricultural producers. Sales of organic products are the only sector which was relatively spared by the crisis and steadily continues its development not only nationally but also globally. Other part of organic production remains within the territory of the country, but it is bought by processors and retailers, who are not certified as biological; and this part is sold on the national market in the form of conventional products for final consumption.

In other words, the share of released Bulgarian bio-production on the national market is below 5 per cent, or less than 1 per cent of the total market for food products in the country. Even in this pessimistic situation some experts see positive effects. Import of bio-products would make much easier the recognition of these products and would increase the interest of consumers. Positive impact of imports is seen also in the competition on the market.

Table 2. *Organic producers in Europe*

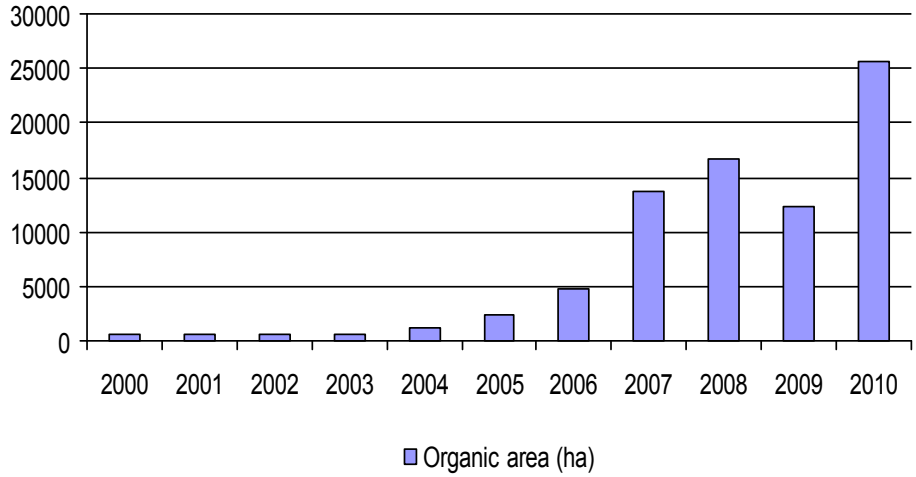
	2010		2009		2008	
Country	Organic producers	% organic	Organic producers	% organic	Organic producers	% organic
EU -15 total	**178 958**	**3,3%**	**172 593**	**3,1%**	**164 192**	**3,0%**
EU -12						
Bulgaria	709	0,1%	446	0,1%	254	0,1%
Malta	11	0,1%	12	0,1%	30	0,3%
Cyprus	732	1,8%	732	1,8%	305	0,8%
Romania	2 986	0,1%	3 078	0,1%	2 775	0,1%
Poland	20 578	0,9%	17 092	0,7%	14 888	0,6%
Lithuania	2 652	1,2%	2 652	1,2%	2 797	1,2%
Latvia	3 593	3,3%	4 016	3,7%	4 203	3,9%
Slovakia	363	0,5%	363	0,5%	350	0,5%
Hungary	1 617	0,3%	1 617	0,3%	1 614	0,3%
Slovenia	2 218	2,9%	2 096	2,8%	2 067	2,7%
Estonia	1 356	5,9%	1 277	5,6%	1 259	5,5%
Czech Republic	3 517	8,9%	2 689	6,8%	1 834	4,7%
EU -12 total	40 332	0,5%	36 070	0,5%	32 376	0,4%
Total	219 290	1,6%	208 663	1,6%	196 568	1,5%

Source: *FiBL-Survey.*

Imported products are supposed to give signal to the consumers that such products exist and consumers' awareness in turn would prompt the producers to understand that consumers are looking for high quality products and a diverse assortment. Currently these tendencies remain, as close to 90 per cent of all Bulgarian organic food is exported to Western countries members of the European Union. Bulgaria is on 7th place for the number of specialized trade area for sell of products with biological origin. For the period 2006 – 2007, 80 per cent of the bio-products are realized through the conventional supermarkets. For that period in Bulgaria there are still no specialized trade areas for selling biological products - the first one was established in 2008. The organic food purchases constitute less than 0,5 per cent of total food purchases.

As already mentioned the absence of sufficient statistical data attenuates the visibility of biological production, its present state and development trends. In the statistical year-books of the National Statistical Institute the concept of biological farming is not present. Thanks to recent reports it has been provided that for biological production in Bulgaria are used 166741 ha organic managed area, which is 3,1 per cent of the total domestic agricultural land, and the production steadily increases.

Graph 2. *Yearly growth of total organic farm land in Bulgaria (ha)*

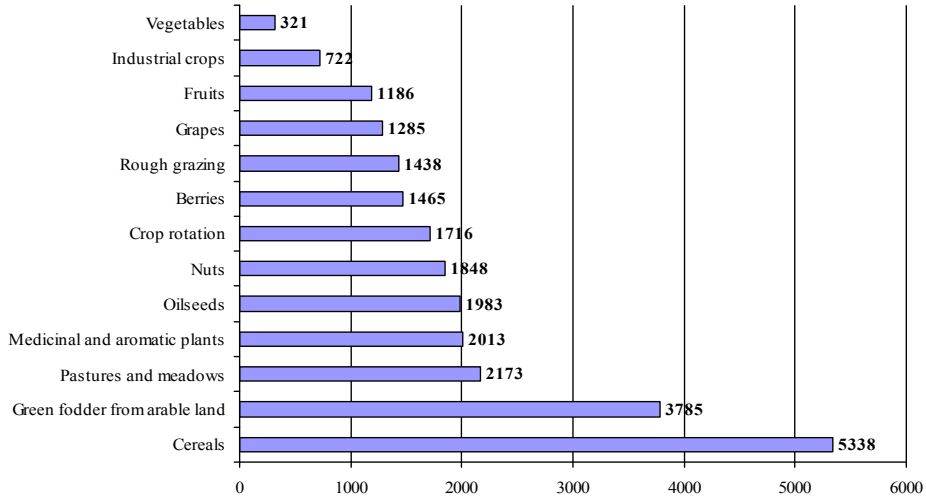


Source: *FiBL-Survey.*

Mainly, in their quality as ecologically suitable for bio-production are certified grassland and pastures – 155793 ha. The same certificates possess 242677 ha of forests where the wild collection, e.g. herbs, mushrooms and berries is organized. Production of biological products is organized on a cultivated area of 12284,14 ha, of which the certified areas are 11771,47 ha, and land in transition is 512,67 ha. The certified land for wild herbs and fruits is 62183,95 ha, while biological green house production is performed in 12 green houses with totally certified area of 20,64 ha. The number of plant biological farms is 77, of which 56 are certified and 21 are in the period of transition; and there are 4 certified farms for biological production of seeds.

In 2010 the number of registered organic farmers is 820 which is four times more than 2006. The obvious explanation for this increase in the Bulgaria's accession to the European Union and the funding provided to the organic farming. The recent statistical data shows that for 2011 the share of organic production compared to the conventional production has registered a 30 per cent annual increase. Control system has indicated a total area of 26622 hectares used for organic farming.

Graph 2. *Crops grown in organic farming in Bulgaria (2010)*



Source: *FiBL-Survey.*

Wheat, corn, barley and rye occupy the largest part of the organic area; there is a positive trend in cereals areas which have registered 20 per cent annual increase for 2011.

Perspectives and obstacles for organic production and market

There are three set of factors influencing development of biological production in Bulgaria: legal framework, market situation and production capacity. Legal prescripts previously discussed are purposeful towards establishing strong horizontal and vertical integration (between producers, processors and traders). There are three main options for integration: association of all producers of organic products through contractual arrangements; association of producers on territorial principle; and association on branch principle. Cooperative enterprises are an opportunity to build innovative, average by size enterprises in the processing and in the field of marketing and realizing production. Concerning the sustainability of organic farming in Bulgaria, significant expectations are called upon cooperatives, which as organizations would have to take the responsibility to support, organize and monitor the bio-production and marketing. Cooperative social and financial liability appears to be a pre-condition and a consequence at the same time for the successful implementation of organic farming in Bulgaria (Kostova, 2006). In 2008, 20 of the 22 measures gradually started under the Rural

Development Programme and contributed to achieving the following objectives: maintenance of farming in disadvantaged areas and prevent the abandonment of agricultural lands; countering the depopulation of disadvantaged areas; maintaining the landscape and biodiversity; rational use, conservation and sustainable development of land and other natural resources; supporting the emergence of local action groups in rural areas; supporting the acquisition of skills for the establishment and functioning of such groups at the local level; supporting the process for the preparation of local development strategies; inclusion of indigenous peoples in the development and future implementation of local development strategies.

The market tendencies signify that the market of bio-products is "growing". In 2005 the market share of biologically produced products in Bulgaria is estimated to turnover of 900 000 euro which represents 0,023 per cent of the total domestic market of food products. In 2006 the market for bio-products is with a market share of 1 per cent, and up to 5 per cent of the totally produced bio-production is released on the national market. Organic food is available in specialized organic food stores, supermarkets and health food shops. The biggest part of the product range is exported – fruits, nuts, infusions, aromatic oil and some vegetables such as tomatoes and cucumbers.

For the period 2006-2007 there are approximately 300 organic items on the Bulgarian market, including packaged foods, milk products, and fresh vegetables. There are 14 major retailers, according to the survey from 2009 (Foundation Bioselena). The total number of retail points to sell organic products is 1801, and the total turnover is 7566000 leva. In 2008 the number of biological products is 733; 657 of them are different food products. The rest are cosmetics or household cleansing bio-products. Of these biological products only 54 or 7 per cent of total 733 are produced in Bulgaria. The total turnover of biological products for 2008 is 7,5 million leva. According to the Bulgarian Bioproducts Association, the total size of the organic food market in Bulgaria for 2010 has grown by 87 per cent in comparison to the same period of 2009. Consumer demand is the driving force to significant changes in supply of organic products, as well as the organic food reputation of guaranteeing healthy and natural qualities, company's philosophy to enhance the balance between the profit and social responsibility, and the shops' policy to provide adequate response to market demand (Vitosha Research, 2009). The rate of consumption of organic foods as a share of the total food consumption in most developed organic markets ranges between

10 per cent and 15 per cent. In Bulgaria, the market is still underdeveloped and the expected level of 2 per cent is quite a positive development of the market over the next years. The products with most sales are food products (about 66 per cent), followed by organic cosmetics, essential oils and herbs (about 48 per cent). Herbs (tea) are sold in 52 per cent of trading points, honey in 31 per cent and baby-foods in 25 per cent of the trading points. In the supermarkets (which holds the biggest share of about 41 per cent of organic product sales), individual specialized stands are occupied mainly by organic food products (83 per cent), followed by organic herbs (51 per cent) by organic cosmetics (37 per cent), essential oils (17 per cent). This trend is also present in specialized organic shops and shops with single (scattered) organic sales (mainly food).

It is expected that in the next 3-5 years that the volume of sales would increase as well as the product assortment, including fresh food and meat products. This however requires well coordinated campaign for increasing public awareness and knowledge towards the effect of organic produce on human health and other aspects. The reasons why the general public is lacking sufficient interest in products from organic agriculture are addressed to several factors such as: information dissemination, limited knowledge towards organic products, non-recognition of organic products on the market and mistrust in organic producers and certifying authorities (Vitosha Research, 2009).

Three are the main reasons for the lower interest towards products with ecological origin on the national market. The first one is the low average income per household. This means that significantly low percentage of consumers can afford the more expensive alternatives of the conventional foods. The second reason is the insufficient social interest towards biological agriculture, and the positive aspects it brings. This fact limits the successful market release of bio-products. Last but not least is the limited production choice. For the period 2004-2005 the distributed by the supermarkets biological jams, honey, tea, herbs, and yogurt are close to 200-300 per cent more expensive than their traditional alternatives. This finding emphasizes the necessity of cohesion between prices of organic and conventional foodstuffs. Some bio-producers try to sell their production at the open markets, which reveals as unsuccessful strategy - their products are difficult to be recognized by the consumer, when sold this way. Certain fresh products such as honey, herbs and spices, fruits and vegetables can be bought at open (direct) markets.

Producers also experience difficulties in their work. In a survey performed in 2009 (Mishev, Stoyanova) some of the problems described on production stage, such as: small quantities and poor products range, lack of delivery's regularity, and low availability of organic products in large retail chains in the country. Prices of organic products are still significantly higher than those of conventional products which contribute to narrow niche-market for organic products. Appointed as problems at production stage are the lack of motivation among producers to increase organic production, low demand for organic products and inadequate government support for organic production. Experts see as a problem the insufficient number of control (certification) bodies and accredited laboratories for analysis of organic food; and the absence of streamlined marketing strategy.

Conclusion

Bulgaria's favorable soil and climate conditions are furthering country's position as a high quality organic producer with good export potential (World Bank, 2007). There are a number of positive factors observed in Bulgaria which highlight the capacity to develop and implement organic production in the future. Local and international demand for eco-innovative products and services has increased in the recent years. More people prefer buying bio-products and products with eco-labels which has created special niche-markets and spurred business for many companies. Following this demand, more companies are motivated to get environmental certificate for their activity, requiring them to use and produce eco-friendly services and products.

Nevertheless there are many obstacles that need to be considered, such as the continuing economic downturn as a consequence diverts economic priorities over environmental. There is a lack of public understanding and insignificant awareness of ecological challenges. Bulgarian small market and thin demand creates dependence of the local companies on the external markets, and it is increasingly apparent the dependence on and favoring international standards and markets rather than developing domestic solutions. Additional problems impose the insufficient of investments in specialized equipment and machinery; and still developing marketing and distribution channels for small organic producers.

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CONDITIONS AND POSSIBILITIES RECULTIVATION OF DEGRADED SOIL IN THE AREA MINING BASIN KOLUBARA[1]

Gorica Cvijanović[2], Gordana Dozet[3]

Abstract

Soil is of particular importance in the concept of sustainable development. The pressurizing factors in loss of agricultural land in the Republic of Serbia and the expansion of urban and industrial areas, infrastructure and mining. The Corine Land Cover database analysis shows 2 to 351 ha yearly loss of agricultural land for the period 1990-2006. Development of coal mines is accompanied by numerous negative impacts on the environment, which requires the cultivation of degraded areas. The study was conducted on deposol soil type in RB Kolubara (Mining basin Kolubara) in order to determine the possibility of biological re-cultivation by different crop growing systems. It was found that the level of humus and nitrogen content in the soil, the abundance and activity of microbial populations can be increased by pure soybean production and inter-cropping with maize, sunflower and sorghum, using mineral fertilizer or manure. The calcification of the soil should also be implemented in order to diminish acid reaction, as well as regular monitoring of nickel levels, as its determined amount was greater than the maximum allowed.

Keywords: *re-cultivation, soil, fertilization, crops*

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Introduction

The development of human population, together with technical and technological progress culminated in 20th century, creating huge environmental problems on the Earth. New techniques and products provided novel life quality to mankind, raised the standard of living and extended average life expectancy. Along with the material and economic progress and the increased level of civilization, man has begun to consume natural resources and energy sources irrationally, degrading the majority of biocenosis in the ecosystem and thereby the ecosystem itself. Large amounts of waste appeared, with little possibility of their removal and destruction. This contributes to the pollution of air, water (hydro pollution) and soil (pedo-pollution), threatening biodiversity in general. The term "sustainable development" is associated with environmental conditions and vulnerability. Since the time is a factor that must be taken into account, sustainability must be considered a process. In the last few decades, sustainability is considered to be related to both renewable and non-renewable resources (Cvijanović D. et al., 2011). Since the progress of human society is heavily burdened by the dramatic degradation of the environment over the past century, strong demographic pressure and limitated natural resources, the sustainable development is the milestone of its long-term prospects (Đukanović 1991).

According to the *Brundtland Report* from 1972, sustainable development is implemented as "development that meets the needs of the present, and does not challenge the possibility of future generations meeting their own needs." As such, it covers various aspects of sustainability - environmental, social and economic (Stojanović and Manić, 2007). It is clear therefore, that sustainable development is defined as target-oriented, long-term, ongoing, comprehensive and synergetic process that affects all aspects of life at all levels. The European Union has adopted the concept of sustainable development in 1990 at the Ministerial Conference in Bergen, and the United Nations two years later at the World Summit on Environment and Development in Rio de Janeiro. Numerous activities of government and non-governmental organizations around the world, led to 1992 UN Conference on Environment and Development, UNCED in Rio de Janeiro. Since then, the number of organizations oriented towards promoting sustainable development, such as the Committee of International Development Institutions on the Environment (CIDIE),

World Resources Institute (WRI), World Bank (WB) has significantly increased. The fourth principle of the Rio Declaration explicitly states that the objectives of sustainable development can not be achieved if the environmental protection is not considered an integral part of the development process.

The government of Serbia adopted the National Strategy for Sustainable Development in 2007, aiming to balance the three key factors, ie. the three pillars of sustainable development: sustainable development of the economy and technology, sustainable development of society based on social balance and environmental protection and rational management of natural resources. National priorities in environment protection and improvement are rational use of natural resources, reducing pollution and resources depletion (minerals, forests, wild plants and animals, water, air and soil).

Change of use of agricultural land

Soil is the main natural resource, a constituent of an eco-system together with water, air and organisms. It is a natural resource difficult to renew. Soil is multipurpose resource, but its basic function the production of food and cycling of matter. The soil provides about 90% of food for mankind and is a prerequisite for the survival of wildlife. Soil degradation is considered as a set of processes caused by human activities that reduce its current and future potential (Sekulić et al., 2003). Soil regeneration and revitalisation are processes that take a long time and require a large investment. Soil is good owned by all humanity and not just a generation or an individual. The concept of soil sustainable development has agro-ecological and socio-economic aspects, because of the development of awareness on the conservation of this elementary agricultural resource. Efforts in food production and preservation of agricultural soil have been intensifying at the global level, during the last few decades. The majority of the areas suitable for agricultural production are already being used. However, a large percentage of agricultural land is converted to non-agricultural, particularly in developed countries. Some studies suggest that with the current dynamics of soil degradation, more than one-third of arable land will be lost or destroyed over the next few decades. Only 11% of the world's total land area (14.5 million km^2) can be used for agricultural production without special constraints: lack of nutrients,

toxicity, floods, waterlogging, or special drainage requirements. It is estimated that OECD countries lose about 5 000 km^2 of arable land per year due to urban expansion and other purpose construction facilities. The process of degradation and reduction of agricultural land is influenced by both natural and anthropogenic factors, and is much more intense than the soil genesis. Therefore, one can no longer discuss soil renewability, only its potential renewability (Milanovic et al. 2008).

Factors putting pressure on agricultural land in the Republic of Serbia are different. Compared to many countries in the region, agricultural land in Serbia is an important natural resource, not only for its size (more than 5 million hectares, 60.2% in central Serbia and 82% in Vojvodina), but also for its regional position. However, due to the expansion of urban areas, industrial facilities, infrastructure, and the expansion of open pit mines, mining and flotation tailings and waste, municipal solid waste landfills, significant areas of agricultural land will inevitably be lost from agricultural production.

Based on the monitoring of changes in land use, performed by analysing the Corine Land Cover Database for the years 1990, 2000 and 2006, 8473 ha reduction of agricultural land for in the period 2000-2006 was found, compared with 1990. Agricultural production land is lost by various types of human activities. The results of the analysis show 2 to 351 ha land loss per year, during the period between 1990 and 2006 (Table 1).

Table 1. *Loss of agricultural land due to various activities*

	Area (ha)			
	1990-2000	2000-2006	1990-2006	annually
Mines and landfills	1701	2124	3825	239
Roads and infrastructure	6	22	28	2
Industrial and commercial buildings	403	1623	2026	127
Sports and recreation facilities	3813	1810	5623	351

Source: *Report on the soil status in RS, 2009.*

Corine Land Cover is the European Agency for Environmental Protection database within the European Network for Information and Observation (Nestor and Protic 2007). Pasturelands, arable land and perennial plantations suffered greatest area losses (Table 2).

Table 2. *Land area that has changed the purpose due to urban expansion*

Soil category	Change of purpose (ha)		
	1990-2000	2000-2006	Total
Pastures and mixed farming areas	2818	2280	5098
Arable land and perennial plantations	2468	939	3407
Water basins	50	0	58
Areas with little or no vegetation	0	0	0
Grassy areas	12	3	15
Forests and transitional woodland	546	1066	1612
wetlands	21	36	57

Source: *Report on the soil status in RS, 2009.*

Factors contributing to reduction and degradation of agricultural land in the Republic of Serbia are strategic objectives that must be directed towards the prevention of further land losses, preservation of its utilizability in agricultural production, especially in areas with industrial, energy and mining activities, as well as improving its quality with the legislative support. Serbian Law on Mining and Law on Agricultural Land Act should precisely define the process of recultivation and degraded areas planning, in order to prevent permanent damage within the framework of the existing environment.

The development of coal mines, as energy-industrial complex is accompanied by numerous negative impacts on the environment which require integrated planning, recultivation and design of degraded land and its use in the post-exploitational period. To avoid adverse consequences of the development of open pit mines, mining operations should be accompanied by biological recultivation of tailings and degraded land planning. The existing law requires users to get these areas back into the production function, with the aim establishing different vegetational and other ecosystems at the newly generated deposol type soil. Numerous studies have shown that it is possible to create new agricultural, forest, aquatic, grassland and other ecosystems in these areas. The largest areas of devastated land are in open mining pits Kolubara and Kostolac (Table

3). Since agricultural areas are limited, and the quality of food dependent on soil health, all appropriate activities to protect its function must be undertaken (Čuvardić et al., 2006). Recultivation is a complex set of multidisciplinary research and practices in different areas (mining and technology, engineering, agriculture, forestry, etc.), aiming to transform degraded land to a condition suitable for agriculture, forestry, tourism, recreation, fishing and other purposes.

Table 3. *Recultivated areas until 2008 (ha)*

	Areas with altered purpose	Landfill areas	Recultivated areas		
			Forests	Arable land	Orchards
Kolubara	1473.03	670.5	775	16	10.96
Kostolac	31998	1625	262	38	2

Overall, the recultivation involves the re-establishment of plant communities in areas degraded by coal exploitation. It can be done periodically or continuously, simultaneously with mining activities. Biological recultivation involves growing field crops, fruits and forest trees on recultivated land. The choice of crops planned for recultivation area depends on many factors, natural conditions being most important: climatic, orographic, favorable characteristics of deposol, further purpose of the newly formed areas and the site size. If biological recultivation is carried out using field crops, it is necessary to introduce large amounts of organic and mineral matter in order to compensate for the lack of basic nutrients, especially nitrogen and phosphorus (Šubarović et al. 2011). Also, one must take into account the choice of plant species and planting techniques (crop rotation, intercropping). Biological soil cultivation must quickly increase the level of organic matter in the recultivating soil, thus increasing the productive capacity of soil. Repairation of production properties of the soil involves leveling, processing, fertilizing, improving soil structure and texture, which directly affect the physical and chemical properties, especially porosity, heat and air-feeding regime, as well as microbiological activity in the soil. Activity and the number of microorganisms in the soil are very important, because the microbes take active part in many processes, such as decomposition of fresh organic matter and synthesis of specific organic compounds that participate humification.

Biological research experiments into soil recultivation without prior application of humus layer are being successfully performed at "Kolubara" lignite mine tailing landfills. The research is focused at choosing the appropriate plant specii and cultural practices in order to create the basis for using the recultivated soil.

Procedires relating to soil recultivation

The recultivation trial was performed at Lazarevac municipality, on "D" Tamnava field, by the canal with mild microdepressions at an altitude of 189-222 meters above sea level. After the technical recultivation, technogenic deposol soil type was sampled. Soil sampling was carried out on an area of 2 ha using chess sampling method (Kastori et al., 2006). Basic chemical soil properties - substitutional acidity, carbonate content, humus and available phosphorus and potassium are the main parameters of soil fertility. In order to increase soil fertility in the study area different types of fertilizers were applied. The total experimental area was fertilized with mineral NPK fertilizer complex with nutrient content 15:15:15. The amount of 600 $kg.ha^{-1}$ manure was plowed. Further fertilization was carried out as follows:

Manure - 30 $t.ha^{-1}$; celuflora - 40 $t.ha^{-1}$, mineral fertilizer (nitrogen fertilizer AN, containing 34.5% pure nitrogen) - 200 $kg.ha^{-1}$. Celuflora substrate used as an organic fertilizer is produced by "Humus Ko" Ltd Loznica company. Celuflore is semi-solid material, with well-homogenized organic matter, grained structure, without any characteristic odour. It contains about 50% moisture, with the maximum capacity of about 85%. Chemical analysis shows alkaline reaction with high P_2O_5 (69.2 $mg.kg^{-1}$) and K_2O (84.4 $mg.kg^{-1}$) content and low total nitrogen content of 0.90%. Trace elements and heavy metals present are within the allowable limits. All the seeds were inoculated immediately before sowing, with specific bacteria capable of nitrogen fixation from the atmosphere, as follows: symbiotic nitrogen fixators: *Bradyrhizobim japonicum* for soy on peat substrate, and the associative nitrogen fixators *Azotobacter chroococcum*, *Azotobacter vinelandii* for corn, sorghum and sunflowers. The titer of associative nitrogen-fixing cells of *Azotobacter chroococcum, Azotobacter vinelandii* was 10^9 per ml culture medium. Sowing of crops was done at the optimal agro-technical terms.

Corn, sunflower, sorghum, and soybeans were used for sowing. Soybean was sown as an intercrop with maize, sorghum and sunflower as well as a sole crop. Soybean is a plant species that has a genetic ability to live in association with soil bacteria of the family *Rhizobiaceae,* symbiotic nitrogen-fixing bacteria located in the root nodules of soybean (Mrkovački 2005, Albareda et al 2009). These characteristics provide it great agri-technical importance, because there is a large amount of soil nitrogen and organic matter remained in the soil, making it good preceding crop in the crop rotation (Cvijanović 2002, Dozet, 2009). At the end of vegetative season basic agrochemical soil properties and dynamics of changes in abundance and enzymatic activity of the soil microbial population were determined. The total number of microorganisms, numbers of some of the physiological and systematic groups was determined by standard microbiological methods on solid agar, and expressed per gram of absolutely dry soil (Pochon and Tardieux, 1962). The intensity of oxidation and reduction process, e.i. DHA was determined by a modified Thalman method (1968) which is based on measuring the absorbance of triphenyl formazan (TPF), obtained by triphenyltetrazolium chloride (TTC) reduction, expressed in μg10 TPF.g $^{-1}$ soil.

Soil conditions in the investigated area

The examinations have shown that the soil was slightly acid to slightly alkaline what is an appropriate basis for the life of most microorganisms. The important indicator of soil fertility is humus content and quality. Humic substances adsorbe most cations that are available to plants, bind some harmful elements into unavailable forms, have beneficial effects on the structure and microbial activity. Low humus content (1.21%) was determined in all samples. Also, there were small amounts of easily accessible forms of nitrogen (NH4, NO3-N), especially nitrate, which is found in soil solution in the form that plants can directly use.However, their quantity is also very variable in a relatively short time intervals, hence this information can be of temporary significance only and valid for the sampling as starting point before fertilization. The content of available phosphorus was very low (<6 mg.100g^{-1}). Since only 5.41 mg was found, the soil requires large amounts of fertilizer, even 130-150% higher than those within the crop yields. The amount of potassium (65.2 mg.100g^{-1}) is high in relation to the optimum (Table 4). The amount of exchangeable magnesium is at its usual level for the area.

Table 4. *Basic agrochemical properties of the soil prepared for recultivation*

pH		Humus	N	NH_4	NO_3	Ca	Mg	P_2O_5	K_2O
H_2O	KCl	%	%	$mg.kg^{-1}$		$mg.kg^{-1}$		$mg.100g^{-1}$	
7.56	6.70	1.21	0.11	2.6	0.2	4800	76.2	5.41	65.2

Determination of harmful pollutants in the devastated land at mining areas is necessary, because they react with the solid phase of soil, what determines their level of solubility. This study determined the content of the six potentially most damaging elements (Cr, Cd, Pb, Ni, As, Hg) (Table 5). Criteria for the evaluation of pollution by these elements are the maximum allowable quantities specified in the Regulations on maximum permissible concentrations (MPC) in soil and water for irrigation (Sl. glasnik RS br 23/94.).

Table 5. *Heavy metals content*

Cr	Cd	Pb	Ni	As	Hg
			$mg.kg^{-1}$		
37.3	0.51	37.3	62.1	2.6	<0.1

The results showed that the amount of nickel were above the maximum allowed limit, while the amounts of other heavy metals were below. The content of nickel was 62.1 $mg.kg^{-1}$, which was 12.1 $mg.kg^{-1}$ greater than the MRL (Table 5). Nickel in soil may originate from the parent material or be entered by human activities (coal burning, introduction of sewage sludge). Its weakly acid reaction and hardly soluble forms reduce the risk of environmental contamination with this metal. Depending on the concentration, Ni can act stimulatory or inhibitory on the enzymatic activity of microorganisms (Govedarica et al. 1997; Milosevic et al. 2002). According to Milosevic et al. (2005) nickel concentrations above 2.0 mg kg^{-1} significantly affect soil microbial properties, depending on the crop.

Results and discussion

The representation of microorganisms depends on soil properties, entered mineral and organic fertilizers, harmful substances. Microorganisms are indicators of changes in soil because they take 60-90% of the total metabolic activity in the soil, and their abundance and enzymatic activity is considered the best indicator of the potential and effective soil fertility. Average soil biomass of microbial origin is 1 to 5 tons per hectare, and even more in some soils (Alexander, 1990). The number of microorganisms in the soil is affected by the

plants through their root secretions (Benziri et al. 2007). The dominance of certain groups of microorganisms directs the processes of synthesis or degradation of organic matter, determining soil quality for crop production. Microorganisms affect the formation of soil structure and thus its physical properties, maintain soil structure, organic matter levels in formed soils or increasing organic matter in technogenic soils. With their metabolic products bacteria bind soil structural aggregates, while fungi and actinomycetes bind them mechanically (Cvijanović et al. 2009). The total number of microorganisms are considered as one of the basic indicators of soil conditions. Given the percentage of microorganisms in soil organic matter, their biomass is also important, with great significance for the formation of organic matter in the soil. The total number of microorganisms, numbers of ammonifiers and dehydrogenase activity depend on the content and composition of organic matter in the soil. Based on the results of the present study, the dynamics in the number of microorganisms that varied depending on the type of fertilizer and plant species was established (Table 6).

Table 6. *Microorganisms in the test deposol soil type*

Fertilizers	*Azotobacter* $10^1 \cdot g^{-1}$ soil	Ammonifiers $10^5 \cdot g^{-1}$ soil	Total num. $10^6 \cdot g^{-1}$ soil	Fungi $10^3 \cdot g^{-1}$ soil	*Actinomicetes* $10^3 \cdot g^{-1}$ soil	DHA µгTPF. g^{-1}soil
			Maize + Soybean			
AN 200 kg.ha^{-1}	87	64	286	78	15	248
Manure 30 t.ha^{-1}	20	143	510	27	10	137
Celuflora 40 t.ha^{-1}	37	73	365	516	10	9
NPK 600 kg.ha^{-1}	63	215	571	31	21	201
Average	52	124	433	163	14	148
			Sorghum+Soybeans			
AN 200 kg.ha^{-1}	40	186	688	41	13	139
Manure 30 t.ha^{-1}	97	155	195	11	10	160
Celuflora 40 t.ha^{-1}	65	165	513	711	16	2
NPK 600 kg.ha^{-1}	139	344	571	30	36	241
Average	85	213	492	98	19	136
			Sunflower+ Soybeans			
AN 200 kg.ha^{-1}	167	179	254	59	8	313
Manure 30 t.ha^{-1}	54	175	682	67	16	301
Celuflora 40 t.ha^{-1}	88	93	701	21	29	287
NPK 600 kg.ha^{-1}	162	244	513	48	30	151
Average	118	173	538	49	21	263
			Soybeans			
AN 200 kg.ha^{-1}	15	91	205	38	14	147
Manure 30 t.ha^{-1}	6	143	234	21	11	117
Celuflora 40 t.ha^{-1}	26	58	392	77	15	185
NPK 600 kg.ha^{-1}	65	258	968	35	13	171
Average	28	138	450	43	13	155

Highest total number of microorganisms was found in soybean-sunflower complex (538x106g^{-1} soil), while the total number of microorganisms was quite uniform in sole soybean (450 106 g^{-1} soil) and the combined soybean and maize crop (433x106 g^{-1} soil) and sorghum (492x106 g^{-1} soil). The number of microorganisms correlated with the total enzymatic activity which was expressed as total redox processes (DHA).

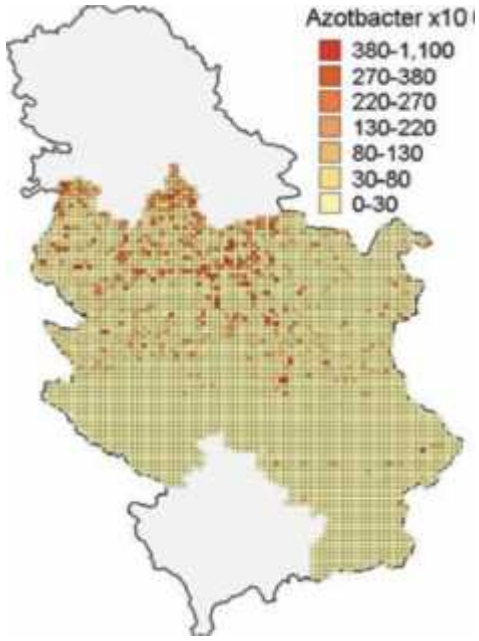
The number of systematic groups of microorganisms like fungi and actinomycetes is very important, because both groups have greatly developed enzymatic system, so they can decompose heavily degradable substances. These microorganisms actively participate in the processes of humification and synthesis of humic substances. On average the number of actinomycetes was 17.103g^{-1} soil, fungi 88.103g^{-1} soil (Table 6).

The number of actinomycetes was relatively small, which indicates that the soil solution environment reaction was not appropriate for their development, because it is a group of microorganisms that require alkaline environment for their development. *Azotobacter* is represented in the fertile soils with neutral reaction, rich in Ca and P, as well as microelements, especially Mo and Fe.

The metabolism of nitrogen fixing bacteria requires presence of trace elements, particularly molybdenum, which is involved in nitrogen fixation system. Beneficial effect of molybdenum on the yield and quality of crops, especially legumes was found by several authors: Brandenburg (1961), Djordjevic (1967), Dozet (2009), Dozet et al. (2009). The numbers of *Azotobacter* are highest in the chernozem soil humofluvisol, alluvium and marsh soil.

This group of organisms is very sensitive to changes in habitat, and respond by changing the number and activity, making them good indicator of the soil conditions. The results obtained show that *Azotobacter* averagely ranged from 28 to 118 cells per gram of oven dry soil. The comparisson of the *Azotobacter* numbers at the examined soil with the numbers in central Serbia (Fig. 1), reveals that its presence was very low.

Picture 1. *Azotobacter ($x10^1.g^{-1}$ soil) in Central Serbia*



Source: *Report on the soil status in RS, 2009.*

Comparing the numbers at the end of the growing season with the initial numbers, a large increase in the total number of microorganisms and investigated physiological and systematic groups of microorganisms in the soil was found. The increase in enzymatic activity was in positive correlation with the other parameters (Table 7). Intercropping of competitive crops leads to an increase in the quantity and activity of the microbial population that is close to the root system of the plant, called the rhizosphere populations. The rhizosphere is the most dynamic and the most populated part of the biosphere. The abundance and activity of the microbial population is affected by the root system that excretes plant metabolic exudates into the external environment. The way of crops combining (in line) contributed to the increase in the weight of the root system per unit area, and thus increase in the amount of exudates that certainly influenced the increase in the overall number of microorganisms and their activities.

Table 7. *Influence of crops on the dynamics of microbial populations*

	Azotobacter $x10^1g^{-1}$ soil	Ammonifiers $x10^5$ g^{-1} soil	Total numb. 10^6g^{-1} soil	Fungi 10^3g^{-1} soil	*Actynomicetes* 10^3g^{-1} soil	DHA µrTPF g^{-1}soil
Maize + Soybean	52	124	433	163	14	148
Sorghum + Soybeans	85	213	492	98	19	136
Sunflower + Soybeans	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 level	674	675	2079	277	882	277

There is no consensus for a definition of soil quality on the basis of its biological value, at the European level. The European Commission has made a list of economic, social, cultural soil features relating to the environment in order to define a good soil state. One of the functions of the soil after its recultivation is its capacity for growing crops used as an alternative energy source. By this, Serbia could join the big projects along with the regions in Germany, Switzerland, Slovakia and Ukraine.

At the end of the growing period basic agrochemical soil properties were analyzed and the results compared with the initial state. Given that the soil samples were of deposol type, suffering from a strong human influence, the changes are evident. The pH had a decreasing trend at all levels of fertilization, thereby increasing the acidity of the soil (Table 8). Changes in the content of total nitrogen were low, from 0.11% in the 34% AN-fertilization to 0.150 after the manure fertilization. Based on the obtained results, it can be concluded that the analyzed parameters in sole soybean, showed no major deviations from the results obtained in intercropping. The results are in accordance with the results of Lilic et al. (2008) who concluded that legumes should contribute with 40% in the process of recultivation of arable crops. Compared with the initial state, 12.19% increase in total humus and 9.09% increase in nitrogen content were found.

Table 8. *Agrochemical properties of soil type deposol the end of the growing season*

	pH		Humus	Total N	P_2O_5	K_2O
	H_2O	KCl	%	%	mg.100g^{-1}	
			NPK			
Maize + Soybean	6.89	6.62	1.57	0.135	4.9	23.6
Sorghum+Soybeans	7.02	5.72	0.98	0.104	5.7	23.2
Sunflower+Soybeans	6.88	5.75	1.12	0.098	4.4	24.5
Soybeans	6.64	5.48	1.17	0.101	4.9	25.5
Average	6.84	5.71	1.82	0.110	4.93	6.84
			AN 34%			
Maize + Soybean	7.21	6.26	1.11	0.093	4.5	15.5
Sorghum+Soybeans	6.83	5.58	1.01	0.087	4.4	23.6
Sunflower+Soybeans	7.24	6.14	0.99	0.104	5.0	17.3
Soybeans	6.62	5.21	1.02	0.150	7.1	20.5
Average	6.98	5.80	1.03	0.110	5.25	19.23
			Manure			
Maize + Soybean	7.04	5.97	1.93	0.166	5.3	20.0
Sorghum+Soybeans	6.87	5.65	0.87	0.092	4.8	21.8
Sunflower+Soybeans	6.54	5.53	0.99	0.105	4.2	20.5
Soybeans	6.91	5.68	3.50	0.240	5.4	22.7
Average	6.84	5.71	1.82	0.150	4.93	6.84
			Celuflora			
Maize + Soybean	7.01	6.07	0.71	0.075	3.3	11.8
Sorghum+Soybeans	7.03	6.09	1.50	0.129	4.3	20.0
Sunflower+Soybeans	7.31	6.19	0.73	0.077	3.3	11.4
Soybeans	7.51	6.31	2.54	0.189	7.7	26.4
Average	7.22	6.17	1.37	0.120	4.65	17.40

The largest amounts of nitrogen (0.15%) and humus content (1.82%) were determined in samples fertilized with manure, which is correlated with the content and quality of manure nutrients (Table 9). Similar results were obtained by Cvijanović et al. (2007), where the maize crop grown in monoculture, the highest content of humus and nitrogen achieved in a combination of manure, maize and mineral fertilizers. According to the classification of humus in the soil, humus content in the investigated soil was in the category of very low humic (0.1%).

Table 9. *The impact of the fertilizers on basic soil agrochemical properties at the end of the growing season*

	pH		Humus	Total N	P_2O_5	K_2O
	H_2O	KCl	%	%	mg.100g^{-1}	
AN	6.98	5.80	1.03	0.11	5.25	19.23
Manure	6.84	5.71	1.82	0.15	4.93	26.84
Celuflora	7.22	6.17	1.37	0.12	4.65	17.40
NPK	6.86	5.89	1.21	0.11	4.98	24.20
Prosek	6.98	5.89	1.36	0.12	4.95	21.95
Initial state	7.56	6.70	1.21	0.11	5.41	65.2
Index level	92.26	87.95	112.19	109.09	91.54	33.61

Conclusions

The procedures required for the process of biological recultivation of devastated soild type deposol with heavily degraded production properties using filed crops, must include:

- The application of ameliorative measures (liming) that would reduce the acidic soil reaction bringing it to neutral.
- Then apply a combination of mineral and organic fertilizers.
- It is recommended to use microbiological inoculates which may contain different types of beneficial microorganisms, that are usually characterized as PGPR (Plant Growth Promoting Rhizobacteria). Both seeds and soil can be inoculated
- After the vegetation period all the plant material should be plowed into the soil to a depth of 10-15 cm
- It is necessary to introduce mixtures of grass and clover into the crop structure at 40% area, because they leave large amounts of underground mass.
- During the process of recultivation the content of nickel in the soil should be controlled, following the results showing the found amount to be greater than the maximum allowed.

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USE OF ANDROCLINIUM REGENERALENTS FOR DEVELOPMENT OF GENETIC DIVERSITY OF TRITICALE

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Abstract

Success of adaptive crop growing is largely determined by an increase of field crops' species diversity based on a special biological method of fertility restoration of androclinium regeneralents of triticale for obtaining the source of selection material. Using this method provides creation of crop varieties which combine economic and valuable properties with adaptive ability. Cultivation of such crops will determine the management of natural and man-made factors in plant growing process in Central Ciscaucasia region.

Keywords: *adaptive crop growing, triticale, anther culture, androclinium regeneralents, fertility restoration, pollination.*

Introduction

The strategy of adaptive intensification of crop growing is based on the use of adaptive capacity of all biological components of agro ecosystems for maximum utilization of solar energy and other inexhaustible resources of the natural environment for the benefit of humans. As L. S. Berg emphasized (1931), agronomy is the science that shows the way of the most rational usage of solar energy absorbed by organisms for the needs of humans. In the system of adaptive crop growing, which is aimed at sustainable growth of yield, resource and economic efficiency and environment protection, the leading role is given to selection. Due to fundamental achievements in the field of general and molecular genetics, physiology, biochemistry, ecology, biotechnology, and other areas of

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research, the possibility of selecting in the management of organisms' heredity have significantly increased. Analysis of the efficiency of breeding programs in many countries suggests that the objectives and methods of selection should be as adapted to the soil and climatic conditions of a particular region. More over high potential yield of species and hybrids should be combined with resistance to abiotic and biotic stresses. However, the plants are very conservative in the question of changing their genetic nature at the species level and the main obstacles in breeding are generally narrow ranges of diversity in the gene pools of most crops (AA Zhuchenko, 1990).

Successful work in this area should be carried out not only on the basis of intervarietal hybridization but also on interspecific. Effectiveness of these approaches for the conditions of our country is shown in the works of N.I. Vavilov, G.D. Karpechenko, I.V. Michurin, G.K. Meister, N.V. Tsitsin, V.E. Pisarev, A.I. Derzhavin, etc. "... Our specificity, our continental climate, the diversity of the conditions ... - wrote N. Vavilov (1932) - force to devote most of our attention to the remote crossing in the question of solving practical issues ".

One of the most significant achievements in this area is the creation of triticale (Triticosekale Wittmack), successfully combining high productivity and adaptive properties of the initial species - wheat and rye. On food properties and technological values artificially created culture is unique and can specify with wheat, barley, maize, rice and sorghum. Triticale is cultivated in nearly 40 countries around the world, while in the area of winter and spring forms reached 4 million hectares. The largest area of triticale is in Poland (840 thousand hectares), Germany (537 thousand hectares), China (550 ha), Australia (400 hectares). The growing interest in culture, according to N. Borlaug (1983), is associated with its high-ability of withstanding low temperatures, acidic and sandy soils, fungal diseases, as well as the nutritional value of grain and green mass.
Triticale breeding success in Russia is associated with the creation of a wide range of varieties that provide depending on the conditions of growing about 7,0-10,0 t / ha of grain and to 90.0 t / ha of green mass. At present, the State register of breeding achievements permitted for use, includes 46 varieties of winter triticale, 28 of which are from the North Caucasus region. Special attention deserve varieties of North Donetsk Experiment Station (Kentavr, Don Bard, Legion, The Tribune), Acad. P.P. Lukyanenko Krasnodar Research Institute of Agriculture (Mudrets, Proriv, Valentine 90, Lider, Mamuchar), Stavropol Research Institute

(Stavropol 5, Quasar, Mamuchar). Since 2007 varieties of spring triticale Yarylo are recognized (Krasnodar Research Institute), which provides up to 70 kg / ha of grain in winter wheat predecessor.

Along with tangible positive results in the breeding of triticale, still there are no forms which would be able to fully correspond to the ideal model of the plant, the ability to realize products effective potential in different soil and climatic conditions. There is an abvious need for a model of sorts for various conditions of the Central Caucasus, and, in our view, it is important to consider the direction of their economic use. Thus, for the pastry dough physical properties (water-absorbing ability, extensibility, elasticity), gluten content, its quality, do not play the same role as for baking. Varieties for the fermentation production should have low protein content (10-12%), high amounts of starch and high amylase activity of the enzymes. For forage varieties it is necessary to use high protein content grain, balanced in essential amino acids, low alkilrezortsin content, grain fineness.

Methodological approaches to solving the problem

The current complex genetic pool of triticale, including the genetic material of wheat and rye to allows successful meeting the challenges of creating certain kinds of expertise. At the same time, to improve the effectiveness of the solution of this problem there must be introduction of modern methods of increasing genetic diversity, including intergenomic recombination. In this direction, we have carried out studies to improve the utilization of biotechnological breeding methods - method of anther culture (Vysotskaya I.B., 2002; Vysotskaya I.B., Krivenko A.A., Barilnik K.G. 2009)

Anther culture method, which is one of the gamete selection method and can be used to produce stable homozygous lines directly from the hybrids F1, significantly speeding up the selection process. This method is that anthers containing microspores at certain stage of development are placed in nitrous area (usually a single cell vacuolated microspore stage). Part of microspores, getting into stressful conditions, develop in a sporophytic ways and forms callus structure, which while transforming in regeneration area give rise to plants (regeneralents) having a different chromosome set. Most of them are haploids, and, in addition, form aneuploid dihaploid shapes. According to the conventional scheme received plants kolchitsinite in order to double the chromosome set and

transfer genes in the homozygous state. However, due to difficulties in the recovery phase of fertility regenerates the scheme has not yet found wide practical application. It is found out that the kolhitsinite regeneralents, and their offspring show considerable genetic instability.

We have developed an effective biological method of restoring the original biological fertility of androclinium regeneralents of triticale, which promote conservation of wide range of genotypical variability that occurs in anther culture in vitro, for its use in breeding (expert opinion established the International priority of the proposed method, issued a patent for the invention № 2354111, RF IPC A01N 4/00, S12N 5/00. - № 2007129595/13, filed. 01.08.2007, publ. 10.05.2009).

The original technology of getting the source material for selection on the basis of triticale anther culture includes the following steps:

1. Selection of donor plants from the varieties with high androgenic potential.

2. Processing of donor heads with low temperature 4° C in during 3-14 days.

3. Sterilization of anthers inside grains scales in 70% alcohol and 8% solution of bleach.

4. Landing on the anther culture on notorious areas N-6 and Rotato (Pt), containing sucrose or glucose as a source of carbohydrates.

5. Cultivation of planted anthers at 27-28° C during 4-8 weeks until the growths appear.

6. Transplantation of formed structures on regeneration area to produce green plants.

7. Breeding of obtained plants by the removal of shoots produced and put them in hormonless area for rooting.

8. Adaption of regeneralents at 14-16° C in Knopp solution.

9. Artificial vernalization of regeneralents in a refrigerator.

10. Growing of regeneralents in an array of specially selected according to the timing of the flowering phase mixture of varieties of triticale for free pollination with the pollen of constant prices-selection forms.

11. Sampling, precipitated by selectively valuable features, for inclusion in a further selection process.

Development of new varieties of triticale by anther culture method

Carried research resulted in obtaining extensive and various source materials for breeding of winter triticale, which gave varieties different in a complex of agronomic properties and features. The best of them are "Kypina" and "Anchor' in 2010. They were given for assessment to the state strain testing.

"Kypina" was received on the basis of the donor selection grade "Blagorodnyiy" of the Stavropol Research Institute of Agriculture (Stavropol). Blagorodnyiy has is a hybrid origin: Stavropol 3 [[(Leukurum 1364/1 × S. montanum) × S. derzhavinii Tzvel.] × (Alabasskaya × S. derzhavinii Tzvel.)] × Stavropol grain [(AD 206 × Armadillo 133) × free pollination].

In 1999 regeneralents in anther culture "Blagorodnyiy" were obtained and in R1 progeny was selected a plant, which in 2000 under the insulator gave seeds (Fig. 1). The obtained seeds were sown in the nursery garden starting material (PIM). In 2001, morphologically homogeneous elite plants were selected and planted in the breeding nursery (SP). In 2002 the best family was selected and combined; they have appropriated the breeding number B-R3. In 2002-2004 B-R3 population was studied in the control nursery (CP), where it stood out morphological uniformity, productivity, high quality grain, and field resistance to wheat stem sawfly, fungal diseases. In 2005 the negative selection of low productivity and morphologically atypical families was carried out. Stable highly productive families were united and assigned the breeding number LR-28. In 2006, LR-28 was studied in the control nursery. In 2007, the brand was tested in MSI and in 2008-2009 under the name Kupina in a competitive station test.

Scheme 1. *Scheme of creation of winter triticale Kupina*

1999 Anther culture of donor varieties of "Blagorodnyiy"

↓

2000 R1 – self pollination of heads under insulator

↓

2001 R2 - the selection of morphologically homogeneous elite plants IM

↓

2002 R3 – combination of the best families in the breeding number B-R3 SP

↓

2003-2004. Study of population of B-R3 in the control nursery CP

↓

2005 Re-selection of highly productive families, assigned the breeding number LR-28 CP

↓

2006 Study of breeding numbers of LR-28 CP

↓

2007. Study of LR-28 variety in a small variety testing

↓

2008-2009. Study of Kupina in the competition

Source: *Own research.*

Anchor variety was obtained by biotechnological method of anther culture from the MAD 1 variety with the use of original method of biological fertility restoration of androclinium regeneralents. This method was developed by us. The donor variety MAD 1 was bred in Mironovskiy Institute of Breeding and Selection of wheat of V.N Remeslo (Bezostaya 1 × Saratov coarse grain) × MT 39, Bronco 90 (spring triticale). In 1999 regeneralents in anther culture of MAD 1 variety were obtained (Fig. 2).

Scheme 2. *Scheme of creation of winter triticale Anchor variety*

1999 Anther culture of the initial variety of MAD 1

↓

2000 Free pollination of regeneralents R1 in the array of winter triticale

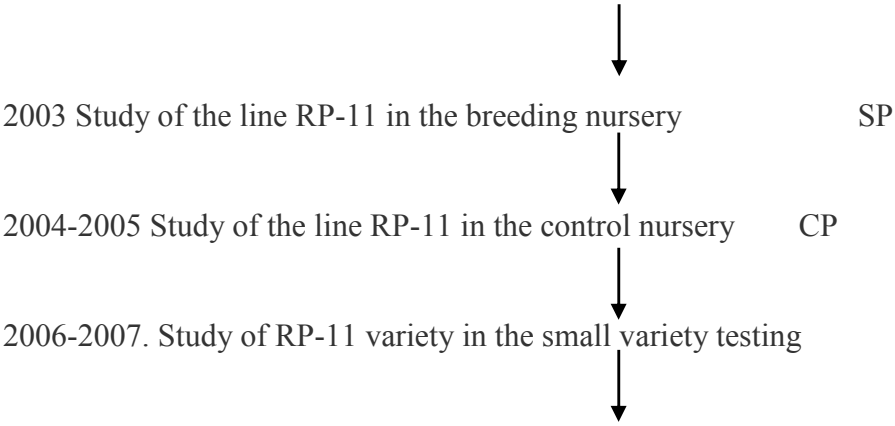
↓

2001 Study of a hybrid population R2 in PIM

↓

2002 Selection in R3 elite plant, line RP-11 PIM

↓



Source: *Own research.*

In R1 progeny was selected a plant, which in 2000 from the free-pollination of Stavropol Research Institute gave seeds. These seeds of R2 were sown in the starting material nursery. In 2002 an elite plant was selected R3 and sown in the breeding nursery under the number RP-11.

In 2003, while studying in a breeding nursery, line RP-11 differed by its morphological homogeneity. In 2004 and 2005 selection-line RP-11 was studied in a control nursery, where it showed its productivity, stunting, lodging resistance, excellent thresh of grains, field resistance to wheat stem sawfly, fungal leaf diseases.
In 2006-2007 RP-11 variety was tested in MSI and in 2008-2009. a new variety called Anchor was tested in competitive station variety study.

The rhythm of growth and development of new varieties of winter triticale

Varieties of different origin and biological characteristics have different growing season, which is important for production. The coincidence of full ripeness of a variety and perfect time for specific agroclimatic conditions of harvesting largely determines the size and quality of the yield. Late ripening characteristic of triticale, is the feature which influences the promotion of these forms in the production as grain filling is shifted to a later period of the summer, when the weather is hot and dry. As a result, genetical determination of seeds' wrinkleless is accompanied by ecologically determined shriveling of grain. The length of the growing season is a genetic trait, and therefore early ripeness of triticale is a

positive feature. Since early ripeness is associated with neutral photoperiodic response, creating of varieties insensitive to day length is a factor contributing to a sharp increase in ductility amphidiploids and extension of the area its cultivation.

New varieties of winter triticale derived from androclinium regeneralents, i.e. Kupin and Achor were studied in comparison with the standard variety of hybrid of Stavropol 5. Sowing was carried out in the first decade of October in 2007, and in the second decade October - in 2008, that is the recommended sowing period for this crop. Inter-phase period of sowing-growing of the studied varieties did not differ and amounted during the yheads of research about 11-15 days (Table 1). In favorable conditions of autumn vegetation, the phase of tillering began within the same time periods. The duration of germination-tillering period was about 30 and 32 days. Plants formed bushes before going into winter and formed 3-5 shoots.

Table 1. *Duration of the phases of growth and development of new varieties of triticale derived from androclinium regeneralents, days*

Variety, line	Duration of inter-phase periods, days				Growing season
	Sowing -shoots	Shoots-tillering	Tillering –heading	Heading –full ripeness	
	2007-2008 с.-х. г.				
Stavropolskiy 5, St	15	30	191	42	256
Kupina	15	30	185	45	252
Anchor	15	30	181	44	247
	2008-2009 с.-х. г.				
Stavropolskiy 5, St	11	32	190	44	260
Kupina	11	32	185	47	258
Anchor	11	32	183	47	256

Source: *Own research.*

Heading phase of Kupina started 5-6 days earlier than standard varieties. Heading phase of Anchor - 7-10 days earlier. New varieties, despite the shorter duration of the growing season, had 2-3 days longer period of heading to full ripeness than the standard one. Consequently, the period of loading and grain formation took longer period of time, which had a positive impact on the productivity of the studied varieties. From the analysis of the rhythm of growth and development of varieties of Kupina and Anchor it is clear that they have a shorter than the standard length of the growing period, the duration of the growing season of Stavropolskiy 5 was 256-260 days. Kupina variety matured 2-4 days earlier, and Anchor 4-9 days earlier.

For the introduction of triticale varieties in a green belt the important factor is the time of harvesting maturity (the beginning of heading stage) and duration of the period of effective use of green mass. In the Stavropol State variety testing stations studied varieties differ in the timing of the beginning of the harvesting maturity phase. Analysis of the duration of the shoots - harvesting maturity period showed that the earliest green mass of the studied varieties gives Anchor variety- on 211-215 day of growing season. Kupina is late for 2-4 days. The difference between the periods of harvesting maturity of these grades and the standards was 5-10 days. Differences in the timing of the heading phase of new varieties allows their consequent entering the green belt in order to get an earlier yield of green mass and extension of the use period of winter triticale.

An important feature of grain varieties is the height of plants. The height of the new varieties did not significantly differ depending on the conditions of vegetation and Anchor variety was 120-131 cm high and Kupina - 156-161 cm (Table 2). Standard Stavropolskiy 5 was higher - 162-166 cm. New varieties have high resistance to lodging, but there are slight differences depending on the growing season. Kupina as well as Standard Stavropolskiy 5, with an increase in plant height had light tendency to lodging at 4 points (Table 3). Regardless of the height of plants, Anchor showed excellent stability.

Economic and biological properties of new varieties of winter triticale

Grain of all sorts in the phase of full ripeness doesn't shed (5 points), head rod is strong enough for thrashing (4-5 points). Anchor's grain is less prone to discoloration during dead-ripe stage due to the wilting of

heads. All varieties are well adapted to mechanical harvesting. Anchor has a great thrashing capacity in contrast with Kupina (4.5 points).

Studied varieties were characterized by a high level of hardiness. The most revealing as to resistance to low temperatures was 2008, when the absence of snow cover lowered the temperature - 22° C. Even under these extreme conditions new species as well as the standard, took great hardiness (94,2-96,1%).

Table 2. *Economic and biological properties of new varieties of winter triticale derived from androclinium regeneralents*

Factor	Stavropolskiy 5, St		Kupina		Anchor	
	2008	2009	2008	2009	2008	2009
height of plants, cm	162	166	146	158	120	131
Logging resistance, points	5	4	5	4	5	5
Bush productiveness , piece	3,5	3,2	4,1	3,5	3,5	3,3
Grain number in a head , piece	35,7	32,1	65,7	40,6	42,9	36,2
Shed, points	5	5	5	5	5	5
Head brashness, points	4	4	5	5	4	4
Head wilting, points	2	2	3	3	5	5
Winter hardness , %	96,1	98,4	95,6	98,9	94,2	95,7
Drought resistance, points	5	5	5	5	5	5
Adaptability to mechanical harvesting, points	5	5	5	5	5	5
Thrashing capacity, points	4	4	5	4	5	5

Source: *Own research.*

Grain yield of new varieties of winter triticale

As it was mentioned earlier, the most important economic characteristic of a variety is its high productivity. Evaluation of studied varieties for grain yield showed stable superiority over the standard variety Stavropolskiy 5 at P <05 (Table 3).

Table 3. *Grain yield of new varieties of winter triticale derived from androclinium regeneralents, t / ha*

Variety	Grain yield		
	2008 г.	**2009 г.**	**Medium**
Stavropolskiy 5, St	2,1	2,4	2,2
Kupina	2,7	3,5	3,1
Anchor	3,9	4,7	4,3
HCP_{05}	0,5	0,7	-

Source: *Own research.*

Anchor had the highest productive potential of grain with different growing conditions, the yield of which was 3,9-4,71 t / ha. The yield of Kupina under favorable growing conditions was 3.5 t / ha, and in stressful conditions - 2.7 t / ha. The average yield of Kupina was 3.1, Anchor - 4.3 t / ha. The advantage of new varieties of triticale in grain yield is determined by the greater density of productive stalks, the amount of grains on the spike and grain size (weight of 1000 grains). The resulting level of grain yield of winter wheat predecessor, allows us to consider the studied varieties promising for cultivation in industrial environments.

Productivity of green mass of new varieties of winter triticale

One of the most important properties of forage triticale is powerful development of plants (160-180 cm), succulent stems, resistance to fungal and viral infection. According to our research, the yield of triticale green mass does not depend directly on the height of plants in the heading stage, and due to the degree of foliage plants. Yields of more undersized Anchor averaged 34.8 t / ha and did not differ from that of the tall varieties of Stavropolskiy 5. Kupina, which is close to the standard height showed an average yield of 1.2 t / ha less than the standard (Table 4).

Table 4. *Productivity of green mass of winter triticale derived from androclinium regeneralents, t / ha*

Variety	Yield of green mass		
	2008 г.	**2009 г.**	**Средняя**
Stavropolskiy 5, St	31,8	36,6	34,2
Kupina	30,0	36,2	33,1
Anchor	32,1	37,5	34,8
$НСР_{05}$	1,5	1,2	-

Source: *Own research.*

Significant differences in the amount of green matter produced in years with different character of moisture. High correlation coefficient shows the existence of interrelation of the yield of green mass and the weather conditions prevailing in different years (r = 0,632; P = 05).

In 2008, Anchor had a yield grade of 5.4 t / ha higher than in 2009, the difference of variety Kupina was 6.2 t / ha, and in the variety Stavropolskiy 5 - 4.8 t / ha. Thus, new varieties are more responsive to the improving conditions of vegetation. Anchor though its height not exceeding 130 cm, can be recommended for getting green mass and inclusion in the green belt.

Grain quality of new varieties of triticale

In the whole complex of measures aimed at the further increase in the productivity of crops and improvement of the quality of their yields, selection is central. During selection the quality is influenced by technology, consumer targeting and food grade, which should displace varietal universals (Zhuchenko A.A, 2004). Varieties of winter triticale breed in Stavropol, as mentioned earlier (Dorofeev V.F., Kurkiev W.C., 1985), characterized by high levels of grain quality, with the yields inferior to modern varieties. However, among the vegetable resources gendonory signs that determine the quality of products are most scarce. According to the majority of researchers, there is no compulsory antagonism between the increase of the amount and quality of the yield, as they can be controlled by different genetic systems. This presupposes the possibility of their association in the genotype of the variety.

From the analysis of grain quality of winter triticale of Stavropol selection (2009) the content of crude protein, depending on the varietal characteristics ranged from 13.8 to 16.4% (Table 5). The highest content of crude protein was observed in standard Stavropolskiy 5, which, along with high protein content, had the highest quantity and quality of gluten. However, the level of grain protein content, the quantity and quality of gluten makes the possibility of obtaining good quality bread from the new varieties of triticale flour.

Table 5. *Grain quality indicators of winter triticale derived from androclinium regeneralents*

Variety	Content, %			Sedimentation, ml
	Crude protein	Starch	Gluten	
Stavropolskiy 5, St	16,4	64,0	27,6	56,8
Kupina	14,1	65,5	21,8	44,1
Anchor	13,8	65,7	21,3	45,7

Source: *Own research.*

Baking quality of new varieties of triticale

A new variety Kupina as well as the Standard Stavropolskiy 5 demonstrated excellent baking characteristics (Table 6). Flour obtained from the seeds of these varieties corresponded top-grade wheat flour: volume of bread was 510 and 489 cm3. According the main characteristic features this bread corresponded with the one from the flour of soft wheat variety Ayvina (selection of Acad. P.P. Lukyanenko Krasnodar Research Institute of agriculture).

Weight of the pan bread sample of laboratory baking from the of triticale Stavropolskiy 5 (516 g), new varieties of Kupina (483 g) and Anchor (484 g) was at the level of soft wheat Ayvina (500), the difference did not exceed 3.4% . High gas-forming and gas-retaining ability of dough made with the flour of Stavropolskiy 5 and Kupina confirmed not only by a large amount of bread, but also high porosity (69 and 72%, respectively). The acidity of the bread made with flour of all varieties of triticale (1.2-1.6 deg.) corresponds GOST 5670-96 for bread products from wheat flour (no more than 3 deg.). Despite high gluten content and its quality, Anchor had lower baking quality.

Bread volume, volume output and the porosity of the class turned out to significantly lower than that of Stavropolskiy 5 and Kupina, which may be associated with increased elasticity of gluten (like durum wheat).

Table 6. *Baking quality of winter triticale*

Variety	Weight of bread, gr	Volume, cm^3	The specific volume of bread,cm^3/gr	Output capacity of bread, cm^3	Porosity, %	Acidity.
Stavropolskiy 5, St	516	1910	3,7	510	69	1,4
Kupina	483	1830	3,8	489	72	1,2
Anchor	484	1130	2,3	302	54	1,6
Ayvina (soft wheat.)	500	1510	3,0	404	63	1,4

Source: *Own research.*

Comparative organoleptic evaluation of bread of different varieties of triticale and winter wheat variety Ayvina confirm the made above findings of appreciation of triticale flour bread and its proper requirements for wheat bread (3). Shape of laboratory baked bread made of Kupina and Ayvina is symmetrical. The symmetrical shape of bread baked of Anchor flour is broken, due to the formation of crumb voids. Crusts' color of all sorts corresponds GOST: from golden-yellow (Kupina) to brown (Anchor, Ayvina) to dark brown (Stavropolskiy 5). The surface of the crust of Anchor and Ayvina is smooth, without cracks and explosions. There are tears in crust of Ayvina. The surface crust of Stavropolskiy 5's bread is uneven, bumpy with detonation.

Picture 3. *The cut of bread of winter triticale varieties and a variety of winter wheat Ayvina*

Source: *Own research.*

Crumb colour of all sorts is even, from white (Kupina), grey (Anchor, Ayvina) to dark (Stavropolskiy 5). The elasticity of the crumb of all the samples is good - there is no deformation. Porosity is thin-walled; it is less uniform of Anchor, Stavropolskiy 5 and Ayvina. The taste and flavor of bread fit these products. Crunching was absent. The best baking properties of flour by traditional technology occurred in varieties of winter triticale Kupina and soft wheat Ayvina.

Conclusion

The use of biological method of fertility restoring of androclinium regeneralents when creating initial breeding material enhances intraspecific diversity of culture triticale. The results of the study of new varieties (Kupina and Anchor) derived androclinium regeneralents suggests broad opportunities for improvement of selection and grain yield of green mass, grain quality and grain adaptive properties triticale. In order to improve varieties in this area it is advisable to use in breeding programs of gene donors of Stavropol selection which possess high levels of grains quality and good baking properties.

Earlier heading phase of the three new varieties of triticale Kupina and Anchor in comparison with the Standard Stavropolskiy 5 at high yields of green mass allows their inclusion in the green belt in order to get an early harvest of green mass and extending the period of winter triticale.

New varieties of triticale derived from androclinium regeneralents, due to the increased grain productivity are promising for getting high quality grain. Anchor differs in that it combines the high content of protein in the grain with high yield, allowing to collect 0,51-0,65 t / ha of crude protein. Kupina gives away on this indicator to Anchor, but exceeds the standard at 0.11-0.13 t / ha. Varieties Kupina and Anchor are now successfully passing the state variety trials in the North Caucasus region of Russia.

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THE ROLE OF SUSTAINABLE DEVELOPMENT AND ORGANIC FARMING IN PRESERVING AGRICULTURE AND RURAL VALUES

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Abstract

As a key component of the development of Serbia, in addition to its economic importance, agriculture also has a remarkable social and ecological significance. The Sustainable Development Strategy of Serbia is based on three pillars – economy, ecology and society, which are appropriately related within an institutional framework. As an integral part of the concept of sustainable agriculture, organic farming can be represented as a significant opportunity for developing countries. In the final decades of the twentieth century, significant efforts were made to conserve and recover fairly degraded environment. Despite the current difficulties, organic farming is developing in line with market needs for high quality food produced using the latest technology with optimum use of natural resources, without the use of pesticides and with minimal waste generation. Organic production allows for greater economic gains, in terms of realized yields and investment, than conventional production. This article reviews the connection between sustainable development and organic farming, and the role of organic farming in the sustainable development strategy of Serbia.

Key words: *organic farming, sustainable development, rural development, strategy*

Introduction

The past few years have seen a great extent of conversion of agricultural land to organic farming soil. It is essential for the organic farming to establish a commercial structure that will succeed in meeting the growing and increasingly sophisticated consumer demand for organic produce.

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The radical step at the end of the 20th century was raising awareness of healthy nutrition, growth in the cultivation of organic produce, and consequent strengthening of induced demand for such produce in developed countries.

Research has so far focussed on the structural, technical and commercial aspects of organic farming, while the connection between organic farming and rural development was grossly neglected. This article argues that there exists convergence between the concept and implementation of sustainable rural development on the one hand and some key features of the modern-day organic movement.

Focus is placed on multiple relations and synergy between these two phenomena. The article is based on fundamental relations between organic farming and sustainable rural development, elaborated with a special reference to principles and practice in organic production, current rural policies and empirical evidence of the rural development initiative, stemming from the expansion of agricultural systems.

The concept of sustainable agricultural and rural development is based on cost-effective utilisation of resources leading to a strengthened cohesion of the rural region, with agriculture taking up a special place in the process. Sustainable agro systems take into account the conversion of natural resources, without neglecting the economic and social approach to developing rural economy. In addition, "multifunctional agriculture" seems to be the buzz word of today, given its multifaceted contribution to the economic development of rural regions. Agriculture yields both market and non-market benefits (such as food, external effects and public goods). Agriculture is viewed as the basis for the diversification of local available capacities in terms of enhancing complementary activities.

The origin of the concept

The generally adopted concept of sustainable rural development tends to connect different theoretical views and experiences. Over the past decade, the growing environmental awareness and progressive recognition of the complexity, inadequate knowledge and predictability of interaction between economy, ecology and society has generated the concept of sustainable development. The concept of sustainable rural development includes three aspects simultaneously standing in a significant confrontation and subject to considerable controversy – the social, the

economic and the environmental. Their action should be synergetic to an extent, but competitive at the same time. Naturally, the concept of sustainable development must determine a realistic measure for highlighting, motivating and satisfying all the aspects of macro-economy, so that it can acquire positive economic trend in the final manifestation. As the most widespread activity of rural economy by tradition, agriculture contributes to the overall and sustainable development of the rural area only if the given resources are managed appropriately. If not, what we encounter is general degradation of the rural environment. This is the reason for propagating the development of sustainable agriculture maximising productivity and minimising the negative impacts on natural and human resources (Stojanović & Manić, 2009).

Exploiting the available resources, the current concept of sustainable development does not threaten the survival and future of the generations to come. The social dimension brings to the forefront the need to meet the rural employment rate goals and raise the quality of life in rural communities. The economic dimension of sustainability establishes the diversity of rural economy, highlighting efficiently the use of resources, raising the competitiveness of rural areas, and maintaining the vitality and integrity of small rural communities.

The environmental dimension of sustainability is manifested in the implementation of the environmental code of conduct, so that the generations to come could also fulfil their needs with a sufficient level of quality. Whereas this aspect of sustainability was originally discussed in terms of rational use of scarce resources, current discussion of this dimension of sustainability increasingly increases the external effect of various activities in rural environments related to the protection of landscapes, habitats, biodiversity, and water and air quality (Tietenberg, 2006).

The concept of sustainable development systemically aims to secure high stability and increase resistance to external influences on the one hand, and preserve and secure it through internal diversity and complexity of environmental and social systems. Moreover, sustainability relies on the co-evolutionary interpretation of reality.

As the most widespread activity of rural economy by tradition, agriculture takes up a special place in development. Agricultural production encompasses deployment of natural, human, production, financial and

local resources transformed not only into food as a tangible product, but also into employment, local community welfare, healthy environment etc. by means of policies, procedures and institutions. Inappropriate resource management results in degradation and threatens the development of rural economy, in terms of depopulation of rural areas, uncontrolled forest felling, and soil and water pollution. Sustainable agro-systems contribute to strengthening positive impact on resources, thus contributing to enhancing the fulfilment of future generations' needs with their own activities (Kahn, 1998).

In the context of interaction between agriculture and the concept of sustainable rural development, farmers can make a significant – whether positive or negative – impact on local, national and international economy and ecosystems. One may notice an increasing insistence on the growing threat of disrupted biodiversity and focussing farmers as protectors of rural environments. The analysis of agricultural production leads to an ambiguous conclusion that agro-sector delivers a unique public service that no other economic sector can provide. Sustainable agriculture is based on using technologies maximising productivity and simultaneous minimising negative impact on natural soil, water, air and biodiversity) and human resources (rural population and consumers).

In search of the most efficient resource utilisation method, sustainable agriculture maintains social cohesion and highlights trust and partnership between institutions at the local level. The prevalent opinion is that modern-day agro-systems are organised and institutionally established on high-value human resources and sustainable in the long term.

Many theoreticians agree on the point that the concept of multifunctionality and sustainability of agriculture and rural development share a common basis, given that both concepts rely on multidimensional view of the role of agriculture yielding both market and non-market benefits. There is, however, a crucial difference between the two concepts. Whereas sustainability focuses on an efficient resource utilisation, multifunctionality highlights the coexistence of production, technological and economic activities. Agriculture is currently viewed as a basis for diversifying local economic capacities in the sense of enhancing complementary activities. Particular attention is paid to the connection of agriculture, protection of plant and animal resources, untouched nature, eco-tourism and eco-production.

Organic production and rural development

Insufficient education and information levels of rural population, coupled with inadequate development are among the greatest limitations to the development of both organic farming and rural development in Serbia. Not enough attention is paid to this issue. Low development levels of institutional capacities in this area obstructs the rural population's access to capital, which requires change in the traditional management structure, decentralisation and adjustment of institutions, adopting the EU rules and passing strategic documents. The Ministry of Agriculture's Sector for Rural Development currently lacks adequate technical and organisational capacities as well as human resources for enhancing the legislative and institutional basis, whereas other Ministries and Agencies do not deal with rural issues sufficiently. According to OECD's classification, regions inhabited with fewer than 150 persons per square kilometre are regarded as rural areas. According to this classification 85% of Serbian territory qualifies as rural area, with 55% of the total population. Apart from poverty, an additional problem for further rural development in Serbia is agricultural land fragmentation, for 46% of farms are one to three hectares in size, which will threaten their ability to cope with the EU competition (retrieved from http://www.vesti.rs/Vojvodina/Osnivaju-se-regionalni-centri-za-razvoj-ruralnog-turizma.html).

The Sustainable Development Strategy brings to the forefront the goal of sustainable development that should result in the balance of the three key factors, i.e. three pillars of sustainable development, sustainable economic growth, sustainable development of the society and environmental protection, combining them into a consistent entity, supported by an appropriate institutional framework. The overall aim of the Sustainable Development Strategy of Serbia in the agricultural segment is perceived as creating an economically profitable and ecologically acceptable agricultural production, that should be the basis of existence of rural population in areas where there are natural predisposition for achieving adequate level of competitiveness for export to the world market (http://www.odrzivi-razvoj.gov.rs, p. 111), whereas the aims of organic farming can be summarised as (Subić, Bekić & Jeločnik, 2010, p. 51):

1. raising land productivity, i.e. fertility;
2. minimising energy inputs on farms;
3. reducing environmental risk; and
4. maintaining the achieved production level.

Viewing all the three pillars of sustainable development and organic production, one can observe the above itemised relations. Organic production is understood as production taking into account the preservation of natural resources and opening space for more rational utilisation of land, water and mineral resources. Accordingly, the element of environment and natural resources from Figure 1 can be connected to organic farming through feedback, where the environment makes the necessary resources available to agricultural production, whereas introducing modern-day technologies and methods in organic farming enables their rational and long-term use. The mission of any organic farming is to protect natural values and resources, and raise the control levels in their exploitation.

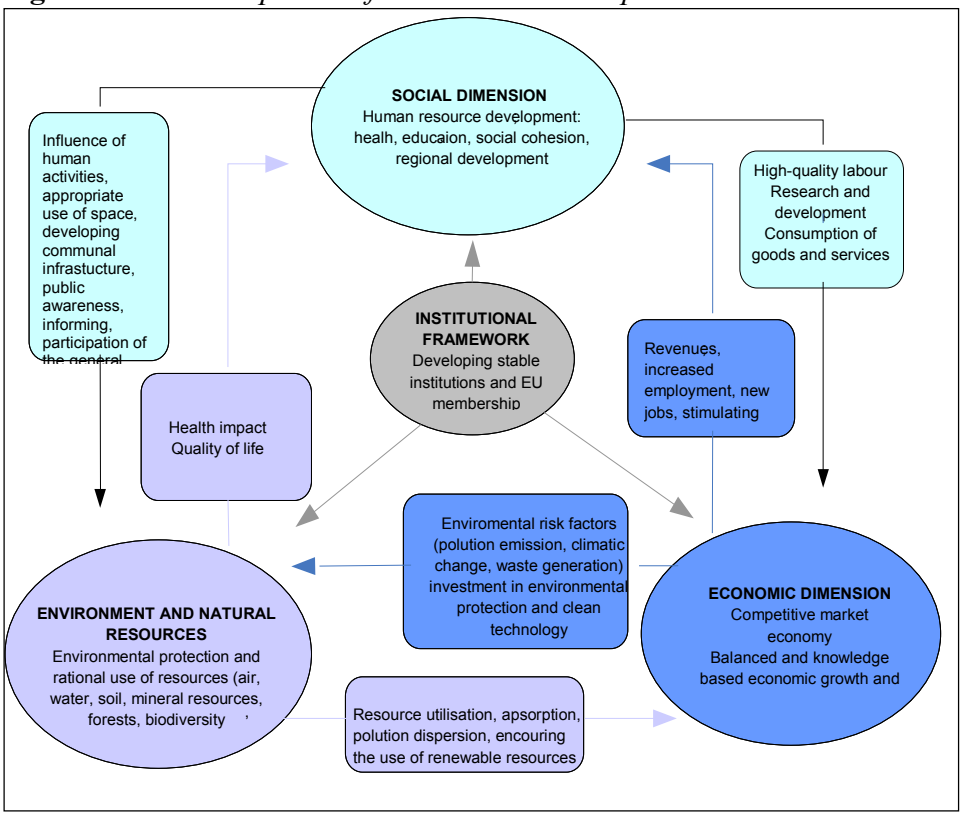
In the practice of developed countries, economy makes a significant, often negative environmental impact. This is primarily due to industrial production, which has been exerting the greatest pleasure on the exploitation of available resources and the environment over the past decades. In order to neutralise the negative effects of industrialisation and conventional forms of agricultural production, prominent place is allocated to organic production, which can be both commercially more competitive and economically profitable. By general consensus of numerous macroeconomists, the strategic sectors of Serbia for raising agricultural activities are power supply, agriculture and telecommunication (Đuričin, 2006, p. 15).

Over the past few months, there is a growing amount of discussion within the EU about financing agribusiness capacities and supporting rural development aimed at environmental preservation from pre-accession funds. Argumentation in favour of organic farming is within the higher level of income and lower costs than in conventional production, regardless of higher yields. Organic production, therefore, highlights the preservation of natural resources as well as environmental protection, and highlighting the strength of producers, thus directly influencing the growth in economic activities in Serbia.

Last but not least, organic production also impacts the third observed pillar of development, i.e. society. Organic products have direct and indirect impact on the population. One of the most significant impacts is preservation of human health and lifestyles. There is also polemic discourse as to whether organic products influence health and to what extent. Not being chemically treated and genetically modified, organic

products receive unequivocal preference. These products are certain to raise metabolic condition and benefit human health. Organising organic production directly reduces the use of technology, machinery, materials and past service, and increases he share of present labour. In addition, organic farming opens new forms of integration and partnership within the entire reproduction chain and value chain, as strengthening the producers' productive and economic status. Organic farming is based on contemporary technical, technological, economic and environmental principles aimed at preserving the environment on the one hand, and protecting people's health and lives on the other.

Figure 1. *The three pillars of sustainable development in Serbia*



Source: *http://www.odrzivi-razvoj.gov.rs/assets/download/Nacionalna-strategija-odrzivog-razvojaRepublike%20Srbije-Finalni-Nacrt.pdf (accessed September 1, 2010, p. 8)*

The past decades have seen organic farms become a significant factor of sustainable development. Production and sale of organic product record a trend of constant growth on the farming and food products markets, thus

creating preconditions for strengthening agriculture's competitive position. The essential am of organic farming is to produce high quality food, but in clearly determined conditions of production, in order to preserve people's health and quality of life. In addition, it is aimed at the future not only from the aspect of environmental protection, enhancing human health and controlling resource exploitation, but also from the aspect of economic prosperity. Serbia has significant available potential for developing organic farming, owing primarily to favourable climatic and agro-ecological conditions, knowledge and tradition.

Development trends and opportunities for organic farming in Serbia

Serbia is endowed with significant natural potentials, favourable agrarian relief, climate and hydrography as an important prerequisite for developing organic farming. The average size of the farm is about 3.5 ha, and their fragmentation enables involvement of a large number of producers in organic agriculture and reducing economic and social tensions burdening this industry over the past few years.

In terms of structural share of rural population and natural resources with 44-5% (*Organic news*, 2011, p. 1), Serbia offers a good perspective for the development of organic production, which would directly reduce unemployment, increase the GDP growth and include uncultivated surfaces in this production to a higher extent, notably in rural areas abandoned for the past few decades for economic reasons.

Organic farming can therefore contribute to socio-economic and environmentally sustainable development, especially in less developed countries (Kilcher, 2007, p.47), owing to the application of organic principles, which implies efficient management of local resources and, consequently, cost efficiency. On the other hand, organic produce market at the local an international level suggests growth perspectives and offers producers and exporters excellent opportunities for increasing revenue and improving living standards.

In the situation of the recognisable geo-agrarian structure of Serbia and funds allocated into the agrarian budget (2.6%), one is definitely likely unable to expect better results and higher yields than the current in the organic farming segment. Only required agricultural development funds amounting to 10% of the agrarian budget could make more significant reforms and structural adjustment to agriculture, in accordance with

standards and requirements of modern organisation of agrarian structure, especially in the segment of organic farming. The SWOT analysis of the organic sector presented in Table 1, leads to the conclusion that a number of options, possibilities and strengths of this sector in Serbia stands in contrast with many challenges which have to be overcome, so that its identified potentials might fully be utilized.

Table 1. *SWOT analysis of the organic farming sector in Serbia*

Strengths	Weaknesses
• National Action Plan exists • Legal framework improving • Trained assessors in the field of organic agriculture in Accreditation Board of Serbia • Awareness of need for quality high in many industries • Large areas of agricultural land not polluted and not intensively cultivated, making con-version faster and easier • Positive opinion on organic farming among academia, many farmers, and consumers • National association exists • Substantial interest of international donors • Road to EU accession • Systematic education and training starting with BSC and MSC study in Novi Sad • International cooperation of local academia with University of Kassel started • Close relations already existing with organic markets in Germany, Austria, Switzerland, and The Netherlands	• Sector and domestic market small • International (EU) markets insufficiently exploited • Insufficient cooperation of actors in value chain • Education in both general and organic agriculture insufficient • Makeup of farms (many small farms, not cooperating) inappropriate • Attention/interest on institutional level limited • Sector at all levels severely underfinanced, only marginal subsidies are marked • Financial engagement of international donors marginal • Financial scheme and technical support for creating and running an accreditation body not yet clarified • Certification systems still non-transparent • Data base on organic agriculture processing and marketing weak and not transparent

Potentials	Threats
• Evolution into Europe's prime supplier of organic berries and some other fruits and products • Evolution into Europe's prime supplier of organic soybean products • Evolution into Europe's prime supplier of organic food/feed ingredients such as starches, brans, flakes, protein cakes, gluten, hydrolysates, pectin, colours, etc. • Modernization of agricultural system by organic segment as the driving force • Easier integration into EU's CAP through organic farming • Perspective of becoming major element in IPARD project approval process, and thus in restructuring Serbia's agriculture and rural areas in general • Possibility of developing into a major pillar of Serbia's agricultural GDP	• Farms cannot develop to the level of international competiveness • Sector fails to be acknowledged at the political level as the driving force in agricultural development • Politics does not sufficiently recognize organic farming in restructuring the agricultural sector in the process of EU accession • Sector cannot build up international relations and cannot penetrate suit able markets • Sector is marginalized by developments in other countries, offering similar range of products • Actors do not respect accepted EU business systems and are excluded from major international trading • Domestic and international investments cannot be mobilized

Source:
http://www.siepa.gov.rs/files/pdf2010/ORGANIC_AGRICULTURE_IN_SERBIA_2012.pdf, pp.40

As far as Serbia is concerned, significant potential for organic food production are noticeable (Sudarević & Davčik, 2005, pp 79-86). This is especially contributed to by geographic position and mild continental climate, several decades of low soil chemisation rate and preserved biodiversity, but also significant human potential in the area of food production and trade. Viewed by individual regions of Serbia, its northern parts, i.e. the Province of Vojvodina offers pronounced potential in field crops, oleaginous crops and vegetables, whereas central and southern

Serbia are significant producers of fruit (raspberry, strawberry, apple, plum, blackberry etc), medicinal herbs and forest fruits. Indigenous apple and plum varieties grown on Mt Zlatibor, Mt Tara and Mt Kopaonik outside plantations can be especially important.

Table 2. *Ideal locations for organic food production in Serbia*

Locality	**area in ha**
Fruška Gora	33,410
Đerdap	22,009
Tara	15,329
Kopaonik	13,140
Mt Šara	12,615
Prokletije	10,198
Karamaš	6,738
Palić	5,773
Tikvara	5,766
Begeč Hollow	5,275

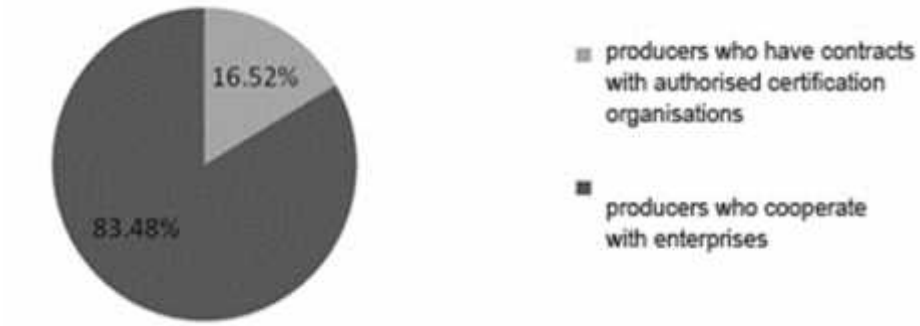
Source: *Exporter, 2009, p. 28 (Eurostat Press Release, organic-food.net, Politika, 2009.)*

One of the positive examples promoting organic farming is Foodland Company, basing their almost entire production and offer on high-yield produce characterised by quality, value added and prominent medical benefits, including organic products. The company's future is based on development projects focussing on organic production, and processing and strengthening cooperation with a large number of small farmers. The production in their business cycle is based on domestic raw materials and indigenous varieties whose genetic structure best suits the agro-ecological conditions of Serbia.

Consumer awareness of the need for health food has undoubtedly become a question beyond dispute. The latest research, however, shows that consumers are either inadequately informed about organic products, or insufficiently educated to distinguish between categories of health food, especially in terms of distinction between traditional, homemade products on the one hand and organic on the other. One of the essential steps in developing organic farming is therefore educating consumers and organising a broad network of promotional companies and agencies that would create demand (Birovljev & Štavljanin, 2011).

The main obstacle to further development of the domestic organic food market is low demand, which is mostly caused by two factors – low purchasing power of the population, and insufficient amount of information on the benefits of these products in comparison with conventional food. The crucial need includes various activities aimed at raising environmental awareness and creating a nutrition culture among consumers (Birovljev & Dujić, 2004, p. 219). This task requires involvement of national institutions, the National Association and all the stakeholders willing to take up a more active role in developing organic farming and establishing the standards of this production in the area of production, technological, scientific, cognitive and other processes.

Graph 1. *The total number of producers using organic production methods in Serbia in 2008*



Source: *The National Action Plan for Organic Production Development in Serbia, 2009, p.5.*

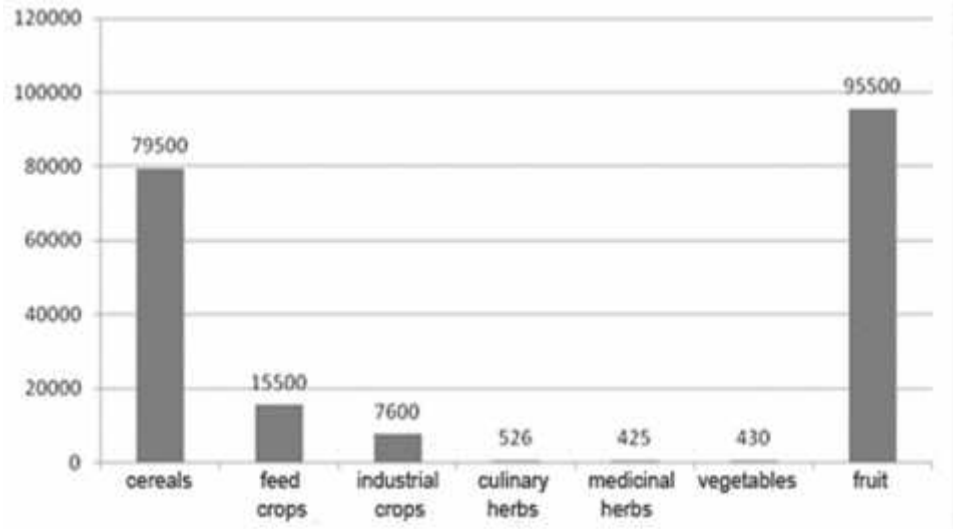
The total number of producers using organic agricultural production is 224, 34 of whom have contracts with authorised certification organisations, whereas the remaining 197 produces cooperate with companies such as Berry Frost, Sirogojno, Miletićevo Bio-cooperative Farm, Bašaid, Žitohem, Eko Telečka etc.

The most common obstacles to small farms in organic production are lack of knowledge and market access, certification, inputs for agricultural production, lack of capital and inefficient organisation. Activities for overcoming these obstacles include increased investment into research, building and expanding capacities, introducing certificates, strengthening market expansion incentives, motivating small farms to establish

cooperatives and partnerships, and introducing more significant consulting, logistic, institutional and administrative preconditions for stabilising and developing this production.

Many developing countries can nowadays access attractive local and international markets faster and more efficiently through certified organic produce, and thus make a direct impact on strengthening their economic position, through increased income and direct influence on improving the country's economic position.

Graph 2. *Total yield of certified organic production of plant origin in 2008 (kg)*



Source: *The National Action Plan for Organic Production Development in Serbia, 2009, p.5.*

Total area involved in organic farming amounted to 596 ha in February 2009, so that the year 2008 saw a total yield of certified organic production of plant origin of 629,551 kg, predominantly fruit and cereals (the National Action Plan for Organic Production Development in Serbia, 2009, p.5.)

Organic farming and organic food production method features as an important pillar of sustainable development of rural areas and environmental protection, and strengthening economic and social standards of farm employees.

It is a fact that Serbia has been facing a variety of economic and other problems; however, organic farming provides an opportunity for a step forward in agricultural development and stabilising the condition within the entire agriculture, which would certainly be an important foundation for preservation of rural environments and small family-owned farms.

Conclusion

The analysis of the correlation between the three key elements of sustainable development, and their cohesion through institutions and regulations has shown that organic production can and may be understood as an element that would enhance the agricultural development strategy.

The sustainable development concept implies a significant level of research activities, reorganising production and introducing new methods of work that would produce expected results, from the standpoint of all three pillars of sustainable development (economy, ecology and society).

Organic farming should be regarded as a particular attitude and system in relation to agricultural production. It implies clearly adopted procedures and standards of production that do not threaten people's health and lives, or the environment. The economic milieu where organic farming takes place shows certain deficiencies, in terms of undeveloped market, ignoring set procedures, lack of information and expert knowledge among the producers, inadequate institutional regulation, and insufficient economic and financial support.

Serbia is endowed with significant comparative advantages for developing organic agriculture, but this is only a potential that should be exploited. Despite the obstacles existing in the organisation and functioning of organic farming, these can be overcome through a set of activities: considerable investment, building and expanding capacities, introducing standards and certificates, strengthening the market, intensifying incentive measures, stimulating and protecting small farmers.

The character, economic strength and size of family farms in Serbia enable and stimulate the development of organic farming, and promote agricultural production. The rural concept of developing small family farms and organic farming feature as a precondition of raising the level of economic efficiency and market competitiveness. Many investors and

financial institutions in the EU support strategic projects placing biodiversity preservation into the foreground, protecting the ecosystem, developing rural environments and preserving small family-owned farms. The chance of Serbia is in organic agriculture, and it is therefore vital to set priorities and highlight the organic farming projects as the strategic carriers of agricultural development.

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PARTICIPATION OF WOMEN AND YOUTH IN SUSTAINABLE RURAL AND AGRICULTURAL DEVELOPMENT*

Jovana Čikić, Marica Petrović[1]

Abstract

Authors discuss the role of women and youth in sustainable rural and agricultural development. The idea of sustainable development of rural areas and agriculture is observed in a relation to the concept of neo-endogenous rural development and multifunctional agriculture. At the same time, multidimensionality of the development is particularly emphasised as a crucial element in understanding the role of women and youth in the process. Basic idea is that the key element for the analysis of the women's and youth's role and participation in sustainable agricultural and rural development is the research of their power. Power derives from the resources which women and young people have, as individuals and as social groups.

Key words: *participation, rural women, rural youth, sustainable rural and agricultural development, power*

Introduction

One of the basic and up-to-date rural sociological issues is the question what rural development is. Although it is one of the central concepts in rural sociological analysis, there is no generally accepted definition of rural development. Such present state derives from the different theoretical opinions on the very nature of the rural development, but also from the complexity of the process itself. On the complexity of rural development as a social phenomenon clearly indicates Singh (2009: 3) when points out that rural development can be understood, at the same

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time, as a process, a phenomenon, a strategy or a discipline. Also, author (Singh 2009: 3) argues that "*there are no universally acceptable blueprints to identify appropriate engines of rural development, if at all they exist. It is a choice that is influenced by time, space, and culture*".

Then, how sustainable rural development can be defined? At the very beginning, we are facing two major problems: first one is related to previously mentioned problem of defining rural development and the second one is the problem of determining the sustainability of the rural development as a process / phenomenon / condition. It has already been pointed out that rural development is a complex, multidimensional and multifunctional process. Even though there are many different explanation of the concept, authors agree that the goal of rural development is to improve the quality of life of those who live in rural communities. According to Moseley (2003: 4), rural development implies "*a sustained and sustainable process of economic, social, cultural and environmental change designed to enhance the long/ term well/being of the whole community*". On the other hand, the idea of sustainable development became in last three decades sort of scientific `must have`, an essential element of studies on different development tendencies and concepts. Defined in an elastic manner (Bruntland et al. 1989), sustainability is a loose concept that is easily under influence of other ideas, but also takes them into its embrace. However, just because of this, the idea of sustainable development should be systematically and critically reviewed[2] (Castro 2004; Jacob 1994; Lehtonen 2004; Пушић 2012; Smrečnik 2002) in order to determine its heuristic, but also the real limits.

Leaving aside the question of sustainability of sustainable development as a scientific concept and as a development strategy, it is important to note that this idea coincides with the idea of neo-endogenous rural development, in chronological and in conceptual terms. Specifically, both ideas insist on activating internal and specific development potentials[3] of

[2] According to Pušić (2012: 428), first criticism of the concept of sustainable development appears only a decade after the concept has arose.

[3] According to Moseley (2003: 20), we can speak of four types of development potentials or capitals for achieving and preserving sustainability of local (rural) communities. First one is ecological capital which includes exchange of energy and matter, as well as physical characteristics such as climate, ecosystems etc. Second one is human capital which refers to the individuals` competence to perform productive work (based on their own characteristics). Social capital implies social institutions and values

the rural communities. Besides, both concepts point out the significance of participatory and bottom-up approach. This also means the change in focus of research and practice of planning. Therefore, neo-endogenous rural development and sustainable rural development emphasize the importance of the local frame as a basis for achieving and preserving, as well as researching the sustainability. According to the both ideas, the aim of the development is relatively independent social community which is able to perform all the necessary reproductive functions and to provide basic elements for the balanced community development. Furthermore, sustainable and neo-endogenous rural development argues decentralization (of space, decision-making power, resources etc.), but only with recognition that rural development is always the result of a combination of exogenous and endogenous factors of the rural community reproduction. Because both ideas emphases activating the internal development resources, special attention is paid to the analysis of the role of local community groups, organizations and institutions in managing local rural communities development.

Ideas and approaches in the research of the opportunities for the contemporary rural communities' development inevitably raise a very important question regarding the role of agriculture in sustainable rural development. It is obvious that contemporary rural communities have been changed in many ways. Nevertheless, agriculture still stays the core element of the rural economy and rural social structure overall. At the same time, being economically engaged in agriculture today means to think about farming as an expression of entrepreneurship, with no regard to the level of its market integration. However, farming is not just business. Farming on family farm is also a way of life (regardless of the level of agricultural development). So, agriculture should be viewed in a broader context. This means that contemporary farming should be examined in the light of its consequences to rural community`s social structure and the position of the community in the broader settlement network. Therefore, the idea of sustainable and neo-endogenous rural development is connecting with the concept of agricultural multifunctionality as a mechanism for a re-integration of economic, environmental and social development goals. This concept is particularly being analysed at the level of family farm because farm is an intersection of the key elements of the rural social structure: rural family and

on which individuals can strengthen their individual capital. Manufactured capital includes all manufactured material goods which enables production process.

household, rural economy and life in the local rural community. Thus, following these ideas, van der Ploeg and Reop (2003: 44) argue that deepening and broadening are strategies or versions of the (sustainable) rural development at the family farm level.

However, it is not rare that the idea of sustainable rural and (particularly) agricultural development is simplified and limited only to the environmental sustainability. Even though it is a very important component, sustainable rural and agricultural development is much more that the environmental protection and rational use of natural resources. Therefore, besides environmental, we can talk about (at least) two more dimensions of sustainability: economic and social (Čikić, Petrović 2010: 16-19), as well as cultural and political component of rural sustainability.

In this light, the question of participation of women and youth in sustainable rural and agricultural development gets new content. This is not just an understanding of their participation and contribution in performing and improving agricultural production. In contemporary social conditions, participation of women and youth in public community life is closely connected to the political and socio-cultural component of sustainability. Specifically, this means that opportunities and constraints to the participation of these social groups must be considered in a relation to their social power (do they have it and in what extent).

Factors of stakeholders` participation in development activities

The request for the stakeholders' participation in activities that are important for the community functioning and development is a common place in contemporary theoretical debates and, even more, in practical requirements that are put before the social development planning practice. Participation includes various forms of activities of individuals, groups, institutions and organizations in the development process, respectively, in the process of proposing, planning, decision-making, measures implementation and evaluation of the development policy effects. The relationship between the stakeholders` social power and their participation can most obviously be seen in the ability to influence decision making. However, participation in activities related to the community functioning and development involves more levels[4] considerably.

[4] Arnstein (1969: 217) speaks of three basic levels and eight sublevels of participation. Pimbert and Pretty (1997: 309-310) speak of participation which ranges on a continuum from passive participation to self-mobilization.

Whether a stakeholder is going to participate in activities relevant to the functioning and development of the community and at what level will stakeholder participate depend not only on the social power at the disposal, but also of the characteristics of its organizational structure, characteristics of internal homogeneity (in terms of ability to coordinate various and different interests), available resources which can stakeholder invest in development activities, as well as the habit of participating. Actually, in our society there is an apparent problem of the nonexistent tradition of active participation in aforementioned official forms of social community life. This is particularly addressing rural areas and rural women and youth. So, we can speak of double deprivation which continuously influences the limits of the opportunities for rural women and rural youth to participate in public social life of the community. First sort of deprivation derives from the general subordination of the rural to urban which is the characteristic of both traditional as well as contemporary Serbian society. Second is generated from gender and generational differences. Gender differences caused lower social status of women overall, particularly rural women. Their social status is lower than the rural men is, but also lower than the social status of (most) urban women. On the other hand, favouring years and experience in traditional peasant society clearly has been defined limits of independent public appearance of rural youth, especially outside the rural family. Apart from this, in contemporary Serbian rural communities in which are generational differences turned in favour of rural youth, their social exclusion is the key factor of the lack of tradition to actively participate in community public life. Besides, a significant part in maintaining the tradition of non-participation in public social community life has the characteristics of the dominant political system during the past decades.

Research of participation of rural women and rural youth in sustainable rural and agricultural development is necessarily moving towards analysis of the opportunities and constraints to its strengthening. As it is shown, prevailing exclusion of rural young people and rural women from development activities is the result of a number of factors, with particular emphasis on the social roles of rural women and rural youth and their respective social statuses. The rural youth and rural women are marginalized social groups[5] (Dardić, Milojević 2010: 13; Krstić i sar.

[5] Today, the term marginalized social group is often used synonymously with the term vulnerable social group. In both cases, we can speak of crowding out of a certain social

2010: 20). Those social groups are characterized by a certain degree of social exclusion. Under the social exclusion of a social group we mean the state of shortage in resources as well as non-accessible resource providers (Praćenje društvene isključenosti u Srbiji 2008: 5; Shucksmith, Chapman 1998: 228-231; Shuchsmith 2004: 44-45; Šporer 2004: 174-177; Šućur 2004: 45-47). Also, it is important to emphasise that social exclusion mean not only to its economic dimension which implies low income or lack of income at all or a little chance of employment. Social exclusion also includes conditions such as disintegrated and dysfunctional families, substandard housing, inadequate health care and care for elderly, lack of access to educational, cultural, political institutions, etc. In summary, social exclusion is a „*multidimensional process that weakens the connection between individual and community*" and „*the greater the characteristics by which a person is excluded, he/she becomes more vulnerable*" (Bejaković 2004: 77)[6].

Lack of resources, regardless it is a relative or absolute deprivation, suggests that marginalized social groups are characterized by a relatively low level of economic, social, cultural, educational capital. Social exclusion puts the members of socially marginalized groups in a vicious circle. Namely, due to the lack of resources, members of these groups have difficult access to individuals, groups, institutions and organizations who are resource providers. At the same time, because they find it more difficult to access resource providers, members of marginalized social groups are not able to increase and strengthen their capital.

The fundamental question is how to enable and intensify the participation of marginalized social groups in the social processes. Their activism is not only of benefit for the group itself (in terms of strengthening group potential, as well as strengthening the capital of individuals). The activism of rural women and rural youth has direct benefits to the rural community in whole because it contributes to the strengthening of the social vitality of the community. The idea of the sustainable development

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groups to the social sidelines. Apart from these, the marginalized social groups include, for example, members of ethnic minorities, minority religious communities, people with severe/incurable diseases etc.

[6] Thus, we can speak of one-dimensional and multidimensional social exclusion (Praćenje društvene isključenosti u Srbiji 2008: 6). In the first case, social exclusion is the inability to reproduce a single resource. In the second case, the group has trouble reproducing more resources which significantly limits the meeting the needs of group members, as well as their active functioning in the social community life.

of the community entails active participation of all stakeholders in social activities which may have an impact on them. Specifically, the success of the implementation of a development plan depends on the characteristics of the stakeholders` network. When network is dispersed (in a way that includes numerous, interconnected heterogeneous group of stakeholders) and the communication between the stakeholders is intense, the greater the prerequisite for the successful implementation of an activity are. However, the social conditions in which the activities of the stakeholders take place (both individually and within the network) complicate this only seemingly simple equation. The communication between the stakeholders within the network is determined by their status or capitals they own and which provide for the implementation of some activities. It puts stakeholders in different positions of power, even when the network, by agreement, work on the principle of equality.

Also, while exploring opportunities for the participation of rural women and rural youth in sustainable rural and agricultural development special attention should be paid to the level at which these groups participate. If we rely on Arnstein`s scale and Pimbert and Pretty`s typology of participation, then participation of rural women and rural youth in the development processes can range from the level of simple listeners to the level of self-mobilization and self-organization. Besides, the study of the role of rural women and rural youth in sustainable rural and agricultural development must not ignore the extent of the group which participates. Based on how much of the group members are active in social processes (or at least are motivated to participate), it is possible to analyze the eventual heterogeneity that exists within the group and which influence internal stratification based on the possession of desirable/required resources.

Participation of rural women and rural youth in sustainable rural and agricultural development

When it comes to women's participation in the (sustainable) agricultural and rural development, literature on the subject assures that the study of this issue is not limited only to the Third World countries (although many empirical studies related exactly to the countries of Africa, Latin America, Asia). In the last couple of decades, the societies with developed agriculture, as well as more favourable characteristics of the rural structure devote considerable attention (both in theoretical and in practical and political terms) to the issue of women`s active involvement

in reproduction of social vitality of the rural communities (Woodward 2004; Bock, de Haan 2004). The similar situation is with the issues of rural youth participation, where the special emphasis is on ageing of rural population, rural migrations, prevention of rural young people to leave rural communities and opportunities for their active engagement in the public social life.

The issue of participation of rural women and rural youth in activities focused on the agricultural and rural development is necessarily related to their role and status in the reproduction of family farms. Thus, the characteristics of these social groups participation in the reproduction of the social vitality of the local rural community are resulting from the characteristics of their participation in the reproduction of the family farm. For example, this means that if woman's role in the economic reproduction of family farm is clearly visible, undeniable and recognizable and has (at least partially) measurable effects[7], it is more likely that a woman will be more motivated and willing to improve their economic activity. At the same time, we assume that woman whose role and contribution to the economic reproduction of a family farm is clearly recognizable is in the possession of a more (financial, social, educational) resources than it is the case with the economically `invisible` farm woman. However, the analysis of the women`s role in economic reproduction of the family farm shows their economic invisibility, especially when the woman is not employed outside the farm, but her entire economic activity is related to the farming. These women are not recognizable as active participants in the family economy nor by their family members or members of the rural community neither by themselves. According to Čikić and Petrović's research (2010: 452), more than the half of women who were the subject of the research and who are economically active in farming see themselves as housewives, not as farmers even though they are engaged in agricultural production and earning agricultural income. Moreover, when woman's contribution in social reproduction of the family farm is recognizable, this indicates present egalitarian relationship between members of the family living on the farm. This relationship, between males and females and between generations implicitly opens (or at least ajar) doors to the woman's activism outside of the family farm because her reproductive role is not only linked to the household.

[7] This is refers to the financial results.

At the same time, the inverse relationship applies: the extent and manner in which rural women and rural youth participate in the family farm reproduction reflect on their participation in public life of the rural community. For example, one of the major problems of the rural youth in Serbia is the inability to meet their own needs within the rural communities they live in (Мојић 2008: 188; Сокић 2005: 372). However, according to the surveys, few are ready to be socially activated in order to contribute to the development of organizational and institutional framework that would allow them to fulfil their needs and aspirations. Thus, rural youth in Serbia are less politically active[8] (Lični i društveni aktivizam mladih u Srbiji 2007: 8), and less inclined to voluntary work (Lični i društveni aktivizam mladih u Srbiji 2007: 10). In fact, rural youth in Serbia is largely characterized by taught non-activism (Milosavljević et al. 2005: 33, cited in: Ristić 2008: 11). Lack of tradition of active participation in the rural communities' public life among rural youth further strengthened their opinion of rural community as a (relatively) undesirable place to live. Thus, non-participation in the public rural community life produces among rural youth inactivity or minimal activity in the reproduction of family farm. Such pattern is confirmed by rural youth`s choice of (non-agricultural) education, their low engagement in farming, lack of interest to inherit the family farm, etc.

As it was pointed out, participation in the reproduction of the social vitality of the rural community and in developmental activities is conducted within the stakeholders' network that functions on the basis of agreement, but also on the basis of power relations. The power, as pointed out by Goverde (2004: 14-17), occurs in three forms: as a capacity/ability, relational phenomenon and/or structural phenomenon. Although stakeholders' network operates on the principle of agreement, which means that the minimal consensus on mutual goals is required, stakeholders are entering into a relationship that is based on the practice of certain powers[9].

[8] In the report on activism of youth in Serbia, it is pointed out that "*membership in a political party is more important than the desire to express their will to participate in the political sphere*" (Lični i društveni aktivizam mladih u Srbiji 2007: 9).

[9] According to Lysgård (2004: 59) „*power cannot be seen as something that someone has and someone does not have. Power is a net of social relations, which is unstable and changeable and which expresses a tense relationship between two or more parts*".

In the case of (sustainable) rural and agricultural development, the problem of functioning of the stakeholders' network and the power is closely connected with the understanding of nature of the very process. If the agricultural and rural development is defined as the process of modernization[10], then it is essential to have and to transfer adequate knowledge, innovations[11] and information. This means that the (non)having the information as a resource puts the stakeholder into the position of (non)power in a relation to other stakeholders. Information, knowledge and innovations are not only circulating within a single network of stakeholders. They are part of the Rural/Agricultural Innovation System. This system provides a plurality of development goals and models for their achievement in accordance with various combinations of available resources.

Based on previously said, it can be concluded that the participation of rural women and rural youth in the sustainable rural and agricultural development is determined by their position in the Rural/Agricultural Innovation System. However, if we take a look at the basic characteristics of rural women and rural youth in Serbia, it is obvious that their position within the System is restricted by the limited dispose of information, knowledge and innovations, favourable in terms of exchange between stakeholders or building power. In fact, the possession of certain knowledge, innovations and information is substantially affected by education, economic status, position in decision-making process, motivation, social capital of the stakeholder. Which of the following rural women and rural youth in Serbia have? The results of scientific researches and national statistic data indicate following:

- rural women in Serbia have the most unfavourable educational structure[12] - 14% have no educational qualifications (Попис, књига 4 2003: 18),

[10] Here, the modernization does not mean it's productivist interpretation, but under modernization entails "*planned, directed and controlled changes in the organization of a social system based on the use of available internal and external resources (primarily, knowledge and information)in order to strengthen the internal structural and functional connectivity of the system and improve its social vitality* "(Чикић, 2012: 30).

[11] Innovation is not only the technical and technological solutions, but the „*package of new social and technical arrangements and practices that implies new forms of co-ordination within a network of interrelated actors"*(Leeuwis 2004: 141).

[12] Compared to women in urban areas and overall male population

- among rural women in Serbia[13] there are the most economically dependent persons (47,1%),

- among rural youth, there are more illiterate persons than among urban youth[14] (Попис, књига 4 2003: 16),

- according to the national statistics, general problem of youth in contemporary Serbian society is unemployment; but, this problem more affects rural young people; according to the Labour Force Survey (Анкета о радној снази 2012: 18; 81) even 35,5% of the rural unemployed persons are young people aged 15 to 29 years, while among rural youth, 11,8% of them is unemployed,

- there is not sufficient data on women and youth as a formal decision-making persons in social institutions and organizations (from local to national levels); Blagojević (2010: 70) states that „*the assessment of the impact on political decisions shows that* (rural – authors' notice) *women* (in Vojvodina - authors' notice) *feel powerless*"; according to the previous, it can be concluded that the same pattern that is applied for the women in Serbia in general can be applied for the rural women as well; this pattern implies that „*absence of women in leadership and decision-making process*", which caused that „*women's interests and needs are not taken into account*" (Kolin, Čičkarić 2010: 117); according to the research on participation of children and youth in general at the local governments in Serbia[15] (Participacija dece i mladih u Srbiji: od prava da govoriš do prava da te čuju 2012), 85,6% of young people said that they had never been involved in decision-making on an equal basis with the authorities,

- except of participation in the work of public institutions and organizations, women and young people are less involved in decision-making at the family farm; Bogdanov (2007: 112) presents the research results which shows that only ¼ of young people participate in decision-making at the family farm; this indicates that most of the young people in rural areas do not want to live on the family farms; participation in decision-making on the family farms is related to the ownership of vital resources for farm existence and development; according to research

[13] According to census data in 2002, among urban women 36,8% are economically dependent. The smallest proportion of economically dependent persons are among rural men – only 25,2% (Попис, књига 5 2003: 12).

[14] According to census data in 2002, among rural youth in Serbia 8,3 ‰ are illiterate. Among urban youth 4,9‰ are illiterate.

[15] The research is conducted on the sample of 2.045 young persons, mostly high school students in 20 municipalities in Serbia.

results, Čikić (2012: 84 - 85) points out that on the family farms in Vojvodina there is no sufficient opportunities for an egalitarian form of decision-making because women are householders in only 4,7% cases; similar facts cite Babović and Vuković (2008: 61);

- social capital of rural women and rural youth in Serbia, as well as the rural population in general is low (Cvejić et al. 2010: 15) and refers mainly to traditional family relationships; binding social capital is the most developed, while bridging and linking social capital, in particular, are very poorly developed.

Presented data and research results suggest that rural women and rural youth in Serbia are dealing with social exclusion which limits their positions of power within Rural/Agricultural Innovation System. One of the mechanisms to improve their position is rural/agricultural extension. While in the foreign literature, the issue of extension is often been approached from the perspective of gender and generation, in our scientific literature, as well as extension practice this is not the case[16]. This situation results from the fact that, in practice, neither women nor young people are seen as target group in agricultural development. However, in the age of family farm income and activities diversification, roles of rural women and rural youth become particularly important. The need for diversification (as a result of the crisis in agricultural production) imposed a space for diversification of income (through employment of farm workforce) or diversification of activity (broadening and deepening of farm economic activities). In this context, regardless the type and model of diversification (Bogdanov 2007: 89), rural women and rural youth are the reserve of human capital on family farms that could be focused on the work modernization and the development of the entrepreneurship.

However, to utilize available family farm human capital, the adequate knowledge and information about the social context in which the farm exists are needed. That means that expanding the focus of agricultural extension to non-agricultural issues/contents is required, as well as adding new target groups in extension work. Expanding the focus of extension to non-agricultural issues/contents means to activate the extension work in promoting and initiating rural tourism, marketing and sales of agricultural products, the preservation of traditional crafts, marketing and sales of

[16] In the last few years, agricultural extension practice shows more interest in working with rural women.

processed and finished products, etc. In addition to the issues that are directly related to the diversification of farm activities, expanding the focus of extension work refers to the contents associated with local rural community and general welfare of all its members. Those contents are environmental protection, improvement of infrastructure and superstructure, social issues (e.g., care of the youngest, the elderly) etc. On the other hand, the agricultural extension should inevitably include `invisible`, but present members of the family farms - women and young people.

Both directions in expanding agricultural extension indicate that the request for farm modernization also means a request for extension service modernization. Primarily, this means a change in extension approach. Modern theoretical concepts of rural and agricultural development clearly indicate that these are dynamic components. Knowledge of the social context of both processes is of extreme importance.

Multifunctional agriculture, farm income and farm activities diversification, sustainable and neo-endogenous rural development drive agricultural extension to outgrow its narrow (technical and technological) framework and to become extension focused on the development of local rural communities. Another important change refers to the exchange of knowledge, innovation and information. If the extension service (as socially organized and institutionalized form of diffusion of knowledge and innovation) is seen as a broker (Howells 2006: 720; Klerkx, Leeuwis 2008: 262) in rural innovation systems, it is evident that in the complex interactions between the elements of the rural social structure, linear extension approach and top-down approach are not suitable and sustainable in a long terms.

Also, new problems of rural extension require a change in the extension methods, especially insisting on more intensive group extension work and mass methods. The real effects of rural extension can be achieved only if the extension is planned and programmed with undoubtedly defined objectives, available and accessible (primarily internal) resources, defined specific roles of actors etc. Therefore, it can be concluded that our rural and agricultural development require fundamental reform of the entire conception and organization of the agricultural extension (Petrovic, Janković 2010: 152-166).

Conclusion

Rural women and rural youth are important, but often not sufficiently visible element of rural and agricultural development. As in the case of other sustainable rural and agricultural development stakeholders, from rural women and even more from rural youth is expected to be active participants in these processes. Leaving aside the issues of motivation, participation of rural women and rural youth in sustainable rural and agricultural development is substantially determined by the capital they are in dispose of. Available capital gives them the positions of (non)power in a relationships with other stakeholders within the Rural/Agricultural Innovation System. If we accept Foucault's thesis on the relationship between power and knowledge (Haralambos, Holborn 2002: 635-639), it can be concluded that for the empowerment of rural women and rural youth as a social groups and improvement of their position with the Rural/Agricultural Innovation System crucial elements are information and education on available and accessible resources and methods of their optimal combination to achieve set goals. Extension service is seen as one of the models for education and information of rural youth and rural women on possibilities for the solutions of the problems they are facing.

Knowledge and information are not contributing to these social groups power only in a direct way. The possession of certain information may affect strengthening of intra-group cohesion which potentially contributes to the group organization and strengthens its position in the stakeholders' network. Due to the complexity of the sustainable rural and agricultural development, the analysis of the participation of rural women and rural youth (as well as other social groups) in this process must highlight the unity and bonds between the rural family, family farms, rural households and local rural communities. This is the only way to perceive their real resources. However, the idea of participation of local stakeholders in the agricultural and rural development is often overemphasizes, so the role of government (national institutions and organizations involved in agricultural and rural development) is put aside. Although, one of the goals of (sustainable) rural development is an affirmation of „*civil society at the local level*" (Cifrić 2003: 109), the role of the state in this process is a necessary and essential, especially in societies, such as contemporary Serbian, where rural communities and farming confront number of structural and functional problems. The essence of rural development (and social development in general) is primarily cultural question[17], to be precise, a

[17] Day (1998) indicates this when examining culture as a factor of development.

question of value. In contemporary social conditions, this means that the issue of rural development (its goals, models, tools, activities, actors, resources, etc.) goes beyond the narrow boundaries of local, regional and even national, regardless of how the process of rural development is specifically `colored`. As outlined by Cifrić (2003: 117), the value of rural is getting more and more confirmed at the global level. This is reciprocally reflected on the factors which determine processes of rural renewal and development and roles of participants in such processes. This means that the participation of rural women and rural youth in Rural/Agricultural Innovation System should be considered in the context of general and specific social conditions for the formation of the new partnerships (Edwards et al. 2000).

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CHALLENGES FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT AND POLICY IN SERBIA[1]

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Abstract

Serbia has been going through a severe agricultural depression since early 1990s. It has now become clear that the transition process is far more complex and is likely to be much more protracted than was first expected. The agricultural policy of the socialist era resulted in considerable environmental problems, which are still present to varying degrees even after a considerable decrease in agricultural inputs during the past twenty years. On the other hand, Serbia still retains a significant proportion of Europe's biodiversity. The existing low input and low intensity agriculture practiced in this country can be perceived in certain respects as an opportunity for environmental sustainability in the agricultural sector. However, in view of future EU membership and accompanying policies, the question is to what extent the requirements of environmental protection and nature conservation will be taken into account in Serbian policy formation.

Key words: *Agriculture, development, policy, Serbia, European Union*

Introduction

The process of economic transformation of the agriculture has been one the most discussed economic issues after 1990. After early optimism that it could be achieved quickly, in only a few years, it soon became clear

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that the necessary changes in institutions and attitudes would take considerably longer. This is particularly the case in the typically large agricultural sector of Serbia. Even after a decade of political, economic and structural changes, there still is an urgent need for comprehensive agricultural development strategies, related policy instruments and effective institutional arrangements for sustainable development. Agriculture has long been identified as a potential source of transformation difficulties and a substantial amount of information and analysis has been produced on specific issues concerning agriculture, food and the rural economy.

Agri-environmental issues in Serbia pertain to one of the following three categories:

(i) the legacy of socialist policy (e.g. soil erosion and decrease in soil fertility, chemical usage and semi-natural habitat destruction);
(ii) the consequences of ad-hoc agricultural policies pursued during transition and agricultural crisis (e.g. land abandonment and fragmentation, bankruptcy of a large number of holdings); and
(iii) the environmental perspective of future policy reform as a consequence of EU integration, trade liberalization under the WTO multilateral negotiations in agriculture and compliance with international conventions.

There are several factors, which will shape agri-environmental policy in Serbia. They include:

1. future EU membership and the implementation of Rural Development Regulation (EC 1257/99) with its compulsory agri-environmental component, and a range of environmental directives including monitoring and reporting requirements;
2. the general trend in policies towards liberalizing commodity prices and production-decoupled payments, and a more integrated and decentralized rural development. This has stimulated interest in potential synergies between better agri-environmental management and rural development (e.g. scope for the development of niche, organic products and the promotion of green tourism);
3. a growing consideration of consumer protection and compliance with European and international food quality standards and norms.

Applicant countries are aware that with regard to their future accession to the European Union, change is necessary and their agriculture has to become more competitive. However, it is also important for them to

conserve their vital natural resources and maintain landscapes that have been created over centuries. Government policies in transition economies should aim at facilitating structural adjustment in agriculture, not only to enhance competitiveness and economic efficiency but also to protect the environment and maintain social welfare in rural areas.

Environmental characteristics of agriculture before 1990 and after the political change

The driving forces for environmental problems in Serbia can be divided into two main categories. First, problems resulting from intensive agricultural production in the socialist regime, which might pose a threat again following the recovery of economy. Second, marginalization and abandonment of agricultural land use due to the recent agricultural crisis. These differing challenges posed by intensification and abandonment of farming highlight the complexity of the relationship between agriculture and environment.

It is clear on the one hand that in the past, the institutionalization of agriculture and inappropriate policies has caused many environmental problems. On the other hand, state ownership of areas of high natural value has at least guaranteed management regimes favorable to conservation. Serbia contain a significant proportion of Europe 's biodiversity, as a result of mostly low-input and low-intensity agricultural practice still used in this country. Good protected areas systems exist and these should be maintained and important areas not yet protected be identified. As the European Commission requires by the time of accession, the presentation of lists of proposed Natura 2000 sites, and the adoption of national legislation capable of implementing the Birds (92/43) and Habitats (79/409) Directives, the accession countries should identify all candidate sites under these Directives. In Serbia this work should be carried out as soon as possible because the infrastructure and agricultural development are proceeding in advance of the necessary steps being taken to safeguard biodiversity.

As a result of land privatization, major parts of designated protected areas now consist of privately owned farmed areas. The realization of conservation objectives in areas of high nature value, including small private holdings, is a challenge for the applicant country. Private ownership may necessitate extensive consultation with stakeholder interest groups and the establishment of compensation or incentive

systems to secure the cooperation of farmers. In Serbia, there is a little if any experience of either activity. One new possibility for Serbia to secure the long-term conservation of biodiversity, maintain agricultural land management and help support rural employment, is to devise agri-environmental schemes. With the prospect of accession to the EU, the elaboration and implementation of agri-environmental measures become highly important as the only compulsory element of the Rural Development Regulation (1257/99).

Accession to the EU

Since the beginning of 1993, the EU has taken several major political steps to open the way towards greater integration and accession. The European Council at its Copenhagen meeting (1993) agreed that the CEECs associated to the EU should become members subject to satisfying a set of key economic and political conditions, such as having a functioning market economy, a democratic political system, and acceptance of the Acquis Communautaire. Eighteen months later, at the Essen summit, a strategy to prepare these countries for membership (the Pre-Accession Strategy) was outlined (European Commission, 1996). The key element in this strategy was the preparation of the associated states for integration into the internal market of the Union. The European Commission as a reference document to guide the prospective member countries through the labyrinth of EU legislation produced the White Paper on this subject. A major part of the White Paper covers the fields of veterinary, food, plant health, agri-environmental and animal nutrition controls, as well as marketing requirements for individual commodities. In May 1996, the European Commission produced a Working Document entitled "Preparation of associated CEECs for the approximation of the European Union's environmental legislation" (96/319). This document determines ways that associated countries could begin to define those directives - in addition to those identified in the White Paper - which are critical to the "approximation" process. In July 1997, the EU invited Cyprus, the Czech Republic, Estonia, Hungary, Poland and Slovenia to start entry negotiations by 1998.

The associated countries desire for membership of the EU has thus led them to begin a process of review and "approximation" of all their national legislation and policies to the Acquis Communautaire. EU environmental legislation has developed over the last 30 years and currently comprises more than 300 legal acts. However, the body of EU

environmental legislation, with which the associated countries eventually will have to align their national legislation and administrative practices - the so called Environmental Acquis - is considerably smaller. It consists of mainly about 70 directives - some of which, however, have been amended several times and supplemented with "daughter" directives - and 21 regulations (European Commission, 1997).

The approximation process includes three key elements:

- to adopt or change national laws, rules, and procedures so that the requirements of the relevant EU law are fully incorporated into the national legal order (known as "Transposition");
- to provide the institutions and budgets necessary to carry out the laws and regulations (known as the "Implementation or Practical Application") of the directive;
- to provide the necessary controls and penalties to ensure that the law is being complied with fully enforcement.

In the forthcoming enlargement of the EU the environmental dimension will present greater challenges than in any previous accession. This relates both to the sheer scale of past environmental liabilities and the gap in the level of environmental protection and legal administrative capacity in the CEECs compared with the situation in the EU. In the Commission's Agenda 2000, it is recognized that full compliance with the environmental acquis will probably be only achievable in the long term for all candidate countries.

Serbian current agri-environmental policy

Policy instruments

Faced with adjusting to political and economic transformation, and the continuing environmental legacy, Serbia has attempted deliberately to build up institutional, informational and financial capacity for environmental protection, using a wide range of instruments. Concerning available policy instruments, regulation is the most widely applied tool in all policy fields with the exception of environmentally friendly farming, which lacks a specific legal framework in the majority of countries. Serbia also applies financial instruments, among which penalties and taxes are the most commonly used. However, the application of financial incentives is limited to only a few cases. Many countries regard existing

environmental legislation as outdated and inefficient. In general, environmental policy displayed a paradoxical combination of extensive and detailed environmental legislation, which in some cases set more exacting standards above those in the Western countries.

New environmental legislation has been, or is being passed in order partly to signify a break from the past pattern of overly detailed legislation combined with ineffective implementation, and partly to bring legislation into line with EU norms, in anticipation of future EU membership. The speed of legislative harmonization with the EU environmental acquis and the level of formal compliance differ and vary greatly from sector to sector. Serbia has achieved legislative progress and adopted a number of legal acts, but less progress has been made with regard to legislation on waste management and water protection. With the current decline in agricultural production and lower fertilizer use, Serbia tends to see this as a low priority.

As regards nature protection, Serbia has recently enacted legislation on protected areas which compiles to various degrees with existing EU legislation. Also has legislation on the protection of wild animal and plant species. But the administration and management of protected areas suffers from a lack of funds and human resources. Law enforcement and public awareness of nature conservation are also weak.

Implementation and enforcement

The use of standards and fines in Serbia as the primary enforcement policy has been largely discredited due to lax enforcement under process of transformation. Enforcement of standards was not taken seriously and the fines imposed were very low. The implementation and enforcement of existing law continue to be a major concern. The strengthening of implementation and monitoring structures was also identified as a priority task in the Accession Partnership (Luxembourg Declaration, 1997). However significant work remains to establish a structure that can fully apply and enforce the acquis.

Adopting EU standards immediately and expecting compliance is unrealistic. First, clear benchmarks and sanctions should be established. These sanctions should be strictly enforced if benchmarks are not met. The challenge is to create a credible enforcement regime. Strengthening enforcement also requires consistent and fair application of the laws.

In order to implement effectively and enforce the environmental acquis, existing structures need to be strengthened and new institutions created, for which competent and responsible human resources and financial assistance need to be made available. The legal-administrative capacity of Environmental Ministry, implementation structures, systems of monitoring and enforcement remains inadequate in many cases.

Enforcement, however, is not just a problem for Serbia, but also a growing focus of attention within European Union. This is because of the problems of uneven implementation by the existing Member States and the recognition that compliance problems can arise even in countries which otherwise have relatively strict laws and procedures. The fundamental difficulty remains the reluctance of Member States to acknowledge the requirement for the Community to possess a more significant role in monitoring and enforcement policy.

Financial support for agri-environmental policy

Regarding financial support, the main part of this is provided by national government. However, international organizations and the EU contribute significantly to activities that focus on the protection or improvement of water quality, biodiversity, and the promotion of environmental friendly farming practices. Despite financial assistance from governmental, international, commercial and NGO sources, the need for additional fiscal support is high, particularly with regard to meeting the challenges of accession to the EU.

The European Union's agri-environmental policy

Since 1992, the Community has supported agricultural production methods, which respect the environment and biodiversity. The Agri-Environmental Regulation (EEC 2078/92) was one of the accompanying measures of the CAP Reform in 1992, which fundamentally changed EU policy, placing more emphasis on the integration of agricultural and environmental policies. One of the most important aims of the Regulation was to promote and encourage agricultural production methods compatible with the protection of the environment and the maintenance of the countryside while, at the same time, contributing to the provision of an appropriate income for farmers.

Member States were required to submit, by the 30th July 1993, draft regulatory frameworks for the implementation of five-year (1993-1997) agri-environmental aid schemes. The level of payment made to farmers engaging voluntarily in agri-environmental aid schemes are established according to three criteria: costs incurred, income foregone, and incentive elements (which must not normally exceed 20% of the former). As the Commission states: "premium should be regarded as compensation for the costs of delivering environmental public goods and cannot be regarded as subsidies in an economic sense".

The full range of agri-environmental measures currently in operation in Member States can be divided into four groups:

- nature and landscape protection;
- economic support of marginal agricultural activities and compensation for natural handicaps;
- regulation of farm based pollution;
- agricultural modernization and structural reform.

Two types of schemes operating in the EU Member States can be differentiated, corresponding to geographical variations; first, the horizontal schemes aimed at maintaining extensive practices on large holdings; and second, highly targeted schemes often designed to protect natural resources by active changes to farm practice on small farm holdings. The former schemes are mainly operating in upland regions of Austria, Sweden, and Finland. The latter schemes aimed at reducing farm pollution are typical of intensive lowland states, such as the Netherlands, Denmark, and Belgium.

Agri-environmental schemes have been running in the majority of Member States for seven years. More than 260 Agri-environment programs had been approved, representing 28% of total EU farmland. The participation target (15% farmland) set by the 5th Environmental Action Program has therefore been achieved. However, looking at the environmental benefits of the programs, it is clear that there is room for improvement. According to the report of the Community's Court of Auditors, the Regulation and agri-environmental policy in terms of its implementation, has proved most effective in maintaining extensive and environmentally friendly farming systems and practices. It has proved notably less effective in bringing about any major de-intensification of agriculture in the most sensitive areas in terms of environmental

pollution, either because of poor take-up rates or because schemes have not been targeted in such zones. Poor promotion of agri-environmental programs was identified as a factor-restricting uptake in several Member States.

Agri-environmental measures have had very little effect in converting intensive practices to extensive farming. One of the main reasons for this unsatisfactory performance is the Commission's and Member States' weaknesses in resource targeting, program design, approval and evaluation. It can be concluded that too little monitoring is built into some of the schemes. This is partly because little attention has been paid by EC on the evaluation of the program and the adequate baseline surveys of important habitats and species against which progress could have been measured is missing. Poor design and implementation of agri-environmental programs across many Member States have resulted in few benefits to species and habitats of high conservation importance. Few programs approved under the regulation have been used to help fulfill the requirements of important European legislation such as the Birds and Habitats Directives. This has resulted from the fact that few Member States have clearly stated conservation strategies for their programs setting out priority species and target habitats and areas. In addition, the implementation of programs turned out to be very costly in terms of their administration and control.

The allocation of funds was determined mainly by the priorities of governments and regional authorities. This resulted in high financing in some countries and regions with less urgent environmental problems, while pressing environmental needs remained unaddressed in countries which did not implement comprehensive programs. Besides the above mentioned criticisms, there are some further negative characteristics of the schemes (EC, 2000):

- much of the EU agri-environmental policy can be seen as seeking to undo what the more traditional aspects of CAP have done;
- the proportion of the EAGGF budget going to agri-environmental schemes is less than 5% of that going to other forms of direct aids;
- regions benefiting the most from agri-environmental aid are not necessarily the poorest or the most threatened by environmental or farm income decline;
- the failure to develop environmental indicators on the basis of which the impact of the programs could be quantified;

- with respect to control, the Commission does not routinely visit Member States to verify the data or analyses submitted by them nor do the EU Agri-environment Unit personnel routinely conduct missions to verify that programs are in practice providing good environmental value for money;
- with respect of staff requirement, the Commission underestimated the workload and failed to deploy enough human resources for the Agri-environment Unit.

Agreement on the Agenda 2000 reforms, agri-environmental measures became a component of the new rural policy strand of the CAP. The Rural Development Regulation 1257/99, covering the period 2000-2006 states that "a prominent role should be given to agri-environmental instruments to support the sustainable development of rural areas and to respond to society's increasing demand for environmental services" (EC 1999b). As Serbia prepares for EU membership, it is in the process of adjusting its policies to EU legislation, which is requiring the adaptation of current agri-environmental schemes, and the introduction of new legislation in this area. The EU provides assistance to carry out these tasks through its pre-accession instrument for agriculture and rural development, which will be discussed below. It is necessary for the accession countries to have an experience and feedback on the beneficial environmental and social effect of the programs prior to nation-wide implementation of the schemes.

The initiatives in relation to the EU agri-environmental measures

Agri-environmental measures are not new phenomena in the applicant countries. Many South-eastern European countries (SECs) already implement schemes, which are similar either to the EU Less Favoured Areas (LFA) measure or to those under the EU Agri-environmental Regulation. Certain countries have developed a legal framework to permit payments for environmental purposes, through management agreements or other mechanisms. In contrast, there is little experience in the use of incentive payments for farmers accepting additional environmental obligations. However, as it is based on legislation, it cannot be considered as an environmental payment under the agri-environmental program but rather compensation for a legislative burden. In spite of the possibility of being compensated, the long bureaucratic procedure for applicants has resulted in a low level of uptake.

Most of the SECs run organic farming schemes although most are in their infancy. However, they plan to encourage and increase this type of environmental friendly production. Some countries have already introduced a legislative base (and others are preparing one) to encourage the appropriate environmental friendly farming practices. For all SECs, the main constraint of the scheme is the absence of financial support and a lack of local markets for ecological products. Support for organic farming could have environmental as well as socioeconomic benefits because it provides a great opportunity for many small farmers who are not able to compete on the conventional market.

In all accession countries, national agri-environmental working groups have formed to develop pilot agri-environmental programs at national and regional level. Their progress shows that governments are interested in exploring new agri-environmental ideas especially if external support is forthcoming. The proposed pilot projects would represent a useful first step for testing the value and viability of this approach with reference to specific conditions in the SECs, including administrative feasibility, levels of response by farmers, and effectiveness in attaining environmental objectives.

Challenges for agri-environmental policy in Serbia

The future challenges for Serbian agri-environmental policy can be summarized as:

- Progress in adoption of the agri-environmental policy is slow in the face of entrenched interests and opposition by agricultural lobbies and domestic economic priorities. The main objective of current agricultural budgets is to improve agricultural efficiency and production and to aid investment, which prepare the agro-food sector for EU accession. Under these circumstances, it is extremely difficult to achieve policy developments that would put more attention for the protection of natural and environmental values.
- Regulation 2078/92, now superseded by Regulation 1257/1999 on Rural Development, is a useful policy instrument but it has to be adapted to Serbian local circumstances. This country is inexperienced in establishing contractual engagement for non-production related farm activities. Limited national resources are

available to compensate landholders for environmental obligations.

- The lack of financial resources and competition for government funds make it unlikely that proposed agri-environmental schemes can preserve the traditional diversity of Serbian countryside wholesale. External funding would be essential if management agreements or other incentive payments were to become a significant policy tool.

Pre-accession fund

One possible external financial source for implementing agri-environmental measures in the SECs is provided under the EU pre-accession instrument for agriculture and rural development. One of the aims of the fund is to support environmentally friendly measures in the applicant countries:

- The fund is managed by the Agriculture DG (VI).
- Target measures include rural development, farm diversification, modernization of the food industry, adaptation of food hygiene, veterinary and plant health controls and marketing, agricultural production methods designed to protect the environment and maintain the countryside, as well as other measures.
- The Community contribution may amount to up to 75% of the total eligible public expenditure.

The SECs were required to submit their Rural Development Plans to the European Union. Every country submitted these plans which were endorsed by the EU's STAR Committee. Although the possibility was offered to the SECs to include agri-environmental measures in these programs, in reality this issue did not get a high priority in the plans. In general countries intend to devote less than 5% funds to such schemes.

Almost all countries will spend the majority of their donor budget (around 60-70% of the budget) on the restructuring of the "classical" agricultural sector; that is, providing investment to agricultural holdings and processing/marketing. Diversification of the rural economy and improvement of rural infrastructure will receive significantly smaller amounts in most countries, although it is still around 20-30% of fund allocation. This probably reflects the importance the candidate countries attach to the speedy re-structuring of their agricultural sectors to achieve

increased competitiveness on EU markets, while rural development and the preservation of the natural resources in the countryside feature much lower on their list of priorities. If this situation persists, it will be a chance missed to provide alternative incomes to rural populations or to help them maintain current low-input farming practices that can benefit the economy and the countryside.

Implementation of EU legislation

All of the Plans make reference to the need to comply with EU legislation and standards and see this as one of the key objectives for pre-accession instrument. Frequent reference is made to the Nitrate Directive and its associated Codes of Good Agricultural Practice (many of the accession countries have already prepared these). The network of protected areas to be designated under the Birds and Habitats Directives, called Natura 2000, and should benefit from sustainable agricultural practices, such as Environmentally Sensitive Areas or similar schemes. The fact that most, if not all, of the Accession and candidate countries are still developing their lists of Natura 2000 sites suggests those potential problems may arise. Implementation of pre-accession instrument when Natura 2000 networks are incomplete poses a threat, as the agricultural development might proceed faster than the necessary steps being taken to protect the biodiversity.

Conclusion

The environmental problems that exist in Serbia partly result from decades of inappropriate management and intensified agricultural production on collectivized farm units. Due to agricultural activities water became the most polluted natural resource while soil degradation is a significant threat to large areas of agricultural land. As a result of the reduced government support for agricultural production after 1990s, there has been a decrease in use of agricultural input and, inevitably therefore, a reduction in some of the pressures on the environment. Conversely, concern for biodiversity loss as a consequence of land abandonment is increasing among the SECs.

The SECs possess vast areas of high nature value which contribute considerably to the biological diversity of Europe. To keep these natural assets and at the same time to develop and manage economically and environmentally sustainable framework, forms a major challenge. As

agricultural sector productivity improves, especially where agricultural policies stimulate intensive use, there is a real possibility that environmental risks will increase. The reality of using low input level can be perceived as an environmental opportunity for the region. However, this situation is only an opportunity if agricultural production can be increased without again increasing pollution. Since official agricultural policies in most SEC countries aim to reverse the decline in yields and provide relatively little support to environmentally friendly types of farming, there must be concern that this opportunity might be missed.

One way of encouraging sustainability in the agricultural sector is the development and implementation of well targeted agri-environmental policies. Agri-environmental programs could play an important role for Serbia for a number of reasons:

- Serbia would support biodiversity conservation and nature friendly farming methods, which are becoming more relevant as the requirement for greater environmental regulation and monitoring of agriculture to satisfy consumer concerns increases;
- They provide not only environmental but also social benefits to rural communities. By supporting labor intensive farming methods and funding additional conservation work in the countryside, they can help to retain rural employment;
- In view of an enlarged Europe, they have a crucial importance because they are a production-decoupled farm income support which is, therefore, more likely to be compatible with WTO commitments than other subsidies.

Certain schemes similar to the EU agri-environmental schemes are already used as agricultural policy instruments by most candidate countries. The importance of the development and implementation of additional measures as required by the agri-environmental section of the Rural Development Regulation (EC) 1257/1999 is becoming highly important in the applicant countries given that these measures will become obligatory for them upon joining the EU. In the SECs, the EU through its pre-accession aid for agriculture and rural development supports the testing of proposed measures in pilot areas. However, in the recently submitted Rural Development Plans, not all the candidate countries intend to use the financial aid provided for these kinds of measures. Strikingly, agri-environmental measures represent a rather small proportion of the pre-accession aid budget in all countries. With

such low funding allocation, it is difficult to see how agri-environmental schemes can be really tried and tested in the accession and candidate countries. It is evident that all SECs give priority to production-oriented agricultural policy focusing on the improvement of their agricultural sectors' efficiency and productivity with environmental and rural development issues accorded a much lower priority.

Integrating the environment across all-important sectors will be a major challenge, especially compliance with the environmental acquis, including the legal and organizational aspects. As this paper has described, all candidate countries have started to transpose the environmental acquis into their national legislation as one of the requirements of the EU membership. While the problems of adopting the EU legislation are considerable, the problems of implementing them are even more daunting. The alignment of the candidate countries' national legislation to that of the EU is a challenging and tremendous task because:

- the shortage of legal expertise, in particular in relation to the environmental acquis, and language barriers are still a problem in the candidate countries, although to varying degrees;
- lack of experience and trained personnel in the new institutions which have been created since the reform began and, as a result legislation sometimes is poorly drafted;
- the legal harmonization process is a divided responsibility between several ministries in some fields of environmental protection and there is too little consultation with affected parties;
- the participation of public and civil organizations in environmental decision makings very weak;
- policies tend to have vague and/or contradictory objectives;
- large parts of existing environmental legislation is outdated or ineffective;
- the body responsible for proposing legislation is not substantially responsible for its application and implementation;
- monitoring and the establishment of structures and institutions that can fully comply and enforce the acquis are weak.

To force the new entrants to achieve existing standards at a stroke would result in massive levels of noncompliance that could fatally undermine political confidence in the Acquis Communautaire. Preparation for accession should not be limited to the transposition and "mechanical"

implementation of environmental and related legislation, but should instead encompass the thorough integration of environmental considerations into sectors policies and programs to achieve a long term and sustainable development planning in accession countries. On the political front, the lack of an integrated agriculture and nature conservation policy is clear in Serbia as is the need for administrative capacity building in organizations responsible for the enforcement, implementation and monitoring of environmental legislation at national and local level.

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LAND AND WATER MANAGEMENT AS ENVIRONMENTAL CHALLENGES IN AGRICULTURE

Maja Štrbac[1]

Abstract

Climate change, land degradation and cyclical drought are challenges to sustainable development in many countries. Management of land and water resources have economic and social importance because it affects: economic growth, biodiversity, sustainable agriculture, food security, poverty alleviation in less developed regions, water availability, etc. Improving soil quality and improving water management requires a partnership and a joint initiative of the countries in the Danube region in order to preserve natural resources. The author analyzes the land, water resources and irrigation in the following countries: Germany, Austria, the Slovak Republic, the Czech Republic, Hungary, Slovenia, Romania and Bulgaria within the EU, and Croatia, Serbia, Bosnia and Herzegovina, Montenegro, the Republic of Moldova and Ukraine. Users and local communities should have ongoing cooperation in integrated land and water management (eg, identification areas and application of technology). Management of land and water are integrated in sustainable development, as response to global challenges.

Key words: *environmental, management, land, water, agriculture*

Introduction

Agriculture plays an important role in the management of land and water resources. The concept of sustainable development combines the dual aims of improving the present conditions for much of the world's population and providing for the needs of future generations. (*OECD*, 2008) While the world economy under the impact of the crisis 'injects' money into the financial sector, which is by nature helpful, the interest margins remain the real economy and sustainable development. (*Anufrijev*

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Ana, Dašić, 2011) Meeting peoples' needs for food, fuel, and fiber depends on sound management of the natural capital - agricultural lands, forests, water, fisheries - on which production of these goods depends. Manufactured goods also depend on sustained production from natural capital, such as subsoil assets. (*The World Bank*, 2012) The Millennium Ecosystem Assessment - the largest ever conducted audits state and trends in ecosystems worldwide - found that ecosystems are in the last 50th years intensively degraded than in any other, a similar period of human history. Specifically, it is estimated that 15 of 24 beneficial ecosystem services degraded over the past half century. (*Dašić, Anufrijev Ana*, 2011) Many elements of human society and the environment are sensitive to climate variability and change. (*Štrbac Maja*, 2010) Environmental measures can slow the agricultural production in the short term, but should provide long-term economic benefits.

Table 1. *Projected impact of climate change on agriculture*

Outcome	Level of confidence
Increase in crop yields in mid to high latitude regions with temperature increases of 1-30 C but lower yields in low latitude regions (also higher forestry productivity). Increases in temperatures above 30 C to have a negative impact on yields in all regions.	Medium
Changes in the frequency and severity of extreme climate events have significant consequences for food (and forestry) production and for food insecurity.	High
Increasing benefits of adaptation to climate change with low to moderate warming.	Medium
Adaptation to place stress on water and other resources.	Low
Smallholders and subsistence farmers and pastoralists to suffer complex, localised impacts.	High
International trade in food and forest products projected to increase, with increased dependence on food imports for most developing countries.	Medium to Low

Source: *Parry, M.L, et al. (2007): Contribution of Working Group II to the Fourth Assessment Report on Climate Change, Cambridge University Press, Cambridge.*

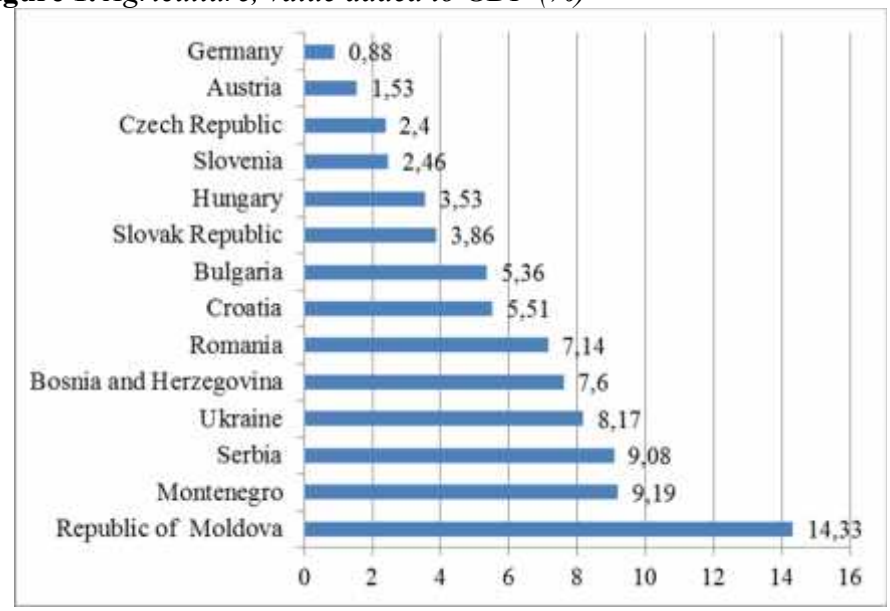
The Danube Region is characterised by rich environmental assets: exceptional fauna and flora, precious water resources and outstanding landscapes (e.g. the Danube Delta, the Carpathians). These should be sustainably preserved and restored. (*EUR-Lex*, 2012) Industrial agriculture is heavily dependent on energy, large amounts of water and other scarce natural resources. Reductions in the use of energy, water and other raw materials along with waste minimisation and elimination, whenever and wherever possible, should be highest priority. (*Štrbac Maja*, 2010) Geographically it concerns primarily but not exclusively: Germany (Baden-Württemberg and Bavaria), Austria, the Slovak Republic, the Czech Republic, Hungary, Slovenia, Romania and Bulgaria within the EU, and Croatia, Serbia, Bosnia and Herzegovina, Montenegro, the Republic of Moldova and Ukraine. (*EUR-Lex*, 2012) The global crisis was a "wake-up call" to policymakers around the world.

Market and governance failures have led to the most pressing financial, economic and employment crisis of our lifetimes. The idea of a growth model with a single general equilibrium has been challenged. (*OECD*, 2012) Strategy for the conservation and management of natural resources is to improve management and avoid overexploitation of natural resources, recognising the value of ecosystem services. In the framework of its post-2010 European Biodiversity strategy, the EU is developing an approach to safeguard ecosystems and biodiversity by increasingly considering their role within spatial planning and infrastructure with regard to climate change adaptation and mitigation and protection against disaster. (*Eurostat*, 2011) Projected impact of climate change on agriculture are presented in Table 1. The most important environmental impact of the production of agricultural products is the use of chemical pesticides and herbicides. This may unintentionally lead to the pollution of soil, water and air, and has negative effects on flora and fauna. As well as the pure environmental issues, safety and health aspects play an important role. (*Štrbac Maja*, 2010)

Before the scientific and professional public of Serbia is very difficult to find industries that will wake the collapse of Serbia, and that will alleviate the effects of the crisis and recession in which a few years ago are. This task involves a public and transparent social responsibility of the architects of the domestic economic scene requires sound environmental industries that will preserve biodiversity and to achieve growth rates. (*Anufrijev Ana, Dašić*, 2011) Rural areas, constituting a specific category based on agricultural production and land resources, require purposeful formation of sustainable development and revitalisation processes. (*Kozuch, Kozuch*, 2010) Different resources require different types of

policies. For extractable but renewable resources, policy should center on defining property rights and helping firms move up the value chain. For cultivated renewable resources, policy should focus on innovation, efficiency gains, sustainable intensification, and "integrated landscape" approaches. (*The World Bank*, 2012)

Figure 1. *Agriculture, value added to GDP (%)*



Source: *Author based on FAO database, 2012.*

Output is agriculture, which alone and in the years of recession, record rates of return on the macroeconomic level. At the same time, it is also the industry that may be based taking into consideration all relevant principles of environmental protection and its preservation. (*Anufrijev Ana, Dašić*, 2011) This creates prerequisites not only for the successful operation of organizations, but also of achieving continuing economic prosperity. (*Dašić, Anufrijev Ana*, 2011) Agricultural enterprises and farms are the basic units of business activity and create the business environment. They determine the directions and scope of utilisation of the natural environment and production resources. Their activity generates the production of goods and services as well as revenue. They create jobs which account for the basis of tax revenue for the commune budgets. Their behaviours shape development processes, economic structure, opportunities for income accumulation and investment. (*Kozuch, Kozuch*, 2010)

The highest value added to GDP has Republic of Moldova (14.33%), followed by Montenegro (9.19%). The smallest value added to GDP has Germany (0.88%), followed by Austria with 1.53% (Figure 1). Agriculture is the major user of water in most countries. It also faces the enormous challenge of producing almost 50% more food by 2030 and doubling production by 2050. This will likely need to be achieved with less water, mainly because of growing pressures from urbanisation, industrialisation and climate change. (*OECD*, 2010) While societal preferences are relevant, there is also the technical question as to which plan provides more of both economic and non-economic benefits in the longer term. (*OECD*, 2008) From carbon emissions to water use to deforestation, businesses have a huge impact on our planet.

But they also have the ability to innovate, the influence to solve some of the world's most pressing issues and the scope to make positive changes happen on a massive scale. (*WWF*, 2012) Eco-innovation can:

- reduce expenses for energy, water and agro-chemicals,
- improve soil quality and nutrient,
- reduce the use of pesticides,
- increase profitability and reduce working hours, etc.

There are mutually reinforcing aspects of economic and environmental policies. We need to recognise the full value of natural capital as a factor of production, and its role as a driver of growth. It is important to focus on cost-effective ways of attenuating environmental pressures to affect a transition towards new patterns of growth that will avoid crossing critical local, regional and global environmental thresholds. (*OECD*, 2012) Agriculture is a major user of land and water resources yet needs to maintain the quantity and quality of those resources in order to remain viable. (*Štrbac Maja*, 2008)

Land management

Land contains water, nutrients, absorb and release atmospheric gases. Pollution, erosion, physical and chemical degradation are the main causes of land degradation. Sustainable management of natural capital underlies green growth in key sectors - such as agriculture, manufacturing, and energy - and is vital for resilience and welfare gains. (*The World Bank*, 2012)

However, current land management efforts to address a multitude of interrelated problems, including deforestation, desertification, air and water pollution, and uncontrolled expansion of human settlements in urban and rural areas, are hindered by a piecemeal and uncoordinated approach, often with duplication of effort or conflicting sectoral goals. A more holistic and integrated approach would improve land management for agriculture and other uses. (*OECD*, 2008)

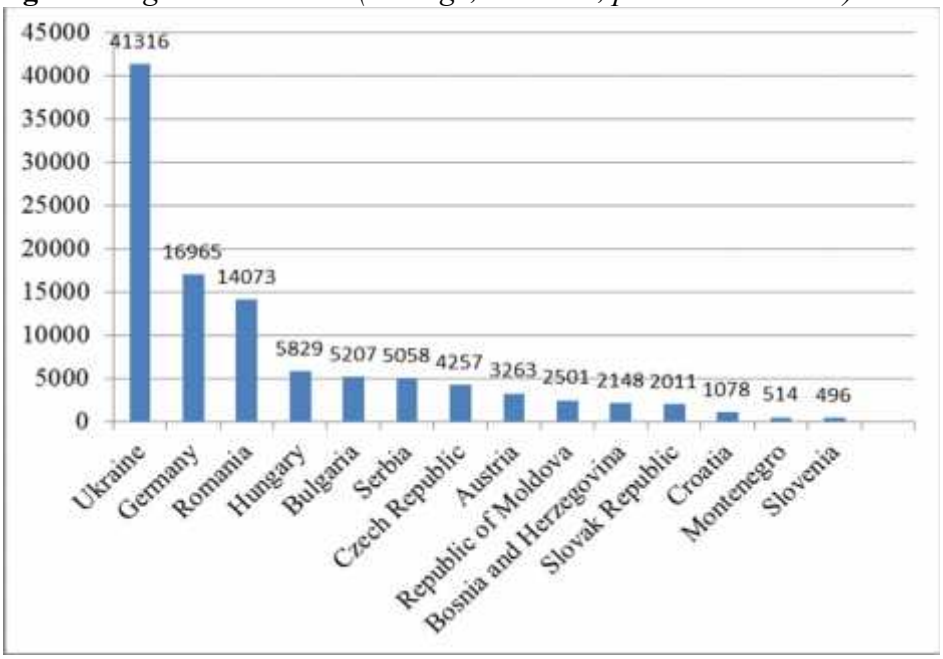
Table 2. *Agricultural area (1000 Ha, period 2002-2009)*

No.	Country	Average	Maximum	Minimum
1.	Germany	16965	17031	16886
2.	Austria	3263	3376	3168
3.	Slovak Republic	2011	2237	1930
4.	Czech Republic	4257	4272	4239
5.	Hungary	5829	5865	5783
6.	Slovenia	496	510	468
7.	Romania	14073	14818	13523
8.	Bulgaria	5207	5330	5030
9.	Croatia	1078	1300	128
10.	Serbia	5058	5066	5053
11.	Bosnia and Herzegovina	2148	2159	2128
12.	Montenegro	514	515	513
13.	Republic of Moldova	2501	2534	2472
14.	Ukraine	41316	41396	41266

Source: *Author based on FAO database, 2012. Serbia, Montenegro, period 2006-2009.*

Land users need to be given the right economic incentives to invest in preventing or mitigating land degradation. (*The World Bank*, 2012) We can see the difference in the observed values of agricultural area (Table 2). The highest average agricultural area (2002-2009) has the Ukraine, followed by Germany. Lowest average agricultural area has Slovenia (Figure 2). The nature and intensity of trade-offs and synergies will clearly vary depending on levels of development, which determine the policy priorities of a country. To deliver on these policy priorities, it is important to have appropriate institutions, procedures and rules for policy formulation and implementation in place. (*OECD*, 2012)

Figure 2. *Agricultural area (average, 1000 Ha, period 2002-2009)*



Source: *Author based on FAO database, 2012. Serbia, Montenegro, period 2006-2009.*

Factors leading to land degradation include poor agricultural and grazing practices and forest degradation as well as factors outside the renewable natural resource sector, including poorly designed infrastructure and mining activities. (*The World Bank*, 2012) Land management involves a special integrated approach for different ecosystems (eg., temperate climates or in hot and humid equatorial zone):

- the specific cultivation and crop rotation,
- reduced use of chemicals,
- selecting seed varieties.

Changes in the pattern of agricultural land use from arable crops to pasture, from more to less intensive cropping systems, and in terms of different cropping patterns can have considerable environmental effects. Some examples include:

⇨ exploiting the potential of agricultural land as a source of renewable energy from biomass production,

⇨ enhancing the biodiversity and habitat functions provided by different cropping systems, and

⇨ altering the sink functions of farm land affecting the net emissions of greenhouse gases from agriculture. (*OECD*, 2001)

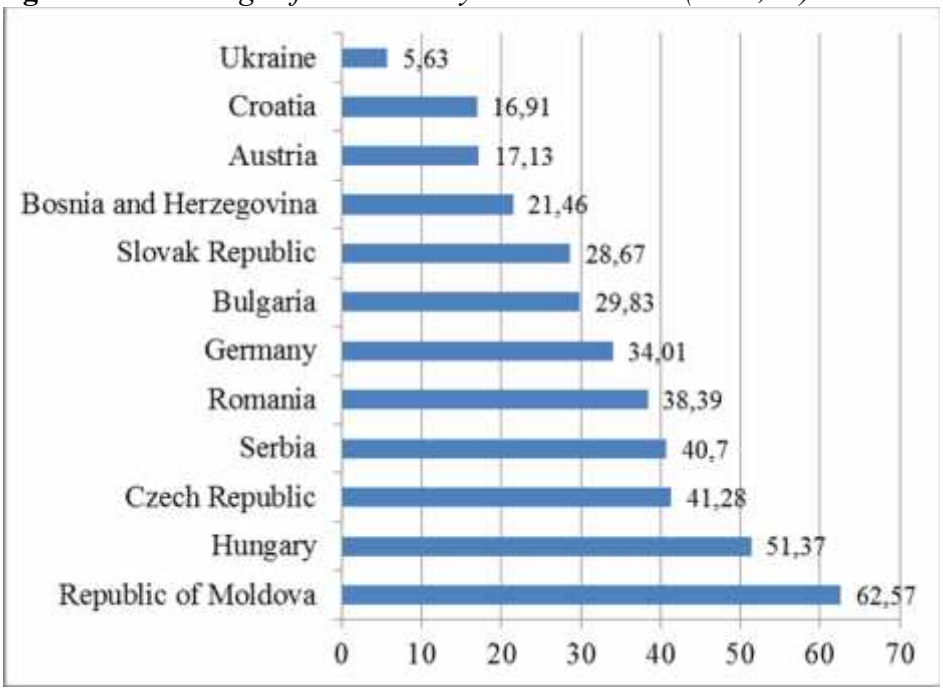
Table 3. *Cultivated area (2009)*

Country	Cultivated area (1000 ha)	Percentage of total country area cultivated (%)
Germany	12145	34.01
Austria	1437	17.13
Slovak Republic	1406	28.67
Czech Republic	3256	41.28
Hungary	4779	51.37
Slovenia	201	9.91
Romania	9151	38.39
Bulgaria	3311	29.83
Croatia	957	16.91
Serbia	3596	40.7
Bosnia and Herzegovina	1099	21.46
Montenegro	-	-
Republic of Moldova	2118	62.57
Ukraine	3400	5.63

Source: *Author based on FAO database, 2012.*

Well-defined, transparent, and secure land tenure systems are essential if farmers are to undertake the long-term conservation that underpins agricultural production and investments to improve natural capital and productivity. (*The World Bank*, 2012) The largest cultivated area has Germany (Table 3), while the highest percentage of total country area cultivated has Republic of Moldova (Figure 3). Innovation is the renewal and enlargement of the range of products, services and the associated markets; the establishment of new methods of production, supply and distribution; the introduction of changes in management, work organization, and the working conditions and skills of the workforce. (*Povrenović*, 2011)

Figure 3. *Percentage of total country area cultivated (2009, %)*



Source: *Author based on FAO database, 2012.*

The land is „home" to many micro-organisms. Loss of natural habitats puts pressure on fauna and flora, and affects the overall quality of environmental health. Fragmentation of ecosystems, land use intensification and urban sprawl are major pressures. The 2020 EU target for biodiversity must be met, by halting biodiversity and ecosystems loss, and by restoring ecosystem services and reconnecting habitats. (*EUR-Lex*, 2012)

Proper land management has specific benefits:

- ✓ economic: increasing agricultural productivity,
- ✓ environmental: strengthening biodiversity.

As new water infrastructure is a key strategy for improving secure access for agriculture, the theme considers various benefits and costs of infrastructural development. (*IWMI*, 2012)

Water management

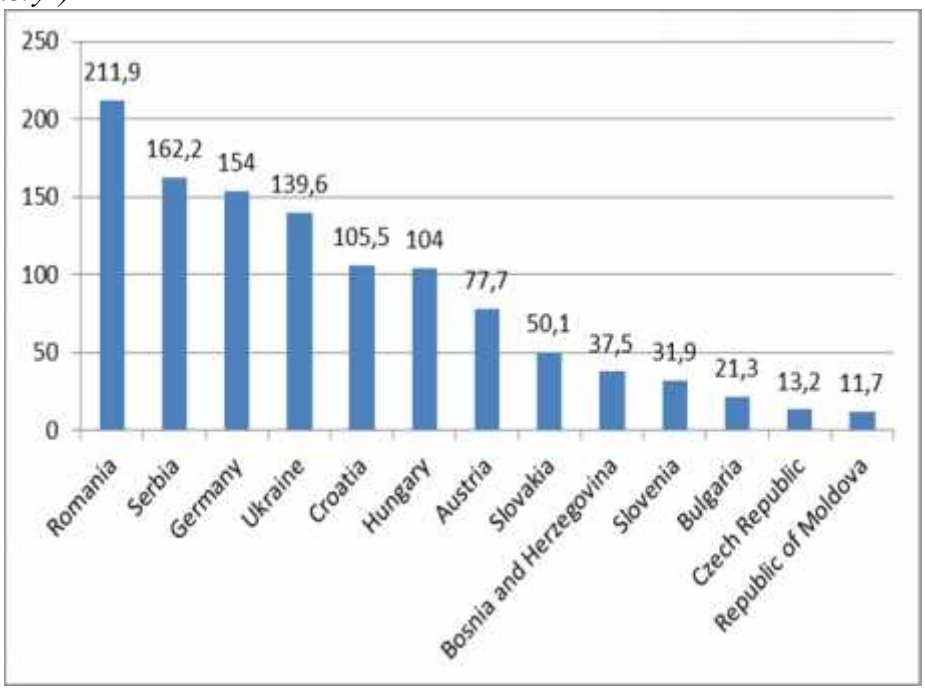
The Danube Region is the most international river basin in the world, with many crucial tributaries, lakes and ground water bodies. Ensuring good water quality, as required by the Water Framework Directive, is central. Sustainable water management is needed, jointly reducing pollution from organic, nutrient or hazardous substances. (*EUR-Lex*, 2012) Global degradation of ecosystems, excessive consumption of water, contamination and salinization of water, energy inefficiency, the growth of CO2 emissions are just some factors that contribute to environmental catastrophe. (*Dašić, Anufrijev Ana*, 2011) These restrictions are the result of ignoring environmental problems and sustainable development as a political problem and issues of survival and social development. (*Nadić, Šuvaković*, 2011)

The formulation and implementation of regulatory measures for the management of water resources are the basis for the prevention of illegal use of water. Water as a common good needs normative engagement and ecological economy has a task to participate in determination of sustainable levels of costs and prices of water resources. (*Alpar*, 2006) In this context, it will be important in future for farmers to receive the right signals to increase water use efficiency and improve agricultural water management, while preserving aquatic ecosystems. (*OECD*, 2010) Water resources in the Danube region are presented graphically in Figure 4. Availability of water for abstraction is strongly determined by geographical location. Geo-climatic differences influence the amount of surface water and groundwater available for use.

When analyzing these mean values, it is important to take into account the variations in availability of and, even more so, in demand for water in different regions of individual countries, e.g. in regions with high demand

from irrigation or tourism. These variations can lead to severe water scarcities at the local level. (*Eurostat*, 2011) The Danube Region is a major international hydrological basin and ecological corridor. This requires a regional approach to nature conservation, spatial planning and water management. Pollution does not respect national borders. Major problems such as untreated sewage and fertiliser and soil run-off make the Danube highly polluted. (*EUR-Lex*, 2012)

Figure 4. *Water resources (total renewable, actual latest value(s), 10^9 m3/yr)*



Source: *Author based on FAO database, 2012.*

All regions of the world show an overall net negative impact of climate change on water resources and freshwater ecosystems. (*Štrbac Maja*, 2010) Resource mobilization, capacity building and transfer of technology can provide safe water for drinking and sanitation needs in order to protect human health. Water availability and access are key constraints to poverty reduction and food security.

Maintaining enough water for agriculture of reasonable quality will be increasingly difficult due to climate change, competition for water with industries, urban uses and the environment, and the need to

produce biofuels. Much of the world is faced with a situation where water supplies for various uses are overallocated, with river flows much reduced, groundwater levels dropping, and important ecosystems threatened - a situation of physical water scarcity. Much of this is driven by agricultural water use. (*IWMI*, 2012) In developing countries, growing populations are increasing demand for water to produce essential commodities like food and energy. Higher rates of urbanization fuel demand for water for domestic and industrial uses, putting stress on existing raw water sources.

Exacerbating matters, climate change increases the risks of greater water variability. (*The World Bank*, 2012) One of the objectives of integrated land use planning is to identify areas where a particular technology can provide multiple benefits. Techniques that improve soil fertility, thereby both increasing agricultural productivity and enhancing biodiversity, are a good example. (*OECD*, 2008) The EU Sustainable Development Strategy underlines the necessity of improving integrated water resources management and avoiding overexploitation. The main legal instrument for water policy in the EU is the Water Framework Directive (WFD), which aims to achieve coherent and sustainable water management, both in terms of quality and quantity. (*Eurostat*, 2011) The elements of natural capital cannot be regarded in isolation. Integrated landscape approaches can increase production of both "regulating" and "provisioning" services of natural capital. (*The World Bank*, 2012) All farms use water. Water is essential for a wide range of activities on the farm (crop irrigation, machinery washing...)

The pressures on our water resources are growing. Climate change will only add to these pressures. (*Štrbac Maja*, 2008) The environmental impact of transport links, tourist developments, or new energy-producing facilities must also be considered. (*EUR-Lex*, 2012) Irrigated agriculture, which accounts for most water used by agriculture, will continue to play a key role in agricultural production growth. (*OECD*, 2010) These challenges are best addressed together, identifying priorities, agreeing and implementing actions. For example, developers and conservationists must find innovative solutions, resolving together the most difficult issues for the benefit of the whole region. (*EUR-Lex*, 2012) The basis for cooperation should be the optimal allocation of water resources and prevent pollution.

Table 4. *Irrigation*

Country	Irrigation potential (1000 ha)	Area equipped for full control irrigation: total (1000 ha)	Percentage of the area equipped for irrigation actually irrigated (%)	Total agricultural water managed area (1000 ha)
Germany	-	485 (2000)	-	485 (2000)
Austria	-	117 (2007)	34.21 (2007)	117 (2007)
Slovak Republic	-	172 (2007)	22.73 (2007)	172 (2007)
Czech Republic	-	38.53 (2007)	51.67 (2007)	38.53 (2007)
Hungary	-	140.9 (2007)	62.19 (2007)	140.9 (2007)
Slovenia	-	9 (2007)	-	9 (2007)
Romania	5500 (2007)	615.3 (2007)	28.18 (2007)	615.3 (2007)
Bulgaria	-	104.6 (2007)	69.45 (2007)	104.6 (2007)
Croatia	-	-	-	3 (2000)
Serbia	-	-	-	-
Bosnia and Herzegovina	-	-	-	3 (2000)
Montenegro	-	-	-	-
Republic of Moldova	1500 (2007)	312 (1992)	-	312 (1992)
Ukraine	5500 (2007)	731.4 (2003)	-	731.4 (2003)

Source: *Author based on FAO database, 2012.*

How societies choose to govern their water economies is underpinned by myriad interactions between technological choices on the one hand and their differentiated socio-ecological, economic, and political impacts on the other. (*IWMI*, 2012) One big worry is water scarcity. Developing countries account for 71% of global water withdrawals, and their demand is expected to increase by 27% by 2025. (from 2010). (*The World Bank*, 2012) Future policies to address the sustainable management of water resources in agriculture will be greatly influenced by climate change and climate variability, including seasonality problems, such as changes in the timing of annual rainfall patterns or periods of snow pack melt. (*OECD*, 2010) Another worry is poor water quality, which sets back growth because it degrades ecosystems; causes health-related diseases; constrains economic activities (such as agriculture, industrial production, and tourism); reduces the value of property and assets; and boosts wastewater treatment costs. (*The World Bank*, 2012) Data on potential irrigation, area equipped for full control irrigation, percentage of the area equipped for irrigation actually irrigated, total agricultural water managed area are different in the Danube region (incomplete and different years of data sources), which requires continuous monitoring, recording and analysis (Table 4).

Efficient irrigation should be aligned with the planned production and the volume of production. An innovative approach means to raise competitiveness through constant improvement of products, processes and services and organization, methods and structure. Innovation is a challenge for every business and every sector, particularly those exposed to international competition in the domestic and export markets. Innovation system is the range of actors - government, financial, educational, labor market, science and technology organizations - which provide the context within which enterprises undertake innovation. (*Povrenović*, 2011) Innovative technologies increase productivity in agriculture and protecting the environment. For example, computerized connect of the monitor to measure soil moisture in irrigation systems. Biochemical oxygen demand (BOD) estimates the total amount of biodegradable organic matter in a system and is a commonly used indicator of water quality: the lower the BOD, the higher the water quality. (*Eurostat*, 2011) Therefore, the question of achieving sustainable development strategy and presented as a problem of formalization one of the possible conditions for the admission of Serbia into the European Union.

This process of formalization is just visible through the slow process of realizing this strategy, lack of interest subjects of political life for the process and inadequate media coverage. (*Nadić, Šuvaković*, 2011) In some regions, projections suggest that crop yields could improve. For other localities, climate change will lead to increased stress on already scarce water resources, while some areas are expected to see the growing incidence and severity of flood and drought events, imposing greater economic costs on farming and the wider economy. (*OECD*, 2010) Surface water quality is important for integrated water resources management. High BOD is usually a result of organic pollution, caused by discharges from waste water treatment plants, industrial effluents, run-off and agricultural sources. High BOD indicates microbiological contamination, which affects the quality of drinking and bathing water. (*Eurostat*, 2011) The starting point for sustainable water resources management and all water use activities is to understand how much water will be available for various uses, including agriculture, the source of this water, its quality, and the variability in quality and quantity. Various drivers of change may fundamentally alter river regimes, water availability for agriculture and access to water which is a function of availability, water policies, infrastructure and institutions. (*IWMI*, 2012)

Economic instruments can affect the efficiency of water use in agriculture. Adequate water pricing policy should be in terms of sustainable water supply (connect to water infrastructure) and not to degrade the water consumption in households (because of the cost price of water). Four green growthwater policies - none of them easy to design or implement - can be adopted:

✓ Correct distortions in water allocation decisions. New mechanisms for allocating water resources should embrace economic principles of allocative efficiency to correct for market failures and imperfections.

✓ Expand the use of water pricing mechanisms to manage demand. The price of most water services does not include investment, operation, and maintenance costs or the scarcity value of the resources. Pricing could be used as an effective instrument to ensure the resource's optimal allocation.

✓ Create new markets. Tradable water rights are an effective water management instrument in the long term but have proven difficult to implement in the short term in most developing countries.

✓ Strengthen the framework for analyzing the relationship between growth and water. There have been few attempts to analyze and quantify the relationship between water and economic growth and development because of the complex spatial and temporal dimensions of water and its management. (based on source *The World Bank,* 2012)

Effective implementation of technically optimal land management strategies depends on the co-operation of the land users and local communities. (*OECD*, 2008) Public sector organizations, including national governments and multilateral institutions, set policies and provide a vital source of finance for large-scale conservation and sustainable development. (*WWF*, 2012) Rural people mainly expect the local authorities to support institutions to make use of economic and social instruments, as well as provide training and consulting services. (*Kozuch, Kozuch*, 2010) Ecologists stress the interdependence between soil, water, air and biodiversity, and the need for a coherent approach to the management of these resources. (*OECD*, 2008) Sustainable intensification can protect biodiversity, reduce deforestation, save water, and reduce greenhouse gas emissions. By integrating improved land, soil, and water management measures into production systems, such intensive systems can also increase productivity while maintaining and even enhancing the value of natural capital. (*The World Bank*, 2012)

There is a need for strong governance and institutional structures at the global level to guide policy making at regional, national and local levels, as an overarching strategy to work towards global objectives whilst accounting for different political systems:

➢ There is a need for an improved balance and greater integration between traditional economists and ecological economists within governmental advisory departments.

➢ Decisions on policies need to explicitly consider the environmental and social impacts of different options. (*UNEP*, 2011)

Development can be balanced with protection of the environment, within a sustainable development approach, in line with the environmental acquis communautaire as applicable. (*EUR-Lex*, 2012) The result of immediate action in the management of water resources should be efficient and rational use of water, reduce pollution, adjusting water shortages, as well as combating the illicit use of groundwater.

Conclusion

Controlled agricultural production can significantly contribute to the conservation of natural resources (land, water, etc.). Uncontrolled agricultural production on the other hand, drained, polluted, leading to loss of biodiversity. Management of land and water resources in agricultural production has become an urgent action, primarily because of the following:

- population growth (expected to grow from 2.3 billion people in the period 2010-2050),
- need to increase food production,
- reduced use of water due to climate change,
- urbanization and industrialization,
- greater need for irrigation (70% of the global demands for water in agriculture),
- flooding and pollution.

Monitoring of soil and water resources, as well as their restoration, should be continued and global (for example, due to the supply of domestic and foreign demand for food). Preserving natural resources means new investments in capacity building for certain purposes, training programs, conferences, and other scientific studies. Formulation of measures to solve: water shortages, floods, droughts, water pollution reduction, improvement of the quality of water, waste water treatment, reduction of water losses, the balance of demand and supply of water, should be the national priorities of each country. Agriculture plays an important role in the management of land resources: flood control, maintenance of biodiversity, design landscape, development of plant varieties, maintenance of habitat specific environment, protection of ecosystems and basis for other eco-services. Certified organic products, renewable energy and eco-tourism, can increase income in the local community, as well as additional financial resources in order to protect the environment. It is necessary to formulate short, medium and long term measures at all levels of society, as well as coordinated action.

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LOWER DANUBE REGION AS A MODEL FOR APPLICATION OF THE CONCEPT OF SUSTAINABLE AGRICULTURAL DEVELOPMENT[1]

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Abstract

Sustainable development represents complex proces which permeates all aspects of human society. Application of the concept of sustainable agricultural development can lead to improvement of all natural resources due to reduction of chemical materials and fertilizers utilization, favoring of autochthonous plant and animal species and development of ecological production in rural areas. Region which is characterized by good natural preconditions for implementation of sustainable development concept is the region of the Lower Danube. Those precoditions are presented mainly by water potential of Danube River and protected natural area National Park „Đerdap" with numerous endemic and relict species. Rational utilization of natural resources can enable sustainable development of this area in terms of production and services (agriculture, ecological food production, products with geographical indication, tourism, hospitality etc.). In this paper authors analyzed the state of main natural resources in the region of Lower Danube with the accent on biodiversity, land and water resources and their management. The authors gave directions for possible sustainable development of this area, with focus on rural areas and agricultural production.

Key words: *Lower Danube region, sustainability, agriculture*

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Introduction

Sustainable development represents complex proces which permeates all aspects of human society. Many human activities which include economy and constant fight for profit caused depletion of available natural resources and disturbance of nature balance. Sustainable development aims to satisfy the needs of global consumer society with, at the same time, reduction of negative impacts on environment. Due to its wide application, the sustainability concept aims to merge three aspects/pillars of the society: *pillar I* - sustainable development of economy and technology, *pillar II* - sustainable development based on social balance and *pillar III* - environmental protection and rational use of natural resouces. Assumption of sustainable development is based on the fact that society must carefully and rationaly manage economic, social and natural capital. It should be stressed that natural capital cannot be replaced by economic or social capital although it is possible to find the replacement for certain natural resources. These three pillars of sustainabillity are complementary and together enable multifunctionality of many natural resources.

In Serbia, in the last decade of XX century there was lesser pressure of agricultural chemicals on natural resurces due to lesser application of chemical in agricultural production. However, intensification of agricultural prodution which started again with the beginning of political transition process, may lead to numerous ecological problems, especially in rural areas.

Rural areas are defined as spaces which main characteristic is land utilisation for the purpose of agricultural and forestry production. Rural areas in Serbia are areas with population density of 150 inhabitants per km^2. In these areas, depopulation processes are becoming more and more expressed, villages are becoming „old“ which has negative impact on livestock production and grasslands quality (especialy in high mountain areas).

Poor regional planning and non-application of good agricultural practice may lead to depletion of biodiversity represented by genetic, species and ecosystems diversity, which provides sustainability and diversification of natural resources. Unplanned intensive agriculture may lead to leaking of fertilizers, pesticides and animal manure and to soil erosion which pollute surface and ground waters.

Concept of sustainable development considers, among other, larger production of so called ecological food, which can be defined as food produced using methods which exclude modern artificial substances such as pesticides, mineral fertilizers and as a food that does not contains GMO or is tretaed with irradiation, industrial solvents or chemical food additives[3]. Ecological food is produced in a way which is harmonized with national and international standards, and it is marked with label which verifies its origin, quality and safety. In sustainable agricultural development, this production method can merge and improve all capitals: environmental protection due to reduction of chemical materials and fertilizers use, non-usage of GMO, development of ecological production in rural areas which mobilize human resources and ensures economic profitability and development of rural areas. For application of this production it is necessary to educate people and to direct them to change their habbits toward sustainable business which demands a lot of time.

Area which is characterized by good natural preconditions for implementation of sustainable development concept Lower Danube Region. Those precoditions are water potentials of Danube River and protected natural area National Park „Đerdap“ with numerous endemic and relict species. Direction toward rational utilization of natural resources can enable sustainable development of this area in terms of production and services (ecological food production, products with geographical indication, tourism, hospitality and etc.).

Material and methods

Research is based on the results of quantitative and qualitative analysis of natural conditions and agricultural resources of the Lower Danube Region. Data were collected from available statistical documents as well as from many regional and strategic plans and developmental strategies. Data were analyzed using analytical-synthetical stratistical method.

Results and discussion

Lower Danube region (Carpathian area) is located in eastern Serbia and includes territory of the following municipalities: Golubac, Kučevo, Majdanpek, Kladovo and Negotin. This region gravitates toward the

[3] Allen, Gary J. & Albala, Ken, ed. (2007). The business of food: encyclopedia of the food and drink industries. ABC-CLIO. p. 288. ISBN 978-0-313-33725-3.

Danube River and orographically it belongs to southern Carpathians. It is the area of 732,35 km^2 and includes Iron Gate and NP "Đerdap". Climatic and soil factors are favorable for improvement of agricutural production and the Danube River represents the largest water potential of all municipalities. *Capacities of natural resources and vunerability of the National Park „Đerdap" and its protected area, which includes the largest part of Carpathian area, predispose this area for reaffirmation and development of traditional agriculture and integral and organic production of healthy food with special quality characteristics, based on methods of traditional production. (Nikolić,Popović, 2010:205).*

Precondition for production of healthy food lies in presence and quality of natural resources: air, soil, water and climatic conditions. It should be stressed that present demographic trends show that the number of people in rural areas is in decrease. Migration of people from villages to cities leads to abandonment of agricultural areas and decreasing the possibilities for sustainable development.

Pedological characteristics indicate that the Lower Danube region has various soil types. At territory of municipalities in Lower Danube region the following soil types can be found: chernozem, cambisol, podzol, alluvial deposits, vertisol, sand soils, pseudogley, dystric cambisol and luvisol. Variety of soil types enabled growing of various crops.

Hydro potential of the Danube River, represents the key developmental potential of all local communities. Together with rivers: Timok, Sikolska reka, Jasenička reka, Slatinska reka, Zamna, Pek and its tributaries, it represents the river network of great importance, especially in the part Corridor VII- river Danube, which opens the possibilities for investing, easier connecting of domestic market with foreign market and easier spatial distribution of various final products.

Efforts are made regarding multilateral cooperation with surrounding countries at all levels, for the purpose of strengtening of Republic of Serbia foreign policy. Networking and creating the space for development of all economy subjects is an important step after period of crisis, sanctions and decreasing of economic activities. Work on corridor 7 - Danube basin (Pan-European transport corridor 7), aims to help sustainable development of Republic of Serbia, especially Lower Danube region, by using the potential of the Danube River. Priorities are:

- development of transport, energetics and information-communication technologies (ICT) along the Danube River;
- environmental protection and sustainable use of natural resources in Danube River basin;
- economic development and strengtening of regional cooperation and partnership in the Danube region;
- creation of safe navigation system in Danube River basin;
- establishment of knowledge economy trough cooperation in the Danube region and active role of science for achievement of strategic goals.

Table 1. *Share of agricultural area in total area in municipalities of Lower Danube*

Municipality	**Area (km^2)**	**Agricultural area (%)**	**Number of settlements**
Golubac	367	42,3	24
Negotin	1.089	64,7	39
Kučevo	721	47,7	26
Kladovo	630	45,7	23
Majdanpek	932	21,6	14
Lower Danube region – total	3.739	-	126

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade.*

According to available data it can be concluded that at the area of Lower Danube there are good natural conditions for development of agricultural production. These municipalities can be considered as rural because they have less than 150 inhabitants per square kilometre (Golubac - 27,2 inhabitants/km^2, Negotin - 39,9 inhabitants/ km^2 , Kučevo - 34,45 inhabitants/ km^2, Kladovo - 37,48 inhabitants/ km^2, Majdanpek - 25,43 inhabitants/ km^2). The share of agricultural land in total area in most municipalities is about 50%, with the smallest percent in Majdanpek municipality and the largest percent in Negotin municipality (Table 1.).

Population

According to the last census of population, households and dwellings in 2011, in the Lower Danube region live almost 100.000 people which is, in compare to 2002, less for about 20.000 people (Table 2.). Reasons for decreasing of population number in Republic of Serbia and in this region should be found in economics situation which lead to population migration, decrease of fertility, increase of number of old population.

Table 2. *Population number in Lower Danube Region*

Municipality	**Population number, 2002**	**Population number, 2011**	**Absolute increase-decrease, 2011 - 2002**
Golubac	9.913	8.161	-1.752
Urban settlements	-	-	-
Other settlements	9.913	8.161	-1.752
Kučevo	18.808	15.490	-3.318
Urban settlements	4.506	3.950	-556
Other settlements	14.302	11.540	-2.762
Majdanpek	23.703	18.179	-5.524
Urban settlements	13.203	10.035	-3.168
Other settlements	10.500	8.144	-2.356
Kladovo	23.613	20.635	-2.978
Urban settlements	10.218	9.768	-450
Other settlements	13.395	10.867	-2.528
Negotin	43.418	36.879	-6.539
Urban settlements	17.758	16.716	-1.042
Other settlements	25.660	20.163	-5.497
Lower Danube area - total	119.455	99.344	-20.111

Source: *Census of population 2002, Census of population, households and dwellings in the Republic of Serbia 2011, first results , RZS.*

About 50% of total population in the region is older than 44 years of age and population under 30 years of age is about 32% of entire population number. In rural areas live 45.684 people that is about 38% of total population number while other 73.771 i.e. 62% of population live outside urban settlements (Table 3.). Considering that so far there are only preliminary results of 2011 Census, according to which in the region the number of people decresed for are almost 20.000 people, it remains to be seen to what extent the change in the population age structure occured.

Table 3. *The age structure of population in the region of Lower Danube*

Age structure	Lower Danube region			
	Urban settlements		Other settlements	
	number	% of total population number in the region	number	% of total population number in the region
Population under 20 years of age	10.911	9,13	13.115	10,98
Population of 20-24 years of age	3.318	2,78	3.573	2,99
Population of 25-29 years of age	3.204	2,68	4.198	3,51
Population of 30-34 years of age	3.017	2,53	4.119	3,45
Population of 35-39 years of age	3.061	2,56	3.671	3,073
Population of 40-44 years of age	3.718	3,11	3.899	3,26
Population of 44 years of age	18.455	15,45	41.196	34,49
Total	45.684	38,24	73.771	61,76

Source: *Author's calculation based on data from Population Census in 2002, RZS.*

Agriculture

In municipalities of Lower Danube Region there are favorable natural conditions for development of plant and animal agricultural production. However, besides unfavorable age structure, there is also large fragmentation of estates, weak clustering of agricultural producers and lack of organized production and sale which could be a problem in the proces of sustainable development.

In the structure of used land, arable land and gardens represent main form of organization in three out of five observed municipalities (Table 4). Presence of arable mail and gardens in total agricultural area is 60,41% at territory of Kladovo municipality, in Golubac municipality 54,84% and in Negotin municipality 51,64%. In Kučevo municipality share of arable

land and gardens is 45,18%, while the smallest areas under arable land and gardens are in Majdanpek municipality - 32,43%. Of entire agricultural area in the Lower Danube region, which is about 170.000 ha, about 50% is arable land and gardens, 3,38% are orchards, 2,42% are vineyards and 44% are meadows and pastures.

Table 4. *Structure of used land in 2010*

Municipality	Agricultural area (ha)	Arable land and gardens (ha)	Orchards (ha)	Vineyards (ha)	Meadows (ha)	Pastures (ha)
Golubac	15.530	8.525	588	237	2.626	3.550
Negotin	70.461	36.388	1.112	2.800	18.145	11.918
Kučevo	34.366	15.525	2.365	137	8.094	8.214
Kladovo	28.806	17.401	289	869	7.104	3.141
Majdanpek	20.089	6.515	1.372	49	9.467	2.682
Lower Danube region – total	169.252	84.354	5.726	4.092	45.436	29.505

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade*.

The largest participation in the sowing structure have grains, whose participation is from 37,57% in Kladovo, to 58,28% in Golubac (Table 5.). Production of industrial crops is the most intensive at the territory of Golubac, with participation of 9,84%. At the territory of Majdanpek municipality there is no production of industrial crops. Production of vegetables is the most intensive at teritory of Kladovo (13,84%) and in Majdanpek (11,47%). Areas under feed crops are the largest in Golubac (21,10%), Majdanpek (20,40%) and Kladovo (18,42%). Almost half of the agricultural land is under crops which are mainly presented by grains and feed crops (Table. 5).

Table 5. *Structure of seeded arable land, in 2010*

Municipality	Arable land and gardens (ha)	Grains (ha)	Industrial plants (ha)	Vegetables (ha)	Feed crops (ha)
Golubac	8.525	4.969	130	733	1.799
Negotin	36.388	19.822	3.582	3.548	4.571
Kučevo	15.525	6.841	31	571	2.603
Kladovo	17.401	6.539	886	2.409	3.206
Majdanpek	6.515	3.448	-	747	1.329
Lower Danube region – total	84.354	41.619	4.629	8.008	13.508

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade*

Important characteristic of the Lower Danube region is natural potential for development of orchard and vineyard production. These claims are confermed by data about surfaces under these crops. The largest areas under orchards are in Kučevo (6,88%) and Majdanpek (6,82%), while the largest areas under vineyards are in Kladovo (4,18%) and Negotin (3,97%). Climatic and geographical conditions are favorable for growing of high quality sorts of grape vine, but wrong use of agrotechnical measures may significantly reduce the potential yield.

Areas under meadows and pastures, which are present in the sowing structure, emphasize the potential of this area for feed crops production and engagement of local population in pasture cattle breeding. The largest areas under pastures are in Kučevo (23,90%) and Golubac (22.86%), and the largest areas under natural meadows are in Majdanpek (47,13%) and Negotin (26%).

Cattle breeding in the Republic of Serbia suffers the consequences of low investing in this sector of agriculture. There is a trend of low agrarian support, unstable and unsure purchase channels of raw meat and milk, which does not enable the producers optimal prices. Therefore, there is a degradation of cattle fund in all segments of cattle breeding. According to limited data, it can be conluded that at the territory of Lower Danube there is a decrease of cattle production regardless of favorable natural conditions for its development.

By implementation of Alpine Convention, Protocol on mountain agriculture, Agenda 21 and new FAO iniciative, Iniciative Sustainable agriculture and rural development (SARD) represents the frame which includes all interested parties, and which supports the transition to sustainable agriculture and rural areas development. This iniciative helps reaching set objectives by supporting pilot projects and creating of capacities necessary for village communities and other interested parties to get the resources easier (technological, market, information etc.); it also stimulates good agricultural practice and fairer employment in agriculture. Together with application of local action plans and developmental strategies, the Lower Danube Region could realized its potentials and achieve satisfying level of sustainable development.

Biodiversity

Biodiversity of Lower Danube is characterized by presence of many areas protected by the law such as National park „Đerdap“ and natural reserve „Golubački grad“. According to the Law on national parks (Official Gazette of RS., no. 39/93 and 44/93.), national park can be defined as „area which by its ecological, biogeographical and other characteristics represents natural area of great importance with ecosystems and landscapes of special values in terms of origin and diversity of vegetation, flora and fauna and if it has one or more of the following features: representative biological, geomorphological, geological, hidrological and other forms and proceses of cultural-historical values with representative features of these values created in interaction of man and its environment.“

National park „Đerdap“ spreads on 63.608 ha and includes 43 highly protected species and 124 protected plant species. Relict species in national park are: Turkish Hazel (*Corylus colurna*), English walnut *(Juglans regia)*, Beech *(Fagus moesiaca),* Oriental Beech (*Fagus orientalis)*, *Acer intermedium*, European nettle tree (*Celtis australis)*, etc. In National Park „Đerdap“ there are also endemic species of Balkan penisula: *Erysimum commatum*, *Hieracium mermoreum*, *Achillea clypeolata*, *Dianthus petraeus*, *Silene flavescens*, *Acer intermedium*, *Alyssum petraeum*, *Coronilla elegans*, *Sesleria rigida*, *Cerastium banaticum* and Winter savory (*Satureia kitaibeli*). In this area also live many animal species such as: wild boar, lynx, deer, roe deer, mute swan, Pygmy cormorant, white-tailed Eagle, Golden Eagle, and viper.

Biodiversity of this area represents an important link with countries of Eastern Europe since Carpathian area is located from Bratislava in Slovakia to Iron Gate, where Danube enters Romania, in length of 450 km. This could lead to creation of different strategies of sustainable development promotion in the countries - signatories of Carpathian convention.

Besides NP "Đerdap" at territory of Lower Danube region are located six nature monuments and three nature reserves. At territory of Negotin municipality there is nature reserve Bukovo and nature monuments Zamna and Vratna while at territory of Kučevo municipality there is nature monument Velika pećina. Nature monument Valja Prerast - Rudna glava and Nature reserve Mustafa - Felješane are located in Majdanpek municipality. NP Đerdap and Mustafa - Felješane are listed as potential emerald areas in Republic of Serbia and it should be emphasized that NP "Đerdap" is marked as area of importance for plants (*Important Plants Area* - IPA), birds (*Important Birds Area* - IBA) and daily butterflies (*Prime Buterffly Area* - PBA).

Action plan for agro-biodiversity, instrument of Common Agricultural Policy (CAP), is adopted in 2001 and it provides the basis for introduction of biodiversity in European Union agricultural politics. Priorities of this plan are:

- Improvement and support of agricultural production favorable for environment and those systems which directly benefit biodiversity;
- Support to sustainable agricultural activities in area of rich biodiversity;
- Preservation and strengtening of favorable ecological structure; and
- Promotion of activities for the purpose of preservation of local and endangered cattle or plant species.

Hospitality

One of the pillars of development and improvement in Lower Danube Region is development of services, mainly hospitality and tourist offer. Development of hospitality will strengthen the position of Lower Danube Region at the map of European touristic organisation, considering that this area has natural potentials and cultural-historical heritage from the Roman age. Cultural heritage such as Viminacium, Wine roads - Wine resorts, Roman limes and medieval fortification are favorable for development of all forms of tourist offer and attraction of large number of

foreign and domestic tourists. Gastronomic offer may consist of agro-food products with geographical indication. Domestic agro-food products must be protected for the purpose of possibility of higher price and better position at domestic and international market, ensuring recognition of protected product at the market, direct link of product with geographical area, which gives it additional value and protection of product from copying.

Creation of basis for attraction of foreign and domestic investments will create conditions for regional development and utilisation of its potentials. One of the ways to stimulate agricultural production is to use the possibilities for production of products with geographical indication such as natural products (stone, marble, wool, etc.), agricultural products (tomato, paprika, peas, etc.), agro-food products (cheeses, wines, meat products, etc.), as well as products of old crafts. High quality of products is necessary because „quality, design, reliability and safety are the things that sell the product“ (Р. Стефановић et al., 2009). It should be stated that only products produced in enough quantities are recongnizable at larger market so it is necessary to „support local producers to establish cooperatives to strenghten their market position and promote their food products while simultaneosly contributing to the promotion of touristic offer of ther region“ (Жаклина Стојановић et al., 2010).

Protected agro-food products which make Lower Danube area and Carpathian region distinguished from other regions are: Rtanjski čaj (Winter savory), Homoljski ovčji sir (Homolje sheep cheese), Homoljski kozji sir (Homolje goat cheese), Homoljski kravlji sir (Homolje cow cheese), Homoljski med (Homolje honey). According to data from 2011, in year 2010/11 at territory of Timok region is registrated 9 wine producers and 16 sorts of vine with protected indication of geographical origin. Another agroo-food product with protected indication of geographical origin is Caviar of Cladovo produced by special technological process and traditional recipe of this region[4]. These products are legally protected by adoption of the Law on indications of geographical origin („Official Gazette RS“ br.18/2010) in 2010. According to this law, geographical origin indication is indication which identifies certain products as a product of certain territory, region or locality where certain quality, reputation or other characteristics of the product can be essentially attributed to its geographical origin and whose

[4] http://www.zis.gov.rs/intellectual-property-rights/inidications-of-geographical-origin/list-of-igo.91.html

production and/or manufacture and/or preparation are conducted on a certin limited area.

Production of known agrofood products of this area is in direct connection with preservation of environment that is sustainable use of natural resources. For example, production of Caviar of Kladovo depends on preservation of water resources quality in this part of Danube River and production of Homolje honey is in direct relation to preservation of environmental quality of Homolje mountain and its surrounding.

Management of the environment - problem of communal waste

In Republic of Serbia there are 164 public landfills which do not comply with technical conditions prescribed in EU and 3.251 wild landfills[5]. Urban population in serbia, produce in average about 1kg of comunal waste per capita daily while village population in average produce about 0,7 kg of waste per capita daily. Amount of agricultural waste produced in Serbia is about 13 million tons/annualy and it includes waste of plant and animal origin. In Lower Danube region annualy is produced about 12.379 t of communal waste[6] (Table 6.) and projections indicate that till 2020. these amounts will significantly increase.

Table 6. *Amount of comunal waste produced anually in the Lower Danube region and projections for 2020*

Municipality	**Population number, Census 2002**	**Amount of produced waste in 2009, in tonns**	**Projection of produced waste amounts in 2020, in tonns**
Golubac	9.392	1.045	1.485
Kučevo	17.825	1.792	2.544
Majdanpek	21.691	2.415	3.429
Kladovo	22.640	2.520	3.579
Negotin	41.380	4.607	6.542
Lower Danube area - total	112.928	12.379	17.579

Source: *National strategy of waste management for period 2010-2019.*

Government of RS in 2003 adopted National Strategy of waste management for period 2003-2008 which represents the first document

[5] Report on environment in Republic of Serbia, 2010.
[6] Year 2009

for waste managament complied with EU legislative in this field. Adoption of this document is in compliance with sustainable development principle considering that one of key postulate of sustainable development is reductiona and recycling of waste that is more efficient use of resources. Law on waste management („Official gazette of Republic of Serbia“, no. 36/09 and 88/10) regulates the question of waste management and responsibilities regarding this issue. Besides this law, waste management is regulated also by te Law on integral prevention and control of environment pollution („Official gazette of Republic of Serbia“, no. 135/04), Law on packaging and packaging waste („Official gazette of Republic of Serbia“, no. 36/09) and Law on environmental potection („Official gazette of Republic of Serbia“, no. 135/2004 and 36/2009). Based on the Law on waste management, in 2010 is adopted the strategy on waste management for period 2010-2019 which should contribute to more efficient solving of problem of waste in Serbia.

At territory of Lower Danube there is large number of old landfills which must be removed for the purpose of human health and environment preservation (Table 7).

Table 7. *Presence of landfills at Lower Danube territory*

Municipality	**Public landfills**	**Old and wild landfills**
Golubac	0	42
Kučevo	1	0
Majdanpek	1	18
Kladovo	1	51
Negotin	1	130
Lower Danube area - total	4	241

Source: http://www.sepa.gov.rs/index.php?menu=10013&id=1007&akcija=showExternal

Solving of this situation requires creation of strategies and action plans of waste management in the municipalities of this region. The largest number of old and wild landfills has Negotin municipality whose local authorities supported creation of Plan for waste management in Negotin municipality which is finalizied in 2008. Main goal of this plan is to contribute to their sustainable development by developing system for control of waste generation, reduction of waste impact on environment, improvement of efficiency of resources, attracting of investors, increasing of economic possibilites that arise from waste and enable proper disposal of waste.

In municipalities of the Lower Danube there is no treatment of waste waters and they are directly discharged into recipient. Of total number of households in the Lower Danube region only 18.159 households are connected to the sewage system (about 45%) and that is mainly in urban areas. Totaly discharged waste waters at the level of the entire region are 3.717 thousand m3 annualy and the largest amounts are produced in Majdanpek municipality where is produced almost half of total amount of waste waters. The smallest amount amount of waste waters is produced at territory of Golubac municipality i.e. 197 thousand m3 annualy that is about 5%, which is municipality with the lowest number of households in the region (Table 8).

Table 8. *Waste waters at Lower Danube territory*

Municipality	Total number of households*	Totally discharged waste waters, thous. m^3	Treated waste waters, thous. m^3	Number of households connected to the water supply system	Number of households connected to the sewerage system
Golubac	2.801	197	0	3.578	328
Kučevo	6.360	520	0	2.150	1.945
Majdanpek	7.357	1.768	0	5.897	5.200
Kladovo	8.427	369	0	10.599	4.506
Negotin	15.087	863	0	9.624	6.180
Lower Danube area – total	40.032	3.717	0	31.848	18.159

Source: *Municipalities and regions in the Republic of Serbia, 2011., RZS, Belgrade.*
Note: * *Census 2011, Preliminary results.*

Regulating the question of adequate waste management includes regulating the issue of communal waste waters. Moving toward sustainable development of this region includes solving of this issue by establishment of the system for acceptance and waste water treatment. According to the Law on waters („Official gazette of Republic of Serbia", no. 30/10) there is an obligation of waste water treatment till the level which does not affect standards of recipients quality i.e. till the level which is in compliance with the maximal emission limits. European strategy for Danube region considers renewal and preservation of Danube river quality, managment of ecological risks and environment preservation.

Conclusion

Lower Danube region can be considered as a region with excellent natural resources for implementation of sustainable development principles which would improve the quality of life of local population, especially in rural areas, and decrease migrations toward urban areas and which would preserve environment and biodiversity of protected natural habitats.

Sustainable development of Lower Danube region considers activities at reduction of depopulation trend and enabling of conditions for equal development of all municipalities in the region. Possible consequence of lack of system support to integral village development is poor social-economic development of rural areas and migration of population from villages to cities and abandoning of large agricultural areas. Rural areas are uninhabited and marginalized, especially mountain villages, with low traffic and communal infrastructure.

Conditions which should be satisfied to enable sustainable development of area consider the following: balanced development of rural and urban areas and closer integration of municipal institutions in the region, strengthen the concept of regional competitiveness and connectivity, improvement of communal infrastructure, protection and use of nautural resources based on principles of sustainable development, public participation in planning and adoption of good practice priciples, development of local economy based on available natural resources and respecting principles of environmental protection.

Sustainable development considers optimal management of waters, preservation and improvement of water quality and their rational use. In the Lower Danube region it considers consistent application of regulations which refer to water protection, increasing access to quality water of rural population, establishment of instalations for waste water treatment, establishment of economic valuation of water services, by application of principle „polluter pays" and „user pays" and ensuring public participation and involvement of water users in all phases of water management.

Sustainable land use in the area of the Lower Danube should include consistent application of legislation relating to the use and protection of land resources as well as prevention of degradation trough changes in land use. All plans and programs for protected areas management should

be in accordance with modern international standards and european directives. For the purpose of environmental preservation in Serbia, regarding agriculture, it is important to implement good agricultural practice, integral production principles and new clean technologies into production.

Sustainable agricultural production must be economically payable and ecologically acceptable, it must be pillar of rural development and rural population existance. Goals of sustainable agriculture must include investing in clean technologies which will reduce pollution originated from agriculture, preserve biodiversity and natural landscapes, preservation of traditional farming systems, concern about animal welfare, preservation of soil i.e. increase of areas under organic and other ecollogial agricultural production systems and growth of public awerness regarding environmental issues.

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SUSTAINABLE USE OF FOREST ECOSYSTEMS AND CLIMATIC CHANGES IN RURAL DEVELOPMENT*

Mihailo Ratknić, Ljubinko Rakonjac[1]

Abstract

In the aim of the reduction of the disadvantages of the current global climate projections it is necessary to use the regional models and models of influnce in the forecasts in the aim of the quantification, accuracy and uncertainties. It is necessary to incorpate the results of these models in the activities which enable the timely adaptation to the climate change and their alleviation. Based on the models and scenarios it can be concluded that over a relatively short period the drastical change in the number and structure of the forest ecosystems in Serbia will occur. The previous concept of the multi-purpose planning system in each individual goal and methods for the achivement must be analyzed separately in regard to the climate change as one of the basic factors of risks. Adverse effects of the climate change in the forest ecosystems and environment in general, these are not the goals for future but the obligations of the present.

Key words: *cllimate models, acumulated temperature, biotope, climatic scenarios, forest managemant*

Introduction

Previously recorded changes of climatic parameters and examination of various climate change scenarios (global, regional) indicate that the Serbian territory belongs to a group of regions in which climatic changes endangers sustainable use of natural resources and, consequently, threaten the state of the environment. In the following decades, even more adverse effects on biological diversity (genetic, species and ecosystem) may be expected in the entire region of south-east Europe, which will be

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manifested through a change of vertical and horizontal vegetation zonality, an increased risk of extinction of species due to a synergic effect of climatic changes and habitat fragmentation, redistribution and migration or extinction of certain forest species, as a result of high temperatures and reduction of ground water level, etc.

Climatic changes cause changes of lasting importance in structural and spatial characteristics of global biodiversity. Apart from exerting a direct impact on plant phenology, through an increase of maxim or minimum annual temperature and amount and distribution of precipitation per season, they additionally influence vegetation through altered frequency of extreme events (for instance summer droughts, frost). The earth is facing a new mass extinction of plant and animal species, similar to that of 65 million years ago when dinosaurs became extinct. Human activity has destroyed a large number of habitats, which are most frequently fragmented or harmed by a long-term pollution from most diverse sources.

Change of climatic characteristics

The climatic modelling-based estimates indicate that by the end of the century, under moderate scenarios, the annual temperature in Serbia will increase by $2,6^0$C, whereas the precipitation amount will decrease by 15-25%. According to the most adverse scenario, an increase of the mean annual air temperature by more than 5^0C and a decrease of the precipitation amount of as far as 50% are expected. An increased frequency, intensity and duration of drought, as a result of an increased temperature, decrease of summer precipitation and a large number of prolonged dry periods, have already been recorded. This trend will be particularly pronounced in the south-east and east parts of Serbia (Popovic, T., 2007).

The intensity of change of climatic parameters is higher than a natural potential of many species to adapt to newly-created conditions. This is particularly apparent due to a fragmented character of the landscape, which will limit the transitions. The changes in natural eco-systems could threaten the concept of preservation of rural values.

Climatic changes and forest ecosystems

The adverse effects will be particularly apparent through the occurrence of extreme atmospheric phenomena, such as drought, severe storms, extremely high temperatures, intensive erosive processes and outbreak of

plant diseases and pests. The Serbian territory is situated in the region characterised by the highest drought occurrence. An increased duration of the vegetation period is expected. The increase of mean air temperature will cause a transition of climatic, and thereby vegetational, zones towards the poles, along with a shift in altitude. The 1^0C temperature change will cause a vegetation shift towards north of between 200 and 300 km, along with a transition towards higher altitudes ranging from 150 to 200m. Apart from a vegetation shift towards the poles and higher altitudes, global warming will also cause a change of vegetation structure. Dying of trees (forests) will be increased due to inadequate ecological conditions of stands and an increased occurrence of entomological and phytopathological diseases. Climatic changes will cause changes in the growth rate of certain species, hamper natural regeneration, as a result of changed humidity of stands. An increased occurrence of forest fires and atmospheric disasters is also expected (IPCC 2001; IPCC 2003; IPCC 2007).

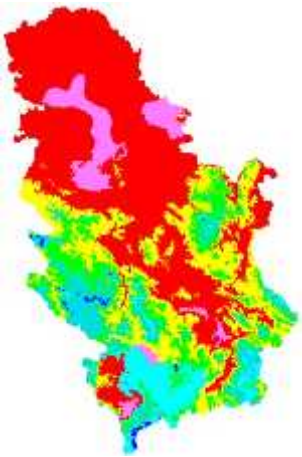
Climatic changes will also cause changes in natural ecosystems, not only in terms of their dislocation, but in terms of their structure as well. A biological potential for adaptation will be reduced and diversity limited. Communities and species with limited adaptation potentials are most endangered. The most serious problem in adaptation of forest and shrub communities to climatic changes is the rate of their change. The changes in natural eco-systems can threaten preservation of rural values. It is expected that the application of adequate measures in forest eco-system management could reduce ecological and socio-economic effects of forest deterioration.

Climatic changes model based on accumulated temperatures higher than 5.6^0C

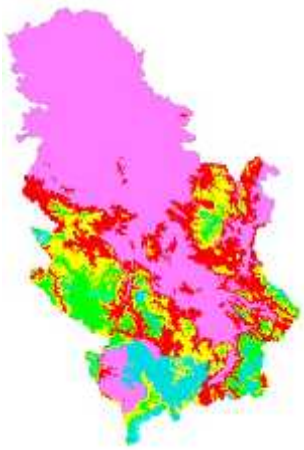
Monitoring changes of a stand's ecological conditions and their spatial distribution in climatic changes is of considerable importance (Raisanen, C. et all 2004). A model of changes of accumulated temperature $>5.6^0$C, contingent upon a forecast temperature increase by 1^0, 2^0, 3^0, 4^0 and 5^0 (Maps 1,2,3), has been designed for that purpose.

Based on these parameters, in addition to ecological characteristics of each individual stand and main species, a survival forecast for all forest and shrub stands, recorded on the territory of Serbia, has been created. The model includes all stand specificities: a location, a size of mountain

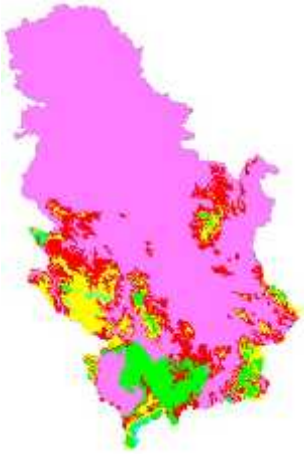
massif, a geological substratum, a climatic position, an altitude, an exposure and microclimatic conditions, community's spreading potential (limited by orographic conditions), etc. In this manner, a realistic forecast of ecological conditions has been obtained. The term DISAPPEARANCE OF STANDS refers to a drastic change of a stand's ecological conditions, under which it currently exists. The system of stand classification is based on the EUNIS stand classification system (Ratknic, M. et all. 2010).



Map 1. *Accumulated temperature for a multi-annual average*



Map 2. *Accumulated temperature for a 3^0 increase as compared to the multi-annual average*



Map 3. *Accumulated temperature for a 5^0 increase as compared to multi-annual average*

The table presents a decline in number of forest stands correlating to the change of temperature. The existence of 160 broadleaved deciduous forests has been established in Serbia. As the air temperature increases by 1^0, their number decreases by 4.4%; a 2^0C increase of air temperature decreases their number by 6.2%; an increase by 3^0 reduces their number by 20.6%, an increase by 4^0, that is, 5^0C reduces their number by 40%. The expected effects of climatic changes on forest ecosystems, forest communities and tree, shrub and ground vegetation species, are the following:

- a shift of boundaries of certain forest types in terms of geodetic latitude and altitude;
- a different natural re-distribution of surface areas of various forest types with respect to geodetic latitude and altitude;

- considered from a long-term perspective, some communities will 'lose the battle' and give up the competition, which will lead to their expulsion (extinction);
- a different composition of certain plant communities with respect to a multi-storey and social position, involving extinction of some species and appearance of others;
- change of attitude of certain species towards light;
- forest communities will be more exposed to various adverse effects that are a direct or indirect result of climatic changes. In addition to the above-stated, it is significant that a higher level of risk, related to the expected adverse effects, is associated to relict, rare and endangered forest communities and their distinctive basic tree species.
- considered cumulatively, the above-mentioned effects will have a direct impact on the possibility of preservation of biological diversity and viability of rational management of these resources.

The above-stated effects also have a direct impact on the possibility and intensity of planning of sustainable forest management.

Table 1. *Broadleaved swamp forests which do not thrive on the acid peat*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.412- Steppe swamp black alder (Alnus glutinosa) forests	Up to 300	a,b	a,b	A	A	A
G1.42- Swamp oak (Quercus) forests	Up to 100	a,b	a,b	A	A	A
G1.44- Swamp narrow-leaved (Fraxinus angustifolia) forests	Up to 100	a,b	a,b	A	A	A

Table 2. *Acidophilious forests in which oaks are dominant (Quercus)*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.871- Moesian acidophilious sessile oak forests (Quercus petraea)	400-1,300	h,c ,d	h,c ,d	h,c ,d	h,c ,d	h,c ,d
G1.872- Moesian acidophilious Turkey oak (Quercus cerris) forests	Up to 400	j,d	j,d	j,d	j,d	j,d
G1.8A- Continental sessile oak (Quercus petraea) forests	Up to 500	j,h	j,h	j,h	j,h	j,h
G1.8B- Continental eastern oak (Quercus polycarpa) forests	Up to 400	j,h	j,h	j,h	j,h	j,h

Table 3. *Broadleaved swamp forests which do not thrive on the acid peat*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.51- Birch (Betula) forests on sfagnum		e	A	A	A	A
G1.52- Swamp alder (Alnus) forests on acid peat		e	A	A	A	A

Table 4. *Riparian willow (Salix), alder (Alnus) and birch (Betula) forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.111- Mid-European white willow forests (Salix alba)	200-700	a, c,d	b,c ,d	b,d	A	A
G1.1141- The continental willow (Salix) galleries on the recent alluvial deposits	Up to 250	a, b	b	A	A	A
G1.1142- The continental (Salix) galleries on the gley soils	Up to 250	a, b	b	A	A	A
G1.115- The fluvial willow and poplar forests	Up to 500	a,b	c	A	A	A
G1.116- The fluvial white willow (Salix alba) forests	Up to 300	a,b	c	A	A	A
G1.117- The fluvial black alder (Populus nigra) forests	Up to 500	a,b	c	A	A	A
G1.118- The fluvial gray poplar (Populus canescens) forests	Up to 300	a,b	c	A	A	A
G1.119- Fluvial mixed black poplar (Populus nigra) and white poplar (Populus alba) forests	Up to 300	a,b	c	A	A	A
G1.1211- Fluvial mixed black poplar (Populus nigra) and white poplar (Populus alba) forests	600-1,400	a,b ,c, d	a,b ,c, d	b,c ,d	b	A
G1.1212- Mountain monodominant gray alder (Alnus incana) galleries	1,100-1,200	e,a	e,a	A	A	A
G1.1213- The mountain gray alder (Alnus incana) galleries with hornbeam (Carpinus betulus)	600-900	a,c ,d	a,c ,d	c,d	c,d	c,d

Table 5. *Non-riverine Forests with birch, common ash, rowan or common hazelnut*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.91B- Balkan birch (Betula) forests on non-marshy terrains	700-1,300	h,d	h,d	h,d	h,d	h,d
GF1.95-Common aspen and birch (Betula) forests with elder (Sambucus)	700-1,300	d	d	d	d	d

Table 6. *Ash-aspen and oak -elm -ash forests along the little rivers*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.2121- Southeastern-European black alder (Alnus glutinosa) forests along the fast rivers	400-1,400	b, c,d	b,c ,d	b,c ,d	c,d	A
G1.2231- Mixed forests of narrow-leaved ash (Fraxinus angustifolia) and pedunculate oak (Quercus Robus) along the great rivers	Up to 250	a,b	a,b	a,b	A	A
G1.2232- Mixed forests of hairy-leaved ash (Fraxinus pallisae) and pedunculate oak (Quercus Robus) along great rivers	Up to 40	a,b	a,b	A	A	A
G1.2233- Mixed forests of narrow-leaved ash (Fraxinus angustifolia), pedunculate oak (Quercus robus) and hornbeam (Carpinus betulus) along the great rivers	Up to 300	a,b	a,b	A	A	A
G1.2234- Hygrophilic pedunculate oak (Quercus robur) and hornbeam (Carpinus betulus) forests	Up to 300	a,b	a,b	A	A	A
G1.2235- Hygrophilic pedunculate oak (Quercus robur) and white poplar (Populus alba) forests	Up to 300	a,b	a,b	A	A	A
G1.2236- Hygrophilic pedunculate oak (Quercus robur) and black poplar (Populus alba) forests	Up to 300	a,b	a,b	A	A	A
G1.241- Hygrophilic common elm (Ulmus campestris) forests	Up to 200	a,b	a,b	A	A	A

Table7. *Beech (Fagus) forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.6911- Moesian monodominant montane beech forests	40-1300	c,d	c,d	c,d	c,d	c,d
G1.6912- Moesian hilly beech forests with the common walnut (Juglans regia)	30-300	b	b	A	A	A
G1.6913- Moesian hilly beech forests with linden (Tilia) spp.	200-600	c,d	c,d	c,d	c,d	c,d
G.6914- Moesian hilly beech forests with sessile oak (Quercus petraea)	400-800	c,d	c,d	c,d	c,d	c,d
G1.6915- Moesian hilly beech forests with European holly (Ilex aquifolium)	400-800	c,d	c,d	c,d	c,d	c,d
G1.6916- Moesian hilly beech forests with butcher's broom (Ruscus aculeatus)	250-450	c,d	c,d	c,d	c,d	c,d
G1.6917- Moesian hilly beech forests with tutsam (Hypericum androsaemi)	350-600	c,d	c,d	c,d	c,d	c,d

Table 8. *Beech (Fagus) forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.6921- Moesian montane beech forests with woodrush (Luzula) spp.	600-1,600	c,d	c,d	c,d	c,d	c,d
G1.6922- Moesian mountane beech forests with moss	700-1,400	c,d	c,d	A	A	A
G1.6923- Moesian montane beech forests with bilberry (Vaccinium myrthyllus)	500-1,400	c,d	c,d	c,d	c,d	c,d
G1.6924- Moesian montane beech forests with dear hern (Blechnum spicant)	500-1,400	c,d	c,d	c,d	c,d	c,d
G1.6925- Moesian montane beech forests with chestnut (Castanea sativa)	400-600	c,d	c,d	c,d	c,d	c,d
G1.6926- Moesian monodominant acidophilious beech forests	600-1,200	c,d	c,d	c,d	c,d	c,d
G1.6931- Moesian montane beech forests with European hop hornbeam (Ostrya carpinifolia)	300-1,000	c,d	c,d	c,d	c,d	c,d
G1.6932- Moesian montane beech forests with autumn moor grass (Sesleria autumnalis)	600-1,200	f,b	f,b	f,b	F, b	A
G1.6933- Moesian montane beech forests with evergreen sedge grasslands (Sesleria rigida)	>1,000	f,b	f,b	f,b	f,b	A
G1.6934- Moesian montane beech forests with common yew (Taxus baccata)	800-1,100	f,b	f,b	f,b	A	A
G1.6941- Moesian monodominant montane beech forests	500-1,600	c,d	c,d	c,d	c,d	c,d
G1.6942- Moesian montane beech forests with European holly (Ilex aquifolium)	650-750	c,d	c,d	c,d	c,d	c,d
G1.6943- Moesian montane beech forests with cherry laurel (Prunus laurocerasus)	1,200-1,300	f,c,d	f,c,d	f,c,d	f,c,d	f,c,d
G1.6951- Moesian monodominant Subalpine beech forests	1,400-1,800	b,c,d	b,c,d	b,c,d	b,c,d	b,c,d
G1.6952- Moesian Subalpine beech forests with Greek maple (Acer heldreichii)	1,300-2,000	c	c	c	A	A
G1.6953- Moesian Subalpine forests of Greek maple (Acer heldreichii)	1,500-1,600	c	c	c	A	A
G1.6961- Moesian relict polydominant beech (Fagus) forests with Turkish hazel (Corylus colurna)	200-1,300	g,b	g,b	g,b	?	?
G1.6962- Moesian relict polydominant beech (Fagus) forests with maples (Acer spp.)	300-500	g,b	g,b	g,b	?	?

Table 9. *Terhmophilous Downy oak forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7321- Pannonian forests of downy oak (Quercus pubences) and oriental hornbeam	Up to 300	h	h	h	h	h
G1.7322- Pannonian forests of downy oak (Quercus pubescens) and oriental ash (Fraxinus ornus)	Up to 300	h	h	h	h	h

Table 10. *Terhmophilous deciduous forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7341- Moeasian forests of downy oak (Quercus pubescens)and European hop-hornbeam (Ostrya carpinifolia)	Up to 300	h	h	h	h	h
G1.7342- Moesian forests of downy oak (Quercus pubescens) and sessile oak (Quercus petraea)	Up to 300	h	h	h	h	h
G1.7343- Moesian forests of downy oak (Quercus pubescens) and Turkey oak(Quercus cerris)	500-700	f,d	f,d	f,d	f,d	f,d
G1.7344- Moesian forests of downy oak (Quercus pubescens) with peony	Up to 700	f,d	f,d	f,d	f,d	f,d
G1.735- Illyrian downy oak (Quercus pubescens) forests		h	h	h	h	h
G1.7511- Moesian monodominant sessile oak (Quercus petraea) forests on limestone	Up to 700	f,d	f,d	f,d	f,d	f,d
G1.7512- Moesian monodominant sessile oak (Quercus petraea) forests on serpentinite	350-1150	i,c, d	i,c, d	i,c, d	i,c, d	i,c, d
G1.7513- Moesian sessile oak (Quercus petraea) forests on serpentinite with European hop hornbeam (Ostrya carpinifolia)	600-800	i,h	i,h	i,h	i,h	i,h
G1.7514- Moesian sessile oak Quercus petraea) forests on seprentinite with European hop hornbeam (Fraxinus ornus)	600-800	i,h	i,h	i,h	i,h	i,h
G1.7515- Moesian sessile oak (Quercus petraea) forests on serpentinite with forsythia (Forsythya europaea)	Up to 500	i,h ,d	i,h ,d	i,h ,d	i,h ,d	i,h ,d
G1.7516- Moesian sessile oak forests (Quercus petraea) on serpentinite with winter heath (Erica carnea)	700-900	i,h	i,h	i,h	i,h	i,h

Table 11. *Terhmophilous deciduous forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7517- Moesian sessile oak (Quercus petraea) forests on serpentinite with Oriental horbeam (Carpinus orientalis)	250-800	i,d ,h	i,d ,h	i,d ,h	i,d ,h	i,d ,h
G1.7518- Moesian sessile oak (Quercus petraea) forests on serpentinite with glossy buckthorn (Frangula alnus)	250-800	i,d ,h	i,d ,h	i,d ,h	i,d ,h	i,d ,h
G1.7519- Moesian sessile oak (Quercus petraea) forests on serpentinite with prickly juniper (Junipersu oxycedrus)	300-700	i,d ,h	i,d ,h	i,d ,h	i,d ,h	i,d ,h
G1.751A- Moesian sessile oak (Quercus petraea) forests on serpentinite with European smoke tree (Cotinus coggygria)	400-800	i,d ,h	i,d ,h	i,d ,h	i,d ,h	i,d ,h
G1.751B- Moesian sessile oak kitnjaka (Quercus petraea) forests on the limestone with the manna ash (Fraxinus ornus)	Up to 500	f,d ,h	f,d ,h	f,d ,h	f,d ,h	f,d ,h
G1.752- Moesian oak forests (Quercus dalechampii)	700-1100	b,c ,d	b,c ,d	b,c ,d	b,c ,d	b,c ,d
G1.7531- Moesian Turkey oak (Quercus cerris) forests on the limestone	Up to 800	f,d	f,d	f,d	f,d	f,d
G1.7532- Moesian Turkey oak (Quercus cerris) forests on serpentinite	900-1,100	i,d	i,d	i,d	i,d	i,d
G1.755- Moesian European oak (Quercus pedunculiflora) forests	Up to 50	h	h	h	h	h
G1.757- Illyrial sessile oak (Quercus petraea) forests		h	h	h	h	h
G1.7611- Typical Hungarian oak and Turkey oak forest	Up to 600	h,d	h,d	h,d	h,d	h,d
G1.7612- Hungarian and Turkey oak forest with butcher's broom(Ruscus aculeatus)	Up to 300	h,d	h,d	h,d	h,d	h,d
G1.7613- The forest of Hungarian oak and Turkey oak with the hawkweeds (Hieracium) spp.	Up to 300	h,d	h,d	h,d	h,d	h,d
G1.7614- The forest of Hungarian oak and Turkey oak with Oriental hornbeam (Carpinus orientalis)	Up to 700	h,d	h,d	h,d	h,d	h,d
G1.7615- The forest of Hungarian and Turkey oak with hornbeam (Carpinus betulus)	Up to 750	h,d	h,d	h,d	A	A
G1.7616- The forest of Hungarian oak and Turkey oak with moss	Up to 650	b	b	A	A	A
G1.7617- The forest of Hungarian oak and Turkey oak with Italian pubescent oak (Quercus virgiliana)	Up to 500	h,d	h,d	h,d	h,d	h,d

Table 12. *Terhmophilous deciduous forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7618- The Hungarian oak and Turkey oak forest with sessile oak (Quercus petraea)	400-1,000	b,c ,d	b,c ,d	b,c ,d	b,c ,d	b,c ,d
G1.7619- The forest of Hungarian oak and Turkey oak with pedunculate oak (Quercus robur)		h	h	h	h	h
G1.761A- The forest of Hungarian oak and Turkey oak with European Hop hornbeam (Ostrya carpinifolia)	Up to 600	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.761B- The forest of Hungarian oak and Turkey oak with common walnut (Juglans regia)	Up to 500	f,h ,d	f,h ,d	f,h ,d	A	A
G1.761C- Kosovsko-metohijska forest Hungarian and Turkey oak forest	400-760	c,d	c,d	c,d	c,d	c,d
G1.761D- The forest of Hungarian oak and Turkey oak with downy oak (Quercus pubescens)	Up to 400	h,d	h,d	h,d	h,d	h,d
G1.761E- The forest of Hungarian oak and Turkey oak with beech (Fagus)	Up to 400	b,d	b,d	A	A	A
G1.762- Moesian Hungarian oak forests (Quercetum frainetto)	Up to 350	h,d	h,d	h,d	h,d	h,d
G1.763- Moesian Italian pubescent oak (Quercus virgiliana) forests	Up to 700	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.78- Macedonian oak forests (Quercus trojana)	300-800	h	h	h	h	h
G1.7A11- Pannonian forest of Hungarian oak (Quercus frainetto) and Turkey oak (Quercus cerris)	Up to 300	h	h	h	h	h
G1.7A12- Pannonian forests of Italian pubescent oak (Quercus virgiliana)	Up to 350	h	h	h	h	h
G1.7A14- Pannonian forests of pedunculate oak (Quercus robur) on loess	Up to 200	b	b	b	b	b
G1.7A15- Pannonian forest of sessile oak (Quercus petraea) and Turkey oak (Quercus cerris)	Up to 400	b	b	b	b	b
G1.7A16- Pannonian forests of sessile oak (Quercus petraea) and royal purple (Cotinus coggygria)	Up to 300	h,d	h,b	h,b	h,b	h,b
G1.7A17- Pannonian Turkey oak (Quercus cerris) forests on loess	Up to 250	b	b	b	b	b
G1.7A18- Pannonian forests of Sessile oak (Quercus petraea) on erpentininte	300-350	i,b	i,b	i,b	A	A

Table 13. *Terhmophilous deciduous forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7C111- Monodominant European Hop hornbeam (Ostrya carpinifolia) forests on limestone	450-1,400	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C112- European Hop hornbeam (Ostrya carpinifolia) forests on limestone with Manna ash (Fraxinus ornus)	500-1,100	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C113- European Hop hornbeam (Ostrya carpinifolia) forests on limestone with maples (Acer) spp.	1,000-1,200	b,d	b,d	b,d	b,d	b,d
G1.7C114- European Hop hornbeam (Ostrya carpinifolia) forests on limestone with oaks (Quercus) spp.	400-1,400	f,h	f,h	f,h	f,h	f,h
G1.7C115- European Hop hornbeam (Ostrya carpinifolia) forests on the limestone with common walnut (Juglans regia)	400-700	f,b	f,b	f,b	f,b	f,b
G1.7C116- European Hop hornbeam (Ostrya carpinifolia) forests on the limestone with Turkish hazel (Corylus colurna)	600-1,200	f,b	f,b	f,b	f,b	f,b
G1.7C121- Monodominant European Hop hornbeam (Ostrya carpinifolia) forests on serpentinite	300- 800	i,h ,c	i,h ,c	i,h ,c	i,h ,c	i,h ,c
G1.7C122- European hop hornbeam (Ostrya carpinifolia) forests on erpentinite with sessile oak (Quercus petrea)	Up to 800	i,h ,d	i,h ,d	i,h ,d	i,h ,d	i,h ,d
G1.7C211- Monodominant Oriental hornbeam (Carpinus orientalis) forests on limestone	300-1,450	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C212- Oriental hornbeam(Carpinus orientalis) forests with lilac (Syringa vulgaris) on limestone	200-600	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C213- Oriental hornbeam (Carpinus orientalis) forests with oaks (Quercus spp.) on limestone	200-600	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C214- Oriental hornbeam (Carpinus orientalis) forests with maples (Acer) spp. on limestone		f,h	f,h	f,h	f,h	f,h
G1.7C215- Other hornbeam (Carpinus orientalis) forests on limestone		f,h	f,h	f,h	f,h	f,h
G1.7C22- Oriental hornbeam (Carpinus orientalis) forests on silicate	200-1,000	j,h ,d	j,h ,d	j,h ,d	j,h ,d	j,h ,d

Table 14. *Terhmophilous deciduous forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.7C221- Monodominant Oriental hornbeam (Carpinus orientalis) forests on silicate	300-1,000	j,h ,d	j,h ,d	j,h ,d	j,h ,d	j,h ,d
G1.7C222- Oriental hornbeam (Carpinus orientalis) forests with lilac (Syringa vulgaris) on silicate	300-1,000	j,h ,d	j,h ,d	j,h ,d	j,h ,d	j,h ,d
G1.7C223- Oriental hornbeam (Carpinus orientalis) forests with oaks (Quercus) spp. on silicate	200-400	j,h ,d	j,h ,d	j,h ,d	j,h ,d	j,h ,d
G1.7C231- Monodominant Oriental hornbeam (Carpinus orientalis) forests on serpentinite	300-1,000	i,h	i,h	i,h	i,h	i,h
G1.7C3- Thermophile maple (Acer) forests	300-700	f,h ,d	f,h ,d	f,h ,d	f,h ,d	f,h ,d
G1.7C4- Thermophile linden forests (Tilia)	Up to 300	h	h	h	h	h
G1.7C5- European nettle tree (Celtis australis)	Up to 100	b	b	A	A	A
G1.7C6- Thermophile ash (Fraxinus) forests	300-700	f,d	f,d	f,d	f,d	f,d
G1.7C7- Pannonian steppe-forests with juniper and poplar trees (Juniperus) – (Populus)		b	b	A	A	A
G1.7C9- Western Asian forest-steppe with wild fruit trees		h	h	h	h	h
G1.7D11- Monodominant forests of European chestnut (Castanea sativa)	200-800	j,d	j,d	j,d	j,d	j,d
G1.7C12- European chestnut (Castanea sativa) forests with sessile oak (Querceus petreaea)	Up to 200	j,d	j,d	j,d	j,d	j,d
G1.7D13- European chestnut (Castanea sativa) forests with common walnut (Juglans regia)	600-800	j,d	jd	jd	jd	jd

Table 15. *Meso- and eutrophic forests with oaks, horbeams (Carpinus), ashes (Fraxinus), maples (Acer), lindens (Tilia) and related forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.A1A- Illyrian oak-hornbeam (Quercus) - (Carpinus betulus) forests	300-500	b,	b	b	b	b
G1.A1B1- Pannonian sessile oak-hornbeam (Quercus petraea) - (Carpinus betulus) forests	200-500	b,	b	b	b	b

Table 16. *Meso- and eutrophic forests with oaks, horbeams (Carpinus), ashes (Fraxinus), maples (Acer), lindens (Tilia) and related forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.A1B2- Pannonian pedunculate oak-sessile oak (Quercus robur) - (Carpinus betulus) forests	80-300	b,	b	b	b	b
G1.A1C1- Moesian sessile oak-hornbeam (Quercus petraea) - (Carpinus betulus) forests	200-700	a,b	a,b	A	A	A
G1.A1C2- Moesian sessile oak-hornbeam (Quercus robur) - (Carpinus betulus) forests		h	h	h	h	h
G1.A1C3- Moesian Hungarian oak-hornbeam (Quercus frainetto) – (Carpinus betulus) forests		h	h	h	h	h
G1.A1C4- Moesian Turkey oak-hornbeam (Quercus cerris) – (Carpinus betulus) forests		h	h	h	h	h
G1.A1C5- Moesian mixed oak- hornbeam (Quercus) spp. – (Carpinus betulus) forests	Up to 200	h	h	h	h	h
G1.A22- Non-riverine ash (Fraxinus excelsior) forests with maples (Acer) spp.	300-1,100	f,b ,d	f,b ,d	f,b ,d	f,b ,d	f,b ,d
G1.A24- Non-riverine ash (Fraxinus excelsior) forests with lindens (Tilia) spp.	200-900	f,b ,d	f,b ,d	f,b ,d	f,b ,d	f,b ,d
G1.A32- Eastern hornbeam (Carpinus betulus) forests	Up to 300	h,d	h,d	h,d	h,d	h,d
G1.A4611- Relict polydominant Turkish hazel (Corylus colurna) forests with European ash (Fraxinus excelisor)	300-1,100	g,b	g,b	g,b	g,b	g,b
G1.A4612- Relict polydominant Turkish hazel (Corylus colurna) forests with Balkan maple (Acer intermedium)	600-1,100	g,b	g,b	g,b	g,b	g,b
G1.A4613- Relict polydominant Turkish hazel (Corylus colurna) forests with oaks (Quercus) spp.	200-600	g,b	g,b	g,b	g,b	g,b
G1.A4614- Relict polydominant Turkish hazel (Corylus colurna) forests with lilac (Syringa vulgaris)	500-1,100	g,b	g,b	g,b	g,b	g,b
G1.A462- Relict polydominant forests in gorges and canyons in which oaks are dominant (Quercus) spp.	100-600	g,b	g,b	g,b	g,b	g,b
G1.A463- Forests in gorges and canyons with Serbian spruce (Picea omorika)	200-900	g,?	g,?	g,?	g,?	g,?
G1.A481- Monodominant walnut forests	200-500	g,?	g,?	g,?	g,?	g,?

Table 17. *Meso- and eutrophic forests with oaks, horbeams (Carpinus), ashes (Fraxinus), maples (Acer), lindens (Tilia) and related forests*

Site	Altitude (m)	Increase of the air temperature				
		1^0	2^0	3^0	4^0	5^0
G1.A482- Walnut forests (Juglans regia) with common alder (Alnus glutinosa)		g,f ,?	g,f ,?	g,f ,?	g,f ,?	g,f ,?
G1.A483- Walnut forests (Juglans regia) with European nettle tree (Celtis australis)	Up to 200	g,f ,?	g,f ,?	g,f ,?	g,f ,?	g,f ,?
G1.A484- Walnut forests (Juglans regia) with European Hop hornbeam (Ostrya carpinifolia) (Ostrya carpinifolia)	Up to 500	g,f ,?	g,f ,?	g,f ,?	g,f ,?	g,f ,?
G1.A53- East European linden (Tilia) forests	Up to 300	h,d	h,d	h,d	h,d	h,d

Source for Table 1-17: *Own research*.

The symbols in the columns of the Table refer to the following: a – decrease of the level of the ground waters; b – narrowing of altitudinal range; h –altitudinal range extension ; c – the shift of the lower limit of the distribution to the higher altitudes; d – shift of the upper limit of the distribution to the higher altitude; e – site of very limited altitudinal range; f – occurs on the limestone bedrock; i – occurs on the serpentinite bedrock; j- occurs on the silicate bedrock; g- relict association; ? – out of reach of model ; A – site disapperance

Guidelines for sustainable use of resources in forest eco-systems aimed at mitigating adverse effects of climatic changes

In the process of preservation of forest eco-systems and establishing new forests, it is essential to take care of stands, a mosaic layout of vegetation, a biological diversity and a landscape value. When establishing new forests, a close attention should be paid to the following:

- establishing mixed stands of autochthonous tree species, while using for afforestation autochthonous tree and shrub species, compatible with a vegetation that could potentially grow under changed climatic conditions in that region. The enlargement of new plantations and shelter belts should be achieved through a change of use of arable land of poor quality
- prevention of spreading and, should need arise, application of measures for extermination of invasive species. On the territory of Serbia, the following species are considered invasive: Acer negundo, Ailanthus glandulosa, Amorpha fruticosa, Celtis occidentalis, Fraxinus pennsylvanica, Gledichia triacanthos, Lycium halimifolium, Parthenocissus inserta, Prunus serotina, Robinia pseudoacacia. Black

locust, European nettle tree and acid tree plantations in natural stands might seem a good choice at the beginning, but later, following several cuts and stump removals, they prove difficult to eradicate, spread uncontrollably and pose a serious problem to preservation of nature. A problem of regeneration of pedunculate oak forests in flood areas, which provide favourable ground for spreading seeds of invasive species, is particularly apparent. A false indigo bush creates compact shrub formations in these areas.

- avoid using cultivars and clones in natural or partially altered natural stands, especially within natural protected areas. Poplar and willow clones, along with those of autochthonous tree species, should be used for formation of wind protection belts along canals and roads, where autochthonous species cannot be used
- for the purpose of preservation of a mosaic character and eco-system diversity of natural stands, a care should be taken not to destroy sensitive or endangered natural eco-systems such as: wet meadows, shallow marshes, natural mixed forests, salt marshes, steppes, etc.
- steppe and salt marsh stands represent a priority protection areas and they are included in the Annex I List of the Council of Europe Directive (Directive 92/43/EEC, Annex I), as typical stands of the Pannonian region. Many plant and animal species living in steppes and salt marshes are endangered and protected by the law as natural rarities on the territory of Serbia.
- a conversion of plantations in natural protected areas into natural forest stands by means of their substitution by autochthonous species
- preserve traversability of ecological corridors of certain regions

The preference should be given to shelter belts, anti-erosive (eolic and water erosion) belts, with a view to preserving and increasing fertility and yield of agricultural and other lands, along with other forest areas with protective function (emission forests). A lower productivity agricultural land (from category IV), threatened by erosion, or chemically treated lands, should be afforested; however, the change of land use should involve a prior anticipation of possible effects. Loss and fragmentation of natural stands represent one of the most serious endangering factors at the global, national and regional level. Connecting isolated stands by ecological corridors should enable preservation of dynamics of populations and living communities, all the way to the processes that take place at a regional level. Ecological corridors connect spatial entities of isolated natural stands and enable seasonal migration and exchange of

genetic material between partially isolated and/or spatially distant stands. They border with natural vegetation, whereas shelter belts, water courses and their valleys with vegetations belt represent natural ecological corridors. Preservation of traversability of ecological corridors is of priority importance for preservation of a region's biodiversity. For the purpose of mitigation or total removal of adverse anthropogenic impact, it is essential to start formation of protection zones that perform an important role in preservation of biodiversity beyond the territory of natural protected areas. A formation of protection green belts would have a favourable effect on biodiversity of agrarian areas, as they enable survival of endangered bird species (vultures, owls, etc.) and mammals (insectivores), while providing places for nesting of songbirds that feed on agricultural areas. Exceptionally thick trees, trees with particularly well-developed crowns, trees with hollows, nests, etc. (that remained in a stand by chance or left there on purpose), have a considerable ecological importance. The amount, the condition and the structure of dead trees and stumps remaining in forests represent a significant ecological information, indicating a stand's degree of naturalness. They represent a living environment for a number of animals and organisms; they are an indicator of a stand's naturalness; they increase biological diversity and, value of a forest from the aspect of aesthetics and landscape diversity, etc.

Conclusion

The existing global climate models have been formed on the basis of the data that do not provide a detailed spatial structure of the variables, primarily a temperature and precipitation amount above heterogeneous areas. For reducing the drawbacks of the existing global climatic projections, it is essential, for the purpose of quantification of reliability and uncertainty of forecasts, to use regional climatic and impact models. It is necessary to build in the results of these models into activities that enable timely adaptation to climatic changes, or their mitigation (if possible). Based on the designed model and scenarios, it can be concluded that a drastic change of a number and structure of forest ecosystems in Serbia is imminent. The previous concept of multi-purpose system of planning for each individual objective (general or specific), and measures for their fulfilment, must be critically analysed with respect to climatic changes as one of the basic risk factors. Considering the above-mentioned warning facts and the already existing reality of adverse impact of climatic changes on forest ecosystems and environment in general, these are not the tasks for future, but the present obligations. The guidelines for

forest management planning ought to determine desirable characteristics of a management system at the operational level, while the guidelines for forest management practice should determine detailed modalities of work, that should be applied in forestry.

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METHODS FOR DETERMINATION OF BIOMASS ENERGY PELLETS QUALITY*

Miladin Brkic, Todor Janic[1]

Abstract

In this work are, on the base of existing standards and collected literature, described the methods for laboratory quality examination of biomass energy pellets after pressing and cooling of pressed material. On the base of existing methods, examinations on shape and dimensions, moisture content, bulk density, fine particle content, wipe away, ash content, calorific value of energy pellets were done. On the base of examination result, a range of data is gathered and physical characteristics of biomass energy pellets are estimated on the base of existing literature and standards. Comparing obtained results with existing standards and literary sources it can be said that the methods for examination of mentioned parameters are acceptable, because there were no greater deviation from regular. It is necessary to quickly reach a national standard for defining quality energy pellets and briquettes of biomass. National standards would regulate the methods for testing the quality of energy pellets and briquettes of biomass.

Key words: *Biomass, pellet, energy, standards, methods*

Introduction

In most of european countries there are no specific regulations concerning energy pellet quality determination. Biomass regulations are mostly used. Only a few countries have specific regulations (*Brkic and Janic, 2009*). At the moment, only three countries have official standards for solid biofuels: Austria ÖNORM M 7135, Sweeden SS 187120 and Germany DIN 51731 plus. Beside previously mentioned there is also an adopted european standard EN/TS 14961.

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European Committee for Standardisation, CEN under Committee TC335 has published 27 techical specifications (preparational standards) for solid fuels during 2003-2006 (*Alakangas, 2010*). This technical specifications are amended and adopted as European standards (EN) 2010. When EN standards become valid, the national standards had to be withdrawn or adjusted to these new standards.

The New European Standard for energy pellets ENplus A1, A2 i B is shown in Table 1. This standard resulted from the standard EN 14961. Conditions defined with this standard must be respected in order to get energy pellet of standard quality, which can later be placed on market and used.

In our country there are no standard for biomass energy pellets quality. Quality standardization and its correct aplication in production and delivery is of extreme importance for successful usage of energy pellets. It is possible to check quality standards by using methods for examining defined parameters of energy pellets.

The aim of this work is to collect, analyze and examin methods for laboratory examination of quality of energy pellets produced after biomass pressing and cooling.

Materials and methods

Energy pellets made of different raw materials were used during this work. Raw materials used in the production process of final product (pellets) were straw, fir sawdust, beech sawdust, as well as mixed biomass. On the base of mentioned raw materials five different kinds of pellets were produced: straw pellets, fir pellets, beech pellets, 87,5% beech and 12,5% fir pellets and 50% fir, 30% beech and 20% straw pellets.

Sampling of energy pellets for analysis of biological, phisical and thermal properties was done in production plants of firms for pellet production. The way of sampling was determined by manual for wheat sampling UP.05.3.002. Energy pellet samples of 3kg were placed in hermeticaly closed bags and stored in refrigerator until analyzing.

Table 1. *New european standard for energy pellets ENplus*

Parameter	Unit	ENplus-A1	ENplus-A2	ENplus-A3
Diameter	mm	6 – 8mm (± 1)	6 – 8mm (± 1)	6 – 8mm (± 1)
Lenght	mm	3,15 ≤ L ≤ 40 Max. 45mm (1%)	3,15 ≤ L ≤ 40 Max. 45mm (1%)	3,15 ≤ L ≤ 40 Max. 45mm (1%)
Bulk density	kg/m³	≥ 600	≥ 600	≥ 600
Calorific value	MJ/kg	≥ 16.5	≥ 16.5	≥ 16.0
Moisture	Ma.-%	≤ 10	≤ 10	≤ 10
Fine particles	Ma.-%	The amount of fine dust must be ≤ 1% counting the amount of dust in the packing pellets or end customer, if it performs bulk transport. The amount of fine dust, may be an agreement between the manufacturer and the customer.		
Machanical durability	Ma.-%	≥ 97.5	≥ 97.5	≥ 96.5
Ash content	Ma.-%	≤ 0.7	≤ 1.5	≤ 3.0
Ash melting	°C	≥ 1200	≥ 1100	≥ 1100
Chlorine	Ma.-%	≤ 0.02	≤ 0.03	≤ 0.03
Sulphur	Ma.-%	≤ 0.05	≤ 0.05	≤ 0.05
Nitrogen	Ma.-%	≤ 0.3	≤ 0.5	≤ 1.0
Copper	mg/kg	≤ 10	≤ 10	≤ 10
Chrom	mg/kg	≤ 10	≤ 10	≤ 10
Arsenic	mg/kg	≤ 1	≤ 1	≤ 1
Cadmium	mg/kg	≤ 0.5	≤ 0.5	≤ 0.5
Silver	mg/kg	≤ 0.1	≤ 0.1	≤ 0.1
Plumbum	mg/kg	≤ 10	≤ 10	≤ 10
Nickel	mg/kg	≤ 10	≤ 10	≤ 10
Zinc	mg/kg	≤ 100	≤ 100	≤ 100
Mercury	mg/kg	≤ 0.05	≤ 0.05	≤ 0.05

Source: *Alakangas E. (2010).*

Working methods were based on collecting data for analysis of energy pellet quality from literature, standards and regulations, analysis of collected data, building of necessary equipment, laboratory checking of of most important methods for pellet analysis, analysis of gained data and conclusions. Checking of methods for analysis of energy pellets quality was carried out in Laboratory for thermodynamic and processed technique of Department for agrycultural technique, Faculty of Agriculture in Novi Sad.

Method for shape and dimension determination in energy pellets

The shape of biomass energy pellets was established visually. The dimension of energy pellets means diameter and lenght. The necessary equipment for energy pellet dimension determination is nonius (movable measurer). From an average sample for diameter and lenght were measured by nonius. After that an average dimension value of energy pellets was calculated.

Method for moist content determination in energy pellets

Moist content in biomass pellets is the "loss" of mass that chipped pallet mass loses during two hours of drying process at temperature of 105 ºC. Moist content determination in pellets was carried out according to the standard SRS E. B8. 012.

Necessary equipment for moist content determination in pellets is: analytical balance with accuracy of 0,1g, laboratory mill, metal drying pots, electric dryer with possibility of temperature regulation, adjusted at 105 ºC and exicator. 20g was taken from average sample for moist content determination in pellets and ground. The ground pellets were immediatelly placed in previously measured pot and its mass measured before it absorb any amount of moist.

Afterwards, the pots with ground pellets were placed in the dryer and left in it for two hours. The drying time is counted from the moment of getting the temperature of 105ºC inside the dryer. After drying the pots were moved, with using protective gloves, to the exicator where they were cooling at room temperature. When dry sample was cool, it was placed on electric skale and total mass was measured. It should not be forgotten that the net mass of a sample is got when mass of the pot is subtracted from the total sample mass.

The moist content (moisture) of energy pellets is calculated on the base of mass ratio to get the mass percentage according to formula:

$$\omega = \frac{(m_1 - m_2)}{m_1} \times 100$$

where: ω–moist content (%),
m_1–mass before drying (g),
m_2 – mass after drying(g).

For every moist content determination it is necessary to do at least three measurings at the same time. The difference between these three measurings must not be more than 0,2 % (absolute value). The moist content (moisture) is shown as an average result of measuring, in two decimal figures.

Method for bulk mass determination in energy pellets

Bulk mass (bulk density) is a parameter which is easy to determine, and is the mass and total volume of energy pellets ratio, according to *Mohsenin (1980)* and *Singh and Goswami (1996).*

Necessary equipment for bulk mass determination is: analytical balance and graduated cylindar of known volume (1.0 l). An average sample was placed in graduate cylindar up to certain volume, and after that the mass of the sample was measured at the analytical balance. The sample mass is determined as the difference between total mass and the mass of graduated cylindar.

Bulk mass of pellets is calculated according to formula:

$$\rho_n = \frac{m}{V}$$

where: ρ_n–bulk mass (kg/m³),
m–sample mass(kg),
V–total volume of the sample (m³)

Method for determination of fine particles in energy pellets

Fine particles of energy pellets (sample) are particles (impurity) smaller than 3,15 mm, as well as dust in the sample (*Gluvakov Zorica, 2012*). Necessary equipment for determination of fine particles is: analytical balance, measuring pot and sieve with dimension of 3.15 mm (in our case it was 3.25 mm, since we did not have the standard sieve). An average sample was placed in previously measured pot and measured on analytical balance. Sample mass is determined as difference between total mass and the mass of the pot. After that the sample was placed in the sieve and sifted. Sample sifting was done manually. After sifting, the sample (pellets) and impurities (particles less than 3,25mm) are measured separately. On the base of these two masses the percentage of fine particles can be measured. For every determination of fine particles it is necessary to do at least three measurings. Pellet attrition is shown as an average result of fine particles measuring.

Method for determination of energy pellets attrition

Resistance of energy pellets to attrition (wear) is determined in rotational container according to ASAE standard 269.2. The device was constructed in workshop of Department for agricultural technique, Faculty of Agriculture in Novi Sad. Samples of 1kg with deviation of ± 20 g were taken for attrition determination and placed in a box with dimensions 300 x 300 x 450 mm, closed and turned with speed of 13t/min during 3 minutes. When turnig of the standardised box was over, the sample was siftedand detrmination of fine particles percentage was done. Difference minus percentage of fine particles is pellet resistance.

Method for determination of ash content in energy pellets

Ash content Ash content of the sample is the mass of energy pellets remaining after complete combustion of the sample at a temperature of 575 ± 25 ° C, expressed as a percentage, according to SRS H.N8.136 The necessary equipment for the determination of ash content is: a platinum, quartz, or porcelain pots, cups or bowls, electric furnace with temperature control at 575 ± 25 º C, the catcher for the pot, cup or saucer, laboratory chopper and analytical laboratory scales. From the average sample used for determination of the ash 20 g was taken and chopped finely. Fragmented pieces of appropriate size were immediately put into a pan and carefully burn at the open flame to full carbonation

(carbonization of the sample). After a complete combustion of the sample a mixture of ash and coke was obtained. 1 g of combusted sample was taken from the bowl and put in a cup. The cup was then placed in a kiln, which was gradually heated. Annealing was performed at 575 ± 25 ° C the next 3 h. During annealing the coke is completely burnt. Upon completion of the annealing only clean ash stayed. Removing the cup from the electric furnace is performed by using the metal "catcher". While removing the cup from the electric furnace it is necessary first to put the lid on the oven to cool for 15 minutes, to avoid cracking because of the great difference in temperatures.

After cooling, the obtained ash was measured at the analytical balance. Ash content in the energy pellets is calculated as follows: first we measure the mass of a sample of crushed pellets before the combustion (20 g), and then we measure the mass of cooled mixture of coke and ash, to find percentage of a mixture of coke and ash in the total sample of pellets. From the total weight of a mixture of coke and ash we took 1 g of sample for annealing. After annealing we measured the mass of cooled ash and calculate the percentage of ash in 1 g of sample mixture of coke and ash. After that, we determined the mass of ash in the total weight of a mixture of coke and ash. Finally, based on the mass of ash in the total weight of the mixture of coke and ash we determined the percentage of ash in the total mass of the sample pellet of 20 g.

Method for determination of the calorific value of energy pellets

Upper calorific value of pellets is determined calorimetrically EN ISO 1716. The mass of dry milled or whole sample of 1 g was measured on the analytical balance and placed in a small bowl. Small vessel with the sample was placed in the upper part (cover) of the "bomb", where the electrodes were connected with a wire. After that the "bomb" was closed and filled with oxygen under pressure up to 30 bar. Before placing the "bomb" into the calorimeter it is necessary to check if there is water in it, if there is not, it necessary to fill it up with water and then drop the "bomb" in the body of the calorimeter. "Bomb" is then fed through the current electrodes. The device causes the process of complete combustion of the sample. A certain amount of heating energy was released by combustion of the sample which is noted by the aparatus and transferred records transferred to the computer. After completion of the procedure is necessary to separate "bomb" and a brush the bowl.

Figure 1 shows the calorimeter, and Figure 2 preparation of the "bomb" with a sample for testing before placing in the calorimeter.

Fig. 1. *Calorimeter*

a) b)

Fig. 2. *Preparation of a „bomb" for examination (a – filling the"bomb" with oxygen , b – placing "bomb" into calorimeter)*

For each determination of ash content at least three measurements should be done and then calculate the average thermal value of the energy pellets rounded to two decimal places. Lower calorific value of pellets obtained from the form:

$$h_g = h_d + 2500\ (9h + w)$$

where: h_g – upper calorific value (kJ/kg),

h_d – lower calorific value (kJ/kg),
h – amount of water after hydrogen combustion (kg),
w – moist content in relative units (′)

Results and discussion

In Table 2, 3 and 4, shows the results of tests of biomass energy pellets quality.

Table 2. *Test results of the form properties of biomass energy pellets*

Species materials	Origin of material	Structure of materials	Form	Average length (mm)	Diameter (mm)
Beech 87.5% Fir 12.5%	Sawdust	Crushed	Cylindrical	21,0	6
Wheat straw	Straw	Crushed	Cylindrical	21,0	6
Fir 50% Beech 30% Wheat straw 20%	Sawdust Sawdust Sawdust	Crushed Crushed Crushed	Cylindrical	23,7	6
Fir	Sawdust	Crushed	Cylindrical	14,5	6
Beech	Sawdust	Crushed	Cylindrical	14,9	6

Source: *Gluvakov Zorica (2012).*

The basic results of the above mentioned tests were obtained by laboratory determination of the shape, size, moisture content, bulk mass, the content of fine particles, attrition, thermal values and strength of energy pellets. The tests of physical and mechanical properties and thermal energy pellets from fir, beech, and mixtures of wheat straw biomass (fir and beech, fir, beech and straw) were done.

The origin of the pellet material is straw or sawdust, and material structure – segmented (Table 2). Examined energy pellets were of cylindric shape. Diameter of the pellets was the same and it was 6 mm. The average length of the energy pellet samples from fir was 14.5 mm,

14.9 mm of beech, wheat straw 21 mm, a mixture of fir and beech 21 mm, and with a pellet mixture from fir, beech and straw 23.7 mm. Based on these data it can be concluded that the pellets of fir and beech have the same length, that a mixture of wheat straw and beech and fir also have the same length, and that a mixture of fir, beech and wheat straw is having the longest pellets.

Table 3. *Test results of the physical properties of biomass energy pellets*

Species materials	**Bulk density (kg/dm³)**	**Unit weight (kg/dm³)**	**Porosity (%)**	**Fine particles below 3.15 mm (%)**	**Obliteration (%)**
Beech 87.5% Fir 12.5%	0,554	1,271	50	0,22	0,55
Wheat straw	0,734	1,350	53	0,05	0,19
Fir 50% Beech 30% Wheat straw 20%	0,573	1,500	66	0,45	1.39
Fir	0,735	1,292	50	1,74	2,03
Beech	0,655	1,300	54	3,07	3,75

Source: *Gluvakov Zorica (2012)*.

Bulk mass of energy pellets from fir is 0.735 kg / dm ³, the beech 0.655 kg / dm ³, from wheat straw 0.734 kg / dm ³, from a mixture of fir and beech 0.554 kg / dm ³, and of a mixture of fir, beech and wheat straw 0.573 kg / dm ³ (Table 3). Energy pellets from a mixture of raw materials have the same bulk density, and then pellets of wheat straw and fir are also of the same value, and at the end the beech pellets have the least value of bulk mass.

The content of fine particles below 3.25 mm of the samples varied from 0.05 to 3.07% depending on the sample pellets. The content of fine particles of fir is 1.74%, 3.07% of the beech, from wheat straw 0.05% of a mixture of fir and beech 0.22%, a mixture of fir, beech and wheat straw

0.45%. A minimum of fine particles were seen in wheat straw pellets, which indicates the fact that there was the least attrition.

Table 4. *Test results of the thermal properties of biomass energy pellets*

Species materials	**Moisture content (%)**	**Ash (%)**	**Calorific value (MJ/kg)**	**Strength (N)**
Beech 87.5% Fir 12.5%	8,81	2,48	15,17	165,4
Wheat straw	7,78	8,63	14,70	224,6
Fir 50% Beech 30% Wheat straw 20%	11,48	1,59	15,64	117,4
Fir	9,54	1,17	16,40	186,4
Beech	10,63	0,64	15,00	163,6

Source: *Gluvakov Zorica (2012).*

Attrition of the samples varied from 0.19 to 3.75%, depending on the sample pellets. In the fir it is 2.03%, 3.75% beech, wheat straw from 0.19%, of a mixture of fir and beech 0.55%, a mixture of fir, beech and 1.39% wheat straw. Therefore, the least attrition is in wheat straw pellets, which leads to the conclusion that these pellets are the most durable.

Moisture content of energy pellets for pellet was 9.54% of fir, beech 10.63%, of 7.82% wheat straw, a mixture of fir and beech 8.81%, a mixture of fir, beech and wheat straw 11.48% (Table 4).

Lowest moisture content was observed in pellets from wheat straw, and the highest in pellets of mixtures of different raw materials. Ash content in energy pellets from fir is 1.170%, 0.64% from the beech, from wheat straw, 8.63% of a mixture of fir and beech 2.840%, a mixture of fir, beech and wheat straw 1.590%. The lowest values of ash are in the pellets made of wood, and maximum value pellets of straw.

Therefore, it is good to mix wood with straw, to reduce the amount of ash in pellets. Calorific value of energy pellets is: fir 16,400 kJ / kg (16.40 MJ / kg), beech 15,000 kJ / kg (15.00 MJ / kg) of straw 14,700 kJ / kg (14.70 MJ / kg) , a mixture of fir and beech 15,175 kJ / kg (15.17 MJ / kg), a mixture of fir, beech and straw 15,640 kJ / kg (15.64 MJ / kg). The highest calorific value is in pellets made of wood, and straw pellets have the lowest calorific value.

Based on these results it can be concluded that the shape of all examined energy pellets is the same. Energy pellets do not differ in diameter. Differences can be observed based on the measured values of length. Therefore, it can be concluded that the shape and diameter of biomass energy pellets meet the German standard DIN, EN plus standard, EN 14961-1 standard, as well as other authors in the average characteristics of the pellets. The length of the analyzed energy pellets is within the regulated performance standards. Lengths mixture of beech and fir, and mixtures of wheat straw fir, beech and wheat straw meet the interval length of the German DIN standards, and the length of pellets from fir and beech meet other authors in the average characteristics of the pellets. The lengths of all the analyzed pellets are within regulated values of EN plus standard, as well as EN 14961-1 standard.

Based on the results of the bulk density it can be concluded that the bulk density of energy pellets from one of the major raw materials bigger than in pellets made of mixture of raw materials. Based on the literature sources average bulk density of pellets made from one raw material is in the regulated literary interval of 600 to 700 kg/m^3, and the energy pellets made of a mixture there was a negligibly smaller value of the bulk density than from literature sources. Bulk density in biomass energy pellets is defined by EN plus standard ($\geq$ 600 kg/m^3), which coincides with the statement above, compared with the values of the apparent density from literature sources for all tested pellets. Bulk

density is not defined in the DIN standard. Bulk density of all analyzed pellets is within the regulated performance standards EN 14961-1 (from ≥ 550 to ≥ 700 and over 700 kg/m^3). The content of fine particles and attrition are the level of resistance of biofuels to stresses or damage during handling or transportation, but these parameters are not defined in standard DIN or EN standards plus, and even in literature. The EN 14961-1 standard content of fine particles (< 3.15 mm) can be in interval from 1-5%. Moisture content is one of the main problems for the wider application of biomass, since corn stalks not dried enough can have up to 30% moisture (Table 4). The moisture content of all analyzed samples of biomass energy pellets is in the standard values of (≤ 12%) DIN standard, EN 14961-1 standard (≤ 10% and ≤ 15%) and in the literary range (7 - 12%) of average characteristics of pellets. The moisture content in the EN standard plus has the same set of values (≤ 10%), indicating that the examined samples of energy pellets from a mixture of raw wheat straw corresponds to EN plus standard values, while in the pellet of beech and fir some deviations were observed.

According to the literature, the ash content of the biomass was in the range from 0.40 to 8%. Lower ash content is in sawdust, and the largest in straw. According to literature sources it can be concluded that the ash content in the pellet made of wood was within the regulated limits, while the wheat straw has a significant discrepancy, because the crops are conditioned by a number of factors (location, cultural practices, etc..) and as such can vary in the same species.

The ash content in the energy pellets for wood is within the regulated values (<1.5%) of DIN standard and literary interval (0.4 – 1.5%) for fir and beech, deviations were observed in mixture of beech and fir. In EN plus standard defined ash content for wood has the same value (≤ 0.7%), significantly lower than the ash content in the DIN standard, so that the ash content of tested energy pellet is much higher than the regulated values of EN plus standard. Ash content in energy pellets from wheat straw is not regulated by the standards of Western countries (Austria, Germany and Sweden) and is in no literature sources.

Ash content of all samples of wheat straw in EN 14961-1 is in the limits of standards (from ≤ 0.5 to ≤ 10 and over 10%). Calorific value of biomass is certainly one of the most important data

analyses, which decide on the applicability and value in use of biomass as a biofuel. There is a strong dependence of heat capacity of water content in the fuel. Thus, the obtained values of thermal energy pellets are valid only for the specified pellets moisture. Calorific value of all the samples are not in the intervals of DIN standards (17.5 to 19.5 MJ / kg), or EN plus standards (16.5 to 19.0 MJ / kg), or from literature sources (16.92 to 17.64 MJ / kg) average characteristics of pellets. Thermal parameters were not defined by standard EN 14961-1, but are a minimum value that is necessary to state, in declaration, as the net calorific value according to EN 14918.

Beside the above-mentioned parameters in DIN standards are regulated values for sulfur, nitrogen, chlorine, arsenic, cadmium, chromium, copper, mercury, lead, zinc and extracted organic particles. In EN 14961-1 and EN plus standard, in contrast to DIN standards, there are only values for sulfur, nitrogen and chlorine. In DIN standard additives are not defined, but are defined in the standard EN plus. Therefore, the above mentioned parameters and standard literature sources, we can conclude that it is necessary to define: diameter, length, moisture content, calorific value, ash content, bulk density, attrition, fine particles and heavy metals to define the quality and the successful application of biomass energy pellets.

Conclusion

Methods for analyzing of biomass energy pellets completely define indicators of quality of energy pellets. Indicators of quality pellets are divided into biological, chemical and thermal, physical and mechanical. Biological indicators are determined by types, structure, anatomical structure and particle size of biomass. Chemical and thermal indicators are determined by the content of some chemical elements in pellets, ash content, moisture content and energy value of pellets. Physical and mechanical data show geometric parameters of pellets, pellet density, abrasion and pressure resistance.

Based on the results a series of data are collected, by which physical and mechanical properties of biomass energy pellets are evaluated according to the existing literature and existing standards. Comparing of our results with existing standards and literature sources leads us to the conclusion that method for testing the following parameters are

acceptable: the shape and size, moisture content, bulk density, the content of fine particles, abrasion, ash content and calorific values of energy pellets, since there were no significant deviation from the declared standard.

Methods that must be used to determine the quality of the biomass energy pellets are the methods that define the following parameters: diameter, length, moisture content, calorific value, ash content, bulk density, abrasion, fine particles and heavy metals, which can be examined only in analytical laboratories. It is necessary to quickly reach a national standard for defining quality energy pellets and briquettes of biomass. National standards would regulate the methods for testing the quality of energy pellets and briquettes of biomass.

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ANALYSIS OF PRODUCTION DYNAMICS FOR THE MOST IMPORTANT CROPS IN THE MUNICIPALITIES OF THE DANUBE REGION

Mirjana Krivokapić[1], *Ana Anokić*[1]

Abstract

Twenty-six municipalities, which belong to the different regions of the Danube region and lie on Danube, have been observed in this paper. An analysis of the most important crops: wheat, corn, beans, potato, apple, plum and grapes has been preformed. As it is shown in this paper, analysis of the dynamic phenomena can be performed, not only by using relative numbers and trend method, but also by using the matrix of growth. Method of the matrix of growth was used to examine the process of production of major crops in the period from 2001 to 2010 and to forecast the total production for all the municipalities that lie on Danube for 2011 and 2012. The aim of this work is to apply the obtained results, based on the analysis of the matrix of growth, to improve the agricultural production of this part of Serbia, which is strategically important and naturally abundant.

Key words: *production, crops, municipalities, Danube region, the matrix growth*

Introduction

Depending in the research goal, there are plenty of statistical methods used in agriculture. In the case of time series analysis of the agricultural activities, mutually connected, the significant position should belong to the statistical method, which uses the growth matrix to examine the structural relations of growth, in order to determine the mutual influences of activities and their connection in wider systems in a practical manner.

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A statistics model, based on the matrix of growth, which enables analysing of the production process for different plant products, such as: wheat, corn, beans, potato, apple, plum and grapes, has been presented in this paper for the Danube region that lie on Danube municipalities from 2001 to 2010. The level of production for current period is evaluated, using the matrix of growth, based on values from the previous period, projecting the future development can be done in the same manner. The average matrix of growth is connected with the production conditions in its beginning and final phase of the examined period.

After Romania and Bulgaria entered the EU in 2007, Danube, as one of the trans-European corridors (Corridor 7), has become the major water route through the EU and it represents the direct water connection between the North and the Black Sea. Bearing that in mind, Danube gained even bigger strategic importance for Serbia than it had ever before.

Republic of Serbia participated in forming the Mutual and global strategy for the Danube basin countries, which will help the strengthening of the economy, integrating the local politics of Serbia in the development plans of the EU and encouraging the cooperation between Serbia with all the countries of Danube basin. Danube's 588 km flow through Serbia goes through different terrains, through lowlands, gorges and marshes. Its features are peaceful lowland flow and low speed of water flow. This is the reason why it is especially suitable for the development of agricultural production.

Every production's goal, even with the crops, is to satisfy the consumer's need on the local market, and to produce the export material. The Danube basin, with all its positive features and potentials of the municipalities that belong to it, represents the strong base for realizing those goals in the future, through the efficient cooperation of Serbia with other countries of that basin and countries of the whole Europe.

Geographical characteristics: sea-level altitude, terrain inclination, geological-pedological and climate features, they all define the base for agricultural production of a certain area. Apart from the favourable climate conditions in the Danube basin, two other factors create a great foundation for increasing the agricultural production, especially plant production in all the municipalities of Danube basin. Those two factors are the possibility of irrigation via Danube-Tisa-Danube canal and the developed food industry. The positive outcome reflects on the whole of

Serbia, and furthermore on Europe. Municipalities within the Danube region, which lie on Danube, belong to different regions of Serbia (Picture 1)

Municipalities in Banat region belonging to the Danube basin are: Bela Crkva, Kovin, Pančevo and Zrenjanin. Arable land dominates in Pančevo and Zrenjanin municipalities. For its hill and mountain structure, significant part of Bela Crkva municipality is in meadows and fields, whereas Kovin municipality has 25% of area covered with forests.

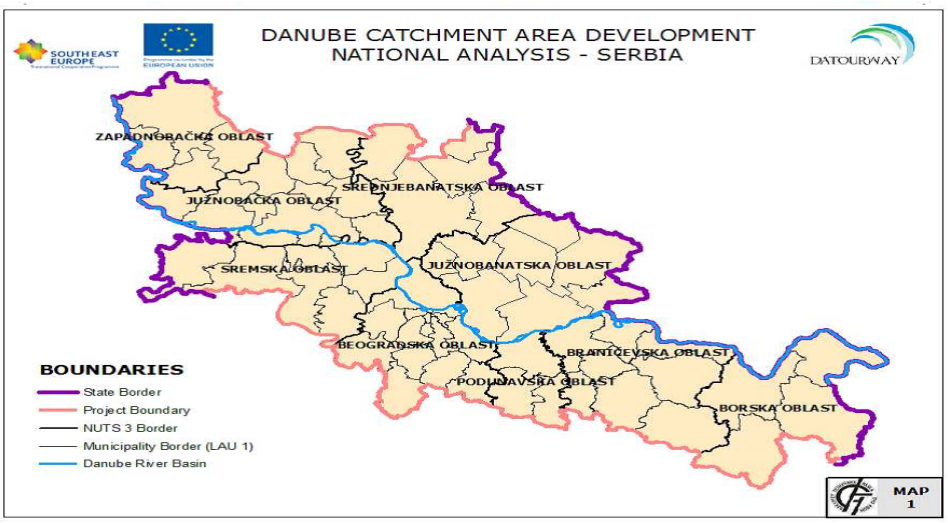
Among the municipalities of Bačka region, Danube flows through Apatin, Odžaci, Sombor, Novi Sad, Bač, Bačka Palanka, Bački Petrovac, Beočin, Sremski Karlovci and Titel. The aforementioned are considered the most suitable soil for agricultural production in Vojvodina and Serbia for that matter, in terms of soil quality and water flows.

In the region of Srem, the municipalities that lie on Danube are: Inđija and Stara Pazova. The whole area is fertile land, where field and vegetable crops dominate greatly, especially the famous Fruška Gora vineyards, the oldest ones in Europe, also a great part of area is covered with orchards.The biggest number of vegetable products with yield per hectare above the average, in Vojvodina and in Serbia, can be found in this area.

In the area of Bor, there are municipalities of Kladovo and Majdanpek located on Danube. This area is quite appropriate for development of agricultural production, especially of grapes, fruit and wheat, because of the very favourable natural conditions and the possibility of irrigation.

The Danube region municipalities that lie on Danube in Braničevo area are Veliko Gradište and Golubac. The significant part of soil in this area is of a low quality, and for that reason this area is economically undeveloped. Since the land is along the banks of Danube is plain, it gives the possibility for enhancing the agricultural production, especially of sugar beet and fruit.

Picture 1. *Regions in Serbia to which municipalities of Danube region belong to*



Source: *DATOURWAY, National analysis, Territorial Tourism Strategy.*

Danube runs through Smederevo, which is one of the three municipalities of Podunavska Province. The whole area is mainly plain and it is in the continental climate, which is beneficial for the field and vegetable crops production, as well as the fruit and wine production. Due to the part of landforms covered with Šumadija hills, intersected with shallow valley water, the agricultural production is enabled to have a good position and a long tradition.

Characteristically for Belgrade, as for all the big cities, on the city outskirts, there are households, which produce fruit and vegetables, mainly for the market. Among those municipalities in the area of Belgrade that lie on Danube are Grocka, Zemun, Palilula and Novi Beograd. In the central Belgrade municipality of Stari Grad, through which Danube also runs agricultural production is not present.

Work method

The matrix of growth is the arranged double progression of n × n numbers which represents the direct and indirect rates of growth of production and it is shown as:

$$R_t = \begin{bmatrix} r_{11t} & . & . & . & r_{1nt} \\ . & . & . & . & . \\ . & . & . & . & . \\ . & . & . & . & . \\ r_{n1t} & . & . & . & r_{nnt} \end{bmatrix} \qquad t=1,.....,T$$

Where the elements on the main diagonal represent direct r_{iit} and the rest are indirect rates of growth $r_{ijt.}$ Elements in i-th row of matrix represent the growth (fall) of production values of i-product compared to the values of other products. Elements in j-column matrix show the growth (fall) values of all the products observed in comparison to the value of j-product in the period t.

If we mark the scope of production Y_{it} ,that is, $Y_{i,t-1}$ (i = 1,2,3...n) of the i-th kind of the observed crops in the period t, that is, t-1, production increment of the observed kind in period (t-1,t) is :

$$\Delta Y_{it} = Y_{it} - Y_{i,t-1}$$

Putting these two changes in relation with the production scope of the i-th crop in the period t or t-1 the direct production growth rate is gained for the i-crop:

$$r_{iit} = \frac{\Delta Y_{it}}{Y_{it}}$$

Indirect rate of growth of production for i-kind of crops, related to the j-th kind, is defined as the relation of production increment of the i-th kind, ΔY_{it} , and value of production of j-th kind in period t, Y_{jt} ,that is :

$$r_{ijt} = \frac{\Delta Y_{it}}{Y_{jt}} \qquad i,j = 1,2,3...n \; ; \; t = 1,2,3,...T$$

Rates of growth are relative indicators, which determine the number of units for production growth of the i-kind of the observed crop compared to the production unit of the i-th kind or j-th kind in t or t-1 period. When only direct production growth rates are observed, then the production growth of one observed crop is expressed independently. When analysing indirect growth rates that is the growth of production of the i-crop compared to the j-kind, it is possible to determine the structure of growth of all the elements and express al the relations in total.

Matrix of growth production, R_t, can be determined, in order to be observed more clearly, in the vector form, as the product of production

increment vector $\Delta Y_t = (\Delta Y_{1t},...,\Delta Y_{nt})$ type $n \times 1$, and vector of the reciprocal production values $\left(\frac{1}{Y_t}\right)=\left(\frac{1}{Y_{1t}} \quad , \quad . \quad . \quad , \quad \frac{1}{Y_{nt}}\right)$ type $1 \times n$:

$$R_t = \Delta Y_t \times \left(\frac{1}{Y_t}\right) = \begin{bmatrix} \Delta Y_{1t} \\ . \\ . \\ . \\ \Delta Y_{nt} \end{bmatrix} \times \begin{bmatrix} \frac{1}{Y_{1t}} & . & . & . & \frac{1}{Y_{nt}} \end{bmatrix}$$

Average matrix of growth is often used for the purposes of research, since it describes the changes of the examined phenomenon for the observed period. This is sometimes needed to determine the movement of some activity in total of period of time, apart from the annual analyses. Elements of the average matrix of growth production, $\overline{R}$, can be determined in various ways, but the simplest way is through vector representation, as the external product of production increment vector for the observed period (0,t) $\Delta Y_{0/T}=(\Delta Y_{1,0/T},...,\Delta Y_{n,0/T})$, which is obtained as the difference of values of production for all the observed products in the last and the first year of analysis and vector of the reciprocal value to the total production of all the products in the period (0,t)

$$\left(\frac{1}{\sum_{t=1}^{T} Y_t}\right) = \left(\frac{1}{\sum_{t=1}^{T} Y_{1t}},.....,\frac{1}{\sum_{t=1}^{T} Y_{nt}}\right) \text{ for t = 1,2,3,...,n i.e.}$$

$$\overline{R} = \Delta Y_{0/T} \times \left(\frac{1}{\sum_{t=1}^{T} Y_t}\right) = \begin{bmatrix} Y_{1,0/t} \\ . \\ . \\ . \\ Y_{n,0/t} \end{bmatrix} \times \begin{bmatrix} \frac{1}{\sum_{t=1}^{T} Y_{1t}} & . & . & . & \frac{1}{\sum_{t=1}^{T} Y_{nt}} \end{bmatrix}$$

Making the assumption that between the production of different kinds of agricultural products there is dependency such that production increment of the i-th kind ΔY_t function of the production level

$$\Delta Y_{it} = f_i (Y_{1t},...,Y_{nt}) \qquad i = 1,2,3,...,n$$

can be established in the following equation system:

$$Y_{it} - f_i (Y_{1t},...Y_{nt}) = Y_{i,t-1} \qquad i = 1,2,3,...,n$$

If the linear dependency of production increment of the i-th kind and production scope is expressed through the indirect rates of growth, that is the matrix of growth R_t in the following way:

$$\Delta Y_{it} = \frac{1}{n-1} \sum_{j \neq i=1}^{n} r_{ij} Y_{jt} \qquad i = 1,2,3,...,n$$

where r_{ij} is the constant of indirect rate of growth, then there is a connection between the production in two successive periods:

$$Y_{it} - \frac{1}{n-1} \sum_{j \neq i=1}^{n} r_{ij} Y_{jt} = Y_{i,t-1} \qquad i = 1,2,3,...,n$$

or in the matrix form :

$\left(I - \frac{1}{n-1} R \right) Y_t = Y_{t-1}$, where I and R are unit matrix and matrix of growth, and Y_{t-1} and Y_t vectors of production in period t-1 and t, successively.

Introducing the average (constant) matrix of growth for the longer period (0,t) it is possible that in the every moment of interval (0,t), t = 1,2,3,...T, establish the connection between the vectors of production Y_t i Y_{t-1}:

$$\left(I - \frac{1}{n-1} \overline{R} \right) Y_t = Y_{t-1} \quad \text{i.e.} \quad Y_t = \left(I - \frac{1}{n-1} \overline{R} \right)^{-1} Y_{t-1}$$

where $\left(I - \frac{1}{n-1} \overline{R} \right)^{-1}$ is the inverse matrix system. Based on the last equation, using the known vector of production in period (t-1) and average matrix of growth $\overline{R}$ vector of production in period t, can be evaluated, which helps to project the analysed activity for the future period. In addition, repeating the method can provide with the evaluation of production for the period t+1 and t+2, taking into account that from the relation

$\left(I - \frac{1}{n-1} \overline{R} \right) Y_{t+1} = Y_t$ results $\left(I - \frac{1}{n-1} \overline{R} \right)^2 Y_{t+1} = Y_{t-1}$, i.e.

$Y_{t+1} = \left[\left(I - \frac{1}{n-1} \overline{R} \right)^2 \right]^{-1} Y_{t-1}$ and also from $\left(I - \frac{1}{n-1} \overline{R} \right)^3 Y_{t+2} = Y_{t-1}$, can be established $Y_{t+2} = \left[\left(I - \frac{1}{n-1} \overline{R} \right)^3 \right]^{-1} Y_{t-1}$

Results and discussion

Taking into account the great importance in the population diets, cattle feeding and resource purpose in the food industry, the most important crops have been analysed in this paper. Those are: wheat, corn, beans, potatoes, apples, plums and grapes. In order to observe the dynamics of their production the data for 2001-2010 period, have been used (table 1.)

Table 1. *Total crop production in the Danube region for municipalities that lie on Danube in period from 2001 to 2010*

Year	Crop production (000)t						
	wheat	**corn**	**beans**	**potato**	**apple**	**plum**	**grapes**
2001	636,625	1572,190	8,844	153,309	35,318	18,230	58,424
2002	565,772	1498,429	6,789	132,127	19,166	11,086	57,229
2003	356,136	1061,055	5,810	98,680	63,634	20,846	76,055
2004	677,086	1727,656	8,899	135,712	52,068	24,133	81,650
2005	489,502	1876,009	8,850	154,958	57,651	18,474	45,014
2006	474,896	1622,025	8,395	158,289	63,279	23,131	57,013
2007	480,239	1164,309	7,488	130,813	66,907	22,543	56,204
2008	515,798	1710,043	7,212	141,133	71,703	27,816	65,103
2009	518,870	1736,012	7,488	153,269	80,333	30,477	62,089
2010	378,260	1988,286	7,362	141,170	77,393	25,603	42,814

Source: *The State Statistics of Municipalities from 2001 to 2010 in Serbia, by Statistical Office of the Republic of Serbia, Belgrade.*

Based on data given in Table 1, matrix of growth production for wheat, corn, vegetable crops, fruit and grapes for period 2001/02, is determined as the external product of production increment vector (ΔY_t) and reciprocal values vector $\left(\frac{1}{Y_t}\right)$ are:

$$R_{01/02} = \begin{bmatrix} -0{,}1252 & -0{,}0473 & -10{,}4364 & -0{,}5362 & -3{,}6968 & -6{,}3912 & -1{,}2381 \\ -0{,}1304 & -0{,}0492 & -10{,}8648 & -0{,}5583 & -3{,}8485 & -6{,}6535 & -1{,}2889 \\ -0{,}0036 & -0{,}0014 & -0{,}3027 & -0{,}0156 & -0{,}1072 & -0{,}1854 & -0{,}0359 \\ -0{,}0374 & -0{,}0141 & -3{,}1200 & -0{,}1603 & -1{,}1052 & -1{,}9107 & -0{,}3701 \\ -0{,}0285 & -0{,}0108 & -2{,}3791 & -0{,}1222 & -0{,}8427 & -1{,}4570 & -0{,}2822 \\ -0{,}0126 & -0{,}0048 & -1{,}0523 & -0{,}0541 & -0{,}3727 & -0{,}6444 & -0{,}1248 \\ -0{,}0021 & -0{,}0008 & -0{,}1760 & -0{,}0090 & -0{,}0623 & -0{,}1078 & -0{,}0209 \end{bmatrix}$$

Considering that all the elements in the matrix $R_{01/02}$ are negative, it is concluded that the production of each observed product, compared to the rest, decreased in the observed period. The meaning of the elements of the matrix of growth of production $R_{01/02}$ is the following: element r_{11}= - 0,1252 shows the relative decrease rate of wheat production in 2002 compared to 2001 and it is 12,52%; r_{12}= - 0,0473 shows the relative decrease rate of wheat, compared to the corn production 4,73% in 2002; r_{13}= -10,4364 shows relative decrease rate of wheat production compared to the beans production. Thus, the elements of the first row represent the relative fall of wheat production, compared to the scope of production of all the observed crops. Elements of the second row show the relative fall of corn production compared to the scope of production of other crops, for example indirect rate r_{21}= - 0,1304 shows corn production fall, compared to the scope of wheat production, whereas r_{24}= - 0,5583 represents relative fall of corn production, compared to the potato production etc.

Production matrix of growth for the period 2002/03 is

$$R_{02/03} = \begin{bmatrix} -0{,}5886 & -0{,}1976 & -36{,}0819 & -2{,}1244 & -3{,}2944 & -10{,}0564 & -2{,}7564 \\ -1{,}2281 & -0{,}4122 & -75{,}2795 & -4{,}4322 & -6{,}8733 & -20{,}9812 & -5{,}7508 \\ -0{,}0027 & -0{,}0009 & -0{,}1685 & -0{,}0099 & -0{,}0154 & -0{,}0470 & -0{,}0129 \\ -0{,}0939 & -0{,}0315 & -5{,}7568 & -0{,}3389 & -0{,}5256 & -1{,}6045 & -0{,}4398 \\ 0{,}1249 & 0{,}0419 & 7{,}6537 & 0{,}4506 & 0{,}6988 & 2{,}1332 & 0{,}5847 \\ 0{,}0274 & 0{,}0092 & 1{,}6799 & 0{,}0989 & 0{,}1534 & 0{,}4682 & 0{,}1283 \\ 0{,}0529 & 0{,}0177 & 3{,}2403 & 0{,}1908 & 0{,}2958 & 0{,}9031 & 0{,}2475 \end{bmatrix}$$

It can be noticed that all the values of the elements of the first four rows of matrix of growth $R_{02/03}$ are negative, that is the consequence of the production fall for wheat, corn, beans and potatoes in 2003 compared to 2002, while the fruit and grapes production in the observed period grows, since the values of the fifth, sixth and seventh matrix rows are positive. For example, direct growth rate r_{33}=-0,1685 shows that the beans production decreased in the observed period for 16,85%, and indirect rate r_{34}= - 0,0099 represents the beans production fall compared to potatoes and it is 0,99% in 2003 etc. Element matrix in the fifth row and seventh column r_{57}=0,5847 shows that the apple production increased compared to the grape production for 58,47%, and element r_{67}=0,1283 shows growth of plum production compared to grapes for 12,83% in 2003 compared to 2002 .

Growth matrix for period 2003/2004, 2004/2005 and 2005/2006 is the following:

$$R_{03/04} = \begin{bmatrix} 0{,}4740 & 0{,}1858 & 36{,}0659 & 2{,}3649 & 6{,}1641 & 13{,}2992 & 3{,}9308 \\ 0{,}9845 & 0{,}3858 & 74{,}9074 & 4{,}9119 & 12{,}8025 & 27{,}6220 & 8{,}1641 \\ 0{,}0046 & 0{,}0018 & 0{,}3471 & 0{,}0228 & 0{,}0593 & 0{,}1280 & 0{,}0038 \\ 0{,}0547 & 0{,}0214 & 4{,}1614 & 0{,}2729 & 0{,}7112 & 1{,}5345 & 0{,}4535 \\ -0{,}0171 & 0{,}0067 & -1{,}2997 & -0{,}0852 & -0{,}2221 & -0{,}4793 & -0{,}1417 \\ 0{,}0049 & 0{,}0019 & 0{,}3694 & 0{,}0242 & 0{,}0631 & 0{,}1362 & 0{,}04026 \\ 0{,}0083 & 0{,}0032 & 0{,}6287 & 0{,}0412 & 0{,}1075 & 0{,}2318 & 0{,}0685 \end{bmatrix}$$

$$R_{04/05} = \begin{bmatrix} -0{,}3832 & -0{,}1000 & -21{,}1959 & -1{,}2105 & -3{,}2538 & -10{,}1540 & -4{,}1672 \\ 0{,}3031 & 0{,}0791 & 16{,}7631 & 0{,}9574 & 2{,}5733 & 8{,}0304 & 3{,}2957 \\ -0{,}0001 & -0{,}00002 & -0{,}0055 & -0{,}0003 & -0{,}0008 & -0{,}0027 & -0{,}0011 \\ 0{,}0393 & 0{,}0103 & 2{,}1747 & 0{,}1242 & 0{,}3338 & 1{,}0418 & 0{,}4276 \\ 0{,}0114 & 0{,}0030 & 0{,}6308 & 0{,}0360 & 0{,}0968 & 0{,}3022 & 0{,}1240 \\ -0{,}0116 & -0{,}0030 & -0{,}6394 & -0{,}0365 & -0{,}0982 & -0{,}3063 & -0{,}1257 \\ -0{,}0748 & -0{,}0195 & -4{,}1397 & -0{,}2364 & -0{,}6355 & -1{,}9831 & -0{,}8139 \end{bmatrix}$$

$$R_{05/06} = \begin{bmatrix} -0{,}0308 & -0{,}009 & -1{,}7398 & -0{,}0923 & -0{,}2308 & -0{,}6314 & -0{,}2562 \\ -0{,}5348 & -0{,}1566 & -30{,}2542 & -1{,}6046 & -4{,}0137 & -10{,}9802 & -4{,}4548 \\ -0{,}0010 & -0{,}0003 & -0{,}0542 & -0{,}0029 & -0{,}0072 & -0{,}0197 & -0{,}0080 \\ 0{,}0070 & 0{,}0021 & 0{,}3968 & 0{,}0210 & 0{,}0526 & 0{,}1440 & 0{,}0584 \\ 0{,}0119 & 0{,}0035 & 0{,}6704 & 0{,}0356 & 0{,}0889 & 0{,}2433 & 0{,}0987 \\ 0{,}0098 & 0{,}0029 & 0{,}5547 & 0{,}0294 & 0{,}0736 & 0{,}2013 & 0{,}0817 \\ 0{,}0253 & 0{,}0074 & 1{,}4293 & 0{,}0758 & 0{,}1896 & 0{,}5187 & 0{,}2105 \end{bmatrix}$$

It is noticed that in 2005/06 the similar tendency was kept as in 2002/03. Also, the potato production increased compared to the rest of the observed products in that period, which can be seen by the positive values in the fourth row matrix $R_{05/06}$.

For the upcoming three-year period, growth matrix was calculated:

$$R_{06/07} = \begin{bmatrix} 0{,}0111 & 0{,}0046 & 0{,}7135 & 0{,}0408 & 0{,}0799 & 0{,}2370 & 0{,}0951 \\ -0{,}9531 & -0{,}3931 & -61{,}1266 & -3{,}4990 & -6{,}8411 & -20{,}3041 & -8{,}1438 \\ -0{,}0019 & -0{,}0008 & -0{,}1211 & -0{,}0069 & -0{,}0136 & -0{,}0402 & -0{,}0161 \\ -0{,}0572 & -0{,}0236 & -3{,}6693 & -0{,}2100 & -0{,}4107 & -1{,}2188 & -0{,}4889 \\ 0{,}0076 & 0{,}0031 & 0{,}4845 & 0{,}0277 & 0{,}0542 & 0{,}1609 & 0{,}0646 \\ -0{,}0012 & -0{,}0005 & -0{,}0785 & -0{,}0045 & -0{,}0088 & -0{,}0261 & -0{,}0105 \\ -0{,}0017 & -0{,}0007 & -0{,}1080 & -0{,}0062 & -0{,}0121 & -0{,}0359 & -0{,}0144 \end{bmatrix}$$

$$R_{07/08} = \begin{bmatrix} 0{,}0689 & 0{,}0208 & 4{,}9305 & 0{,}2520 & 0{,}4959 & 1{,}2783 & 0{,}5462 \\ 1{,}0580 & 0{,}3191 & 75{,}6703 & 3{,}8668 & 7{,}6110 & 19{,}6194 & 8{,}3826 \\ -0{,}0005 & -0{,}0002 & -0{,}0383 & -0{,}0020 & -0{,}0038 & -0{,}0099 & -0{,}0042 \\ 0{,}0200 & 0{,}0060 & 1{,}4309 & 0{,}0731 & 0{,}1439 & 0{,}3710 & 0{,}1585 \\ 0{,}0092 & 0{,}0028 & 0{,}6650 & 0{,}0340 & 0{,}0669 & 0{,}1724 & 0{,}0737 \\ 0{,}0102 & 0{,}0031 & 0{,}7311 & 0{,}0374 & 0{,}0735 & 0{,}1896 & 0{,}0810 \\ 0{,}0173 & 0{,}0052 & 1{,}2339 & 0{,}0631 & 0{,}1241 & 0{,}3199 & 0{,}1367 \end{bmatrix}$$

$$R_{08/09} = \begin{bmatrix} 0{,}0054 & 0{,}0016 & 0{,}3725 & 0{,}0182 & 0{,}0347 & 0{,}0915 & 0{,}0449 \\ 0{,}0501 & 0{,}0150 & 3{,}4681 & 0{,}1694 & 0{,}3233 & 0{,}8521 & 0{,}4183 \\ 0{,}0005 & 0{,}0002 & 0{,}0369 & 0{,}0018 & 0{,}0034 & 0{,}0091 & 0{,}0044 \\ 0{,}0234 & 0{,}0070 & 1{,}6207 & 0{,}0792 & 0{,}1511 & 0{,}3982 & 0{,}1955 \\ 0{,}0166 & 0{,}0050 & 1{,}1525 & 0{,}0563 & 0{,}1074 & 0{,}2832 & 0{,}1390 \\ 0{,}0051 & 0{,}0015 & 0{,}3554 & 0{,}0174 & 0{,}0331 & 0{,}0873 & 0{,}0429 \\ -0{,}0058 & -0{,}0017 & -0{,}4025 & -0{,}0197 & -0{,}0375 & -0{,}0989 & -0{,}0485 \end{bmatrix}$$

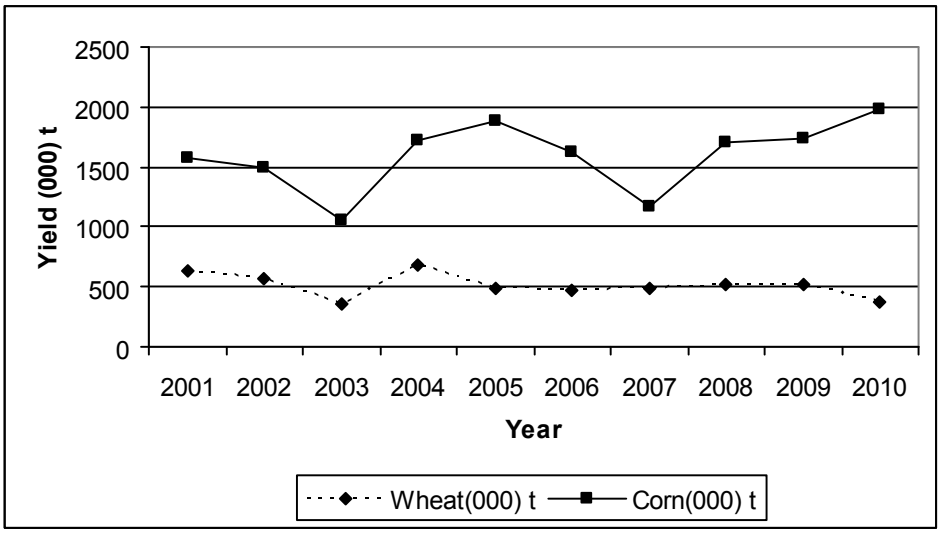
Matrix $R_{03/04}$, $R_{07/08}$ and $R_{08/09}$ show the increase in 2004, 2008 and 2009 in the production of all the crops apart from apple, beans and grapes.

The last matrix of growth calculated for period 2009/2010 is:

$$R_{09/10} = \begin{bmatrix} -0{,}3710 & -0{,}0706 & -19{,}0610 & -0{,}9940 & -1{,}8132 & -5{,}4809 & -3{,}2776 \\ 0{,}6669 & 0{,}1269 & 34{,}2670 & 1{,}7870 & 3{,}2596 & 9{,}8533 & 5{,}8923 \\ -0{,}0003 & -0{,}00006 & -0{,}0171 & -0{,}0009 & -0{,}0016 & -0{,}0049 & -0{,}0029 \\ -0{,}0320 & -0{,}0061 & -1{,}6434 & -0{,}0857 & -0{,}1563 & -0{,}4726 & -0{,}2826 \\ -0{,}0078 & -0{,}0015 & -0{,}3993 & -0{,}0208 & -0{,}0380 & -0{,}1148 & -0{,}0687 \\ -0{,}0129 & -0{,}0025 & -0{,}6620 & -0{,}0345 & -0{,}0630 & -0{,}1904 & -0{,}1138 \\ -0{,}0510 & -0{,}0097 & -2{,}6182 & -0{,}1365 & -0{,}2491 & -0{,}7528 & -0{,}4502 \end{bmatrix}$$

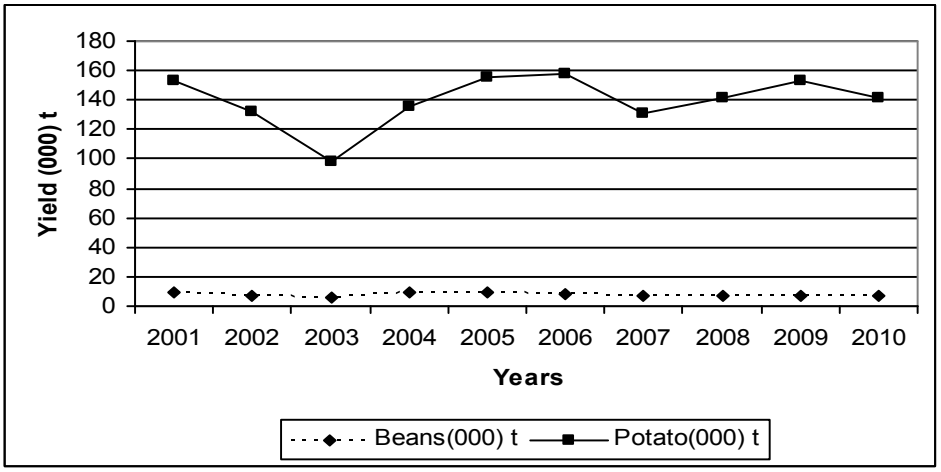
The first and the last production growth matrix have similar structures. The difference is that in 2010 corn production grew compared to the other observed crops. It is also noticed that in 2005 and 2007 producion of beans, fruit and grapes shows the same tendency, while the rest of the observed crops have the opposite tendency i.e. what decreased in 2005, increased in 2007 and the other way round. For instance, the first row of matrix $R_{04/05}$ is with negative values, which means that wheat production decreased in 2005 compared to the previous year, and the first row matrix $R_{06/07}$ is with positive values and wheat production grew in 2007 compared to 2006. On the other hand, the second row of matrix $R_{04/05}$ is positive, and with matrix $R_{06/07}$ negative, which means that corn production decreased in 2005 compared to 2004, and increased in 2007 compared to 2006. This conclusion complies with the graphical chart of wheat and corn production in the observed period (Chart 1.)

Chart 1. *Total production of wheat and corn in the Danube region for municipalities that lie on Danube in period from 2001 to 2010*



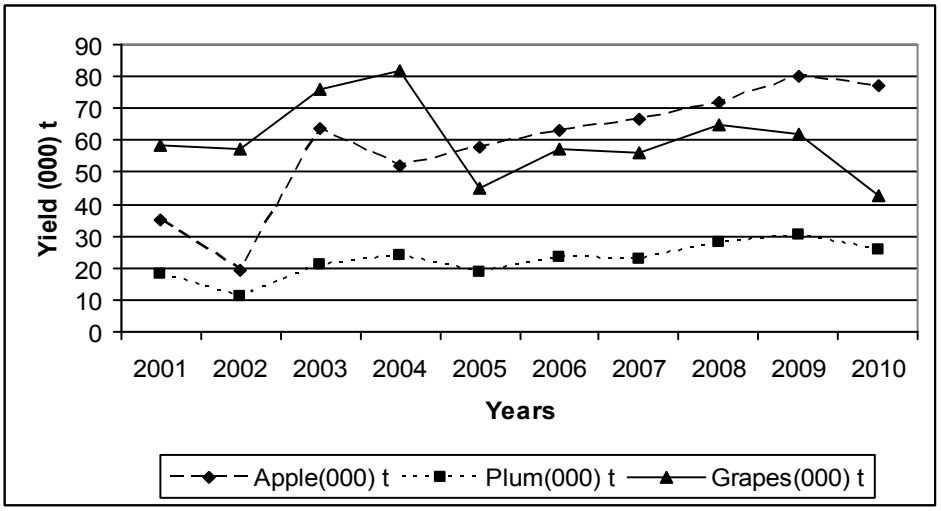
By observing and comparing the direct and indirect production growth rates, for each consecutive year, we can notice that beans production varied less than potato production, and this is proved in the graphical presentation of these productions (Chart 2.)

Chart 2. *Total production of beans and potato in the Danube region for municipalities that lie on Danube in period from 2001 to 2010*



Based on the graphical presentation (Chart 3), as well as the entire calculated growth matrix, we can see that grapes production exceeded apples production from 2001 to 2005 and from 2005 to the end of the observed period, an opposite tendency was shown. Plum production scope was under the scope of apples and grapes production, for the complete observed period.

Chart 3. *Total production of apples, plums and grapes in the Danube region for municipalities that lie on Danube in period from 2001 to 2010*



The average matrix of growth of production of: wheat, corn, beans, potato, apples, plums and grapes for period from 2001 to 2010, is gained as the vector product of the production increment vector and vector of the reciprocal value of the total crops production in the observed period:

$$\overline{R}_{01/10} = \begin{bmatrix} -0.0580 & -0.0180 & -3.7832 & -0.2073 & -0.4679 & -1.2658 & -0.4757 \\ 0.0934 & 0.0290 & 6.0928 & 0.3339 & 0.7536 & 2.0386 & 0.7660 \\ -0.0003 & -0.0001 & -0.0217 & -0.0012 & -0.0027 & -0.0073 & -0.0027 \\ -0.0027 & -0.0008 & -0.1777 & -0.0097 & -0.0220 & -0.0595 & -0.0223 \\ 0.0094 & 0.0029 & 0.6161 & 0.0338 & 0.0762 & 0.2061 & 0.0775 \\ 0.0016 & 0.0005 & 0.1080 & 0.0059 & 0.0133 & 0.0361 & 0.0136 \\ -0.0035 & -0.0011 & -0.2286 & -0.0125 & -0.0283 & -0.0765 & -0.0287 \end{bmatrix}$$

Direct rates of growth (elements on the main diagonal) show that, in the observed period of ten years, production of wheat, beans, potato and grapes declined annually for about 5,8%; 2,17%; 0,97% and 2,87%. Corn production increased annually for about 2,90%, apples for 7,62% and plums for 3,61%. The elements (without the first one) of the first column in the average matrix of growth represents indirect growth rate of wheat production. From this it can be seen that corn production increased annually for about 9,34%, beans production decreased for 0,03% and potato for 0,27%, apples and plums production increased for 0,94%, further 0,16% and grapes production declined for 0,35% in comparison to wheat production in period between 2001 and 2010. Elements in first row (without the first one) represent the average indirect decrease rate in wheat production (since the elements in the whole row are negative) compared to production of other crops in the observed period etc.

The average matrix of growth, apart from providing with the possibility of analysing production activities of different types of observed agricultural products for the observed period, has a very important part in evaluation of production for the upcoming period. Production evaluation in 2011 and 2012 of the observed crops can be performed by using the following connection between the scope of production in the last year of the observed period (2010) and inverse matrix system, which includes the average growth matrix:

$Y_{11} = \left(I - \frac{1}{n-1}\bar{R}\right)^{-1} Y_{10}$, $Y_{12} = \left[\left(I - \frac{1}{n-1}\bar{R}\right)^{2}\right]^{-1} Y_{10}$ and $Y_{13} = \left[\left(I - \frac{1}{n-1}\bar{R}\right)^{3}\right]^{-1} Y_{10}$ i.e.

$$\begin{bmatrix} Y_{1,11} \\ Y_{2,11} \\ Y_{3,11} \\ Y_{4,11} \\ Y_{5,11} \\ Y_{6,11} \\ Y_{7,11} \end{bmatrix} = \begin{bmatrix} 1,0097 & 0,0030 & 0,6305 & 0,0345 & 0,0780 & 0,2110 & 0,0793 \\ -0,0156 & 0,9952 & -1,0155 & -0,0557 & -0,1256 & -0,3398 & -0,1277 \\ 0,0001 & 0,00002 & 1,0036 & 0,0002 & 0,0004 & 0,0012 & 0,0005 \\ 0,0005 & 0,0001 & 0,0296 & 1,0016 & 0,0037 & 0,0099 & 0,0037 \\ -0,0016 & -0,0005 & -0,1027 & -0,0056 & 0,9873 & -0,0344 & -0,0129 \\ -0,0003 & -0,0001 & -0,0180 & -0,0010 & -0,0022 & 0,9940 & -0,0023 \\ 0,0006 & 0,0002 & 0,0381 & 0,0021 & 0,0047 & 0,0127 & 1,0048 \end{bmatrix}^{-1} \times \begin{bmatrix} 378,260 \\ 1988,286 \\ 7,342 \\ 141,170 \\ 77,393 \\ 25,603 \\ 42,814 \end{bmatrix}$$

With the final result of production evaluation for 2011:

$$\begin{bmatrix} Y_{1,11} \\ Y_{2,11} \\ Y_{3,11} \\ Y_{4,11} \\ Y_{5,11} \\ Y_{6,11} \\ Y_{7,11} \end{bmatrix} = \begin{bmatrix} 344,1801 \\ 2043,1865 \\ 7,1595 \\ 139,5738 \\ 82,94612 \\ 24,6339 \\ 40,7589 \end{bmatrix}$$

for 2012:

$$\begin{bmatrix} Y_{1,12} \\ Y_{2,12} \\ Y_{3,12} \\ Y_{4,12} \\ Y_{5,12} \\ Y_{6,12} \\ Y_{7,12} \end{bmatrix} = \begin{bmatrix} 1,0193 & 0,0060 & 1,2586 & 0,0690 & 0,1557 & 0,4211 & 0,1582 \\ -0,0311 & 0,9904 & -2,0270 & -0,1111 & -0,2507 & -0,6782 & -0,2549 \\ 0,0001 & 0,00003 & 1,0072 & 0,0004 & 0,0009 & 0,0024 & 0.0009 \\ 0,0009 & 0,0003 & 0,0591 & 1,0032 & 0,0073 & 0,0198 & 0,0074 \\ -0,0031 & -0,0010 & -0,2050 & -0,0112 & 0,9746 & -0,0686 & -0,0258 \\ -0,0006 & -0,0002 & -0,0359 & -0,0020 & -0,0044 & 0,9880 & -0,0045 \\ 0,0012 & 0,0004 & 0,0760 & 0,0042 & 0,0094 & 0,0254 & 1,0096 \end{bmatrix}^{-1} \times \begin{bmatrix} 378,260 \\ 1988,286 \\ 7,342 \\ 141,170 \\ 77,393 \\ 25,603 \\ 42,814 \end{bmatrix}$$

With the evaluation of observed values in 2012:

$$\begin{bmatrix} Y_{1,12} \\ Y_{2,12} \\ Y_{3,12} \\ Y_{4,12} \\ Y_{5,12} \\ Y_{6,12} \\ Y_{7,12} \end{bmatrix} = \begin{bmatrix} 309{,}9311 \\ 2098{,}3024 \\ 6{,}9792 \\ 137{,}9600 \\ 88{,}5142 \\ 27{,}5470 \\ 38{,}6927 \end{bmatrix}$$

for 2013:

$$\begin{bmatrix} Y_{1,13} \\ Y_{2,13} \\ Y_{3,13} \\ Y_{4,13} \\ Y_{5,13} \\ Y_{6,13} \\ Y_{7,13} \end{bmatrix} = \begin{bmatrix} 1{,}0289 & 0{,}0089 & 1{,}8843 & 0{,}1033 & 0{,}2331 & 0{,}6305 & 0{,}2369 \\ -0{,}0465 & 0{,}9856 & -3{,}0347 & -0{,}1663 & -0{,}3754 & -1{,}0154 & -0{,}3816 \\ 0{,}0002 & 0{,}00005 & 1{,}0108 & 0{,}0006 & 0{,}0013 & 0{,}0036 & 0{,}0014 \\ 0{,}0014 & 0{,}0004 & 0{,}0885 & 1{,}0048 & 0{,}0110 & 0{,}02962 & 0{,}0111 \\ -0{,}0047 & -0{,}0015 & -0{,}3069 & -0{,}0168 & 0{,}9620 & -0{,}1027 & -0{,}0386 \\ -0{,}0008 & -0{,}0003 & -0{,}0538 & -0{,}0029 & -0{,}0066 & 0{,}9820 & -0{,}0068 \\ 0{,}0017 & 0{,}0005 & 0{,}1138 & 0{,}0062 & 0{,}0141 & 0{,}0381 & 1{,}0143 \end{bmatrix}^{-1} \times \begin{bmatrix} 378{,}260 \\ 1988{,}286 \\ 7{,}342 \\ 141{,}170 \\ 77{,}393 \\ 25{,}603 \\ 42{,}814 \end{bmatrix}$$

with evaluation of the observed production in 2013:

$$\begin{bmatrix} Y_{1,13} \\ Y_{2,13} \\ Y_{3,13} \\ Y_{4,13} \\ Y_{5,13} \\ Y_{6,13} \\ Y_{7,13} \end{bmatrix} = \begin{bmatrix} 275{,}4876 \\ 2153{,}8459 \\ 6{,}7693 \\ 136{,}3911 \\ 94{,}1569 \\ 28{,}6037 \\ 36{,}7268 \end{bmatrix}$$

The forecast results show that total production of wheat will fall in all the municipalities of the Danube region that lie on Danube in 2011, 2012 and 2013. Its scope will be from 344.180,1 t ; 309.931,1 t and i 275.487,6t, respectively. Corn production will have the opposite tendency, compared to wheat, since the amount of produced cereals grows each year of the forecast period. Forecasted values for vegetables, beans and potatoes, show production growth for these crops in the following year, compared to the previous, for the period from 2010 to 2013 for the territory of the observed municipalities. When talking about fruit and grapes, apples production increases, grapes production decreases, and plums oscillates from year to year. Namely, plums production in 2010 was 25.603 t, while the forecasted value for 2011 shows reduced production, and for 2012 and

2013 growth of 27.547 t , that is 28.603,7 t of plums for all the municipalities of the Danube region that lie on Danube.

Conclusion

Purpose of this paper is to determine the development of a certain phenomenon, based on the analyses of that phenomenon in a certain period, for which we have real data. In this case, that is production of specific kind of crops, and to improve in next period, if it is necessary, the parameter of agricultural production which led to not having positive results. Performed analysis of production of certain crops, in this paper showed that for analysing the dynamics of phenomena, apart from the relative numbers and trend methods, matrix of growth can be used. The significance of growth matrix is great, and in this paper it is presented that its applying as mathematical method is very useful, also, in agriculture when it comes to one of the most important segments, and that is production.

Development of crops production represents an important factor in agricultural development, but also the base for development of the farming production, as well as for many processing industries (mills, baking, candy manufacturing, spirits industry etc.) There are vast differences in natural and economic conditions for development of agricultural production, in different municipalities of Serbia. Therefore, the differences among municipalities in realized scope of production are significant. Territory of the Danube region municipalities, that lie on Danube, has the area of 11.840 $km^{2,}$ which is 15% of the Republic of Serbia area [2], and the average participation of the observed kind of crops produced in the analysed municipalities is 27,94% wheat, 27,33% corn, 22,74% beans 15,82% potatoes, 27,43% apples and 16,13% grapes, which is above the territory participation of those municipalities in Serbia, and the exception is plums production which has the average production about 4,78% of the total production in Serbia. Therefore, it can be concluded that the observed municipalities have had a great contribution to the total crops production of Serbia. Having in mind that not all their capacities have been used fully, there is a possibility that in the future, by modernizing of production according to European standards, that production will enlarge its scope with even better quality products, which correspond to consumer's needs both in the country and abroad.Europe is the world's biggest food importer, mainly from developing countries. This enlists Serbia as a potential candidate, whose different food manufacturers, especially cereals, fruit, vegetables and wine, will produce

enough food of high quality, and is considered to be safe. This way they will contribute greatly to development of rural areas. Agriculture and rural development represent one of the most demanding sectors in the harmonization with the EU standards, since the regulations concerning the matter of agriculture are almost one third of all the regulations in the EU. In the Danube region, there is huge, unused, and potential for production of wheat, vegetables, fruit and wine. Hence, efforts should be made in order to develop and promote that area, and that way affirmation of Serbia in Europe can be achieved.

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PERSPECTIVES OF FORESTRY DEVELOPMENT ACCORDING TO SUSTAINABLE DEVELOPMENT IN THE SERBIAN DANUBE REGION[1]

Nada Mijajlović, Slavica Arsić[2]

Abstract

Serbian Danube region is located in the Danube area, with units marked as Upper, Middle and Lower Danube. This paper aimed to review the state of the forests in the Serbian Danube, emphasize the importance of certain forest ecosystems such as rainforests Iron Gates, forest of reserve in Upper Danube, forests of Fruska Gora and the need to protect and preserve the forest and improve the circuits on the principles of sustainable development. The paper considers the individual municipalities for each of the units of Danube region in Serbia, presented and commented upon data collected from statistical databases that were available at the state level as well as the available literature.

Keywords: *forestry, sustainable development, national park, a nature reserve, the Serbian Danube.*

Introduction

Forests are of great importance at the global level and, in the context of very current climate change, have multiple roles. The importance of forests in terms of synthesis of oxygen is well known, as a significant volume of wood that is used in industry; forests affect water circulation, the micro-climatic conditions, prevent soil erosion, they present habitat for many plant and animal species, forests are a significant factor in the

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global carbon cycle as a reservoir of bound carbon. Earlier, the forest covered a much larger area but intensive logging has led to a significant reduction of the surface. To major deforestation the development of agriculture and increasing arable land in the nineteenth century had brought. By the mid-twentieth century, two-thirds of forests in Serbia were pulled out . In addition to deforestation, there has been degradation in several ways: the development of certain diseases, destruction by insects, effects of natural disasters and fires account.

In terms of the forest area Serbia is considered as the middle wooded ground. Of the total Serbia territory area according to national inventory (2009) forests was represented on 29.1% (7.1% in Vojvodina, in central Serbia 37.6%). According to international definitions, woodland is also scrub and bush and in Serbia they occupy 4.9% of the area. According to the calculations, forest land in Serbia stretches to 34.0% or 36.3% compare to the productive land area. Years of monitoring forest cover in Serbia and statistics related to these issues in relation to the referenced 1979th shows that the forest area has increased by 5.2%, which certainly is relevance in a positive impact on the environment. This increase is a result of the implementation of forest cover planned forestation, but some other factors must be taken into account as a reduction in the number of residents in the rural area and the cessation of extensive agricultural production. The question is targeting also cadastral and recording categories and land uses that are not always in line with reality. The forest coverage in Serbia is close to the global one (30%) and significantly lower than the EU, which is 46% (2000).

In comparison to some European countries, Serbia is similar to Romania (28.0%), Spain (28.8%), Norway (28.9%), France and Greece (27.9%). The forest coverage in Serbia in relation to population is 0.3 hectares per capita. Compared with other countries, it is much smaller (1.01 ha Austria, Bosnia and Herzegovina 1.38 ha, 1.31 ha, Bulgaria, Croatia 1.25 ha, 0.75 ha, Czech Republic, Finland 5.91 ha, Germany 0, 92 ha, 6.93 ha, Norway, Rumunija1, 02 ha, ha, 1.02 Slovenia, Switzerland and Russia 11.11 ha). Quality of forests is determined on the basis of their structure and origin. In Serbia, the dominant are coppices, with 64.7% of the forest area, stands of origin cover 27.5%, while artificially raised (from cultures) represent 7.8% of the forest. The average density of forests in Serbia is 939 trees per hectare.

Total number of established national inventory of woody species (important for forestry) in Serbia is 49 species. Of this number, there are 40 species of deciduous and the other, evergreen, are represented by 9. The total volume record the highest percentage of beech forest 40.5%, 13.0%, followed by bitter and sessile oak 5.9%, 5.8% of Italian oak, hornbeam 4.2%, 3.1% locust, oak 2.5% and 1.6% of ash. Spruce Coniferous has the largest capacity share of 5.2% and 4.5% of white pine and fir 2.3%. While the poplar is grown on 1.7% in volume of the total forests in Serbia, other types of trees have 1 or less than 1% share. Of the total forest area (2,252,400 ha) in Serbia state-owned is 1.194 million ha, or 53%, and other 1,058,400 ha or 47% is privately owned. (National Forest Inventory of the Republic of Serbia, 2009).

In the context of sustainable development and conservation of the environment and biodiversity, a growing need for protected areas in the national and international instruments ratified by our State exists. Protected areas are considered in the light of climate change, one of the main tools to mitigate these effects. Preserved, especially forests, ecosystems have greater flexibility and adaptability in relation to climate change. Protected areas can mitigate climate change by preventing the accumulation of carbon being lost in the process of photosynthesis absorb de novo and associate carbon from the atmosphere. Integral ecosystems contribute to the mitigation of extreme events such as storms, floods and droughts. Sustainable use of protected ecosystem has its economic importance in terms of tourism and fisheries, as in the Danube region can be emphasized. (The assessment of vulnerability to climate change, Serbia, Belgrade, 2012.)

The wealth of forests in Serbia in the number of tree species, their biodiversity and the primary gene centers are unique in Europe. Total number of native species of trees and shrubs is 205, among which should be highlighted endemic and endemorelict (Pinus pence, heldreichii Pinus, Picea spruce, Fraxinus pallisae, Forsythia europaea, Corylus colurna). It is estimated that there are about 1000 plant communities. Gorges and canyons from the eastern to the western part of Serbia are important refungium of tertiary Balkan Peninsula and the most of their communities are forestry ecosystems. In Serbia, are endangered approximately 600 plant species and 500 animal species about. In Serbia, the preservation of biodiversity realized in two ways:

• In situ - biodiversity conservation or preservation of existing communities through: nature reserves, national parks, seed stands, and groups of trees or individual trees

• Ex situ - the preservation of the gene pool of specialized crops or raising the Arboretum, a living archive, tests provenance, progeny tests, seed orchards.

In order to preserve biodiversity in Serbia were isolated natural communities of different nature: 50 nature reserves, of 569.000 ha, 5 National Parks (Fruska Gora, Iron Gate, Tara, Kopaonik and Sara) on an area of 246.000 ha and 934 ha of seed stands with a dense network of parallel clonal plantations with domestic and foreign clones of poplar, willow and black locust. (Professional basis for the development of the National Forest Action Programme, 2008)

Forests as a factor in climate change

Climate change is a global problem with serious consequences at the local level. In the center of the Serbian Danube following climate change occurs:

- Absent of the usual seasonal changes, with frequent droughts and floods, which caused significant damage.
- The increases of temperature and drought have particularly negative consequences for the agricultural area of the Lower Danube and Vojvodina.
- Reduced winter snow cover and reduce indirect impact on the reduction of water resources (drinking water, as well as those designed for industry and agriculture)
- Forests are vulnerable in many ways by climate change: fires are more common and more dangerous, more frequent are disease outbreaks, epidemics and pests.

Legislation in the field of environmental protection in Serbia has been adapted internationally, especially taking into account the protected area as a special nature reserve Upper Danube and the National Park Fruska Gora and the Iron Gate on the Danube area. These are unique natural ecosystems and are rare and valuable in terms of biodiversity that they have.

Global warming has an impact on forest ecosystems so that there is more to the withdrawal of forest and cooler locations. The impact of climate change is evident in Serbia and one of the areas most exposed to the impact of these changes is considered to be the Danube-Carpathian Basin. The impacts that climate change may have on the forest are as follows:

- Pushing the limits of some forest types in relation to the geographic breadth of the house, and elevation;
- Change the size distribution of different forest types and their relationship;
- The Decline and withdrawal of certain forest communities
- Changes in the composition of plant communities
- Changes in the ratio of individual species to the light
- All of the above will have the effect of cumulative effect, which will adversely affect the conservation of biological diversity and the possibility of a rational management of these natural resources. (Medarević et al., 2007).

Forests are an important component of the global carbon cycle. Forests are in an interdependent relationship with climate and represent an important factor in global warming. The forests are the main vegetation type in terms of net source of carbon bonding and retention. Forest ecosystems and land that is associated with has a great capacity to accumulate and release carbon.

Forests are an important reservoir of carbon and we have to mark them as potential for mitigation of global warming due to the binding capacity and the accumulation of carbon. Forests are exposed to climate change in terms of increasing mean annual temperature, precipitation and changes in extreme weather conditions. Adverse climate changes in forest communities adapt to specific physiological mechanisms but the relationship is interdependent. Forests produce wood mass that binds and protects carbon dioxide, thereby supporting climate change. Deforestation and over-exploitation and destruction leads to releasing carbon dioxide gas as one of the greenhouse gases. Combustion of fossil fuels emits carbon dioxide into the atmosphere where its concentration is increased, leading to global warming and climate change. Trees and Forests mitigate this change by binding of carbon dioxide in the process of photosynthesis and store it in the form of various compounds in the wood mass in a process called "carbon capture to."

Forests and carbon cycling

It is considered that the level of carbon has not changed in the last six thousand years and maintaining control should take measures to ensure its ecological balance. A small change in the rate of photosynthesis, respiration and decomposition might cause changes in the level of carbon dioxide which also affects the global climate for decades. According to the theoretical basis, the increase of carbon dioxide can be stimulating and enhancing for the growth and development of plants, which means that forests will have better growth by increasing carbon dioxide in the atmosphere. Under experimental conditions, it was shown that a doubling of carbon dioxide leads to the initial increase in growth of 20-120% with an average increase of 40% (Eamus and Jarvis, 1989). However, with further increase of carbon dioxide level, effect on growth is positive but more reducing.

Investigating carbon cycle as the process, one must take into account that 20% of the wood weight is carbon, apart from the carbon present in the soil organic matter in the humus occurring decomposition of biomass. This results in enormous storage of carbon in forests, where it is twice more than in the free atmosphere, according to research by FAO. Approximately, 7.6 billion tons of carbon is emitted into the atmosphere each year, of which 6 billion tons comes from the fuel burning and 1.6 billion from deforestation (IPCC, 1992). According to the International Panel on Climate Change (IPCC), a reduction in carbon dioxide emissions is required to at least 60% to stabilize its level in the atmosphere. Serbia is a signatory to the Convention on Climate Change of the United Nations explaining what must be done to educate and raise awareness on climate change and energy conservation.

Table 1. *Carbon reserves in relation to the origin of the forests*

The origin forest	Area (ha)	Volume (m^3)	Carbon (t)
High natural stands	621.200,0	157.511.262,8	50.411.688,6
Coppice	1.456.400,0	181.188.914,2	63.733.764,2
Artificially established	174.800,0	23.787.240,6	6.091.897,6
Total	2.252.400,0	362.487.417,6	120.237.350,4

Source: *National Forest Inventory of the Republic of Serbia, 2009.*

Table 1 shows the reserves of carbon in wood volume of forests in Serbia for assessment that is presented to the National Forest Inventory. The amount of carbon that is retained in the forest depends on the growth of

biomass, which depends on various factors (changes in forest area, commercial logging, forest fires, extreme weather, air pollution, changes in land conditions, soil erosion, introduction of harmful insects and pathogenic fungi, etc.). (Karadzic, D. (2007)) in relation to the total area of forest carbon reserves amounted to 53.38 t / ha.

In Table 2 the observed data indicate that the ratio of the value and volume of individual tree species and carbon proportionate is the largest in its most common letters.

Table 2. *Reserves carbon in relation to the most common tree species*

Tree species	V –volume (m^3)	Mass C-carbon(t)
Beech	146.850.828	50.663.535,6
Oak	9.242.373	2.865.135,6
Sessile	21.542.890	7.109.153,7
Hornbeam	15.157.240	5.982.645,1
Turkey oak	46.980.446	18.322.373,9
Italian oak	20.986.446	7.030.465,8
Silver Linden	1.779.096	435.755,5
Acacia	11.243.944	4.160.259,1
European poplar	6.137.862	1.288.951,1
Spruce	18.810.547	4.015.583,1
Fir	8.304.924	1.702.509,3
White and black pine	16.434.457	4.765.992,4
Total	323.471.072	108.342.360,2

Source: *National Forest Inventory of the Republic of Serbia, 2009.*

Forest management must be considered as a function of emission reduction and carbon absorption with conservation of accumulated carbon in existing forests as a great potential in the system of management.

Danube forest ecosystems in Serbia are rich in flora and fauna. Danube area, as a big powerful body along the river, is characterized by marshes and wetlands filled with diverse flora and fauna. A flooded area along the Danube is reduced due its conversion into agricultural land and drainage, and has a reduced diversity of native flora and fauna. Forests have undergone changes and old willows were replaced by European poplar. Although the Danube area is rich with protected areas and numerous plants and animal species, the importance of preserving wetlands and floodplains is underlined. These areas are ornithological reserves of rare and endangered species.

Upper Danube basin

Under the area of Upper Danube basin within its borders, has a special nature reserve of the same name (protected by the Regulation on the protection of a special nature reserve "Upper Danube," Official Gazette of RS, 45/01). This special nature reserve is a natural resource of great importance and is one of the first categories of protected resources. By classification of IUCN it is placed in category IV as Habitat and Species Management Area. The reserve represents an area (19. 648 ha), placed on the left valley plain of the Danube from border with Hungary to Bogojeva, covering the city of Sombor and the Municipality of Apatin.

Special Nature Reserve of the Upper Danube is a large marsh complex. This partly hydromorphic area is also a part of Hungary and Croatia, and considered as one of the last major flood areas in Europe. In the composition of this nature reserves enter Monoštor and Apatin marsh. These marshes are composed of a number of plant communities such as forests, meadows, ponds and wetlands along the Danube River and its meanders. This wetland was drained and thus is very narrow, representing the rest of the great marsh ecosystem. The impact of human activities in this area is reflected in the establishment of forest plantations. These planted forests at the same time are used as hunting grounds. Over large areas (over 1000 ha) on rewire "Tikveš" and "Karapandža" oak was raised. Establish of the hunting association on the forest farm "Jelen" in 1952. opened a new era in management regarding forestry, hunting and fishing in this area. It has been realized as an imperative that these complex forest must be managed comprehensively and integrally, as this is a valuable natural resource and rarity.

Today we can say that this is a special nature reserve and one of the last refuges for plants and animals associated with floodplains.

In terms of fauna presented in the reserve, there are, 51 species of mammals, 248 species of birds, 50 species of fish, 11 species of amphibians, 9 species of reptiles, many invertebrates. In terms of flora it is considered that there are more than 1000 species of plants. The reserve is home to dense almost impassable marshy forests composed of native poplars. The reserve is represented and some endangered species *Eranthis hyemalis, Hottonia palustris* and *Hippuris vulgaris.*

It is quite obvious that reserve must be investigated not only in terms of biodiversity and natural values but in terms of tourism. There is a great potential in the authentic cultural heritage of this area, which makes it very authentic as destination. Developing hunting tourism and fishing represents certainly a big potential in this area. The high level of awareness and knowledge of local people about the need and importance of the protection and conservation of these ecosystems on the principles of sustainable development must be noted. http://www.gornjepoduna vlje.info

In view of the research the forestry Apatin, Bač, Bačka Palanka, Beočin and Sombor city will be presented. (Table 3.)

Table 3. *The total forest area in some municipalities of the Upper Danube basin*

	Forest area (ha)		
Municipality/year	**1979**	**2005**	**2008**
Sombor (city)	7.076	6.644	6.626
Apatin	2.984	4.877	4.350
Bač	3.140	4.114	4.616
Bačka Palanka	2.810	10.277	4.808
Beočin	5.287	5.640	5.815

Source: *Municipalities in Serbia, Statistical Office of the Republic of Serbia.*

In relation to the forest area it is noted that the trend of increasing forest area and reforestation is being implemented. It is observed that the city of Sombor has a biggest forest area of all municipalities and that the existing data on other municipalities with smaller areas and that the oscillations (if the data is reliable) is the largest in the Bačka Palanka.

Apatin municipality has under forests (of the total 332 km^2) 4350 ha, which represents 13% (below the national average). Special contribution to biodiversity of this municipality is famous Apatin marsh. Sombor is a city with territory of 1. 178 km^2 and 6626 ha of forest (which represents 5.62%). Bach is a municipality in the investigated area, which has 12.6% of its territory covered with forest (total area of 36.500 ha of forest is 4.616 ha), (Municipalities in Serbia 2010). Largest forests are placed in the southern and the western part of a municipality. Among trees and shrubs the most represented is American ash, domestic poplar, locust, oak and oak as well as natural communities, having also a plantation forest.

Forests are being built here in order to protect from pop lion and strong winds. Alleys were also erected along the roads and on farms. In a municipality of Backa Palanka. as it is largely under the influence of human activities, the original natural environment and biocenosis loess terraces were turned into fields. Some parts of the former municipalities have preserved the authentic look and natural vegetation particularly in steppe grasslands and thickets, especially in the Danube. At loess terrace less forest area consisting of acacia trees and shrubs and oak, are presented. The largest forest is Popina (Bagremara). The forest area represents only 8.36% (57.500 ha of municipal area is 4.808 ha of forest).

The municipality located in Beočin is on the shore of Danube, subjacent of Fruška Gora. Forest within the municipality is 31.3% of the total territory (18. 600 ha of forest is covered 5815 ha). Most of the forests are deciduous and are located in the National Park Fruška Gora. According to the plans at the municipal level, the reforestation of the forest management will be carried out targeting: regeneration to appropriate indigenous species, the capacity of existing forests increment, and rationalization of the forest funds exploitation.

The Middle Danube Region

In the Middle Danube basin, designated as metropolitan areas, some municipalities and cities that are related to this field were considered. Both urban and agricultural activities in this area have greatly changed and are not like its original appearance. Now on the threshold of the New Sad the National Park Fruška Gora is placed as an Important Bird Area (IBA) and Important Plants Area (IPA). This mountain (539 m highest point) is rich with oak, hornbeam, beech, linden and other trees species. Flora of the protected area has over 1,500 plant species. The plant communities of the National Park are inhabited by over 50 endangered plant species. It should be noted that it was found more than 30 species of orchids, of which 18 species of international importance. In addition to dendroflora a fragmented steppe species might be found. Among fauna presented a protected species of insects, amphibians and reptiles, which are on the Red List of Threatened Species, might be found. Avian species are represented with 211 ones of which 130 are nesting. Fruška Gora is one of the most important areas for rare birds nesting in the Pannonian Plain and Serbia. Only in Fruška Gora eagle nest one of the endangered species. Of the many species of mammals protected species of bats, ground squirrel and mole rat should be set aside. Within the researched

area Irig municipality (capital of Fruska Gora) has forests on 17.82% (total territory is 23,000 ha of which 4099 ha is covered with forest). (Table 4) In terms of flora and fauna this municipality is conditioned by relief, climate, hydrograph, etc. factors. In addition to forest Fruska Gora has grass plant communities. Here, the presence of a large number of herbs species might be found. Plant communities are a good habitat for wildlife and accordingly the hunt is possible.

Table 4. *The total forest area in some municipalities of the Middle Danube basin*

	Forest area (ha)		
Manicipality/year	**1979**	**2005**	**2008**
Irig	4007	3914	4009
Inđija	831	354	694
Ruma	5975	7464	7831
Pećinci	4648	8307	8756
Pancevo (city)	1085	1292	3160
Smederevo (city)	2617	2910	1521

Source: *Municipalities in Serbia, Statistical Office of the Republic of Serbia.*

Inđija municipality is very poor with forest (1.64%); existing forest is placed along the bank of the Danube and complex of forests in Čortanovci belongs to the National Park Fruška Gora. In terms of fauna there is a little wildlife (deer, rabbits, foxes, hamsters and other small rodents) presented ; birds such as grouse, quail, pheasants are controlled by hunting societies. The Danube hosts perch, carp and sturgeon of fish species. In Smederevo, as one of the municipalities investigated in the Middle Danube Basin Forest Fund, exist a problem but it was reduced to 3.16% (according to the latest statistics of 481 km^2 of the total area of the municipality only 1.521 ha is covered with forest). Forests in this municipality are mostly planted with climatogenous farneto and bitter oak.

In the town of Pančevo ecosystems with many species of flora and fauna that are endemic and relict can be concluded. In terms of tree species it is prevalent European hybrid of poplar, white willow and black poplar, red oak, elm juniper (unique autochthonous conifer of Pannonian Plain). Among herbaceous plants it should be also mentioned Banat peony, Pančić wormwood, sandy immortelle, swamp and marsh communities have rush,

trask, screens, white and yellow water lilies, on the loess dryer plateau residents are: foxglove, thistle, pigweed, mustard, dandelion, and yarrow. Venison has a large (deer, roe deer, wild boars, foxes, wolves rarely) and small game (badger, hamster, otter, nutria, rabbit, skunk, weasel and hedgehog). The steppe habitats of rare species are such as desert ants, ant lion, prairie gerbil, ground squirrel, mole rat, steppe polecat. In the city of Pančevo, as highly urban environment, the decrease in forest reserves from 12. 925 ha (2006.) to 3.160 ha (2008.) can be registered. This fact can not be ignored given the importance of forest assemblies for this polluted environment. Reforestation activities must be intensified, and also prevent unplanned and uncontrolled logging and harvesting of existing forest reserves.

The total forest area in the Belgrade area (urban and suburban municipalities) is 9141 ha (relative to the entire territory of 3205 km^2 of the area that represents 12.2%). Area covered with forest per capita is 0.025 ha. Minimum optimal forest area per capita of a region is 0.33 ha making thus an optimum to the positive ecological functions of forests in environmental conservation. To activate reforestation in Belgrade is certainly a priority. Contemporary open attitude and approach to the problem of climate change has one of the solutions to raise larger plantation forest management in urban areas such as Belgrade. Study by Professor Brian Stone's (Institute of Technology, Georgia) has proposed planting of millions of trees that would create a new city forest, which would be part of the solution of climate change at the international level. (http://openalex.blogspot.com/2009/11/urban-forestskey-to-international.html)

The situation in terms of growing stock in Novi Sad urban environment is certainly not satisfactory (total city area of 699 km^2 is covered with forest on 2 618 ha, representing only 3.74%). Regarding to many pollutants in this city it is needed to increase the protection of the forest fund and it is one of primary activities at the city of Novi Sad.

The Lower Danube basin

Within the Lower Danube, still referred to as the Carpathian area, the five municipalities Golubac Kučevo Majdanpek Kladovo and Negotin were taken for analyzing. (Table 5) The central part of the area is occupied by sparsely populated, wooded hills and mountains and the National Park Iron Gate. Each of these municipalities belongs partially to the national park.Iron Gate is a national park that meets the geomorphological, hydrological and natural science requirements for national park status (Official Gazette 36/09) . Iron Gate National Park is the territory placed in southeast of the Europe and the

north-eastern of Serbia, on the border with Romania. Đerdap lays on the right bank of the Danube from Golubac to Karataš near Kladovo occupying 100 km in length. (www. djerdap np. org / start. html)

As the main feature of the Iron Gate overgrown forests (64%) is considered, with forest communities rich and diverse. From over 1. 100 plant species should allocate relict and endemic. Corylus Colum is one of the relict species, which here forms thick and old phytocenoses with other relics. Eternal green trees and shrubs in the Iron Gate are represented by holly *(Ilex aqufolium),* olive *(Daphne laureola)* and yew *(Taxus baccata).* Together with relict species in these communities one can meet modern species of trees and shrubs. Approximately there are fifty plant communities in this area of which 35 are relict. Vegetation characteristic of this national park is that different types of woods alternate at a short distance. Large differences were observed in the forests of silicates in relation to the forest on a limestone base. In addition to the previously mentioned species Corylus columna relict communities are made up of the following types: Lilac (Syringa vulgaris), walnut (Juglans regia), silver linden (Tilia cordata), maple (Acer monspesulanum), downy oak (Quercus pubescens), hackberry (Celtis australis) , sumac (Corinus coggigrya). Most important with particular emphasis on forests are Moesian beech (Fagus moesiaca), oak (Quercus petraea) and hornbeam (Carpinus betulus). It is considered that the scientific significance have a relics of the mixed forest community types:

- Beech, colurna, walnut and other species
- Oak, ash, colurna, lilac and other
- Forests lilac ,colurna and other
- Forests hackberry, walnut and other species with lilac
- Forests of maple, linden and other types of nuts
- Beech forests with walnut and other species
- Forests consisting of oak, hornbeam, lilac and other species.

It can be based on these forest communities to conclude that in this national park, there is very interesting mosaic of forest types and communities of interest in the scientific and tourist sense. Iron Gate is the largest national park in Serbia and as such is protected by a special legal document. Local plan for use of the National Park represents the goals and objectives of nature conservation and development, and measures to improve conditions and sustainable use of the area. According to this document zone with three levels of protection were determined. In addition, the National Park was established as Iron Gate IBA (Important Bird Areas), IPA (Important Plant Areas) and

PBA (Prime Butterfly Areas) and is a part of the EMERALD area network (Emerald Network of Areas of Special Conservation Interest - ASCII) - significant with point application of Convention on European wildly Flora and fauna and natural Habitats (Bern Convention) conservation in Serbia. The area of this park is placed on the Preliminary List of the World Cultural and Natural Heritage (UNESCO), is a candidate for the Biosphere (MAB), and is in the list of the Carpathian region (Framework Convention on the Protection and Sustainable Development of the Carpathians). (Spatial Plan of Special Purpose for national park "Iron Gate", 2011.) All regulations must be given to the importance and implementation of activities to protect this national park has to be implemented. It is believed that the health of these forests is unfavorable. Epidemic drying in much of the national park have moderate intensity while it is prominent in the sessile oak forests. Causes of drying are pests (gypsy moths and other insects), and fungal infections of origin. Forests are exposed to climate change and the impact of pollutants.

Table 5. *The total forest area in some municipalities of the Lower Danube basin*

	Forest area (ha)		
Municipality/year	**1979**	**2005**	**2008**
Kladovo	28.114	18.017	25.423
Majdanpek	64.769	80.592	80.592
Negotin	27.454	27.530	27.530
Golubac	16.554	16.554	16.498
Kučevo	35.915	34.911	34.880

Source: *Municipalities in Serbia, Statistical Office of the Republic of Serbia.*

The Golubac municipality has an area of 368 km^2, of which forests are covering 174.06 km^2, which makes 47.4% of the territory (which is above the national average, of app. 28% - Rural Development Strategy Plan, 2009-2013.). The forest fund is predominantly covered with 82.2% of beech and less with 9.5%. of oak The Danube River is a key natural resource and greatest comparative advantage of this municipality. (Table 5)

According to official statistics (Municipalities in Serbia 2010. forest area in the municipality of Negotin is 27. 530 hectares (which is 25.28% of the total area of the municipality, the data has not changed in the last five years). The plan for reforestation activities is actual where emphasis will be placed on the protection, rehabilitation, controlled harvesting and sustainable use of forests. Since there are four hunting (Negotinska Krajna, Deli Jovan Alija

and Vrat) in which the big game (mouflon, fallow deer, European deer, chamois, wild boar, deer) and small game (pheasant, rabbit, quail) are grown, it is planed to increase and track the number and diversity of game, contributing to the conservation and enhancement of biodiversity of the area. Development opportunities, which contribute to diversification of agricultural activities in the municipality of Negotin are collection, cultivation and processing of a variety of herbs and berries.

Within the municipality, which has Kučevo 721 km^2 are significant areas covered with trees seizing 348.8 km^2 (48.34%). Forests are a resource base for the timber industry, thus representing a priority for sustainable development in this municipality. Kladovo Municipality has favorable agro-ecological conditions reflected by the presence of vast plains and river terraces (Donji Ključ) and elevated areas of forests and pastures (Gornji Ključ). Forest is covering more than 40% of the municipality`s land of which the largest part belongs to the NP "Iron Gate" and "Srbija forest". It is considered that there is significant potential for gathering berries and herbs in this municipality. Majdanpek municipality is placed in mountainous part of the Carpathians, covered with 68%of forests (2.3 times bigger than the national average). Raw forest potentials in Majdanpek are underutilized, stacked wood is used for the production of fuel wood, charcoal and cellulose. The plans of the municipality focusing on diversification of economic activities to increase activated population has included intensification of the following activities (for which there is real potential and opportunities): collecting medicinal herbs and forest fruits as related to the production of organic food, cosmetic and pharmaceutical industries development.

Conclusion

A Forest ecosystem in the Serbian Danube region, discussed in this paper, represents a part of the whole European Danube region and must be preserved as it is ratified in international and national regulations specified. Modern approach to the problem of forest ecosystems must be comprehensive and current climate change must be taken into account. Interaction of climate change and the carbon cycle in nature is intrinsically linked with the state and the sustainable use of forests in the global and local levels. In the Serbian Danube region significant numbers of forests are preserved in their natural state representing thus a resource that should be preserved and enhanced. The world trend of increasing urban forest plantations can be achieved in the metropolitan area associated with the great industrialized cities such as Belgrade and Novi Sad.

The concept of sustainable development of the basic principles that must be respected assume the active role of human activity on the local level, so the local population must have a high level of awareness on environmental protection in order to achieve the set goals of sustainable development at a global level. Forests are placed particularly in the Lower Danube region natural resource with high biodiversity. Serbian Danube area is also interesting from the tourist point of view representing a natural phenomenon that must be protected and preserved respecting the principles of sustainable development.

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TECHNOLOGICAL PROCESS OF EXTRUSION AND ITS EFFECTS OF NUTRITIVE VALUE OF FEED FOR ANIMALS

Nikola Puvača, Vladislav Stanaćev[1]

Abstract

Throughout the world as well as in Serbia, different thermal processes are used for improving nutritional value of food and feed products intended for human and animal consumption. Food processing is an extremely important in developed and non-developed countries. Due to rapid global population growth, severe food shortages could be faced. To prevent this, food and feed production must be increased through application of new technologies in biotechnology, that is, bio-industry. Technological parameters of extrusion process, quality of feed after extrusion and major transformations in feed structure occurring during thermal treatment are presented. Development of animal production is, however, impeded due to difficulties caused by continuous rise of feed prices and occasional shortages of protein feeds. The aim of this paper is to present the effect of extrusion on the nutritive value of feed: soybean, rapeseed and corn.

Keywords: *technology, extrusion, quality, nutrition, feedstuffs, animals*

Introduction

Food processing is an extremely important in developed and non-developed countries. Due to rapid global population growth, severe food shortages could be faced. To prevent this, food and feed production must be increased through application of new technologies in biotechnology, that is, bio-industry (Lazarević et al., 2005). Numerous technological processes aimed at improving nutritional value of food and feed products intended for human and animal consumption and efficiently utilization of primary and processed agricultural and food by-products have been

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developed worldwide. Heat treatments are used to improve the nutritional, hygienic, physical and chemical and other animal feed properties. There are many heat treatments, each different in the heat source, construction of the device or process parameters applied, and their efficiency depends on a range of factors. Two unavoidable factors of all heat treatments are temperature and time of their application, although the impacts such as humidity, pressure, shear force and others causing additional effects cannot be neglected either.

Combining of these parameters is the starting point for development of all kinds of heat treatments and devices that are used in feed industry. Basically, all the different process techniques increase the temperature of the product. If you are adding moisture in the process, we are talking about hydrothermal treatment. Most of the processes that are used are hydrothermal treatments because even when moisture is not introduced from the outside moisture released from the material to be treated participates in the process. Another effect is mechanical and it can be located in or out of the heat treatment device. No matter where it is carried out, the mechanical treatment causes an additional effect to heat treatments so that they become thermo-mechanical processes. Thus, there are many possible combinations, and types of heat treatments in animal feed processing, and most frequently used are cooking, roasting, popping, steam flaking, toasting, conditioning, pelleting, micronisation, expanding and extrusion (Puvača, 2011; Puvača et al., 2012).

Today, various heat treatment processes are used worldwide for cereals and other grain processing, such as toasting, extrusion, hydrothermal treatment, micronization, microwave heat treatment, dielectric heat treatment (Tsukamoto et al., 1995; Sakač et al., 2001; Marsman et al., 1998), however, according to the practical experience and literature data (Sakač et al., 2002; Sakač et al., 2003; Sakač et al., 2006), extrusion is the most commonly used processes in Serbia. Extrusion is a complex and complicated technological process, but it is very flexible and provides the possibility for processing of a range of different raw materials:

- Oilseeds (soybean, sunflower, rapeseed, cotton seed, peanuts, etc.)
- Cereals (wheat, corn, barley, rice, oats, etc.)
- Legumes (beans, peas and field pea)
- Raw materials with high moisture content (fresh fruits and vegetables, animal, fish and milk proteins)

- Combinations of raw materials (different portions of some of the above raw materials which are mutually complementary in nutrient content)
- By-products and wastes from the food industry (e.g. rendering plant products, meat and meat and bone meal, waste from fish processing industry, by-products of dairy industry, breweries, sugar refineries, etc.)
- Complete animal feed mixtures (balanced meals for piglets, calves, poultry, dairy cows and horses, fish feed, pet food, etc.).

Extrusion is the technological treatment that modifies the most the internal structure of material. After treatment, the product is often quite different, from nutritional point of view, compared to the raw material from which it is composed. The material that has been properly extruded is much better, according to its nutritional and physical properties than the pelleted material. Animal feed components undergo a whole range of changes during extrusion. These are primarily changes in starch and protein components. Friction and shear of the product during the extrusion provide an additional effect caused by the splitting of oil cells, and cell walls. Given that this is the treatment with high temperature and short duration, the loss of useful substances is minimised. However, it should be noted that irregular extrusion might result in negative effects. Properly applied heat treatment process has been shown to reduce anti-nutritional factors to an acceptable level, enhance digestibility of some nutrients (protein, oil, carbo hydrate), and improve sensory properties and microbiological quality of final product (Jansen, 1991).

Along with the antinutrient content reduction, thermolabile nutritive components must be preserved, therefore, process need to compromise these two demands. Soybean processing into high protein and high energy feed involves application of heat treatment processes, namely extrusion. Advantage of this process, the final result of which is the full fat extruded soybean grits, soybean processed by dry or moist extrusion and heat treated soybean seeds, is that it offers possibility for the production of quality product with improved hygienic and physico-chemical properties. Besides cereals, as carbohydrate portion of a diet, animal feed must provide protein and fat of satisfactory biologic value. Soybean is the main source of protein for the feed industry and is also considered a high energy feed due to its oil content. In Serbia, the use of feeds made from heat treated soybean grain is becoming more widespread in recent years. Whole soybean grains contain approximately 38% protein and 20% and are of special value for young animals with higher dietary energy

requirements (Hanson, 1996). Extrusion is a technological process during which soybean is subjected to high temperature and high pressure and during which raw material is mechanically treated by shear forces (friction), that transform the structure of the initial material and create final product of different chemical composition, appearance, shape, etc. During extrusion, soybean seed undergoes numerous physico-chemical transformations and antinutritional factors are reduced (trypsin inhibitor by 97-98%) (Puvača, 2011).

When soybean is exposed to excessive heat treating, or over-processing, the negative effects that reduce protein and essential amino acids content and give rise to undesirable reactions – Maillard reaction, lipid oxidation and others occur (Sakač et al., 1996). Furthermore, carbohydrate digestibility is increased during extrusion process, as reflected by the changes in the rheological properties of starch, i.e. starch swelling, solubility in cold water, decreased viscosity and partial or complete release of amylose and amylopectin from starch granules. Starch gelatinization that takes place in the course of extrusion is an irreversible process, and when cooled, its volume is usually increased by 2 or 3 times (Miller, 1978).

Together with soybean, rapeseed (*Brasicca* sp.) is an oilseed crop having huge potential from an energy and protein standpoint, and containing components of high nutritive value, notably proteins and oil, but it also contains antinutritional factors such as erucic acid and glucosinolinates (Sakač et al., 2007; Stanaćev et al., 2008; Stanaćev et al., 2011). Although rapeseed is a good source of quality protein, its use in rations is limited by its fibre, phytic acid, glucosinolates, polyphenols content (Mansour et al., 1993; Naczk et al., 1998; Park et al., 2000). The use of rapeseed in compound feed is rather limited by its poor sensory properties because of high glucosinolate content– which is responsible for the pungent odour and biting taste as well as palatability, nutritional and health-related problems, particularly in non-ruminants (Puvača, 2011).

Problems caused by the antinutritional factors present in rapeseed can be overcome by selection and development of low-glucosinolate rapeseed varieties and application of technological processing methods (thermal treatment) leading to reduced glucosinolate and other anti-nutrient content. Use of rapeseed which is after extrusion, converted

into a high energy and protein feed leads to improved feed utilization efficiency and increased use of this feed in animal production (Milošević et al., 2005). Adequate energy level in complete feeds can be obtained through cereal supplementation, as the carbohydrate portion of the ration. Cereals and milling by-products are primary source of energy in animal diets, and major ingredients in commercial feed.

Corn is the most commonly used grain in the animal feed production in Serbia due to its high energy content (16.2 MJ/kg), starch content, relatively high oil content and low fibre content. In addition to its excellent digestibility, corn is considered to have better flavour than other grains (Berkrić, 1999). Rules on quality and other requirements to be met by animal feed specifies that, apart from corn and grains, wheat and corn bran, wheat and corn meal, corn germs, rye and rice bran and other milling products may be used in animal feeding systems. Thermal treatment is typically used to enhance nutritional, hygienic, physico-chemical and other properties of grains, i.e. to improve nutritive value of some ingredients, upgrade sensory characteristics, ensure the microbiological wholesomeness of final product and inactivate thermo-labile anti-nutrients (Jansen, 1991; Stanaćev et al., 2011; Stanaćev et al., 2012; Puvača et al., 2012).

Extrusion is a heat treatment which involves HT/ST principle of extrusion cooking (high temperature/short time), namely, the process in which material is exposed to high temperature (to 200 °C) for short time (to 2 minutes). Extrusion processing of corn, which is the major raw material in the animal feed production (Filipović et al., 2008), as well as extrusion of corn dry milling, and contribute to improve feed utilization efficiency (Kormanjoš et al., 2007). There is a growing demand for meat, milk and other animal farming products. Development of animal production is, however, impeded due to difficulties caused by continuous rise of feed prices and occasional shortages of protein feeds.

Materials and methods

Soybean extrusio – dry process

Extrusion of soybean was carried out in the machine manufactured by "Oprema zootehnička oprema" Ludbreg, Croatia, type M2, model

1000. Soybeans were pre-dried to moisture content of 10%, and cleaned of foreign material by means of air aspirators. Throughput capacity of the extruder was 1000 kg/h, rated power of electric motor 77 kW, and screw feeder driven by 1.5 kW electric motor. Extruder assembly consisted of four segments (extruder zones) and four screw flights with different pitch. Screw flight sections are mounted on the extruder drive shaft. Since the screw flight sections are segmented, ring-like "shearlocks" and restriction units are placed between each section to control the pressure. Used shearlocks were marked 5 3/2", 5 3/2", 5 ½" and 5 ½". Extruder head with nozzle was placed at the end of the flight section of screw. When screw flight sections, shearlocks and restriction units are mounted on the extruder drive shaft, segments are placed onto the extruder drive shaft and tightened in place. Digital thermometer is mounted in the last segment of the extruder and water and steam connections in the first segment.

Soybean extrusion - wet process with stream injection

Soya extrusion with steam conditioning was carried out in "Miltenz" device, type 501-SP (New Zealand), throughput capacity 500 kg/h. Extruded consisted of five heating segments (zones), main electric motor with nominal power of 37.5 kW, screw feeder driven by 1.5 kW electric motor and extrudate cutting device driven by 2.2 kW electric motor. Soybeans were treated using three segments. Conditioning of ground soybean was carried out with saturated steam at 5.5-6.0 bars. Extrudate flow was regulated by die openings adjustment. Optimized opening diameter at the end of the extrusion process was ¾" (19 mm). Retention time in the extruder was constant at about 7 seconds. Retention time was determined by adding red colour into the ground material before entering the extruder, i.e. by measuring time needed for coloured extrudate to exit the extruder. Following the extrusion, final product was cooled to the room temperature.

Rapeseed extrusion

Rapeseed and mixtures of rapeseed with corn were used for extrusion (rapeseed : corn – 30:70 and 50:50). Extrusion was carried out in the machine manufactured by "Oprema-zootehnička oprema", type M2, model 1000 extruder (Ludberg, Croatia), with four heating segments. Throughput capacity was 850-1000 kg/h, rated power of electric motor 75 kW, and screw feeder driven by 1.5 kW electric motor. Rapeseed

and mixtures of rapeseed with corn were subjected to heat treatment using all 4 heating segments with "shearlocks" and restriction units placed between each segment to control the pressure and temperature of the material subjected to extrusion and regulate flow through the extruder. Extruder head with nozzle was placed at the end of the flight section of screw. Extruder assembly consisted of four identical segments placed onto the extruder drive shaft and tightened in place when screw flight sections, shearlocks and restriction units were mounted on the extruder drive shaft. Working temperature measured in the head of extruder during extrusion was 125±1°C, extruder capacity was 90%, current strength 85-90 A, and nozzle diameter 8 mm.

Corn extrusion

Corn with moisture content of 12%, pre-ground in a hammer mill, screen size Ø 5 mm, and then moistened for 6 hours to reach 18% moisture, was used for extrusion. The extruder used had throughput capacity 900 kg/h, electric motor power 100 kW and screw feeder driven by 1,1 kW electric motor. Extrusion temperature was 90 and 95 ^{0}C.

Chemical methods used for determining quality of soya, rapessed and corn

Basic chemical composition (moisture content, crude protein, crude fat, crude fibre and mineral matter content) was determined according to A.O.A.C. method (1984). Starch and total reducing sugar content was determined in accordance with the Rules on the methods of sampling and carrying out chemical and physical analyses of grains, mill and bakery products, pasta and quick frozen pastry products. Content of trypsin inhibitor in soybean seed and extruded full fat soya grits (dry extrusion and conditioning) was determined according to the method of Hamerstand at al. (1981). Urease activity in analyzed samples was determined according to the method prescribed by International ISO 5506 standard (1988). Nitrogen Solubility Index – NSI was determined according to A.O.C.S. method (1987). Amino acid composition of tested samples was determined on Biotronic LC 5001. Samples were hydrolized with 6 mol/dm^3 hydrochloric acid for 23 h at 110 °C. Cystine and methionine were previously oxidized with formic acid for 15 h at 2 °C (Moore et al., 1958). Content of total

glucosinolates was determined according to the Hungarian standard MSZ-08-1908-1989 which includes absorbency measurement of Pd-complex glucosinolates at 425 nm. Standard curve is designed by spectrophotometer series standard solution of synigrine (Sigma, S-1647) with Pd-reagent.

Results and discussion

Quality of feed made in the dry extrusion process can be determined based on the results obtained for chemical composition and amino acid composition of soybean seeds before and extruded full fat soya grits after the treatment (Table 1). Contrary to the soybean seeds, where proportion of amino acids in total protein content was 95.88%, certain losses in amino acid content occurred during production of extruded full fat soya grits and proportion of amino acids in total protein content dropped to 87.04%. This reduction in the content of some amino acids was similar to already established decrease of amino acid levels during heat treatment of soya (Gundel and Matrai, 1996). Content of the limiting amino acid, lysine, in the feed was somewhat lower than reported in literature for thermally treated soybean, where it ranged from 5.5-6.5% in protein.

This decrease is the result of the lower lysine content in soybean seed (6.1%) used for the production of feed in question and the application of more aggressive treatment in production of analyzed feed. Recorded losses in lysine content caused by heat treatment can be explained by lipid-protein interaction and Maillard reaction taking place between NH_2-group of the lysine residues in the side-chain and the glucose or other reducing sugar present in the soybean (Sakač et al., 2001). Quality of final product (Vukelić et al., 2012), i.e. extruded full fat soya grits, can be determined based on the relevant data obtained during assessment of adequacy of applied heat treatment, shown in Table 2. Major antinutritional factor in the soybean seed, thermolabile trypsin inhibitor, was significantly inactivated by extrusion process (94.70%). Puvača et al. (2012) indicates that the stream treatment (100 ºC > 15 min) reduces trypsin inhibitor content in soybean by 65-97% and extrusion (145ºC, 16s) by 78-98%. Nitrogen solubility index (NSI), yet another quality indicator used in thermal treatment optimization and quality control, was 65-75% in soybean seed (Božović et al., 1992), but significantly lower in thermally treated products.

Table 1. *Quality indicators of soybean seeds and extruded full fat soya grits*

Quality indicators	**Soybean seed**		**Extruded full fat soya grits**	
Chemical composition	% in sample	% in dry matter	% in sample	% in dry matter
Moisture	10,06	-	4,67	-
Crude protein	37,48	41,67	39,40	41,33
Crude fat	19,27	21,26	20,26	21,25
Crude fibre	4,39	4,88	4,08	4,28
Mineral matter	4,63	5,15	4,81	5,05
Amino acid composition (% in protein)				
Asparaganinic acid	12,00		10,35	
Treonine	4,59		3,63	
Serine	5,02		5,00	
Glutaminic acid	14,73		13,84	
Proline	4,87		3,59	
Glycine	4,10		3,99	
Alanine	3,99		3,86	
Cystine	1,54		1,26	
Valine	5,14		3,76	
Asparaganinic acid	1,27		0,84	
Treonine	4,27		4,26	
Serine	7,20		7,13	
Glutaminic acid	4,49		4,21	
Proline	5,18		4,95	
Glycine	3,49		3,44	
Alanine	6,10		5,03	
Cystine	7,90		7,89	

Source: *Filipović et al., 2001.*

Though data reported in the literature for optimum NSI values in thermally treated soya differ, data reported by Holmes (1988) could be taken as a reference, according to which NSI level of 12.5% is considered too aggressive, while NSI level of 25.1% is considered as optimum in our country. Comparing these values with NSI values of extruded full fat soya grits (25.4%) it can be concluded that applied thermal treatment was optimum one.

Table 2. *Quality indicators relevant to assessing adequacy of applieheat treatment*

Quality parameter	Soybeans	Extruded full fat soya grits
Trypsin inhibitor (mg/g)	61.66	3.27
Urease activity (mg N/g/min at 30 ºC)	10.95	0.26
NSI (%)	65.82	25.64

Source: *Filipović et al., 2001.*

Considering general agreement in literature data that trypsin inhibitor content of 5 mg/g or lower after any heat treatment is acceptable (Milić et al., 2012), it can be concluded that applied processing regimes were adequate and resulted in the final product of optimum quality. This statement could be additionally confirmed by the urease activity level (Table 2), being in agreement with data given in Table 3, which are taken as reference values for determining optimum working parameters during thermal treatment of soybean. Quality of grinded soybean extruded in „Miltenz“ extruder (wet extrusion, with steam addition) and final product, i.e. extruded full fat soya grits is shown in Table 4.

Table 3. *Urease activity levels obtained during different heat treatments of soybean*

Heat-treated soybean products	Urease activity (mg N/g/min)
Over-treated	<0.05
Optimally treated	0.1-0.3
Below-optimum treated	0.3-0.5
Under treated	>0.5

Source: *Filipović et al., 2001.*

Data shown in Table 4 are an indicative of soybean seed of an average quality established and maintained in Serbia in recent years (Lazarević et al., 2005). As the exudate quality primarily depends upon the quality of initial raw soybean seed and extruding temperature, it is very important to know the basic quality indicators of initial raw material, which have not changed significantly in our country for years (Lazarević et al., 2005). Major changes occurred in the antinutrients content, namely, trypsine inhibitor and urease activity, being in a positive correlation with mentioned antinutrients. Higher antinutrient levels in raw soybean require application of more aggressive treatment regimes, and it is, therefore, desirable to have raw material of similar quality to obtain extrudate of

standard quality with the application of the same technological parameters. If the quality of raw soybean substantially departs from the average soybean quality according to which optimization of the extrusion process took place, optimization should be conducted again.

Table 4. *Quality indicators of soybean seeds and extruded full fat soya grits (extrusion with conditioning)*

Indicators	Soybean seed	Extruded full fat soya grits
Moisture content, %	9.80	11.22
Crude ash, %	4.56	4.54
Crude fibre, %	5.26	5.11
Crude fat, %	20.19	20.05
Crude protein, %	35.40	35.27
Urease activity, mgN/g/min	8.00	0.22
NSI %	66.34	21.27
Trypsin inhibitor, mg/g	48.92	3.11

Source: *Filipović et al., 2001.*

When rapeseed is extruded alone its high oil content (41.07% in dry matter) prevents adequate heating and produces an oily pulp which is susceptible to lipid oxidation.

Table 5. *Glucosinolate content in rapeseed alone and in combinations with corn before and after extrusion*

Sample	Treatment	Glucosinolate (µmol/g DM)	Glucosinolate reduction (%)
Rapeseed	ground	65.91	
Rapeseed	extruded	46.43	30.00
Rapeseed+corn 30:70	ground	21.35	
Rapeseed+corn 30:70	extruded	15.67	26.60
Rapeseed+corn 50:50	ground	32.83	
Rapeseed+corn 50:50	extruded	24.62	25.00

Source: *Sakač et al., 2006.*

For this reason, rapeseed was extruded in combination with corn and resultant product was of longer shelf life, suitable for storage and

formulations with other feeds. After dry extrusion process, reduction in total glucosinolate content ranged from 25-30%, what can be seen in results given in Table 5.

Chemical characteristics of corn and corn extruded at 90 and 95 ^{0}C are given in Table 6. During extrusion changes in the protein structure occur, thus leading to decrease in protein solubility (Filipović et al., 2003). Nitrogen solubility index (NSI) is one of quality indicators used in optimization of thermal treatment regime, as it reflects changes in the protein structure due to high pressure and temperature during extrusion process. Statistically significant difference between NSI values for corn and obtained extrudate is yet another confirmation that corn proteins undergo structural changes during extrusion at 90 and 95^{0}C.

Table 6. *Chemical composition of ground and extruded corn*

Quality indicators	**Corn**	**Corn extruded at 90^{0}C**	**Corn extruded at 95 ^{0}C**
Crude protein	9.25^c	9.07^b	8.97^a
Mineral matter	1.83^b	1.56^a	1.58^a
Crude fibre	3.45^c	2.47^a	2.80^b
Crude fat	4.80^c	2.08^a	2.66^b
NSI	13.11^b	6.06^a	5.88^a
Starch	70.90^c	67.06^b	64.98^a
Total sugar	1.00^a	3.99^b	4.12^b
Reducing sugar	0.40^a	0.42^a	0.45^a

Source: *Filipović et al., 2009.*

Values are expressed as a mean value of five independent determinations. Means in the same row sharing the same superscript letter are not significantly different. During extrusion, substantial physico-chemical changes take place in the carbohydrate fraction of corn, thus affecting starch digestibility and availability. Starch is gelatinized and degraded in the course of extrusion, and accessibility of enzymes to starch granules in the digestive tract is improved (Filipović et al., 2009). Starch content in extruded corn is significantly lower than in non-extruded corn, and, as the result, total and reducing sugars content is increased, thus contributing to the change of sensory parameters, namely, slightly sweet taste of extrudate.

Conclusion

Extrusion of soybean grain intended for human and animal consumption is one of heat treatment processes, used to improve its nutritional, hygienic and physico-chemical properties, that is, to inactivate thermo-labile antinutrients, upgrade sensory properties and ensure product safety. Upon extrusion of corn, quality feed of improved nutritional value is obtained, with increased total and reducing sugar content due to changes in starch structure. Extruding of rapeseed with corn resulted in the product of reduced glucosinolate content ranging from 25-30% in relation to untreated material. This feed is of satisfactory quality and can be in small quantities for broiler chicken feeding.

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SUSTAINABILITY OF DAIRY FARMING SYSTEMS IN CENTRAL SERBIA[1]

Rade Popovic[2], Marija Knezevic[3]

Abstract

Two dairy production systems with biggest share in total milk production in Central Serbia are small farms with tie stall barn and small farms with grazing period. In the article are examined their main system characteristics, sustainability and integration in dairy supply chain. Three dimension of sustainability were explored by chosen indicators on farms sample in Kolubara district. Economic sustainability is low since average entrepreneur's profit is negative for both production systems, although small dairy farms with grazing period encountered less negative profit because advantages in feeding costs. Rate of dairy production systems viability is 25%. Social sustainability declined over last decade. Small dairy systems are discriminated by ability to get dairy subsidies. Demographic viability is low, especially for small farming system with grazing period, where it is 25%. Small farming systems are dispersed over all territory and don't make big pressure on ecology and natural resources.

Key words: *dairy, family farms, system, sustainability, Serbia*

Introduction

Goal of this paper is to describe and analyse the most numerous dairy production systems in Central Serbia and its sustainability. Research was conducted in first half of 2012 in Kolubara district. There was several reasons way this district was picked up. First, it is part of Sumadija and

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western Serbia region which is the most important in milk production and account for 50.3% of all cows in Republic of Serbia. Density of cows in district is the highest in Serbia. Measured in cows/km^2 it is 17.1, or 0.25 cows/ha of agricultural land. Second, availability of pastures and meadows in Kolubara district is quite similar like as average in Central Serbia. Third, small dairy family farms are dominant type of farms in dairy production.

Eight dairy family farms with heard size 1 to 5 cows were interviewed. Questionnaire with focus on 2011 production year, and some social and ecological aspects of farming system is filled out on each farm. Based on gathered data and later phone calls with interviewed farmers, economic dairy budgets are completed. According those results economic sustainability is examined through chosen indicators. Besides that, also ecological and social sustainability is researched.

Production systems and sustainability

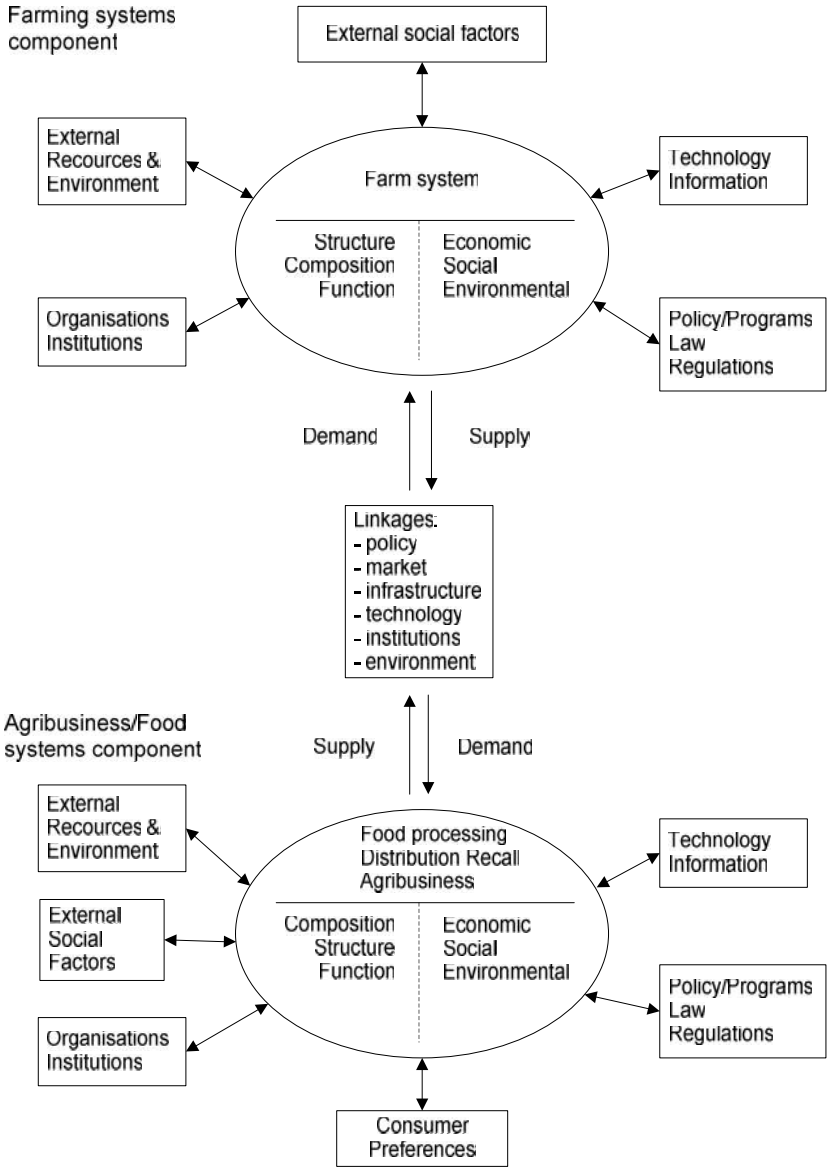
System is usually defined as a group of elements with strong functional relationship between them and at same time limited or not-existent relationship with surrounding elements or systems. Stimulus from outside focused on any one system element, results in whole system response.

In wide context, production (farming) system is set of: technical, technological, organisational, economical and social factors (Krstic, Lucic, 2000). Because of that, better understanding of farming system asks for multidisciplinary approach. Farming system includes several elements: inputs and outputs, a boundary, an external environment and process for transforming inputs into outputs (Shadbolt, Martin, 2005). Outputs, main product and by-products are result of process of transforming inputs with nature state (climate conditions, presence diseases). Collateral benefits or problems could be created, depend of type of production system. Examples of benefits could be enhancement of rural landscape or better conditions for rural tourism, etc. As problems usually are recognised: nitrate contamination of groundwater, manure odour, pesticide runoff, etc. System boundary could be understood as difference between what is under management control and what is not.

Production system can be analysed with static and dynamic approach. Static analysis of production system gives less information and not well holistic understanding, since it is one specific time picture. Dynamic

farming system research builds understanding of the interactions, interdependencies and responses under changing conditions between parts of whole system (Malcolm et al. 2012).

Figure 1. *Components and linkages in integrated food system from farm to consumer*



Source: *Shadbolt, Martin, 2005.*

Farming systems could be seen in wider scope as a part of food chain system. In Figure 1, farming system is shown as a part of integrated food chain. Understanding long term sustainability of farm systems, even if it is looking in narrow economic aspect, is hard without whole picture of food system. Farm is not an isolated island and its relations with other participants of food chain could be competitive or cooperative. Integrated food system has strong two-sided relationship between parts of food chain that helps in improving strength of weakest elements. Boundaries of farming system are consisted from same group of elements, as boundaries in other parts of food chain systems. All five groups of elements (Figure 1) influencing in certain way on farming system as well as on whole food chain. But through cooperative action on horizontal and vertical level between farms, food processing companies and retailers, it is possible to make reverse influence on elements of boundaries.

Dairy farming systems are very diverse worldwide. They varied in range from low input – low output (New Zeland dairy farms) to high input – high output (California dairy farms), or from organic to conventional, or from mixed to specialized, etc. Comparing dairy farms worldwide IFCN Dairy Research Centre (Hemme, 2011) defined six dairy production systems: farms with stanchion barn, farms with free stall barn, feedlot farms, grazing farms, small scale farms and future farms. First five are well known production systems. Future farms represent those production systems which can be expected to develop in specific region according present circumstances.

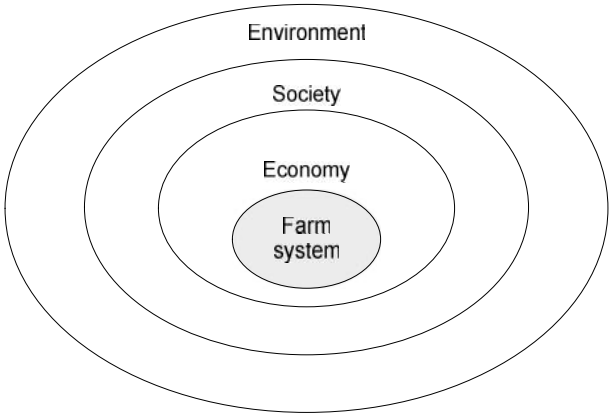
Goss et al. (2010), analysing dairy sector in Republic of Serbia, defined four dairy production systems: small upland farms, small lowland farms, medium farms and large lowland farms. First two production systems dominate in Serbian dairy sector and especially in Central Serbia. Their basic characteristics are: herds with 1 to 5 cows, mostly Simmental breed, low milk yield, usually more than 5 lactations, cows are tethered in barns and milked by hand or portable machine, milk is used for: calves, formal market (dairy plants), and informal market (farm family needs, sold as a row milk or dairy products from farm or on local market). The main difference of those two production systems is that small upland farms use pasture in period from May to October.

Beside diversity, dairy production systems are one of the most complex in agriculture. Complexity is result of more elements in production system,

stronger interactions and interdependencies among elements, longest biological and supply lags, etc.

Sustainable farming systems can be defined as socially responsible practice that allows economic viability of farm, maintaining resources and ecosystems in same or improved shape for future generations. Generally, sustainability of agricultural production lies on three dimensions: economic, social and ecological. All dimensions are equally important and relationship between them are numerous and complex. Economic dimension of sustainability is concerned with efficient use of farm resources, viability and competitiveness of farm. Social dimension of sustainability is twofold. From one side, society has responsibility to provide equal opportunities for farm families compared with non-farm families in sense of support fair living standard and access and use of services and resources. From other side, farmers have responsibility in ethics of agricultural production (use of sustainable production technologies, food safety, etc). Ecological dimension of sustainability is the most important since previous two dimensions are human creation and they are changeable over time. Manner of resources use (land, water, air, biodiversity, etc.) should ensure its equal quality and quantity for future generation.

Figure 2. *Model of strong sustainability*



Source: *Adapted according Shadbolt, Martin, 2005.*

Strong concept of sustainability (Figure 2) is based on ecologic primacy and don't allow substitution between environmental and either or other two components (Shadbolt, Martin, 2005). According same authors, sustainable farming system has four properties: productivity, stability,

resilience and equity. Productivity is ratio of produced output per unit of resource used in monetary or physical terms. Stability is ability of farm system to maintain stable productivity, during small disturbing forces. Resilience is property which allows farming system to survive severe and unpredictable disturbing forces. Resilience takes in account resistance to disturbing forces and time and rate of recovery. Equity means securing balance in distribution of cost and benefits from productivity of the system through present and between present and future generation of farmers.

The main problem in applying concept of sustainability to specific farm production system is how to choose proper indicators for all three dimensions. Many approaches and models of sustainability measurement were developed and tested in dairy sector, especially during first decade of XXI century. Every one researcher find hard to measure sustainability in dairy sector. The most used indicators for economic dimension were: entrepreneur's profit, operating profit margin, return to labour (Ndamby, Steglich, Hemme, 2011), farm viability, market return (Dillon, Hennessy, Hynes, 2009) etc. Same groups of researchers, as indicators for social dimension of sustainability applied: importance of government payment in farm income, market return, hours per worker per year, employees per 100 t of milk, and demographic viability. For measurement of ecological dimension of sustainability were used: carbon footprint, water footprint and stocking rate.

Dairy production systems in Central Serbia

Small farms with herd from 1 to 5 cows produce the most of milk in Serbia. Although its number decreasing over years, according data from 2009, they still account for 77% of all cows, produce 68% of milk and delivers 59% of milk to dairies (Gross et al. 2010). Neglecting of such production structure in recent years leaded to some decisions of agricultural policy makers that weren't beneficial for this part of dairy sector. The most of small dairy farms lost possibility to get milk premiums in period from 2009 to 2012.

Figure 3. *Characteristics of dairy production systems practiced on small farms, based on results from 8 farms*

Factor	Small farms with tie stall barns	Small farms with grazing period
Milk yield **- For human use** **- For calf includ.**	 From 2,800 to 5,000 l From 3,400 to 5,200 l	 From 2,000 to 4,500 l From 2,700 to 4,500 l
Breed	Dominantly Simmental	Dominantly Simmental
Breeding	Artificial insemination with 1.8 attempts in average	Artificial insemination with 2.5 attempts in average
Calving	Through all year	Prefer. winter or early spring
Calves	0.93 calves per cow, sold on market after 10 days or 2-3 months depends of market situation, female reared for replacement as needed	0.92 calves per cow, sold on market after 10 days or 2-3 months depends of market situation, female reared for replacement as needed
Culling rate	6 – 7 years	6 years
Labour	330 hours/cow/year	300 hours/cow/year
Bulk feed	Whole year fed in barn with mainly corn silage or corn stover, red clove hay, seldom meadow hay and feed by-products.	Grazing from May to November; in rest period use mostly meadow hay, red clove hay and seldom corn silage
Concentrate	From 4 to 5.5 kg concentrate mainly mixed on the farm from own cereals, roasted soybean and bought: soybean meal, wheat bran, sunflower shell, mineral supplements	From 3.5 to 4.5 kg concentrate mixed on the farm from own cereals and bought: soybean meal, wheat bran, sunflower shell, mineral supplements
Housing	Cows tied all year round in stalls barn	Cows tied in stalls barn during winter and raining days
Milking	Cows are milked two times in the barn by portable machines without pulsators	Cow are milked two times in the barn by hand or portable machines without pulsators
Milk collecting	Several close living farmers collect milk on one farm in cooling tank provided by dairy plant	Several close living farmers collect milk on one farm in cooling tank provided by dairy plant
Milk marketing	Dairy plant	Dairy plant and local market

Source: *Own research.*

Following findings of Goss et al. (2010) focus in this paper is on two dairy production systems that exist in range of herd size 1 to 5 cows. Name of production systems will be here modified according results of field research in Kolubara district. Two identified dairy production systems are: small farm with tie stall barns (SF – TSB) and small farm with grazing period (SF – GP). Close explanation of chosen production systems is given in Figure 3.

The main difference between those two production systems is in chosen feeding, milking and marketing subsystems. Other subsystems are similar as breeding, calves rearing, milk collecting and housing. Looking on output side significant difference exist in milk yield of those two production systems.

Economic sustainability of small dairy farming systems

Profitability of production system is the most utilised indicator of economic sustainability. In this case both production systems (Figure 4) encountered negative entrepreneur profit, although small farms with grazing period had lower loss. Source of negative profitability has to be looked in characteristics o production systems.

SF – TSB has higher milk yield and higher milk subsidies. In this production system even farm with 3 cows, because of higher milk yield, succeed to reach quarterly minimum of delivered milk, and got milk premium. Comparing production systems there is no significant difference in average milk price (28.61 RSD/l for SF – TSB and 27.93 RSD/l for SF – GP). Main reason for that lies in low milk quantity and quality. Seven farms delivered less than 15,000 litres milk per year and didn't receive quantity stimulus from dairy processors. Milk quality ranged between 1st and 2nd class, among all farms. On cost side SF – TSB had significantly higher costs mainly because of higher bulk feed cost, as well as bedding, labour and building costs.

SF – GP comparing with SF – TSB achieved moderate revenue, but on cost side reached significantly lower cost that more than saturate difference in revenue. Sources of higher cost competitiveness lies in bulk feed, bedding and labour. Sundries costs are lower since more farmers milk cows by hand. Interest on fixed capital is considerable as SF – GP use specific land area for grazing.

Figure 4. *Summary of selected average financial data of two farming systems in 2011 in Central Serbia* (in RSD/cow/year)

	Small farms with tie stall barns	**Small farms with grazing period**
REVENUE	**156,160**	**140,153**
Milk	105,053	98,984
Calves	22,149	19,985
Manure	15,000	15,000
Subsidies	13,958	6,184
COSTS	**185,734**	**155,289**
Variable cost	**100,817**	**75,465**
Concentrates	30,255	30,908
Bulk feeds	44,831	24,814
Bedding	5,345	3,053
Water	*372	*379
Insemination	2,625	3,396
Vet. service and medicines	1,714	2,115
Dairy sundries	6,344	2,862
Contract work	643	1,077
Interest on operative capital	8,689	6,860
Fixed cost	**84,917**	**79,824**
Labour	33,212	29,987
Machinery and equipment	8,723	8,515
Buildings	10,089	6,258
Heard depreciation	8,029	7,600
Drainage fee	274	265
Insurance	0	0
Overhead cost	5,499	2,002
Interest on fixed capital	19,366	25,462
Farmer's income	**31,156**	**47,173**
Entrepreneur's profit	**-29,574**	**-15,136**
Viability	**-27.807**	**-7.685**
***** only one from four farm is paying for water		

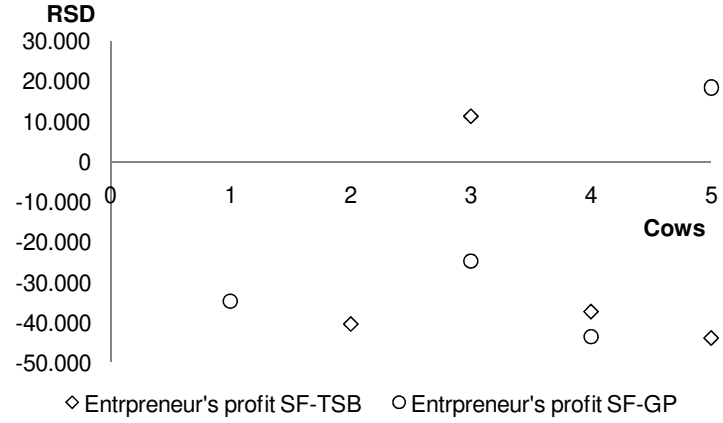
Source: *Own research*

Viability of farm systems is defined here based on works of Hennessy (2004) and Frawley and Commins (1996), cited in Dillon, Hennessy and

Hynes (2009). An economically viable farm has (a) the capacity to remunerate family labour at the average agricultural wage, and (b) the capacity to provide an additional 5 per cent return on non-land assets. In lack of data for average agricultural wage there is for family labour applied same price as for paid labour (150 RSD/hour). Viability is analysed for one year, though it is always better option to take in account data for long term period. Both farming systems showed negative results, although SF-GP had less negative results. Analytical data showed that in analysed group of dairy farms by one farm in each group were viable in 2011, and it is same farms as in Figure 5. A result is very low rate of viability, only 25% in samples.

Two from eight farms earn entrepreneur's profit (Figure 5). Average entrepreneur's profit ranges from – 44.087 to 18.336 RSD per cow. There should bear on mind that first level of competition for dairy enterprise on farm is other farm enterprises. If farms couldn't reach zero or positive entrepreneur's profit in midterm period, expected reaction of farmers could be to redirect resources from dairy to some other more profitable enterprises. Situation is worsened in 2012 where severe drought caused significant yield drop, and feed prices increased over 50% in second half of the year. With modest increase of milk price, economic situation for small dairy production systems in Central Serbia in 2012 is not bright at all.

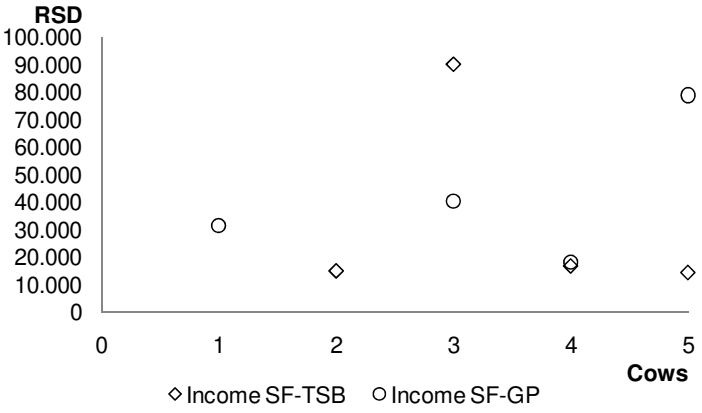
Figure 5. *Entrepreneur's profit on eight dairy farms in Kolubara district (in RSD/cow/year)*



Source: *Own research.*

All examined farms had a positive net farm income, as it presented in Figure 6. Range of income was from 14,147 to 89,971 RSD per cow. But, only two farms succeed to cover opportunity costs for unpaid family labour and owned capital. Reason for difference among farmer's income and profit in dairy enterprise is in share of owned resources. Small farms use resources that are mostly owned by farmers. In dairy enterprise works solely family labour. Only during crop harvesting season and manure disposal farmers employ additional external labour. Farmers do not use loans from bank. In SF – TSB about 50% of used land is rented, till SF – GP produce milk using only owned land.

Figure 6. *Farmer's income on eight dairy farms in Kolubara district (in RSD/cow/year)*



Source: *Own research.*

Social sustainability of small dairy farming systems

Social sustainability of small dairy production systems is examined from two sides. First is responsibility of society for dairy farms that can be measured through importance of subsidies, which create equal opportunities for farmers comparing with other rural entities, and support fair living standard. Several years ago, government changed focus in agricultural policy for dairy farmers. Before that, all registered farms could apply for milk premium. In 2009 only farms with 4 and more cows could satisfy condition with at list 2,500 litres of delivered milk to dairy per quartile, to be able to apply for premium. In later years minimum of delivered milk were increased, and this further decreased ability of small farms to get premiums. Motivation for government to change policy was to increase milk quality and amount of milk delivered, and to shrink total

dairy subsidies. In dairy sector where small dairy farms with up to 5 cows are dominant in total milk production, expected goals were not fully reached. Amount of delivered milk were not increased, quality of milk increased but mainly because of dairy company investment in cooling tanks installed on farms, total milk premiums cut for 61%, and total milk production decreased for 3.7% just in 2009. From about quarter of million dairy farmers in Serbia only 9,000 in 2009 and 5,975 in next year received milk premiums.

Importance of government payment in farm income is one of most used indicators to measure social sustainability. Three farms in SF – TSB production system received partially or fully subsidies. In SF – GP production system just one farm received partial subsidies. Problem here is low farmer's income from dairy operation in both farming systems, what is proved by low rate of viability. In this case using of mentioned indicator will not give a sense. That's why a social sustainability is measured by level of discrimination in subsidies availability, comparing small farm production systems with bigger one. In Figure 7 it is shown, with assumption of 3.300 litres of delivered milk for bigger dairy production system, that SF – GP is the most discriminated by 85% or more in its ability to get subsidies.

Figure 7. *Discrimination level in subsidies availability*

	Unit:	**Bigger dairy production system**	**SF – TSB**	**SF – GP**
Milk yield	l milk/cow/year	4,000 – 6,500	3,791	3,648
Milk delivered	l milk/cow/year	3,300 – 6,200	3,016	2,817
Milk price	RSD/l	32.50	28.61	27.93
Subsidies:				
Premiums	RSD/l	16,500	9,219	6,184
Genetically improvement	RSD/cow	25,000	7,143	0
Subsidies per cow	RSD/cow	41,500	16,362	6,184
Discrimination level	%	0%	61%	85%

Source: *Own research.*

Social sustainability, from other side is measured by two indicators: demographic viability and hours per worker and year. According Dillon, Hennessy, Hynes (2009) demographically viable farms are those with at least one household member below 45 years of age.

From examined farms only one operator in each production system don't expect to be in dairy production in next 5 years. But reality is even more pessimistic since average operators' age is 64 years in SF – TSB and 60 in SF - GP. Successors exist on 6 of 8 farms, but its intention to keep dairy production on farm is week. Only 2 successors in SF – TSB intended after taking over the farm to continue with milk production. On SF – GP only on one farm successor intend to continue dairy production. Derived rates of demographic viability are very low, 50% and 25% respectively.

Hours per worker and year indicates working conditions on farm. According Ndamby, Steglich and Hemme, (2011) average expected number of hours per farmer throughout a production year is from 2,000 to 2,200. Working hours above that level indicates deterioration of working conditions as an aspect of social sustainability. Looking only on dairy enterprise in SF – TSB farmer spends in average 330 hours per cow and year, while in SF – GP it is 300 hours per cow and year. Counting working hours in field and hours spent in dairy enterprise it can be concluded that both farming systems are from this aspect sustainable.

In addition it can be mentioned that the SF – GP are located more out of settlements than SF – TSB. The most usually additional source of cash on the farm is pension from one of farm family member.

Ecological sustainability of small dairy farming systems

From observed data, ecological sustainability is here measured with stocking rate, as indicator of production intensity. Level of maximum production intensity that can be treated as bottom level of sustainability is set by Ndamby, Steglich and Hemme in 2011, on 1 to 1.2 livestock units per hectare. Density of cow/ha on SF – TSB and SF – GP is 0.44 and 0.38 respectively, that is significantly lower from proposed level.

Dairy manure is used completely as fertiliser on own farm land in both production systems. Manure is disposing in inappropriate places nearby barns that allows nitrate licking in groundwater. Application of manure on

farmland fields is usually two times per year for all farms. From these aspects it can be concluded that both small dairy farming systems are ecologically sustainable.

Integration of dairy value chain

Dairy chain in Serbia is consisted from about quarter million of dairy farms, almost 200 dairy processors and several big retail chains. Some previous researches (Popovic, 2008, Popovic, Radovanov, 2010) reviled that Serbian dairy value chain is not well integrated and market power is moved to retailers in recent years. Prerequisite for a value chain to be integrated is transparent flow of information, materials, and existence of horizontal and vertical cooperation among participants in chain.

Small farm production systems, since producing individually lower quantity and quality of milk, become less important for bigger processors. Low milk prices and lack of subsidies pushed small farmers more on informal market. The focus of activities in last decade was to improve size and productivity of commercial dairy family farms (with at least 10 cows in herd). Leading examples are companies Imlek, Mlekara Subotica and Somboled providing loans and consulting service for dairy farmers to obtain additional cows, new barns and milking equipment. Cooperating with farmers, dairy companies aim to secure quantity and quality of milk supply. In addition, such attempts partially increase efficiency of all dairy food chain.

Beside these several very positive examples, dairy supply chain in Serbia is not integrated. That is mean that from farm supply companies across dairy farms, dairy processing companies, retailers and to consumers there is still no behaviour in sense of understanding “whole picture”.

Conclusion

Small dairy farms are still the most important part in structure of milk production in Serbia. Sustainability of small dairy farms system is emergent area and should attract greater interest. Rate of decrease in milk production of such farming systems wasn’t saturated with increase of production in medium and large dairy production systems in recent years. Result was decrease in total milk production by average rate 2% in last five years.

Undoubtedly, according results of examined indicators, both small dairy farm production systems have problems in economic and social sustainability. Applied indicators for economic dimension of sustainability reviled negative average entrepreneur's profit in SF – TSB and SF – GP. Some farms in both production systems succeeded to realised profit. SF – GP compared with SF – TSB, beside lower revenue, thanks to significant advantages in costs of feeding subsystem reached lower loss. All farms have positive income but in average it is not sufficient to cover family labour cost calculated by average agricultural wage. Because that, economic viability is very low with just 25% rate. Agricultural policy discriminate SF – TSB and SF – GP by 61 and 85 % respectively in dairy subsidies availability. Demographic viability of farms has low rates 50% (SF – TSB) and 25% (SF – GP). Farmers are aged with no successors on each farm and weak intention to continue with dairy production. Working conditions on farms are sustainable with amount of working hours per year below maximum level.

In case of ecological sustainability those production systems don't make big pressure on environment and a use of resources is on ecologically sustainable manner. Density of livestock units per hectare is significantly smaller than proposed level.

Milk supply chain is not well integrated in Serbia, and small dairy farming systems are even less integrated. Government and dairy processing companies have been losing interest for small dairy farms since last five years. Dairy farms with bigger herds are able to use benefits of economics of scale i.e. lower average costs per litre of produced milk, received full dairy subsidies, and higher milk prices because of better milk quality and higher quantity.

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ANIMAL GENETIC RESOURCES IN THE FUNCTION OF SUSTAINABLE AGRICULTURAL PRODUCTION

Radica Djedović, Grigorije Trifunović***

Abstract

The breeding of high productive breeds of farm animals in intensive conditions resulted in the fact that in the last fifty years over 65% of autochthonous breeds became endangered, while a considerable number of low productive, but more resistant breeds and strains disappeared. In a current concept of sustainable use of genetic resources the protection of these breeds has multiple importance, primarily genetic (preservation of natural variability), geographical, cultural-historical, economical and other. A key element of previous strategy of preserving was in-situ and ex-situ conservation. By development of molecular and genomic selection the isolation and identification of desirable genes associated with specific phenotypic characteristics, as well as measuring of genetic distance which enables ranking of breeds and strains within one breed will be increasingly in use. Program of preserving and protection of animal genetic resources in Serbia commenced in the nineties of the last century and in that period the Law which conceives the making of the List of genetic resources of farm animals was passed along with the way of their preserving and keeping a corresponding Register of autochthonous breeds. This paper points to the importance and methods of preserving the existing animal genetic resources and gives a description and population trend of the most important autochthonous breeds in the Republic of Serbia.

Key words: *animal genetic resources, conservation, sustainable agricultural production*

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Introduction

A scientific expert and also a wider social public is discussing more often the theme of sustainable development wherein a strategy of preserving the animal genetic resources has a very important place. Almost whole research work on sustainable development observes a definition by the Organization of food and agriculture of the United Nations – FAO (1998) which says: "A sustainable development represents management in natural resources and their preservation, orientation towards technological and institutional changes in order to preserve centuries old heritage and to keep on meeting primary human needs, of both present and future generations." Such a defined sustainable development, especially in the sector of agricultural production enables protection of soil and water, along with plant and animal genetic resources, while being ecologically non−degrading, technologically suitable, economically sustainable and socially acceptable. Therefore, the term sustainable agriculture means the integrated system of vegetable and livestock production practices which in the long run will meet the needs of people for food, improve the quality of human environment and natural resources which an agricultural economy depends upon, make possible both an efficient use of non−restorable and restorable resources and the process of natural biological cycles, maintain an economical value of production and improve a quality of life of both agricultural producers and whole society.

In the Draft on the Strategy of rural development of the Republic of Serbia for period 2010–2013 it is pointed out that territory of Serbia owns significant natural resources (water resources, large surfaces of arable land, afforested surfaces and meadows) with rich biodiversity. Important prerequisites for high biological and genetic variability in Serbia are its geographical location, climatic conditions, as well as openness of its territory to surrounding regions. A degree of variety of fauna in the Republic of Serbia is relatively high. It is estimated that total number of species existing in the territory of Serbia makes 43% in total species of Europe. In fauna 500 species are considered endangered and similar situation is in vegetable genetic resources as well. Specialists estimate that between 0.01 and 0.1% of an overall number of species disappear every year.

In the world today 40 species of farm animals are being raised, wherein only 14 species realize over 90% of global animal production (Drobnjak et al., 2012). Main reason for reduction in animal genetic resources is rearing of limited number of species and breeds in intensive systems, with uniformed conditions and industrial character of production. Majority of high−productive breeds which are raised today are genetically homogenous due to intensive primary selection and inbreeding, and such genetically uniformed populations are considerably more sensitive to changes in the factors of outside environment. How much are autochthonous breeds of domestic and raised animals neglected today, contrary to favoured improved breeds, can be illustrated by the fact that 391 in 2719 breeds of the most represented species (cattle, sheep, goats, pigs, buffalo, horse and donkey) are in danger to disappear, while 295 have already disappeared, in which number about 200 breeds originated from western Europe and former USSR (Loftus and Scherf, 1993).

The greatest value of autochthonous, primitive breeds is in their genetic combinations which can produce phenotypes of strong constitution, vital, resistant to diseases and adapted to unfavourable conditions of rearing. Therefore, variability of genotypes of one population represents a potential for its surviving, in which, due to disappearing of autochthonous breeds and genes which they carry, there occurred an irretrievable reduction of genetic variability contained in their combinations. Protection of animal genetic resources is important for preserving a natural genetic variability, but also has a scientific, economical, ethical, cultural and historical importance together with a certain merit in regarding the standards of traditional heritage of every region and nation.

Program of preserving and protection of animal genetic resources in Serbia started in the nineties of the last century. Currently, according to the List of autochthonous breeds of domestic animals and endangered autochthonous breeds („Official Journal of RS", nr. 38/10) the autochthonous species and breeds of domestic animals in Serbia include cattle (podolsko cattle and busha), buffaloes (domestic buffalo), horses (domestic hilly horse and nonius), donkeys (Balkan donkey), pigs (mangalitsa, resavka, moravka), sheep (pirotska, karakačanska, krivovirska, bardoka, svrljiška, lipska, šarplaninska, vlaško vitoroga, čokanska tsigai and tsigai), goats (Balkan goat), hens (Svrljig hen, Banat bare necked hen, Sombor kaporka), turkey (domestic turkey), duck

(domestic duck), goose (podunavska goose), guinea fowl (domestic guinea fowl), pigeon (Serbian high flier), bee (*Apis melifera carnica*), dog (šarplaninac). The greatest number of programs and projects on preserving animal genetic resources has been conducted for these breeds of cattle and pigs which will be thoroughly discussed in this paper.

A role of global coordinators in preserving agrobiodiversity and animal genetic resources

A set of complete genetic information contained by each species represents a genetic diversity as the only source of genetic material for improving, revitalization and biotechnology. An entirety and variability of genes, then variability of biological species, communities and ecosystems all form biological variability or biodiversity within which there are no useless genes, species and ecosystems, and every species, breed, sort, strain or variety is no less important from the other. The term agrobiodiversity is used for biological variability within agricultural systems that means, among other meanings, a variability within species and breeds of domestic animals.

Steps for preserving global biodiversity were established at a world summit on sustainable development and protection of environment (June 1992, Rio de Janeiro, Brasil), when more than 165 countries signed the Convention on biological variability, and until today it has been accepted by more than 180 countries, including Serbia. All aspects of biological variability are encompassed by this convention, and its major goals are: preserving of biological variability, sustainable use of genetic resources and equal distribution of benefit produced by their usage. A role of global coordinator in preserving genetic resources of domestic animals is taken by the organization for food and agriculture FAO which in 1996 developed a Global Strategy for managing farm animals resources (AnGR), as a major framework for protection of diversity in domestic animals. Major elements of global strategy are identification, description, development and monitoring, conservation of unique and endangered breeds, utilization, stuff training and enlarging of international communications and encouraging of public opinion. In that way the countries are given the assistance in organizing themselves in the work of managing and preserving AnGR.

FAO has also established a global information network (Domestic Animal Diversity Information System DAD-IS) with the seat in Rome, initially directing the program for the 14 most important species of domestic animals with highest participation in global agrobiodiversity with the aim to extend it to other 26 species of domestic animals and their relatives. The first overall analysis of AnGR in a whole world started in 2001 and involved over 170 countries.

Criteria for endangered breeds

According to the recommendations of FAO (Domestic Animal Diversity Information System – DAD-IS) all the breeds of domestic animals are, according to the origin, place of raising and the length of time spent in some area, divided into:

Autochthonous breeds – which have naturally appeared there and have been raised in that region for centuries,

Local or traditional breeds – which have originally appeared in some other region but have adapted well to production systems and conditions of rearing in the new region and have been raised in that region for at least 50 years (cattle and ungulates) and at least 30 years other species,

Imported breeds – which are temporarily or permanently imported, mostly high productive breeds meant for more intensive production systems.

Besides mentioned classification there is also a scale recommended by FAO (1992) and partly modified in 2007 based on the number of female breeding animals in population. Every country is enabled, respecting its interests and needs, to make a scale for classification of the level of endangerment and minimum number of animals necessary for their preserving. The recommendation of FAO for a low level of effective size of population is 50 animals and in that respect, since the change of the inbreeding coefficient (F_x) is conversely proportional to the value Ne (effective size of population**),** inbreeding coefficient would on average increase by 1% annually. On the basis of expected total increase of the inbreeding coefficient during 50 years of reproduction a mean value of the inbreeding coefficient would be 50%, and in accordance with

effective size of population Ne five classes of endangerment have been defined (Table 1) in relation to a time distance (EAAP – AGDB, 2008):

Table 1. *Class of population endangerment*

Endangerment class	Time distance
No endangerment	< 5 years
Potentially endangered	5 – 15 years
Minimally endangered	16 – 25 years
Endangered	26 – 40 years
Critically endangered	> 40 years

It is a general classification for all species of domestic animals showing that the species with shorter generation interval and shorter reproductive cycle (pigs, poultry) in the course of 50 years are considerably more endangered. On the other hand the Rule Book on the list of genetic reserves of domestic animals of RS (2010) states precisely that a total number of animals within one breed, for example, pigs, should not be under 200 animals (Table 2), in order for that breed to be successfully revitalized and preserved.

Table 2. *Minimum number of animals per species*

Species of animal	Minimum number of animals
Cattle/buffalos	300
Horses/donkeys	350
Sheep/goat	250
Pigs	200
Poultry	300

Source: *List of genetic resources of domestic animals, ways of preserving genetic resources of domestic animals, as well as the list of autochthonous breeds of domestic animals and endangered autochthonous breeds (Ministry for agriculture, forestry and water management, 2010).*

The existence of genetic variability in small populations is important because of the possibility to apply selection. As one of selection criteria in endangered breeds the EAAP (EAAP – AGDB, 2008) defined a number of newly introduced females into reproduction NFN (New number of females). NFN is calculated for every breed, ie., population, on the basis of following formula:

$$NFN = nf \times pb \times tf \times nh$$

where:

nf - is a total number of breeding females (if unknown the number of registered females can be used)

pb – percent of breeding females in pure breed

tf – if the number of breeding females has a falling trend then tf = 0.7, on the contrary tf = 1

nh – if the number of breeding stocks is smaller than 10 then nh = 0,5, on the contrary nh = 1.

Mixing with other breeds also contributes to the increase of the degree of endangerment along with a reduction both of breeding females in pure breed and breeding stocks. When smaller breeding stocks of autochthonous breeds of cattle and pigs for individual breeders are formed we must take care that their size is sufficient in order to prevent genetic changes and loss of the most important breed qualities. Minimum number of animals needed in breeding stock or herd is calculated on the basis of effective size of population- Ne, (Falkoner, 1997).

$$Ne = \frac{4NmNf}{Nm + Nf}$$

where:

Nm-is the number of male animals

Nf- is the number of female animals in population.

In populations limited in number and considered endangered the increase of effective size of population and limiting or decreasing the inbreeding and therefore increase of genetic variability can be achieved by use of suitable methods of conservation.

Table 3. *Number of endangered autochthonous breeds in the region of the Republic of Serbia*

Species	Breed	Strain	Size of known population	Number of known locations
Horse	Domestic hilly horse		80	15
	Nonius		90	15
Donkey	Balkan donkey		350	5
Cattle	Busha		750	50
	Podolsko cattle		350	6
Buffalo	Domestic buffalo		1100	40
Pig	Mangalitsa		2000	40
	Moravka		100	5
	Resavka		35	5
Sheep	Pramenka	Krivovirski	250	5
		Pirotski	60	2
		Lipski	250	7
		Metohia (Bardoka)	40	2
		Karakačanski (Kucovlaški)	125	3
		Vlaško vitorogi	450	3
	Tsigai	Čokanski	400	4
Goat	Balkan		250	4
Hen	Svrljiška		200	2
	Sombor kaporka		200	3
	Banat bare necked		1000	5

Source: *Estimation based on data available by MPŠV (Ministry for agriculture, forestry and water management) and major breeders organizations*

Methods of conservation and programme of preserving autochthonous breeds of domestic animals as sustainable genetic resource

Taking into account data available according to which a majority of autochthonous breeds and strains of domestic animals in Serbia (Table 3) belong to the group of endangered-sustainable genetic resources, a preservation of their genetic potential is necessary in order to avoid a disturbance of equilibrium existing between genes and genotypes characteristical for these historically, culturally, economically and scientifically important breeds for our country. Population trend in majority of autochthonous species and breeds a few years before (Drobnjak et al., 2011; Drobnjak et al., 2012) was in decline what could in longterm produce a loss of certain genes or whole genofunds if we do not continue with conducting necessary measures connected with conservation, planned mating, registering and exchange of genetic material. Preserving of existing genofund of autochthonous genetic resources at a current level of development of science is possible by way of:

1. *In situ* conservation (preserving of alive individuals)
2. *Ex situ* conservation (freezing of semen, gametes or embryos)
3. Creation of gene banks

By applying *in-situ* conservation, that is, maintaining the individual animals of population of autochthonous species in an alive state, the breeds and strains could almost be maintained with unchanged frequency of genes and genotypes in a longer time period under condition that in chosen breeding stocks an obligatory control of mating and changing of breeding males in every generation according to established plan is being conducted. This way of protection means also obligatory marking of all animals in pure breed, keeping register, control of productivity via conducting of breeding programs and aims of development of species, breeds and strains as sustainable genetic resources.

During preserving genetic resources in alive state it must be taken into account that chosen animals represent their population, ie., they reflex a genetic variability of population in the best way. In order to attain a desirable effect in preserving a genetic fund it is important to provide maximum variability of traits that we want to preserve through chosen

animals. Preserving of frequency of existing genes and genotypes can be achieved by reducing the inbreeding (sib− mating) to the lowest level possible.

Genetic structure of population of autochthonous cattle breeds can be altered also by random samples wherein a size of population has a prominent place. Importance of changes better known under the title of «genetic drift» or «random drift» is greater if population is smaller and frequency of actual gene-allele lower. If we know the number of parents in population and frequency of alleles we can calculate a frequency of alleles in progeny with a possibility as high as 95%.

Random drift, as a cause of the change in frequency of genes, has a special importance in small populations of domestic animals, as is the case in mating and exploitation of smaller number of lines but it can have even greater significance in populations of autochthonous breeds and strains whose number is decreasing every year. In that case a participation of homozygotes is being increased on the account of heterozygotes, and there occurrs a higher relative increase of kinship. The control of kinship and inbreeding is especially important in numerically small populations. Kinship and inbreeding are measured by a coefficient of kinship and inbreeding. The inbreeding coefficient represents reduced homozygosity as a result of mating of individuals in closer kinship in relation to the average of kinship in controlled population. Two individuals are in kinship if they have one or more mutual ancestors in origin in the first six generations of pedigree. The basis for measuring the kinship is half a gene which one of the parents passes on to offspring. The coefficient of kinship shows a proportion of the same genes in origin for two individuals. A major reason for control of kinship is its evading or reduction to necessary minimum (Latinović, 1996). Consequences of the application of mating in kinship are reflexed through action of inbreeding depression characterized by greater embryonal death in the first phases of the life of descendants, smaller rate of growth in later age and reduced fertility. Some of the experiments conducted show that a body mass of descendants at birth is significantly reduced for every increase of inbreeding coefficient from average one. Consequences of inbreeding can be displayed also as anomalies in descendants, what can be prevented to some degree by conducting a biological test in chosen breeding males (Radica Đedović, 2004).

Methods of *in-situ conservation,* although rather expensive to maintain the fund of alive individuals represent the encouragement to rural development and have a socio-economical, scientific, cultural and ecological merit. However, the methods of preserving animal genetic resources in alive state are not efficient enough to prevent them from diseases, political disturbances and natural catastrophes.

Cryopreservation, known under the name of *ex-situ* conservation means maintenance of genetic resources by storing and then using of sperm, embryos, egg cells and tissues at low temperatures in liquid nitrogen or other medium for a longer period of years (Dempfle, 1990). Deep freezing and use of sperm of chosen breeding males is a very simple and successful way of reproduction, especially in bulls, primarily because of possibility to store it for a longer period with no consequences for the success of insemination and because of fast and easy transport. In case we use embryos or egg cells as a method of cryopreservation the success of such a mode of reproduction is far lower because it depends on the percentage of survival after melting and a rate of pregnancy after defrosting.

Cryopreservation has found less application in pig breeding than in other species of domestic animals for more reasons. One of the reasons is that the preserving of boars sperm in frozen state today is a process still neither studied enough nor advanced, due to the characteristics of the semen itself what in the end results in significantly reduced conception and decreased size of breeding stock in relation to insemination by unfrozen sperm or by natural mating (Reed, 1982). Also, expensive equipment, complicated process of preparation and storage of genetic material and swine solid reproductive capacity have influenced this mode of conservation of animal genetic resources of pigs to be mostly experimental in character with poor application. Besides this drawback, by the cryopreservation of genetic material the process of evolution and adaptation of breed is also being frozen what can diminish breed productive and reproductive abilities in the future (Oldenbroek, 2007). By application of artificial insemination and embryotransfer there is a possibility also of transferring contagious diseases if failures occured during collecting, processing and distribution of semen.Creation of gene banks of endangered autochthonous breeds in our country today is limited since there is no enough scientific and expert workers and necessary financial support. However, this mode of conservation will very soon find its perspective in our conditions as

well. No matter the mode of conservation we decide upon the preservation of unchanged existing genes and genotypes of autochthonous breeds is highly significant. Chosen breeding females and males, carriers of favourable genes, have to realize a normal and regular fertility, and to produce the number of descendants characteristic for monitored species of domestic animals. When choosing the animals for breeding following criteria have to be respected related to:

1. origin
2. exterior
3. productivity

These criteria mean that all animals have to be registered such as to have at least minimum information related to origin-pedigree. As for the breeding male animals we should determine their belonging to certain line which should be one of major criteria during choosing breeding females, primarily in order to avoid kinship, wherein selection demands for improving the traits of longevity, health and body development should not be neglected. In the process of improving the autochthonous breeds of domestic animals it is possible to apply different methods of selection, in which as an especially recommended one could be the system of breeding in an open nucleus instead of a classical progeny test. In evaluating exterior it is very important to keep record of all specific morphological, physiological and behavioural breed traits. Also, a special attention should be given to preserving the important characteristics (differences in the colour of hair, shape of horns, type and other) in order to recognize qualities of a singular animal within this framework. Selection of autochthonous breeds for higher productivity of milk and meat can have an influence upon a greater economic effect, but there is a danger to lose existing fund of genes responsible for the traits such as: resistance to diseases and poor conditions of external environment, and longevity.

Serbia has made the Draft on strategy of conserving and preserving of animal genetic resources that envisages preservation of locally adapted breeds because of their social and economic merit, future research and education while the priority is given to the most endangered breeds. Through selection service we control numerical state in certain autochthonous species, breeds and strains of domestic animals and when their number falls below the number meaning that a certain breed is endangered we take some measures to preserve it.

Most important autochthonous breeds and strains of cattle and pigs in the Republic of Serbia

Busha

According to Latinović et al. (2006) Busha belongs to the group of shorthorn cattle originating from *Bos brachyceros Adametza*. It is also known under the name of Balkan hilly or Illyrian cattle. It belongs to primitive breeds which had survived in the regions of extensive livestock production where men had little influence on cattle breeding. Busha is always of one colour, from light grey, yellow, reddish, red to black. A special variant is tiger−like Busha with thick, narrow tiger stripes over a whole body. On the basis of colour and territorial spreading of some Busha populations the most distinguished in colour we can speak about Busha strains. The most important strains represented in Serbia are: grey (grey-reddish) Polimska Busha (southwestern Serbia) and Red Metohian Busha (south Serbia and Kosovo).

Busha horns and hoofs are always of a dark or black colour. Horns are short, wreath−like, light around the base, with black tops. The bones of the head are fine, forehead wide, recessed, eyes orbits expressed. The neck is dry with poorly expressed necklace. The back is narrow, short and straight and buttocks most often lowered. Chest is narrow but deep and large. Legs are relatively short, with large and hard hoofs. The udders are poorly developed but properly built.

Exterior measures vary so that the height of withers in cows and bulls is from 105 to 120 cm and 120 cm and more, respectively. A body mass of adult animals varies considerably depending on rearing conditions being from 220-300 kg for females and 250-400 kg for males. As working animals Busha bulls cannot develop a great tractive power, primarily because of their small body mass. Besides rather modest requirements regarding nutrition and care Busha is characterized by a very high resistance to low temperatures, diseases and parasites.

Picture 1. *Red Busha (photo P. Perišić)*

Picture 2. *Grey Busha (photo P. Perišić)*

Busha is a late maturing breed. It achieves sexual maturity at 18 months of age or later depending on the raising conditions. An average production of milk is about 1000 litres per lactation that lasts shorter than standard one. Calving interval is about a year. The milk is of a good composition and contains 4 to 6% milk fat, depending on the phase of lactation. In the territory of Serbia and former Yugoslavia the decrease in the number of Busha started from the middle of the twentieth century. In mountainous regions along with improving of growing conditions Busha was being improved by certain easier, more productive breeds (Grey Tirol, Montaphon, Pincgav) according to the principle of assimilation. New, more productive populations were also created known as separate

strains (Gatačka Busha). In lower regions with better rearing conditions Busha was improved by Simmental breed so that by cross−breeding through several generations a Domestic Spotted Breed in the type of Simmental was created. Preservation of existing genofund of Busha at current level of scientific development is possible by means of *in* and *ex situ* conservation. *In situ* conservation has started in several locations (Crna Trava, Kuršumlija) with the aim to preserve the animals in alive state so that Busha population should remain preserved with unchanged frequency of genes and genotypes for a longer period on condition that in chosen breeding stocks there is obligatory control of mating conducted without the application of inbreeding.

Podolac or Podolsko cattle

This cattle breed originates from European aurochs (*Bos primigenijus Bojanus).* According to some hypothesis Podolac or Podolsko cattle was brought into our regions either by Hungarian tribes in the time of their invasion or by the invasion of Avars tribes in the course of VII century. Podolac was in the past very respected breed because of its outstanding working and fattening abilities. In the region of former Yugoslavia Podolac has participated in creating several autochthonous breeds (Kolubara, posavska gulja, Istra cattle) which represent traditional breeds today. A characteristic of Podolac and all steppe cattle is that they are of one colour.

The colour of the hair is light grey with darker shades on the neck, thighs and external leg surfaces. Females and castrates are less pigmented than bulls. Calves at birth are of a light chestnut or sorrel colour which they lose after the first shedding. A front part of the body is more developed than the hind one. Legs are long, with strong joints, good postures, strong and darkly pigmented. Udders are poorly developed, overgrown by coarse hair with often present supernumerary small tits on the belly and thighs of cattle. Cow body mass most often ranges from 400 – 500 kg, bulls about 900 kg. In time Podolac lost its importance as a working breed. Production of meat and milk is not at an enviable level. The fattening traits are more expressed than milk yield trait. According to Bodo (1990), production of milk is low while the content of milk fat is high. The number of Podolac and similar cattle and an area of their raising have decreased a long time ago. In order to preserve genes of

Podolac in some countries (Hungary), special reservates are formed for this breed. Similar activities with the same aim are initiated in our country as well (Stojanović and Đorđević-Milošević, 2003) so that a current size of population of Podolac breed under control is about 350 animals with growing population trend. Locations in which Podolac is currently raised, ie., in which *in situ* conservation has been conducted, are Bačka Topola, Banatska Palanka (Bela Crkva) and Zasavica (Sremska Mitrovica).

The autochthonous pig breeds in Serbia include Mangalitsa (there are more strains of Mangalitsa and according to some authors even more breeds), moravka and resavka, while the autochthonous breeds such as šiška, šumadinka, zdravinjsko small pig and others are permanently lost with no possibility to be recovered. The existing aforementioned breeds in our country have almost vanished but in the last years of the twentieth century the first efforts and attempts to identify and preserve them were performed.

Mangalitsa

According to Pribičević (1950) Mangalitsa represents a pasture pig that spends a greater period of year on pastures and in the woods with no or poor feeding, so their production traits are modest except for the production of fat. Fattening capability in Mangalitsa is mostly directed to producing a large quantities of fat compared to meat because it is a typical swine breed for fat production. The mass of grown−up fattened culled animals is 200 – 250 kg. Depending on the colour of hair we distinguish a few strains of Mangalitsa, therefore Belić et al. (1961) state that there are two strains, white (originated in Hungary) and swallow bellied strain (originated in Srem, village Buđanovci, supposing that a wild boar also had a certain influence in its creating), while Nikolić (1951) says that besides the first two there was also a black strain created as a result of crossing of Mangalitsa and black pigs of Srem but it had disappeared.

Mangalitsa is a breed of a medium size, with an averagely long and averagely wide head usually with slightly bent profile and strong pigmented snout. The ears are flobby, drooped and placed in the direction of snout. A body is short, rather round, especially in fattened animals.

Picture 3. *Mangalitsa swallow bellied sow*

A participation of bacon and lard is very high 58.3% (Brinzej 1956), therefore Mangalitsa breed has no equal as regards the production of fat. Similar results were obtained by Radović et al. (2010), who established a yield of fat of 28.78%. They also established a high percent of fat in the sample of MLD as 13.24%, as well as the content of cholesterol in 100 g MLD of 61.89 mg. The same authors established a content of cholesterol of 52.81 mg in 100g MLD in Swedish Landrace in the same study. When the numerical state of autochthonous pig breeds in the Republic of Serbia is in question there are no true data concerning it but it is obvious that the number of Mangalitsa is rising while the number of moravka and resavka is below the limit for endangered breeds. On one hand it is influenced by a poor productivity and non economical raising of mentioned breeds, and on the other by the absence of planned and longterm strategy of preserving genetic resources by the state. The influence of global economic situation in the Republic of Serbia in the last years resulted in no subsidies granted for the raising of autochthonous breeds so today it is based mostly on the enthusiasm of the individuals and some organizations that have understood a long term importance of these breeds in future, not only for extensive, but also for intensive livestock production.

Conclusion

Autochthonous breeds of domestic animals created during a long process of evolution and as such well adapted to local rearing conditions in the future will represent a significant source of variability for improving

resistance, vitality and longevity of high productive breeds. Because of this as well as for the fact that they can become a foundation of sustainable agricultural production the protection of already existing animal genetic resources is necessary. For that purpose the nucleuses of the most important autochthonous breeds with suitable number of animals in the vicinity of their natural habitat have been formed in the Republic of Serbia. Population trend of Podolac and Mangalitsa is rising while a population trend of Busha is still falling. In the future it would be necessary to master a technology of obtaining and cryopreservation of embryos, while the priority of creating the gene banks, when cattle and pig breeding are in question, should be given to Busha, Podolac and Mangalitsa. Also, a further cooperation with authorized institutions on global and regional level is necessary, as well as popularization of aforementioned breeds via agricultural fairs, exhibitions and similar manifestations.

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AGRICULTURE, SUSTAINABILITY, CLIMATE CHANGES AND THE CRISIS OF ENERGETIC RESOURCES IN THE ECONOMY OF THE 21ST CENTURY*

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Abstract

In today's world, the climate changes and the crisis of energetic resources belong to a group of the most current and most significant problems which jeopardize modern mankind and life on Earth. These two mutually intertwined problems on the global level represent a great threat to the world's economy of the 21st century from the aspect of further quantitative economic growth and sustainability of modern mankind. Their combined influence with multiple destructive consequences especially affects food production in the world and represents a limiting factor for agriculture on its way to sustainability. That is why observing agriculture within the economy of the 21st century becomes of strategic significance in the goal of creating security, i.e. sufficient food production and reduction of poverty in the world, and in the function of achieving sustainability.

Key words: *climate changes, crisis of energetic resources, economy, agriculture, sustainability, poverty*

Introduction

In the world's economic frames, the branches of the economy are only as worth as their % participation in the gross domestic product (GDP). If we observe agriculture as a branch of economy in those frames, it lies at the very bottom of the ladder of key developmental priorities. If we, for

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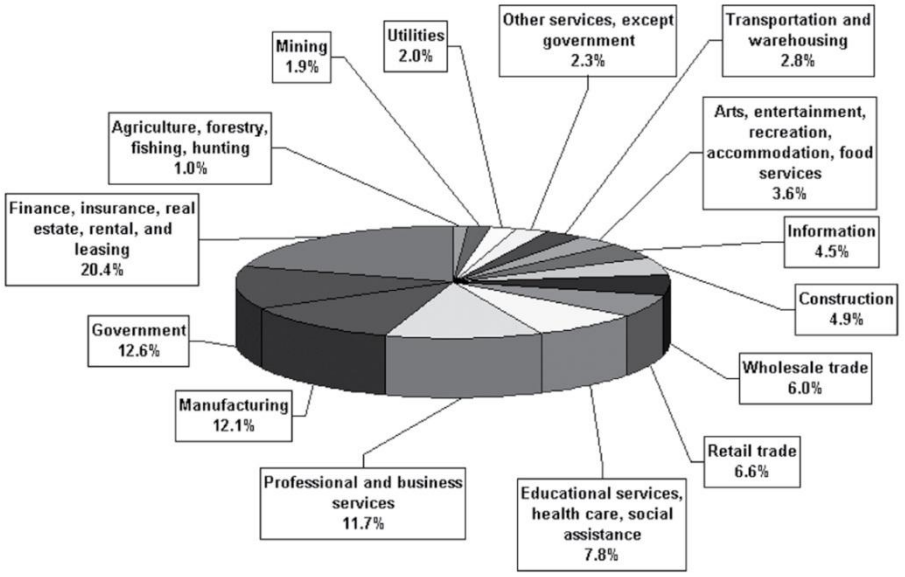
example, analyze the American economy from the aspect of GDP, the top of the ladder of key developmental priorities is taken by the financial sector and insurance which together make for about 20.4% of the GDP (*figure 1*). Following the financial sector and insurance, come the state i.e. the government which participates with about 12.6% of the GDP, and industrial manufacture with 12.1% of the GDP. Agriculture as a basic and a strategically important activity in food production, as well as forestry, fishery and hunting make for only about 1% of the GDP. They are, thus, at the bottom of the ladder of key developmental priorities.

Figure 1. *The percentual participation (%) of economic branches in the GDP of the American economy*

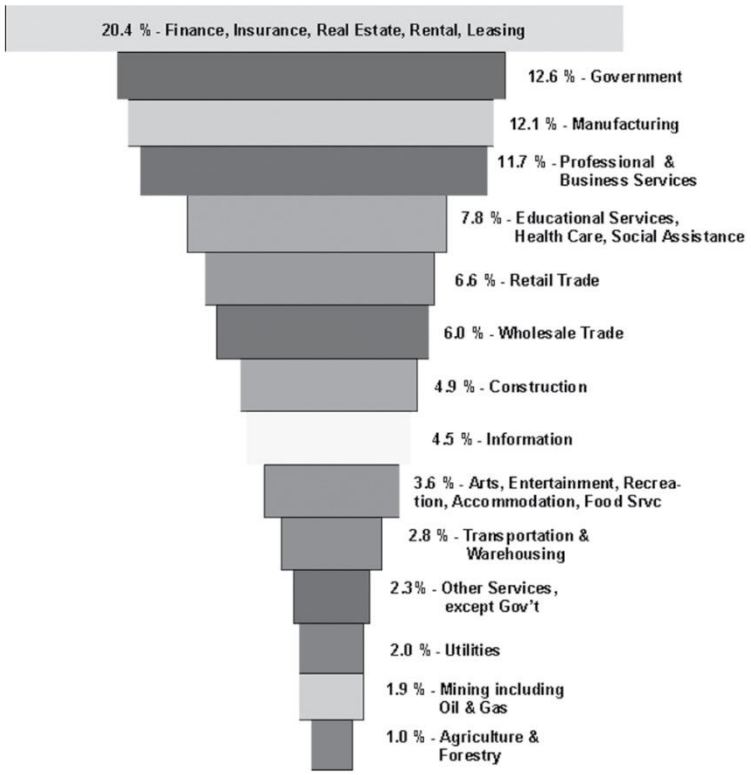


Source: *Resource Insights: Upside-down economics, http://resourceinsights.blogspot.com/2007/07/upside-down-economics.html (02.07.2012).*

Such a setup of key developmental priorities in the American economy which can approximately be taken as a world average, does not care for the concept of *sustainable development* and is not harmonized with the basic principles of *green economy*. In fact, here we have a case of the so-called *„upside-down"* phenomenon of the American economy (*figure 2*). That is an economy which lies on the *„shoulders"* of agriculture, forestry, fishery and hunting, but also mining, and it drains all of its power from

excessive and irrational use of non-renewable and limited natural resources such as oil, gas, coal and uranium.

Figure 2. *Shows the so-called „upside-down" phenomenon of the American economy*



Source: *Resource Insights: Upside-down economics*, *http://resourceinsights.blogspot.com/2007/07/upside-down-economics.html (02.07.2012).*

Bearing in mind the significance which agriculture has for mankind in satisfying the existential human needs and reducing poverty through food production, this kind of principle of forming the key development priorities is not sustainable on the long run. On one hand, there is a developmental disproportion in relation to other economic sectors. On the other hand, such a principle of forming developmental priorities is conflicted by the economy of the world's new reality which is characterized by significant climate changes and the crisis of energetic resources on a global level. Of all economic branches, agriculture is the

one that is hit the hardest by climate changes and the crisis of energetic resources. They are becoming a bigger and bigger threat to today's civilization and the survival of life on Earth.

Namely, the excessive emission of hazardous gases (CO_2) with greenhouse effect leads to global warming, and that leads to catastrophic climate changes in the world. The world economy in the 21st century is faced by three very significant crises. *These crises are intertwined and have multiple destructive consequences to modern mankind*. Those are:

1) *The crisis of the global financial market which can be seen through a recession in the world's leading economies;*
2) *The crisis of energetic resources which can be seen through a rise in the prices of resources, shortage of petroleum products and exhaustion of other natural resources;*
3) *Climate changes which lead to global warming which especially affects agriculture, i.e. food production*.

From the aspect of these three global crises it is necessary to set up new economic principles for economic activity in the 21st century. The exhaustion of non-renewable and limited natural resources, and climate changes, determine a completely new frame for economic activity. New economic principles should be mostly based on the principles of *green economy*, which sees human economy as a part of a wider ecosystem of our planet with its limited resources and in the function of sustainable development. If we go from a wider plane of economy to the plane of agriculture, it becomes clear that the current practice of agricultural manufacture in economically developed countries is not sustainable and that it demands significant changes, which will have different economic implications.

In economically developed countries, the high productivity of modern agricultural manufacture of industrial character is highly based on agricultural mechanization, cheap oil, gas, artificial (mineral) fertilizers and pesticides. The degradation of agricultural soil in these countries has, through the use of current tilth methods, reduced the global agricultural productivity by about 13% for the past half a century. Also, most of the pesticides, to which the crops have become addicted over time, have lost their effectiveness, because the plant pests have in the meanwhile become resilient to them.

That is why it is necessary to develop those plant cultures that will have the greatest resilience to climate changes and to develop use of ecologically healthier methods of agricultural manufacture. Bearing all of this in mind, what was once a developmental advantage of agriculture in economically developed countries, will in the future, because of the upcoming climate changes and the crisis of energetic resources, very quickly become a great weakness in the process of food production (most of all, healthy food production) in these countries. The most significant list of risks according to their intensity and significance, i.e. level of hazard they represent in the modern environment, and that also affect agriculture is as follows:

1) *Climate changes*[3]*;*
2) *The crisis of energetic resources as an input crisis*[4]*;*
3) *Ecological degradation*[5]*;*
4) *Reduction of soil fertility and its erosion*[6]*.*

Climate changes in the world and agriculture

Climate changes represent the greatest danger to the modern world's economy, to preservation of ecosystems and biodiversity, as well as to the survival of living beings on Earth. We are talking about changes that have an especially hazardous effect on agriculture, which manifest through the emergence of two specific climate trends:

1) *global warming* (constant increase in temperature on Earth, followed by reduction of atmospheric precipitation and drinking water reserves, which results in reduction of the amount of water in rivers and lakes, melting of mountain glaciers, absence of rain monsoons in Asia, drops in the level of underground waters etc.);
2) *instable and unpredictable weather with extreme characteristics* (appearance of weather conditions which no longer have regular and predictable rotation of seasons, cold and warm periods, as well as rain seasons, all of which can comfortably be denoted as bad weather conditions).

[3]Temperature growth and weather instability.
[4]Reduction of oil, gas, coal et cetera, which causes a continuous growth in prices, but also susceptibility to market speculations.
[5]Pollution of water, soil and air, as well as reduction of biodiversity.
[6]A consequence of intensive use of artificial fertilizers, but also climate changes.

Seen from a long term distance, climate changes will result in draughts and water shortage, as well as mass migrations of the population all over the world. That's why it is necessary for us to give up carbon dioxide, i.e. fossil fuels which, when burnt, emit CO_2 which affects climate changes. All of this can cause tensions and conflicts within and between states in the future. As a solution to overcoming this global problem, there arises the transition to the so-called *low-carbon* economy which should reduce the level of hazardous gases in the atmosphere.

Having in mind the current trends in the world, in the field of reducing the emission of hazardous gases which affect climate changes, the farmers in the EU will have to reduce the emission of greenhouse gases (*GHG*) which will influence climate changes by at least 20% by the year 2020. This can be primarily achieved through a greater use of renewable energy sources, such as the *biomass*, but also through production of raw materials for other forms of renewable energy. It is realistic to expect that the farmers will not be able to implement such an action plan on their own, and that they will require financial help at the state level.

It is also necessary to create such plant cultures that will be more resilient to absence of water or to excessive moisture and to reduction in the use of artificial fertilizers. This implies the creation of perennial plant cultures which have a deeper root, with the necessary changes in agricultural food production technology. According to data from the *International Food Policy Research Institute (IFPRI)* and the *Worldwatch Institute*, agriculture should be placed in the focus of current discussions on climate changes in the UN, considering that it emits about 30% of the total amount of greenhouse gases. However, it also has the ability of absorbing the greenhouse gases emitted by other industrial sectors. It is considered that agriculture plays a key role in fighting climate changes and that, through adequate innovations in this food production sector, the total emission of hazardous gases from fossil fuels can be reduced by 25%. The proposed strategy should encompass:

1) *reduction of classic cultivation of agricultural soil and use of artificial (mineral) fertilizers, as well as prevention of erosion and adding more organic matter to the soil (remains of plant cultures left after harvesting, such as compost, manure etc.);*

2) *replacing cultivation of annual plant species with cultivation of new sorts of perennial plants, that have a deeper root and a greater ability for storing CO_2 in the ground;*

3) *changes in the way of feeding domestic animals in order to reduce the amount of methane which comes from the process of food digestion;*

4) *better environment protection by avoiding cutting down forests and through restitution of vegetation on degraded soil.*

Climate change consequences for agriculture can be catastrophic from the aspect of food production, but also the environment, i.e. resources, which can eventually jeopardize the existence of mankind on Earth. As examples which justify this claim, we can take Syria and India, where the climate change consequences for agriculture and the population were catastrophic. Namely, according to a research study from the UN, a combination of climate change, soil degradation caused by human action and the absence of necessary irrigation in the year 2009, struck about 60% of agricultural soil in Syria, as well as about 1.3 million farmers. Also, more than 800,000 farmers lost all necessary means for life and were forced to move to cities, which caused an additional demographic pressure on urban areas.

As for India, in the year of 2009 about 2/3 of agricultural soil was affected by the consequences of the absence of rain bringing monsoons. In such conditions, the non-sustainability of agricultural production based on excessive use of artificial (mineral) fertilizers becomes apparent, since such a way of land cultivation demands about 10 times more water than ecological agricultural systems. Namely, the artificial fertilizers kill life in the soil, making the soil more vulnerable to draught. These fertilizers produce nitrogen oxides which are far more dangerous for the climate than CO_2. One can say that agriculture based on artificial fertilizers uses water excessively and leads to exhaustion of underground waters, but also destroys the natural fertility of the soil and contributes to climate change.

According to a report on the state of the environment in India for the year 2009, about 50% of fertile soil is caught in a degradation process. The causes of this state come from excessive use of artificial fertilizers, soil erosion by wind or water flow, cutting down forests, as well as poor agricultural practice (excessive grazing, poor practice in crops rotation,

and poor irrigation control in the sense of excessive use of underground waters which do not have the time to renew themselves). Thus, in order to prevent the negative trends in India, the farmers will have to reduce their use of artificial fertilizers, start using recycled water and additionally train themselves for appropriate implementation of crops rotation.

Agriculture and the crisis of energetic resources in the world

The energy resource crisis has a significant influence on the economy of the 21st century, but also on agriculture, i.e. the world's food production. Many of the worlds eminent experts who deal with this problem consider that no other issue ever had such a great significance for the future of mankind, as the issue of energetic resources (fossil fuels), mostly oil, does. The world's food production is namely greatly dependant on oil and natural gas. This will result in a reduction of reserves of non-renewable sources of energy and in catastrophic consequences for the world's population. The situation with coal is not far better, since 80% of the world's coal reserves is located in only six countries, and those are USA, Russia, China, India, Australia and South Africa. The biggest reserves of coal in the world are in USA (Montana) and Russia (Siberia).

According to modern research, producing one calorie of food demands the use of about five calories of oil and natural gas. Mankind now uses about 60 million barrels of oil and natural gas daily on food production only, which makes up for about 40% of total daily production of oil and natural gas. With the progressive growth of the world's population, this percentage will continue to grow. Excessive and irrational use of fossil fuels (coal, oil and natural gas), but also the emission of other hazardous gases, such as nitrogen oxides and methane[7] lead to drastic climate changes all over the world. One can, thus, conclude that climate changes are mostly caused by emitting into the atmosphere large amounts of CO_2 which originates from fossil fuels and other hazardous gases.

For example, bearing in mind that the energetic resources used in agriculture, i.e. food production create a large amount of CO_2 and thus influence climate change, Sweden has introduced marking the food on the market with information on the amount of energy used in its production.

[7] *Nitrogen oxides* come from decomposition of artificial (mineral) fertilizers used in agriculture during soil cultivation, while *methane* comes from decomposition of organic matter and food digestion in domestic animals.

The point is saving the energy used in manufacturing certain food. In this way, the buyers will stimulate the production of organic products, not only because they are healthier and ecologically cleaner, but also because one uses less fossil fuels, thereby making a lesser influence on climate changes. This approach is obviously in correspondence with sustainable development.

By observing agriculture in the context of climate change and the crisis of energetic resources, and considering the trend towards reducing the distance between food production and the consumer, i.e. *food localization*, we get an alternative in the form of producing *biofuel*, which will soon become the cheapest fuel. Considering that fossil fuels are a non-renewable source of energy which is becoming depleted, agriculture in the future will demand food production with less oil and gas and more human labor. This will result in great social turbulences and changes from the aspect of reinstating the role and significance of rural areas. Besides food production, rural areas should also become the main manufacturers of energy from renewable sources. We can therefore say that reruralization will be the dominant social trend in the 21st century. The historical balance between the rural and urban population will return. Also, according to certain projections, more food will be produced in cities than there is produced today, but the cities will be smaller. Also, much more people than today will live in the province and produce food.

Fossil fuels, i.e. non-renewable natural resources are getting rarer and rarer in the world. Considering this fact, non-renewable energy sources such as oil, gas, coal, etc. will become more expensive on the market, so agricultural production based on them will also become less profitable. One should also say that such a form of agricultural production, as well as the modern way of life marked mostly by *consumer economy*, have led to great ecological pollution and immense degradation of the Earth's ecosystems, as well as drastic climate changes which threat the very survival of mankind and the living world. Modern development trends in the world's economy have been warning for a long time that the future quantitative economic growth will be limited by natural resources, which is why it is necessary to add a qualitative component to economic growth. The world today spends 30% more natural resources than nature can create or renew.

The significant role of agriculture on the way to sustainability of the economy of the 21st century and its perspective in the context of the crisis

of energetic resources and climate change are also confirmed by UNEP's (*United Nations Environment Programme*) report from October 2008 on the need for forming a *green economy* as an ecologically cleaner economy in the 21st century. This report states that agriculture is a part of a category of very significant green sectors which use clean energetic resources, but also clean technology, such as *recycling*. The *sustainable development of agriculture* which encompasses *organic food production* is emphasized. The significance of rural energy which includes energy from renewable sources such as wind and solar energy, as well as sustainable biomass production are also stated. One should also add to all this the construction of sustainable ecosystem infrastructure, and the reduction of hazardous emission from deforestation and forest degradation.

The sustainable role of agriculture from the aspect of global trends in modern economy

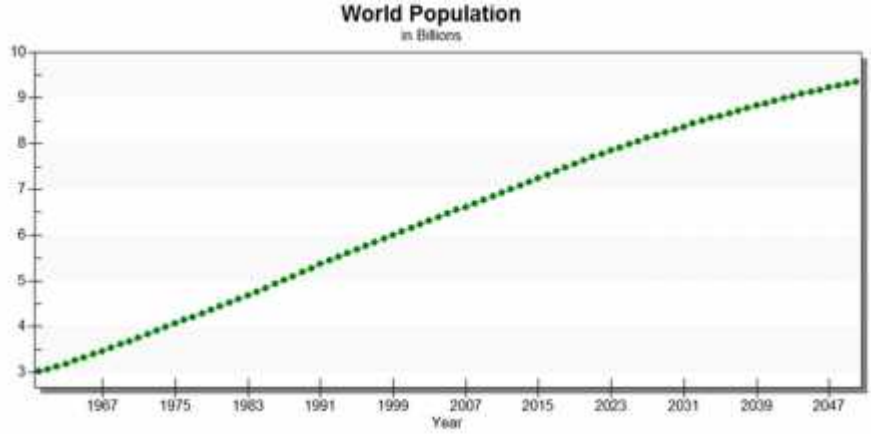
The modern conditions of the developmental environment are characterized by constant uncertainty and turbulent changes on the global market which have in the past years been entering all the pores of economic activity with the onset of the world financial crisis and industrial recession. In accordance with that, the demands and limitations of future development of the world's modern economy, but also agriculture as its integral part during the 21st century, become clear. Those are:

1) *the progressive enlargement of the world's population will demand greater food production;*
2) *the reality of climate changes and adaptation of food production to the conditions of climate uncertainty with the goal of reducing the emission of polluting hazardous gases;*
3) *the absence of non-renewable natural resources which leads to a growth in their price on the market*.

According to some projections, the world's population will increase by 50% by the year 2050 (*graph 1*). Considering that one half of the world's population already today lives in cities, with the continuation of the current trend of urbanization, ¾ of the world's population will live in cities by 2050. According to these projections, a lot more food will be needed to feed the world's population with a tendency that food

production will become harder and harder. Besides food production, rural areas will obviously expand their activities to other areas of manufacture. Namely, rural areas will take a continuously increasing function of producing energy from alternative sources. We are talking about rural energy which will mean producing energy from renewable sources, i.e. from the plant mass (biofuel) but also by using wind and solar energy.

Graph 1. *The trend of population growth with a projection up to 2050*



Source: *Taken from: http://en.wikipedia.org/wiki/File:World_Population_Forecast_to_2050_from_International_Futures.png (01.08.2012).*

Generally seen, economically developed countries are today on a path towards a green economy, i.e. the so-called *low-carbon* economy which means the future with a reduced use of fossil fuels, mainly oil, and with a reduced emission of hazardous gases (CO_2) which lead to climate changes. In many aspects we are moving towards a future which is still greatly unknown, and which can be observed through the following 4 aspects:

1) *the end of consumer economy and anthropocentrism (egocentrism) based on excessive consumption, because there are fewer resources for manufacturing goods, and the prices are higher;*

2) *the end of the advantages of urbanization and further excessive expansion of cities, because urban areas are great energy consumers and ecological polluters – certain jobs in urban areas will eventually disappear or will lose their allure, while rural areas, which are energetically more efficient, will in time get new jobs and strategically sustainable functions;*

3) *the end of globalization based on cheap transport of goods from remote regions and revival of the localization principle, especially from the aspect of food production;*

4) *the end of industrial agricultural manufacture based on cheap fossil fuels and the development of new forms of organic agricultural manufacture as a sustainable form of manufacture that uses less fossil fuels, increases soil fertility, it is less hazardous to the environment and demands a greater percentage of population to be engaged in food production.*

It is obvious that adjustment to these conditions will not be easy, so besides the current world economic crisis and industrial recession, ecological and energetic crisis, we can also expect a global food crisis. In other words, the upcoming global food crisis will not disappear with the disappearance of the world economic crisis, nor will the food crisis hit only the underdeveloped, i.e. poor countries. The global food crisis will also hit the economically most developed countries. The basic causes which can lead to a global food crisis are the following:

1) *consumers mostly use those amounts and those kinds of food whose production demands a greater area of arable land and greater amount of water than is, in average, available in most countries, which leads to an increase in food import;*

2) *in economically developed countries we can note a trend in decreasing the number of farmers who are engaged to work in land cultivation and food production;*

3) *modern, i.e. industrial agricultural food production uses large amounts of energetic resources, which is why it depends on the growth in prices of energy-generating products, such as oil and gas;*

4) *the growth in food prices leads to introduction of new protectionist measurements and limitations of food export in many countries of the world;*

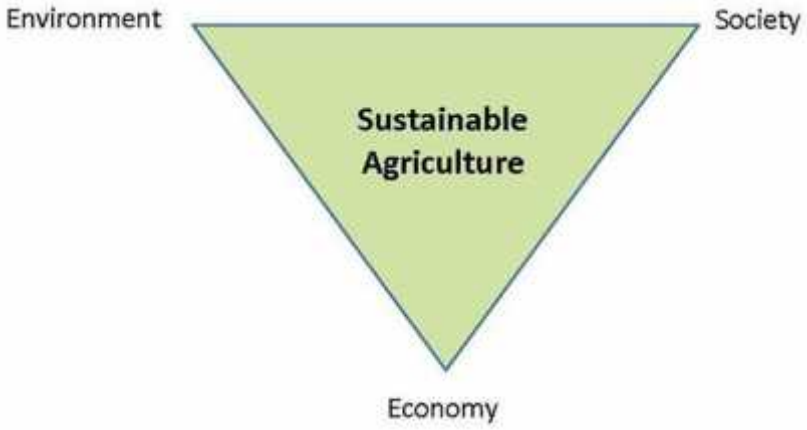
5) *climate changes lead to a decrease in crop yield which influences the growth in food prices;*

6) *the increase of living standard in the most populated countries of the world, such as China and India, leads to a greater consumption of food, which also influences the growth in food prices.*

The sustainable role of agriculture from the aspect of global trends in modern economy means the transition from industrial agriculture to agro-ecological methods of production. That further means protecting biodiversity and fertile soil from damage and erosion, lesser use of water in agriculture and decreasing water pollution with nitrogen-based fertilizers and pesticides, reducing emission of gases which influence climate changes from agriculture. Of extreme importance is also the transition to organic agriculture, i.e. production of ecologically clean, healthy and pesticide-free food, but also diversification of food production and food localization.[8] Also, adequate risk control through implementation of sustainable technology has been gaining significance in the recent years. All of these aspects are in the function of realization of a sustainable role of agriculture from the aspect of global trends in modern economy. Namely, the sustainable role of agriculture is based on the principle of satisfying the needs of the present without jeopardizing the ability of the future generations to satisfy their needs, and it does so through an integration of three basic developmental goals (*figure 3*), and those are:

1) *economic profitability;*
2) *social justice;*
3) *ecological responsibility.*

Figure 3. *The sustainable role of agriculture integrates three basic developmental goals in the domain of economy, society and environment*



Source: *Brodt S., Six J., Feenstra G., Ingels C. & Campbell D. (2011): Sustainable Agriculture, Nature Education Knowledge, 3(3):1.*

[8] Brussels outlines vision for 'fairer' EU farm policy, *http://www.euractiv.com/cap/brussels-outlines-vision-fairer-news-499832 (20.07.2012).*

Generally seen, the strategy of sustainable development which does not respect the issue of the future crisis of energetic resources, as well as other influences of climate changes on life, economic activity, but also agriculture, cannot be successfully implemented and realized, seen from a long term distance. The influence of these two key factors should be considered when planning all forms of economic activity in a state, including agriculture. The current economic crisis should not block our view on clear limitations and directions of future sustainable development. The drop in prices of oil and other primary products due to the threat of a global economic recession will last for a relatively short period. The world will soon face much more dangerous consequences of food shortage, as well as an increase in prices of non-renewable natural resources.

Agriculture as a strategic and primary activity in food production will face hardly predictable factors which can leave extremely difficult consequences for food production. Among these factors are the influence of climate changes on agricultural manufacture and the influence of market speculations regarding food price due to a reduction in the availability of non-renewable energy sources in the world. Having these factors in mind, the question of agriculture on the path towards sustainability within the economy of the 21st century, in its initial state becomes a question of strategic character from the aspect of ensuring food security and reducing poverty in the world, and in the function of achieving sustainable development.

Conclusion

Certain research and trends in the world show that we can, in the future period, expect a slight slow-down in global warming, due to the ice-melting on the poles, but this will be immediately followed by even greater draughts, floods, snow blizzards, sudden temperature changes etc. It is also considered that the climate changes will hit agriculture, i.e. food production the hardest, which is why significant strategic financial investments from the world's states are necessary in order to prepare agriculture for the upcoming crisis period. Besides that, agriculture must adjust to new economic conditions, defined by *green economy*, i.e. the so-called *low-carbon* economy in order to reduce the emission of hazardous gases (CO_2) into the atmosphere. Besides agriculture, other economic branches should gradually adjust themselves to these conditions in the goal of reducing hazardous gases, but also because there are fewer non-renewable energy sources in the world, mainly oil.

Considering such a formation of global problems, it becomes obvious that agriculture, i.e. food production can no longer survive solely as a concern of farmers and rural areas. That is why in the conditions of the upcoming crisis of energetic resources and climate changes, agriculture in rural areas, i.e. food production, as well as energy production from renewable sources should become a concern of mainly the state and the cities which emit the most hazardous gases. All of this implies that there is coming a time where there will appear a new, much more righteous alliance between the states (cities) in the world and agriculture in rural areas, which will serve for the good of mankind, and in the function of sustainable development.

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OPPORTUNITIES FOR DEVELOPMENT OF TOURISM WITHIN THE AREA OF FRUŠKA GORA*

Sanja Đukić, Danica Glavaš-Trbić[1]

Abstract

This paper analyzes the possibilities of tourism development in the area of Fruška gora. The area of Fruška gora is the lower mountain massif in Vojvodina with a total area of 13.430,01 hectares. At the heart of this area there is the National Park "Fruška gora", and in a broader scope, there are predominantly rural-type settlements and agricultural land used in an extensive and intensive way. The main economic activity of the area is agriculture, and to a lesser extent, tourism. The presence of the National Park in this area emphasizes the issue of sustainable development of Fruška gora, in that direction economic activities are subordinated to the principles of sustainable development. The authors conclude that sustainable tourism is an adequate and the most favorable model for performance of tourist activities in the area.

Keywords: *Fruška gora, development, tourism, rural development.*

Introduction

European integration has underlined the importance of the Danube region, and Serbia as a country that belongs to the **Danube region** has a unique opportunity to participate in the promotion and protection of this important river road. According to this, the area of Fruška gora that partly

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belongs to the Danube region has the opportunity to contribute significantly to the achievement of the objectives underpinning the Strategy for the Danube Region. Furthermore, through the achievement of the objectives of the Strategy for the Danube region through investment, opens up numerous opportunities for the area of Fruška gora to significantly improve its connectivity infrastructure, socio-economic integration and its environment. The area of Fruška gora is a unique mountain massif in the area of Vojvodina (Republic of Serbia) and covers an area of approximately 139.430,01 hectares. Due to specific positions in the Pannonian Plain, Fruška gora is often called island mountain. At the heart of Fruška gora there is National Park "Fruška gora" on area of about 25.525 km^2, while in the broader coverage, there are agricultural land and settlements. Within this area there are seven municipalities and two cities, as follows: Sremski Karlovci, Beočin, Irig Inđija, Šid, Bačka Palanka, Ruma, Novi Sad and Sremska Mitrovica. On the whole area are performed the protection of natural resources and values, determined by certain regimes of protection. Therefore, the principles of sustainable development are vital for the management of this area. Also, landscape conservation of Fruška gora implies that the economic activities which are performed have to subordinate according to the principles of sustainable development. The most important economic activities in the area are agriculture and tourism.

Sustainable Development of the area of Fruška gora

Within the area of Fruška gora there are three zones which are the basis for protective measures, such as[2]:

- Zone I - Zone of protected areas covering an area of 27.489,60 hectares (19,72%) and includes: National Park "Fruška gora", part of the Special Nature Reserve "Koviljsko petrovaradinski rit" and strict nature reserves and natural monuments;
- Zone II – the protected zone of National Park "Fruška gora" that covers an area of 66.090,82 hectares (47,04%);
- Zone III - active protection zone covering 45.849,62 hectares (32,88%), and is located between the borders of the protection zone of National Park (zone II) and the borders of the area of Fruška gora.

[2] *Prostorni plan područja posebne namene Fruške gore do 2022. godine* (2004): „Službeni list AP Vojvodine", broj 18/04, Novi Sad.

The central part of the area of Fruška gora is National Park "Fruška gora" with a total area of 25.393 ha. National Park "Fruška gora" is the first national park in the Republic of Serbia (as in the former Yugoslavia), and its status has received in the 1960. year. These characteristics have caused a selection of **model of sustainable tourism** for the area of Fruška gora, as the most acceptable form of tourism for areas that are characterized by well-preserved ecosystems. For example, in the first zone of the area of Fruška gora is permitted sustainable development of tourism, recreation and other development functions in the use of natural and cultural values, and to ensure the protection and preservation of these values. In the second zone of this area are permitted some activities, such as: informational and advertising presentations of natural resources, education and the controlled movement of visitors and the controlled construction of hiking and other trails. In Zone III of the area of Fruška gora there are the biggest possibilities for sustainable tourism development. In this zone the development of tourism will be performed in accordance with the possibilities of the area. According to this, in active protection zone is allowed: building the necessary infrastructure, the construction of tourist-recreational, health and rehabilitation, cultural and educational facilities, the development of traditional sectors (agriculture, trade, manufacturing, catering). Also, in this zone the control of hiking and other trails is necessary, as well as the movement of visitors.

Natural and cultural values of the area of Fruška gora

The base of the development of tourism in the area of Fruška gora are its **natural, cultural and historical value**. Among others, the important characteristics of **natural resources** are following: geographical location, geological structure, complexes of linden and mixed forests, hunting animals; Fruška gora's vineyards, typical landscapes and others. Fruška gora has a specific geographic location with a different micro-climate conditions which are different from the surrounding areas, so it has a dominant position in the Srem-Bačka's plain. From the geological point of view, Fruška gora is a complex area because it consists of rocks, which are diverse composition, and the origin of different ages. The area of Fruška gora is known for its fossil remains (plants and animals) and represents a unique museum in nature. In this area there are large complexes of linden and mixed forests, which are the largest in Europe,

with numerous hunting animals. Fruška gora's vineyard has a long history of wine growing (about 1.700 years) and it is considered one of the oldest wine-growing regions in Europe. Fruška gora abounds with numerous typical views that are in line with the Convention on the landscape.

In terms of **cultural and historical values** of the area of Fruška gora there is a large number of locations from different periods, such as:

- archaeological locations from the period of prehistory, Antiquity and the Middle Ages;
- the spatial cultural and historical sites (the historical core of Sremski Karlovci and Irig);
- objects of traditional architecture;
- sacred objects of different confessions made in different periods (Middle Ages, from the late Byzantine era, Baroque, etc.);
- monastery complexes formed between the fifteenth and sixteenth centuries;
- objects of technical culture and labor colonies (in Beočin and two mining colonies in Vrdnik) that occurred in the nineteenth and early twentieth century;
- monuments, memorials and sights related to Second World War, and for the period from the seventeenth and eighteenth centuries;
- castles and summerhouses from the nineteenth and early twentieth century;
- fortification monuments;
- monuments from the Ottoman period.

Tourism zone in the area of Fruška gora

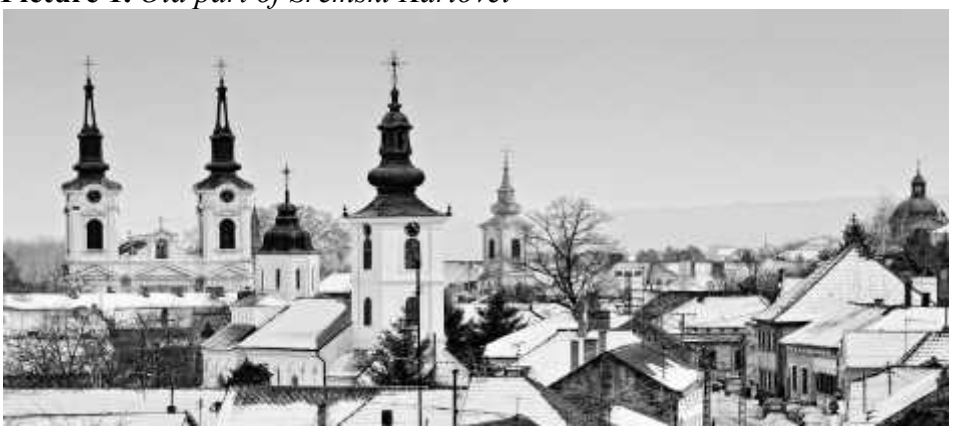
The area of Fruška gora can be divided into several locations which have similar features in terms of tourist offer, such as[3]:

Zone I - Danube: this includes the area known as "Fruška gora's Danube", where Danube River forms the basis for the development of tourism activities. This zone can be separated into two parts, as follows: Zone A (includes coastal areas of the Danube from Novi Sad, over Sremski Karlovci and Čortanovci to Stari Slankamen) which is more

[3] *Prostorni plan područja posebne namene Fruške gore do 2022. godine* (2004): „Službeni list AP Vojvodine", broj 18/04, Novi Sad.

suitable for nautical tourism and less for swimming (except for Čortanovci and Stari Slankamen), and Zone B (includes coastal areas from Novi Sad upstream to Bačka Palanka), which is more suitable for bathing, recreation and boating (presence of river islands, sandy beaches, sandbars and armlets). For this zone are associated potential tourist routes: Novi Sad - Sremski Karlovci - Čortanovci – Stari Slankamen and Novi Sad - Sremska Kamenica - Danube trip to Neštin and local water routes between the two coasts of the Danube. Tourist locations in this zone are: Sremski Karlovci Čortanovci, Stari Slankamen, Koruška-Susek and seasonal locations on river islands.

Picture 1. *Old part of Sremski Karlovci*



Source: *PhD Lazar Lazić, full professor, Faculty of science, Novi Sad.*

Zone II - Iriški venac: this zone covers a broader area of the eastern part of Fruška gora from Popovica, through Iriški venac, to the southern slopes. Besides "Fruška gora's Danube", this zone has the conditions for the successful development of tourism. Namely, in this zone, it is possible to organize recreational activities, events, various meetings and seminars, and rural tourism in towns.

For this zone are associated potential tourist routes: Novi Sad - Popovica - Iriški venac; Novi Sad - Paragovo - Iriški Venac – „NORCEV“; Ruma - Irig - Hopovo - Iriški venac; Irig - Vrdnik - Zmajevac (or Vrdnik - Jazak); Inđija - Maradik - Krušedol - Iriški venac.
Important tourist locations in this zone are: Stražilovo, Iriški venac, „NORCEV“, Zmajevac, Spa Vrdnik, monasteries – Krušedol, Hopovo, Jazak, and villages – Vrdnik, Neradin and Jazak.

Picture 2. *Tourist location - Iriški venac*

Source: *PhD Lazar Lazić, full professor, Faculty of science, Novi Sad.*

Zone III - Crveni čot: in this zone there are significant tourist attractions, but they are away from the main tourist routes. There is domination of recreational facilities, which can be of picnic or residence character.
For this zone are associated potential tourist routes: Beočin - Brankovac - Letenka; Beočin - Čerević - Testera - Andrevlje; Vrdnik - Brankovac.
Important tourist locations in this zone are: Brankovac, Andrevlje, Testera, Letenka and Osovlje.

Picture 3. *Picnic area of Letenka*

Source: *PhD Lazar Lazić, full professor, Faculty of science, Novi Sad.*

Zone IV - West of Fruška gora: this zone includes areas of western landscapes of Fruška gora, but there is a bad connection to other parts of the area of Fruška gora. For this zone is related tourist direction: Sremska Mitrovica – Šid – Erdevik – Sot – Lipovača and other locations.

Picture 4. *Hunting ground Vorovo*

Source: *Dragiša Savić, National Park "Fruška gora", Sremski Kamenica.*

Important tourist locations in this zone are: Lipovača, Spa Kulin with the lake Moharač, the lake Sot, monasteries, hunting ground Vorovo, villages Ljuba, Molovin and other smaller locations.

V zone – Fruška gora's vineyards: this zone includes the areas from the Danube to the north parts of the forest, as well as the southern slopes of area of Fruška gora. In this area are located villages with wine cellars, which are an important basis for the formation of the "wine road". In this zone there are some centers where there is a good tradition of grape growing and wine-making, such as: Sremski Karlovci, Irig, Neštin, Erdevik et al.

Picture 5. *Vineyards on the slopes of Fruška gora*

Source: *documentation base of „Master plan održivog razvoja Fruške gore 2012-2022."*[4]

[4] Univerzitet u Novom Sadu (2011): *„Master plan održivog razvoja Fruške gore 2012-2022."*, naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad.

Analysis of opportunities of tourism development in the area of Fruška gora

Previous development of tourism offer of the area of Fruška gora were: its **natural landscapes** (forests, picnic, flora and fauna), **mineral springs** and **monasteries** with the immediate environment, which caused and so far have been the most common forms of tourism - excursions, cultural (religious) and spa tourism. On the other side, **bio and geodiversity, villages, vineyards and wine production** makes it possible to expand the list to other forms of tourism: ecotourism, geotourism, rural tourism and wine tourism and other forms of sustainable tourism.

The area of Fruška gora has a favorable geographical position. Especially, the proximity of the Danube is important, as one of the most important tourism resources in Europe, as well as proximity to major tourist generating markets in the country (Belgrade and Novi Sad). Also, the status of a National park is another brand in the offer and sign of the quality of tourist services (research shows that national parks are one of the most attractive types of tourist destinations in the world). Geo and bio diversity are in the function of potential tourism offer (eco-tourism and natural). On the other side, the cultural-historical heritage is an important potential for the development of those forms of tourism which are based on such resources (monasteries, archaeological locations, rural landscape features, monuments from Second World War, the cities of the immediate environment - Novi Sad, Sremski Karlovci, Šid). The projection of the future development of tourism in this area should be kept in mind that there is a tradition of excursion tourism (distribution of many resorts with long tradition - Stražilovo, Andrevlje, Testera), which justifies the status of Fruška gora as a mountain for excursion).

In the area of Fruška gora are several important **accommodations**, as follows: hotel "Norcev", hotel "Termal", motel "Vojvodina", youth resort in Letenka, the resort for children in Testera, Dom PTT in Brankovac, Andrevlje - center for Economic and Technological development of Vojvodina and others. Also, in this area are several significant **restaurants**, and the most visited are: Čarda (Sremski Karlovci); Vinski podrum (Sremski Karlovci); Vinski podrum (Irig); Restoran Koruška (Koruška); Restoran Lipovača (Lipovača); Restoran Brankov čardak (Stražilovo).

Also, there are significant incentives in the development of tourism in the Republic of Serbia for those forms of tourism for which Fruška gora has a great potential (mountain tourism, cultural tourism, ecotourism, tourism of special interest, sustainable tourism). Also, there is the possibility of using foreign investment (applying for EU projects) and programs for tourism development. Other motivating factors for tourism development in the area of Fruška gora are: the possibility of remodeling existing restaurants (especially mountain homes on the most attractive locations for tourism) and the possibility of building tourism infrastructure (which would serve not only for the development of tourism, but also for the local population).

However, **in terms of limiting factors** that may significantly reduce the further development of the tourist potential of the area of Fruška gora should be allocated as follows:

- insufficient level of tourism development in comparison to the potentials;
- low quality of the material base of tourism (accommodation facilities are inadequate, poorly developed tourist signalization);
- lack of improved tourist propaganda and marketing efforts;
- lack of specific tourist products and programs, especially those that promote nature conservation (e.g. eco-tourism);
- lack of plans for tourism development and policy documents for the mountains in general, and also for particular segments of tourism (cultural tourism, rural tourism, eco-tourism, spa tourism ...);
- the existence of economic activities in the area of Fruška gora which are in the conflict with the recreation activities (mining and forestry), and their preference to the detriment of tourism;
- irresponsibility and negligence of individuals towards the natural heritage of Fruška gora;
- the existence of commercial vehicle traffic that is not acceptable for sustainable mountain tourism destinations;
- the existence of competition from other mountains in Serbia which are already built tourist image (e.g. Zlatibor, Divčibare, Tara and Kopaonik).

Key segments of the destination of the area of Fruška gora are: preserved nature, geo and biodiversity, national park, monasteries, villages, ethnographic heritage, wine routes.

Key forms of tourism and of the area of Fruška gora are: ecotourism, rural tourism (which is strongly associated with natural and eco-tourism), religious tourism, spa and wellness tourism, biking, trekking, wildlife observation. **The image of the area of Fruška gora should be based on the following elements**: national park, complexes of linden trees, geological history, baroque monasteries, wine routes.

The market segments in the area of Fruška gora are: tourism of special interest (e.g. ecotourists), families with children, a school trips with a revitalized concept of the school program in the nature, tourists with needs of health and wellness treatments and vacationers. Possibilities for the **development of tourism** in the area of Fruška gora on **the basics of sustainable development** can ensure a planned and limited use of natural resources with the aim of their protection and conservation, as well as forming an attractive tourism product of Fruška gora.

Possible forms of tourism within the area of Fruška gora

The area of Fruška gora in accordance with their values, but also the fact that it is a protected nature reserve, causes certain forms of tourism that could be arranged. Having in mind the different criteria (motives, physical, environmental, economic and functional) in the area of Fruška gora it is possible development of[5]:

- **all forms of cultural tourism** - organizing the school of nature, ecological camps, excursions, expert and professional exchange programs for adults, cultural events, religious tourism.
- **recreational tourism** - stationary and specialized (hikers, nature lovers...);
- **health tourism** - vacation prevention (children, youth, workers, specialized groups (athletes, invalids with disabilities), convalescence (in spas) and climatic treatment;
- **rural tourism** - which in recent years is more attractive, and the area of Fruška gora has excellent qualities for its development.

All these forms of tourism can be organized throughout the year, and in **determination of the optimal priorities** that election is based on: **low**

[5] *Prostorni plan područja posebne namene Fruške gore do 2022. godine* (2004), „Službeni list AP Vojvodine", broj 18/04, Novi Sad.

initial investment, tourism competitiveness and the possibility of maintaining the continuity of tourist activities during the year. According to these criteria, it is possible to organize in the early stage of tourism development of the area of Fruška gora:

- **excursion forms of tourism**: cultural - educational trips (monasteries, monuments, cultural events, nature protection areas), and recreational outings;
- **stationary forms of tourism**: cultural and educational visits (school of culture, art, nature, as well as technical seminars, educational programs); sports and recreation residences (preparation of athletes, sports school, weekends and vacations, etc.), rural tourism with eco or ethno characters (visiting rural areas, rural cultural and entertainment events, stay in rural areas and the like), spa, health and recreation tourism, and convalescence.

Objectives in the development of tourism in the area of Fruška gora

The main objective of tourism development of Fruška gora is a formation of a tourist destination of sustainable tourism, where tourist contents and facilities comply with environmental capacity. Other objectives are related to achievement: economic prosperity, protection of natural and cultural values, the optimum satisfaction of visitors and other. However, all the objectives of the future development of tourism in the area of Fruška gora can be divided into three groups[6]:

1. **Economic goals** - stimulating economic development; growth in employment, growth in investments, creating complementary relationship between nature conservation, agriculture and tourism, the development of existing restaurants and creation of new, increase quality of offer, and the development of new tourism products.
2. **Environmental goals** - environmental protection, preserving the quality of environmental, rational use of energy, preventing esthetic degradation of space (natural and cultural resources), monitoring the impact of tourism in the area.
3. **Socio-cultural goals** - improving quality of life, growth in education and raising the cultural level of the population of Fruška gora,

[6] Univerzitet u Novom Sadu (2011): *„Master plan održivog razvoja Fruške gore 2012-2022.“*, naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad.

creating and fostering of local identity, provision of public safety and the protection of cultural monuments.

Realization of these goals implies that it must be implemented certain activities that would be in the form of operational tasks, as follows:

1. Development of some forms of tourism that encourage the protection of nature, i.e., national parks and monuments (eco and geotourism, volunteer camps). For this purpose, it must be developed accommodation facilities in the concept of ecohotel, with the creation of the optimum satisfaction of tourists and local population. Also, for this purpose it is necessary to develop special forms of tourism (e.g. trekking) that encourage mountain recreation with learning about nature;
2. Development of concrete and attractive thematic itineraries (the line that connects the places with the same characteristics), as well as tourist products, such as: path of its natural and cultural values, as well as products of rural, spa, wine and cultural tourism;
3. Modernization of existing accommodation facilities, as well as a construction of new, where it is necessary, and in a manner that will not endanger the mountain;
4. Development of tourist infrastructure (signalization and equipment).

Rural development and sustainable agriculture of the area of Fruška gora in the function of development of tourism

The area of Fruška gora is the rural area, where **most of the settlements** are **rural type** (excluding the city of Novi Sad, as well as municipalities Sremski Karlovci and Inđija). **Agriculture is the main economic activity** of the area. Significant potentials for crop production are located in Sremska Mitrovica, Novi Sad and Bačka Palanka, Inđija and Irig. The potentials for livestock production are located in Novi Sad and Sremska Mitrovica. The main characteristic of agriculture of the area of Fruška gora is the predominance of small and medium-sized holdings, which is a limiting factor in the utilization of these resources. In the recent period agriculture of Fruška gora was based on a dominant share of certain sectors, such as: **fruticulture, viticulture, livestock production and vegetable production**. Previous practice in the development of agriculture was largely turned to conventional production. Raising awareness of food-safety issues, in a recent period in this area appears a

growing interest for organic and integral aspects of agricultural production.Likewise, there is a growing interest **for collecting and cultivation of medical plants**, because the area of Fruška gora has significant advantages in terms of these resources, which are not used enough by now. Forestry, hunting, fishing and beekeeping are important rural potentials of the area of Fruška gora.

The area of Fruška gora has favorable conditions for fruticulture. Locations at a higher altitude are suitable for growing of peaches and pears, while the lower locations can manage other types of fruit, such as: apples, cherries, hazelnuts, plums, cherries, apricots and strawberries. The greatest potential for fruticulture are located in town of Sremska Mitrovica and in municipality of Irig. Fruška gora's vineyard has a long history of production about 1.700 years, where are dominated wine varieties. The area of Fruška gora is known for producing wine bermet (liqueur obtained by maceration wine more herbs and spices) among other types of wine. Fruticulture and viticulture have opportunities to produce more, but in this aim it must engage a larger area (which the area of Fruška gora has enough).

Vegetable production in the Fruška gora has a good tradition and the most represented vegetables are onions, tomatoes, peppers and watermelons, mainly for fresh. The area of Fruška gora has favorable conditions for the organization of various forms of vegetable production - arable field production, production in greenhouses, biogarden production, growing vegetables in a multi-functional biogardens, but they are not used. However, the biggest constraints in a further development of the vineyards, orchards and vegetables are insufficient surfaces. Furthermore, there is a lack of storage and processing facilities, as well as inadequate and uncertified seeds and planting material. Potential of crop production in the area of Fruška gora is huge. For example, the current fruit production in this area is about 37.000 tons and it is possible production of about 300.000 tons of fruit. Likewise, vineyards in the current period are spread over approximately 1.500 hectares, while the possibility of production is much larger (about 5.000 ha).

Livestock production in the area of Fruška gora in recent decades has regressive movement and has traditionally been well developed. With a crop production makes a unified whole. The greatest potentials for the

development of livestock production in this area are related to dairy cattle and milk production and the production of beef, sheep, goat, pig and poultry meat. The optimum soil and climatic conditions in the area of Fruška gora are important for the development of much annual and perennial **honey, medical and aromatic plants**. The area of Fruška gora has a significant contingent of linden wood, as the most significant base of honey plants. Also, the potential for increase of honey production can be enhanced by plantation of honey plants (wild cherry, acacia, evodia, facelia, buckwheat, sage, lavender) and a higher share of pastures. Currently, in the area of Fruška gora there are about 15.000 bee colonies, but the potential of beekeeping in Fruška gora is much larger. Considering the natural conditions and the ability to increase plantings of honey plants this number could be doubled. Improving honey plants, in this area is possible to achieve production of 2.000.000 kg of honey per year, as well as increases in another bee related products (pollen, royal jelly, wax, etc.)[7].

Exploiting the potential of medicinal plants in the area of Fruška gora is possible through the organized collection, and through production of these species. So, e.g., in the area of Fruška gora some species are already present for organized collection, such as: linden, rose hip, hawthorn, ivy, milfoil, St. John's wort, Troskot, dandelion and thyme. Also, this area has the optimum conditions for the cultivation of medical and aromatic herbs, such as: mint, lemon balm, thyme, chamomile, calendula, basil, marshmallow, valerian, primrose, etc. In fact, greater exploitation of these resources means that it is necessary to provide facilities that would enable primary processing of these plant species, as well as the ability to produce essential oils.

When it comes about **forestry**, the important fact is that most of the National Park "Fruška gora" is covered by the forests. The most represented are silver linden trees, as well as oak, beech and fruit trees. Forests in the National Park are mainly a function of care, education, research activities, development of hunting, but they also have a production function.

[7] Univerzitet u Novom Sadu (2011): *„Master plan održivog razvoja Fruške gore 2012-2022.“*, naučno stručna studija, (koordinatori: Pejanović, R., Orlović, S., Lazić, L., Panjković, B.), Novi Sad.

Potentials for **hunting** in the area of Fruška gora are underutilized. This area is one of the most beautiful hunting grounds in the Republic of Serbia. Although the hunting ground, Fruška gora has a qualitative range of existing wild animals, but it is not sufficiently attractive for tourist hunting market. In the future, it is necessary to improve these potentials by the increase in supply of hunting other wild animals (wild boar, pheasant). The area of Fruška gora has excellent conditions for the development of **fisheries** due to the existence of a number of ponds, which are mostly owned by Orthodox monasteries. The existence of geothermal water in the area of Fruška gora is a significant advantage, which has not been used enough (except in the spa tourism), because they allow fish farming throughout the whole growing period. Besides, in the area of Fruška gora there are a number of reservoirs, but they are not used for sport fishing.

The area of Fruška gora has a **favorable geographical position** which allows good transport links, but the **transportation infrastructure is in a poor condition** (roads, road equipment, road signalization). Also, the area of Fruška gora has considerable limitations for other aspects of the infrastructure, because of incomplete gasification of the villages, sewer system is under-built. The cause of undeveloped state of infrastructure in the area of Fruška gora should be attributed by the insufficiance of permanent funding sources. Besides agriculture and tourism, in the area of Fruška gora exist other economic activities, such as: **industry, trade, transportation, manufacturing, small business, catering, public utilities, mining and water management.** Sustainable agriculture and other rural resources are directly contributing towards the development of tourism.[8] According to this, agricultural products represent a good basis for the development of gastronomy tourism in the area of Fruška gora. The most important **gastronomic events** in the area of Fruška gora (local and regional characteristic) are[9]:

- "Exhibition of Slava's cakes" – Ruma;
- "Srem's cake" – Ruma;

[8] Pejanović, R., Lazić, L., Antonić, D., Đukić, S., (2011): *„Mogućnost razvoja turizma u ruralnim sredinama regiona Fruške gore“*, Tematski zbornik, VI Međunarodni naučni skup „Mediteranski dani Trebinje 2011 Turizam i ruralni razvoj – savremene tendencije, problemi i mogućnosti razvoja“, Trebinje 07-08. Oktobar 2011, str. 412-419.

[9] Kalendar manifestacija, http://www.manifestacije.com/manifestacije_kalendar.php, (23.09.2012).

- "Dani bostana" – Rivica (Irig);
- "Days of wine" – Rivica (Irig);
- "Patlidžanijada" – Neradin (Irig);
- "Sremski svinjkolj i kobasacijada" – Šid;
- "Masquerade and cake festival" – Šid;
- "Srem wine festival" – Berkasovo (Šid);
- "Sremska kulenijada" – Erdevik (Šid);
- "Sremski ručak čobanski" – Šid;
- "Pudar days" – Šid;
- "Zlatni kotlić" – Stari Slankamen (Inđija);
- "Ethno festival" – Inđija;
- "Ham festival" – Krčedin (Inđija);
- "The best wines under one roof" – Inđija;
- "Days of honey" – Inđija;
- "Kolo Srema" – Sremska Mitrovica;
- "Kotlićijada" – Sremska Mitrovica;
- "Bostanijada" – Sremska Mitrovica;
- "Festival kuglofa" – Sremski Karlovci;
- "Festival of national cakes" – Sremski Karlovci;
- "Karlovačka berba grožđa" – Grožđebal“ – Sresmki Karlovci;
- "Banoštor days of grape" – Banoštor (Beočin);
- "Zlatni kotlić Beočina" – Beočin.

Likewise, events of **ethnographic character** are significant with the aim to promote folklore, traditions and customs, as well as a distinctive and rich gastronomy, as follows[10]:

- "Karlovac Christmas celebrations" – Sremski Karlovci;
- "International ethno festival" – Krčedin (Inđija);
- "Pudar days" – Irig;
- "Maradik autumn" – Maradik (Inđija);
- "Guščijada" – Šatrinci (Irig).

The area of Fruška gora has excellent conditions for the development of wine tourism, together with the increase of areas under vineyards. So, it

[10] Kalendar manifestacija, http://www.manifestacije.com/manifestacije_kalendar.php, (23.09.2012).

can be expected that the wine routes extend the entire length of the area (from Slankamen, Beška, Sremski Karlovci, Petrovaradin, Beočin, via Irig, Vrdnik, Erdevik, Neštin, till Šid).

Picture 6. *Wine cellar of winery Probus (Sremski Karlovci)*

Source: *http://www.podrum-probus.com/galerija.htm*

Conclusions

Previous development of tourism in the area of Fruška gora **was not satisfactory** due to socio-economic factors present in past decades. The full potentials of tourism are not used, and previous activities have mainly been in the form of school trips and other organized trips (Stražilovo, Fruška gora's monasteries), and hiking activities. Belonging to the **Danube region** is a unique opportunity to facilitate **economic revitalization of the area through the development potential of tourism and sustainable agriculture**. This development opportunity which is offered by solutions for the Danube region, has direct implications even for the parts of the area of Fruška gora which are not part of the Danube region. In the function of a fuller exploitation of tourist potential of Fruška gora, it is necessary tourist offer based on the development of certain tourist activities, such as: **ecotourism, rural tourism (which is strongly associated with natural and eco-tourism), religious tourism, cultural tourism, wine tourism, spa and wellness tourism, biking, trekking, wildlife observation**. All these forms of

tourism satisfy the requirements of the sustainable development of the area. Sustainable tourism allows protection and preservation of natural values and resources, as well as the cultural and historical heritage. In this context, **rural resources and sustainable agriculture are important elements of the tourist offer of the area of Fruška gora** and they are significant for the successful tourist positioning of the area of Fruška gora.

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APPLICATION OF SUSTAINABLE DEVELOPMENT CONCEPT

Snežana Trmčić, Marko Trmčić[1]

Abstract

Applying the concept of sustainable development implies harmonized economic and social growth, while respecting the principle of protection of natural resources of the environment. Standards of human life should be based on the capabilities of the environment without depleting the resources which need to remain of unchanged quality and efficiency for future generations to use. The concept of sustainable development and Agenda 21 are terms that have become a leading ones in the field of policies for maintaining a healthy environment after the United Nations Conference on Environment and Development held in Rio de Janeiro from 3 June to 14 June 1992. Agenda 21 represents a manual for action in different areas (soil protection, agriculture, forests, water, air, etc.), and lists the main social groups whose activities are of key importance for the sustainable development of the country. Purpose of this paper: We pointed out the importance and application of the concept of sustainable development, with particular emphasis on its application in the Republic of Serbia.

Key words: *SD in Serbia, Agenda 21*

Introduction

Sustainable development is the biggest challenge to mankind in the 21st century, according to the experts of United Nations. Evidence of detrimental human activities on the environment, evidence of the vast differences between the rich and the poor, evidence of the terrible social injustices that afflict a huge number of people - no one is questioning. It is a process that, if not stopped, will threaten the survival of mankind in the

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near future. However, the concept of sustainable development does not make sense if it cannot be implemented as an everyday practice. Therefore, experts from around the world joined their knowledge and talents to design principles to be followed in the future development of mankind in order to avoid the sad end of our civilization.

Their work is crowned by a document called Agenda 21 - the action plan for the UN on the subject of Sustainable Development for the 21st Century, which was one of the final documents of the biggest conferences ever held on our planet - "Earth Summit 1992" in Rio. It was the world conference about the protection of environment and development that will not exclude one another. The above document was adopted by almost all countries of the world; Agenda 21 contains about 2500 guidelines, principles and requirements to be followed in life in order to achieve global sustainability.

Of these, two thirds are related to the local level. In 28th section of this document statesmen invited local authorities around the world to launch a process of extensive communication with their residents, to jointly develop their own local versions of Agenda 21 - hence the name of the Local Agenda 21. When it comes to protecting the environment in Serbia, we have to notice the absence of the strategic objectives definition on which basis access to the strategic adoption of all the necessary documents can be gained. Serbia has no national strategy for the protection of the environment which could be matched with any other strategies that apply to the particular issues of the importance to the environment.

However, the Serbian government has so far adopted several strategic documents relating to the various issues that have an impact on the environment. With the adoption of the National Strategy, all of these documents and the ones that will occur later would have to be adjusted. Therefore the point and purpose of the work, given that sustainable development is a concept that seeks to improve the quality of life by combining three interrelated factors including: economic development, environmental protection and social responsibility. Only by their homogenization stability is possible. The concept of sustainable development, which provides a balance in meeting the needs of present and future generations, is the key to life and reproduction of the human species. The essence of sustainable development concept, based on the alignment of economic growth on the hand, and the fact the standard of

living for the people that need to be based on the capabilities of the environment without depleting the resources that must remain unchanged and the level of utilization of quality for future generations, we have pointed to the importance and role of applying the concept of sustainable development in general, and its application in our country. We pointed out the importance and application of the concept of sustainable development, with particular emphasis on its application in the Republic of Serbia.

Sustainable development

The protection and improvement of the environment is a global problem of modern mankind. The solution of this problem is closely related to other global problems of our civilization, such as: rational use of natural resources, keeping active demographic policy and the development and promotion of international cooperation in the field of science and technology, as well as overcoming the problem of poverty. Sustainable development is a concept that tends to improve the quality of life by combining: economic development, environmental protection and social responsibility. These three factors are interrelated, none of them is sufficient by itself, they must exist together to make a simple yet stable support. It not only us who are jeopardize but many generations to come. The present state of insecurity and uncertainty of modern man is "really the end of his wildest dreams that it could all be taken into his own hands and become master of his own destiny completely" [2].

The essence of the concept of sustainable development is the alignment of economic growth on the one hand, and the use of natural resources and ecosystems on the other. Living standards of people should be based on the capabilities of the environment without depleting the resources which must remain of unchanged quality and efficiency for the future generations. The theory of sustainable development, which provides a balance in meeting the needs of present and future generations, is the key to life and reproduction of the human species. This strategy takes into account the socio-cultural and natural environment, as well as the aspect of the future. The whole philosophy is founded in such a way to ensure the continuity of civilization heritage. Such a concept, of course, tends to optimum economic effect, with minimal degradation of the environment.

[2] Đurić, M., The origin of the Europe future. Odyssey of an ancient philosophical ideas, SANU, Beograd, 2001, str. 105.

The principles of sustainable development

1. **The environment** - The physical *"endurance"* of the environment imposes limits to many human activities and suggests that we need to reduce consumption of the natural resources. We have to live within those limits in order to pass on this planet to the future generations in a condition that will continue to support and sustain healthy human life.
2. **Future -** Our moral obligations toward future generations is not to jeopardize possibility for them to meet their needs.
3. **Quality of life** - Human wellbeing, along with the material, there are social, cultural, moral and spiritual dimensions.
4. **Fairness** - wealth, opportunity, and responsibility should be fairly distributed among countries and among different social circles within countries, with special emphasis on the needs and rights of the poor and people who for whatever reason are in a weaker position.
5. **The precautionary principle** - If we're not sure what the impact of an action or development of the action might have on the environment, we should apply this principle and rather make mistake on the safe side.
6. **Holistic (comprehensive) thinking** - Solving complex problems of sustainability requires that in the resolution process all the factors that are affecting the problem are included[3].

The concept of sustainability could become a social vision of similar work and orienting importance as other ideas and utopias 19th the 20th century (the idea of human rights, the idea of the state of social welfare and general progress through technology and economic growth, ideas of socialism). This concept could fill a "blank space" which arose after the collapse of socialism and the abolition of East-West conflict, structural and environmental problems of mass unemployment caused by the extended crisis, "the idea of growth." [4]

[3] www.portal.unesco.org

[4] Ilien, A., according to Andevski, M., „*Ecology and sustainable development*", „Cekom", Novi Sad, 2006, str.116.

Agenda 21

"The most important message to humanity is that the current model of development cannot continue and must be changed."[5] World Commission on Environment and Development, also known as "Brundtland Commission" published in 1987 and in Nairobi in a report entitled "Our Common Future", which indicates the risk, for people and our planet, from the politics of economic growth without taking into account the possibility of regeneration of the planet Earth.

The establishment of the World Commission on Environment and Development (1983, under UN) meant a major shift in interpretation of the concept of sustainable development although for the start of implementing this concept Earth Summit in Rio de Janeiro 1992 is very important because it has succeeded to link the issues of development and environmental protection.

In addition, the result is the adoption and signing of several important documents, including the Declaration on Environment and Development - better known as the Rio Declaration, the Convention on Climate Change, the Convention on Biological Diversity, Principle of management, conservation and sustainable development of all types of forests, and an action plan for sustainable development for the 21st century, called Agenda 21**.**

„Agenda 21 is a plan of action on sustainable development and is considered the greatest accomplishment of the Rio Conference. Topics of this agenda, which contains about 500 pages are poverty, protection of the atmosphere, forests, water resources and the protection of wild and domestic animals, important areas of human activity such as agriculture and health, the issue of waste and so on. The document pays special attention to children, youth, women, farmers and entrepreneurs. UN is taking upon them the responsibility to help these groups, which was not the previous practice.„[6]

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[5] Bruntland, H., *„Our common future",* World commission on environtment and development"Nairobi, 1987., str.3

[6] Stojanović, V.*, "Environment and sustainable development*", Dečja kuća Gornji Milanovac, 2007., str.6.

Local Agenda 21

In Preamble of Agenda 21 it is said: "Mankind is at a decisive point in its history. We are witnessing the inequalities between nations, poverty, hunger, illiteracy, disease and damage to the ecosystem from which our future life depends. By bringing development interests and the interests of environmental protection, by respecting them, we may be able to secure the basic needs of mankind, raise living standards for all people and achieve greater protection of ecosystems, and by doing so secure higher yields and thus secure a future.„[7]

In Chapter 28 of Agenda 21, it was pointed out that the key role in achieving sustainable development must be played by local authorities. They were invited to design their own documents - Local Agenda 21. Local Agenda is an action plan for the implementation of sustainable development at the local level. General provisions of Agenda 21 are transferred into concrete plans and activities in some local communities' .In every local community there are many different stakeholders in environmental issues: the national government, local governments, citizens, non-governmental organizations, business and industry, etc. Each of them either by making a particular decision, either by applying certain patterns of behavior are affecting the state of the environment in the local community.

Therefore, it is necessary to agree on the objectives to be achieved in protecting the environment, and strive to achieve the desired objectives by common activity and by aligning individual efforts. Most local governments in all countries should have started process of consultation with their citizens by 1996 and should have achieved consensus on local Agenda 21. At present, more than 2,000 local governments in seventy countries, is developing a Local Agenda 21, in cooperation with members of their local communities. The basis for the process of Agenda 21, which promises success, is the greater involvement of stakeholders from politics, government, economy, trade unions, churches and religious communities, associations and "unorganized" citizens.

[7] *Agenda 21,* Preamble, UNCED, 2002., str.2.

This Local Agenda 21 is an interesting offer for the social engagement of citizens. Exactly this activation and the engagement of citizens and activation of volunteerism in urban planning projects and utilization of construction land can yield excellent impulses in the process of Agenda 21. [8]

Agenda 21- Results

If we compare what was said in Agenda 21, from 1992, in Rio and what has been achieved, the results of the process are rather disappointing. Neither mood of citizens was changed nor is mobility of masses achieved, nor has commitment to achieve sustainable development and appropriate objectives. However, Chapter 28 of Agenda 21 about the action cannot be taken as a realistic measure. At the time when Agenda 21 was adopted, there was no previous experience in this area and it was more of a theoretical concept on paper.

No one could predict how long it will take to transfer this concept into reality and society. The conclusion is that we should pay tribute to what has been achieved so far, but that there is still much to be done. Even though the local Agenda 21 has not fully met the expectations related with the coverage of the range of problems and making the solution of these problems, it must be said that it has met the great response from people.

Until now, unfortunately, the critical mass has not yet been reached. Local Agenda 21 processes are still only voluntarily, not mandatory and do not deal with controversial topics such as finances of the local community, long-term community development, and strengthening integration of minorities in the community and etc.

Principle to implement the concept of sustainable development in the local community represents enormous potential, but the community must recognize this potential and engage. Today in politics still dominate the short-term action programs.

[8] Hermanns,K., *Die Lokale Agenda 21. Herausforderung für die Kommunalpolitik*; in: Aus Politik und Zeitgeschichte 10-11/2000,str. 3

The concept of “Sustainable Development” includes a formula for compromise between the (legitimate) requirements of the “third world” countries" for more technical and infrastructural development and greater prosperity and requirements of the group for long-term conservation of nature and natural resources.

This conflict line between excessive use of resources and the need for achieving social equalization has theoretical solution: highly-industrialized countries must rapidly reduce the use of resources and those parts of the world that has not industrialized and where industrialization is yet to be carried out most rationally use resources so that globally there is reduction in their usage.

At the World Conference in Rio contract has not been signed to regulate the use of resources in the future or to offer trade benefits for economically weaker nation, but Agenda 21 opened a new scene: sustainable development is planned on the basis of consensus reached, while a lot of different states administrative and technical proposals, but in any case restrictions have not been offer. Delegations of many countries that were present at the conference signed the agenda, because it did not contain any restrictions or obligations. Non-governmental organizations which were present at the conference were satisfied because for the first time they had the right of voice. Every scholar of international political scene may recognize that this proclamation such as Agenda 21 to already week United Nations could not bring much. [9]

Sustainable development after Agenda 21

Since the Agenda 21 process implemented slowly because there were problems in accessing the information, there has been a new summit and a new conference in 1998 in the Danish city of Aarhus at which has been brought a the new Convention which recognizes the right of citizens to receive information, the right of citizens to participate in decision decisions, and if this is a challenged, citizens may seek the protection of the court. Local communities are the closest spots to environmental issues and responsible together with government at all levels for the benefit of people and nature. Therefore cities and villages have a key role in the process of changing lifestyles, production, and consumption patterns of

[9] Apel, H.,*Lokale Agenda 21 und Partizipation; in: Ausserschulische Bildung* 2/1999, S. 137.

people and nature. The idea of sustainable development helps that living standard of cities and villages is based on the natural resources, but not in a way that someone else decides on your behalf, every citizen should decide about themselves and their surroundings so that he shall be organized in the groups, a group that meets laws and to accept responsibility, to implement laws.

When scientists and environmental activists who understood the danger threatening the planet because of the way energy is used "that leads to a great extent to a change in the atmosphere, adding 20% of the carbon cycle, 50% of the nitrogen cycle, and 100% of the sulfur cycle[10]", an initiative has been started and another summit conference organized in Kyoto, Japan in 1997 with the theme of reducing gases that lead to climate changes.

The result of this conference was the signing of the Kyoto Protocol. The Kyoto Protocol was opened for signing in the organization of the UN Convention on the climate changes on the 11th December 1997. For its entry into force, it was necessary to be ratified from at least 55 states and the states that have ratified it to represents at least 55% of the greatest world pollutants. The Kyoto Protocol was put into force on 16 February 2005. , when he was signed by Russia and to date it has been signed by over 140 countries which represent 61% of pollutants.

The Protocol obliges industrialized countries of the world that emissions of greenhouse gases be reduced by an average of 5.2% compared to the referent year - 1990th, in the period since 2008 to 2012 year. All countries have an obligation to reduce such emissions listed in the Annex to the Kyoto Protocol. Besides the UN convention on climate change from 1992, the main international contract that regulates the issue of climate change, the Kyoto Protocol is an attempt for the general obligations and rights from Convention to be partly specified and to be made operational.

The main aim of the Convention is to ensure the stabilization of atmospheric concentrations of greenhouse gases at a level that would prevent adverse impacts on the environment and reducing the speed of heating of the atmosphere due to excessive emissions.

[10] *Kyoto protocol* to the United nations framework convention on climate change, 2007., art.3.

Provisions of the Convention and its protocols are clearly delineated responsibilities of developing countries, then the countries with economies in transition and industrialized countries. The principle of the various obligations of developed and developing countries is consistently applied in the Kyoto Protocol.

"The European Union is a major supporter of the Kyoto Protocol. The protocol was ratified by the decision of the EU Council of Ministers of the European Union, which entered into force on 31 May 2002 and with one of the later directives from the end of 2003 it is established the system of emissions trading in the EU and includes some of the most important industrial areas: energy, steel and cement production, glass production, production of bricks, paper and others."[11] "The directive is even stricter than the Kyoto Protocol, because it requires that the emission of harmful and dangerous fumes in the EU is reduced by 8% compared to level in 1990, by 2010" [12] The importance and effectiveness of the Kyoto Protocol is the subject of a dispute between environmentalists and politicians. Many believe that the protocol is too expensive (per year costs about 150 billion euro), and that these funds could be better used in other ways. Thus, according to some estimates even fully implemented, the Kyoto Protocol would reduce the expected rise of temperature in just 0.1 degrees Celsius by 2100, slightly compared with predictions that by then the temperature rise of 1.4 to 5.8. [13]

United Nations Millennium Summit held in New York in September 2000 year and it was attended by 189 heads of state. For this summit is important that the issue of development goals and deadlines for their achievement as the Millennium Development Goals. Eight main goals are posted to encourage all countries to participate in solving problems in the field of human development. "Goal objectives included 18 clear tasks that need to be achieved in the 25 years, retroactively from 1990 to 2015 year. One of the eight primary goals is to ensure environmental sustainability, which should be implemented through the three tasks:

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[11] *EU Directive* 2002/358/EC available on http://europa.eu/scadplus/leg/en/lvb/l28060.htm.

[12] Stopić, M.,Dičić, N.,Zorić, J.,*Pravci zaštite životne sredine u Srbiji*, Beogradski centar za ljudska prava, 2009.str.10.

[13] Lomborg,B., *Cool it – The Skeptical Environmentalist's Guide To Global Warming*, 2007., str.22.

1. Integrating principles of sustainable development into country policies and programs and reverse the process of degradation of natural resources in the opposite direction;
2. Halving the percentage of people without sustainable access to safe drinking water by 2015 And
3. Achieving a significant improvement in lives of at least 100 million of the slum dwellers by 2020 "[14].

World Summit on Sustainable Development held in 2002 in Johannesburg. The summit came to the conclusion that many of the efforts in the field of environmental protection remained without results, primarily because the largest industrial polluter of the world (the U.S., Russia and others) did not accept the principles contained in previous declarations and conventions. Attention is paid to the problem of climate change and global warming only when the only option for improving situation remained a radical change of norms that regulate the production of greenhouse gases and a large shift in the behavior of states.

From 3 to 15 December 2007 on the island of Bali in Indonesia, United Nations held conference on the subject of climate change in which they discussed the future of the Kyoto Protocol. Conference stream about the climate in Bali was very dramatic, that in the end the delegates agreed on the preparation for the new global climate agreement is expected to be adopted at a conference in Copenhagen in December 2009.Months before the meeting in the Danish capital, it was clear that there will be no serious agreement, because the biggest polluters, the developed countries have not shown much interest in serious resolution of the issues regarding pollution of the planet. In order to provide at least some kind of result, more heads of state and government announced their arrival in Copenhagen.

Thus, the United Nations Conference on climate turned into a world meeting. "It was a strange conference." Literally everyone agreed that something must be done to stop climate change. Tendentiously was mentioned that we must not allow the temperature to rise over the next decade more than two degrees if humanity wishes to maintain some kind of control over the consequences of climate change. Difficulties were starting when specific agreement needed to be made on how to achieve that goal. The Chinese did not want any controllers in the country, the

[14] „*The Millennium Summit and Its Follow Up"*. Global policy, 2000., str.4.

Europeans did not want to commit to further reduction of the emissions of carbon dioxide, and the Americans avoided giving any long-term promises. Africans wanted more money, but they could not promise transparency, that is, control of spending that money. In the end the total blockade threatened. "[15] In order not to return to their homes without any concrete results, the conference participants agreed on non-binding document. What will be the policy when it comes to preventing climate change?

After the Copenhagen much of the trust that has been painstakingly built between industrial and developing countries has been lost. There remains only one more chance: developed, which are the biggest "producers" emissions of the greenhouse gases, must stand at the head of the movement for climate protection at the same time not placing others constantly new conditions. They cannot always talk about burden sharing, but must take their part in the practice. In Copenhagen a huge opportunity is missed - the world community could demonstrate that it is capable of action.

Applying the concept of sustainable development in Serbia

Sustainable development in transition economies is hampered by a lack of strategic development plans and the limited available financial, material and human resources for the implementation of significant project. Governments, to their sorrow, experienced that uncritical financing of individual projects; sector or geographic area simply leads to a waste of resources if there is no adequate resource planning system. Sustainable development plans are effective only there where there are well-conceived ideas that take into account the real territorial priorities and when they align with available funding. This process is called strategic planning.

Creating strategic policy requires a set of strategic instruments to ensure the best use of available resources as well as synergy and additional effects of individual measures. It requires considerable analysis and discussion of the many political options available to decision makers, on which basis they need to prioritize.

[15] Beme, H., „*Conference saved from fiasco with tricks"*,Deutsche Welle, December 2009.

The Serbian government has so far adopted several strategic documents relating to the various issues that have an impact on the environment in Serbia - National Sustainable Development Strategy with Action Plan (2008), National Strategy for Economic Development of the Republic of Serbia since 2006 to 2012, the Energy Development Strategy until 2015, Strategy for introducing cleaner production and others.[16]

National Strategy for Sustainable Development of Serbia, has defined the goal "to bring balance to the three key factors, namely the three pillars of sustainable development: economic growth and sustainable economic and technological development, sustainable development of society based on social balance and environmental protection and rational management of natural resources by combining them into one unity, supported by appropriate institutional framework". [17]National Strategy for Sustainable Development of Serbia is made according the Sustainable Development Strategy of the European Union and the United Nations Millennium Development Goals. The adoption of these strategies is not enough, but it is necessary for the authorities to consistently apply them. In the very scarce practice, of enforcement these strategies significant results have not been achieved. Thus, the National Waste Management Strategy – with a program of alignment with the EU, adopted in 2003, should help in the process of creating a cleaner Serbia until 2010.

At this point there are 4481 illegal and 164 officially registered dumps in Serbia, however, most of these dumps are just waste dumps, and are not built according to the European Union standards ; about 1.24 million tons of waste are annually disposed in a regular landfill, and about one million tons of waste are disposed in illegal dumps; most of the villages in Serbia has no organized containers and transport trucks, garbage collectors in landfills because there is no economic calculation, or does not have enough resources to invest in it. In addition to these strategies, Serbia intensified the adoption of a series of laws in the field of environmental protection since 2004 to date, such as: The Law on Environmental Protection, Law on Strategic Environmental Impact, Impact Assessment Act on Environment, Law on Integrated Prevention and Pollution Control, Waste Management Law, The Law on Packaging and Packaging Waste,

[16]Strategic documents of the Goverment are available on http://www.srbija.gov.rs/vesti dokumenti_sekcija.php?id=45678;
[17] *Nacionale strategy for sustainable development*, Republic Serbia Goverment, 2008., str.3

The Law about the amendments and addition policies to the Law on Environmental Protection and The Law on ratification of the convention on access to the information, Public Participation and decision-making and access to Justice in Environmental Matters. One of the most important laws when it comes to Serbia accessing and integrating in European Union is certainly a law on ratification of the Kyoto Protocol beside the Convention on Climate Change (2007).

All the programs, action plans and projects for their achievement being adopted in different sectors should be coordinated with each other and future national strategy for environmental protection. The above mentioned acts should have to include the definition of the specific problems faced by Serbia and specifically defined obligations of government and other public institutions, as well as the time frames in which these obligations must be met. Effective and systematic implementation of these laws is crucial for improving the environment protection systems.

Alignment with the EU ligislation

National Strategy for Sustainable Development in Serbia represents relationship between ecology and economy. It is estimated that about 30 percent of all activities in the process of harmonization Serbia with the European Union will be about improving the environment. A third of community law regulations (acquis communautaire) refer to the area of the environment, which is more than a thousand. Dealing with the environment means working on several complex projects: the establishment of horizontal legislation, which includes an impact assessment, strategic environmental impact assessment, access to information and public participation, then the monitoring of air quality and climate change, waste management, protection and water management o, nature protection, industrial pollution control and risk management.

Similarly, in EU great attention is paid to the environmental projects and implementation of the laws at the regional and local level. The regional approach is one of the key commitments of the European Union and many European funds to which different parts of Serbia compete or will compete, along with the strengthening of relations between Serbia and the EU were established precisely to ensure a balanced development of the region and to influence the regional associations. Such a policy is not

limited by national borders, but the overall objectives of the Union. When Serbia had full access to these funds it's likely to feel the significant benefits in the area of environmental protection.

Principles of Sustainable Development Strategy of the Republic of Serbia

National Strategy for Sustainable Development of the Republic of Serbia is based on the globally accepted principles defined in the Declaration on Sustainable Development in Johannesburg, UN Millennium goals of development, the EU Sustainable Development Strategy. These are:

1. Intergeneration's solidarity and the solidarity within. Meet the needs of the present without compromising the rights of future generations to meet their own needs. Solidarity within reach democratically agreed allocation of available natural and cultural capital in a manner that provides for the basic needs of all social groups.

2. Open and democratic society; participation of citizens in decision-making process. Guarantee of civil rights, provision of access to information and ensured access to justice. Provision of adequate consultation as well as the participation of citizens in decision-making process. Defend the stability of democratic institutions, peace institutions and freedom.

3. Knowledge as a carrier of development. Promoting prosperous, competitive and innovative environmentally efficient economy based on knowledge, which provides a high standard of living and high quality of full employment. Promote education and raising public awareness of sustainable competitive development.

4. Involvement in social processes. Promote the full integration of people into society, encourage equal opportunities for all by promoting human rights, especially working equality by fighting against all forms of discrimination using affirmative measures for the marginalized groups and reduction of poverty. Differences and polarization among members of society should be reduced to a minimum and continuously fighting social exclusion and poverty.

5. Integration of environmental concerns into the policies of other sectors; Promote the integration of economic, social and environmental approach and analysis and support the use of tools such as strategic environmental assessment. Encourage social dialogue, corporate social responsibility and public-private partnerships.

6. The precautionary principle. Require the preservation of the natural balance in circumstances where there is no reliable information on a particular issue. Each activity must be planned and implemented to cause the least possible change in the environment. In the event of potentially significant impacts on the environment, take preventive actions, particularly in situations endangering the welfare of people and animals.

7. The polluter / user pays, includes costs related to the environment in the product price. Internalize the costs related to the environment or to include the destruction of the environment in the economic costs of polluters / users applying the principles polluter / user pays. In this way it is enabled coverage of the full economic cost, which includes cost of production use and disposal of the product during the entire lifecycle.

8. Sustainable production and the consumption. Respect balanced relations in exploitation of natural resources and ensure a high level of protection and improvement of the environment quality. Reduce environmental pollution and promote sustainable consumption and production so that economic growth does not cause a proportional increase in environmental degradation.

For Serbia's European path is very important that the National Strategy for Sustainable Development of Serbia is accordance to the Sustainable Development Strategy of the European Union and the United Nations Millennium Development Goals as well as the adoption of the Law on Ratification of the Kyoto Protocol besides the Convention on Climate Change (2007). In *Table 1*, SWOT analysis is presented of the national strategy for sustainable development of the Republic of Serbia *(strengths, weaknesses, opportunities and threats).*

Table 1. *SWOT analysis of national strategies sustainable development of Republic of Serbia*

SWOT ANALYSIS	
Advantages	**Weaknesses**
- Favorable geographic position of the country. - Potentially high quality of the work force. - Setting the base of democratic, open society. - Reform processes started in Serbia.	- Insufficient level of citizens general trust in institutions. - High degree of differences in regional development. - Slow privatization process. - Insufficient number of investment. - Insufficient investment in development in most of the sectors. - Growth of the private sector.
Opportunities	**Treats**
- Integrations in the EU. - Engagement in the EU funds. - Collaboration with Diaspora. - Introducing EU norms and standards for providing high quality of environment. - Completing the privatization process.	- Growing level of intolerance and social division. - Growth of unemployment rate; poverty, indebtedness and slower economic growth. - Lagging behind the region due to the unresolved political issues. - Possibility of new isolation of the country (open and hidden).
- Increasing the number of public/private partnership. -Introducing "cleaner" production. - Improving the energy efficiency. -Rationale use of raw materials, and traffic intensity.	- Unresolved issues fight against corruption and organized criminal. - Unfavorable demographic trends. - Insufficient level of public awareness.

Source: *Strategic commitment for sustainable development, p.15.*

Conclusion

The twentieth and twenty-first century is marked by the disastrous actions of man on the environment, the huge differences between the rich and the poor, and extreme social injustices that afflict a huge number of people. Most people are still not aware that the current way of life must change in order to allow future generations to a healthy existence on the planet. These changes do not mean that we would be worse off; they are not focused on the enormous sacrifice but are just asking from us to create new and different habits.

In the last two decades, as a result of the international conferences on the protection of the environment, we are starting to use a new terms which are often used when talking about nature and people. These expressions are: Sustainable Development, Agenda 21, Local Agenda 21 etc. All these terms have come to us from international meetings where the more advanced countries initiated and prepared activities that are focused on our future. From these conferences we are left with the documents in the form of conventions, declarations or protocols .

The Serbian government has so far adopted several strategic documents relating to the various issues that have an impact on the environment in Serbia, of which the most important one is The National Sustainable Development Strategy with Action Plan (2008) and, others. In addition to these strategies, Serbia intensified the adoption of a series of laws in the field of environmental protection since 2004. year to date, such as the Law on Environmental Protection, Law on Strategic Environmental Impact, Impact Assessment Act on the environment, etc. .. One of the most important laws when it comes to our integration to the European Union is certainly a law on ratification of the Kyoto Protocol besides the Convention on Climate Change (2007).

However, in addition to the adoption of policies and laws governing the protection of the environment, it is more important efficient and systematic implementation of these laws in order to promote environmental protection system. In this respect, as well as the harmonization of these acts with EU legislation, in particular the implementation of the European directives on environmental protection and sustainable development; In front of Serbia there are responsible jobs that should be implemented as soon as possible.

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MACRO-REGIONAL STRATEGY FOR THE PURPOSE OF CONTEMPORARY CONCEPT OF SUSTAINABLE DEVELOPMENT*

Sonja Jovanović[1], Snežana Radukić[2]

Abstract

The concept of sustainable development is incorporated into all contemporary development policies and strategies. Therefore, there is a mutual complementarity between the goals of different strategies (Europe 2020, Danube Strategy, Strategy for the Baltic region) and sectoral policies (agricultural policy, environmental policy). The subject of research in this paper is analysis of key dimensions of the sustainable development concept as a basis for the creation of contemporary development strategies. The aim of this research is to highlight the importance of macro-regional approach (for example, macro-regional Strategy for Danube region) to solving important and common issues in many countries, with emphasis on the challenge of improving agriculture, as well as preserving and improving the natural environment.

Keywords: *sustainable development, macro-regional strategy, Danube strategy, agriculture, European Union, Republic of Serbia.*

Introduction

Sustainable development is the contemporary development concept that represents the basis for creation of development policies and strategies both at the macro and micro level. Incorporating this concept in the

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strategy documents provides a balance of economic, environmental, and social dimensions of development. Recently, much attention is paid to the institutional dimension of sustainable development. Contemporary approach to the concept of sustainable development updates and highlights the institutional dimension as the main topic of the leading summits and conferences at the global level.

One of the new models to achieve sustainable development, i.e. joint action group of countries to achieve economic, environmental, social, and other goals, is the macro-regional approach. The example of good designed and on the macro-regional approach based strategy is the Strategy for the Danube region. This strategy has the potential to enable the countries of the Danube region face with common, highly complex challenges. One of the challenges is the improvement of agricultural production, with simultaneously reducing pollution as well as preservation and enhancement of the environment, especially in the less developed countries of the Danube region.

The Danube region is one of the most important agricultural regions in the European Union. This region presents a great potential for the development of organic agriculture, rural tourism, fishing, and a significant source of water supply. However, to use this potential in the best possible way, it is necessary carefully managed and planned policy and strategy, as well as well-organized and harmonized action plan for their implementation.

Contemporary approach to the sustainable development concept with emphasis on the institutional component

The sustainable development concept, as well as generally accepted and known, is the subject of consideration at the level of national and supranational institutions, but also in the business world. This paper presents a brief review of some elements that are recognized as important for attractiveness and improving of this development concept. Thus, the emphasis is on: *a) the necessity to better anticipate future changes, b) the introduction of new principles, c) updating the institutional component of this development concept.*

a) It is well known that the concept of sustainable development is based on the ethical principle, or on the principle which means that the quality

of life of future generations must not be worse than the quality of life of today's generation. This is also the definition of sustainable development by the Brundtland Commission[3]. Similar definition of sustainable development emphasizes the *International Institute for Sustainable Development*, according to which "the essence of the concept of sustainable development makes the idea how intra and inter-generational equity shape or change national economies and international development".[4] From this definition follows the challenge facing today's society that we should anticipate future changes to a greater extent, both at the national and global level.

b) Taking into account the essence of the definition of sustainable development certainly should be pointed out some principles of this concept which based on equity. One group of principles of sustainable development, which emphasizes the responsibility for equity in a geographical sense, i.e. equity beyond the limits of national economies, is highlighted by *Haughton*. Thus, *Haughton* quoted the five most important principles of equity to achieve sustainable development:[5]

- *Consideration of the needs of future generations* (intergenerational equity);
- *Social justice* (intra-generational equity);
- *Cross-border liability* (geographic equity);
- *Procedural fairness* (all people are open and honest) and
- *Inter-species equity* (significance of biodiversity).

The final document of the UN Conference on Sustainable Development *Rio+20* (held in Rio de Janeiro from 20-22nd June 2012), entitled "The future we want"[6], reaffirms the principles proclaimed twenty years ago in the "Rio Declaration". In particular, the principle of "common but differentiated responsibility" was highlighted, which is contained within the Seventh Rio Declaration principle.

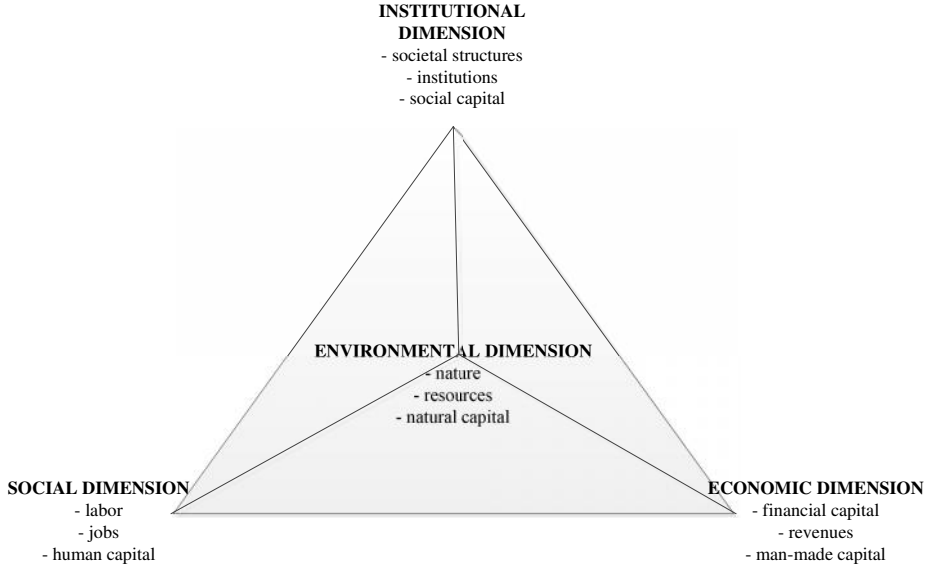
c) To achieve the sustainable development concept, of great importance is the existence of an adequate institutional framework or institutional

[3] *Our Common Future* (1987): World Commission on Environment and Development, Oxford University Press, Oxford, p. 43.
[4] *International Institute for Sustainable Development*, www.iisd.org
[5] According to: Haughton, H. (1999): *Environmental Justice and the Sustainable City*, Journal of Planning Education and Research, 1999, Vo. 18, No. 3, p. 240.
[6] *The future we want*, RIO+20 United Nations Conference on Sustainable Development, United Nations, June 2012, http://www.un.org/en/sustainablefuture/ (01.09.2012)

support. Thus, the institutional dimension has been recognized as the fourth dimension of sustainable development concept. This means that for the economic, ecological, and social development on the basis of sustainability, the institutional support is complementary and necessary dimension.

Since 1995 was formally introduced institutional dimension as the fourth pillar of the sustainable development concept. *Joachim H. Spangenberg*[7] has created a model called the *prism of sustainability*, which includes four dimensions of the sustainable development concept (Figure 1).

Figure 1. *Prism of sustainability - the four elements of the concept of sustainable development*



Source: *Adapted from Spangenberg, J.H. (2002): Environmental space and the prism of sustainability: frameworks for indicators measuring sustainable development, Ecological Indicators, No. 2, p. 303, http://www.china-sds.org/kcxfzbg/addinfomanage/lwwk/data/kcx27.pdf*

Institutional adjustments, used to achieve sustainable development, include also management of social capital. In this sense, for these adjustments is an important development of science and technology, the

[7] Spangenberg, J.H. (2002): *Environmental space and the prism of sustainability: frameworks for indicators measuring sustainable development*, Ecological Indicators, No. 2, p. 295-309, http://www.china-sds.org/kcxfzbg/addinfomanage/lwwk/data/kcx27.pdf

achieved level of public awareness, access to information, the level of preparedness for natural disasters and others.

To what extent the institutional dimension is important for the realization of the sustainable development concept, saying the conclusions of the UN Conference on Sustainable Development *Rio+20*. In addition to the issue related to "green economy", the establishment of an institutional framework for the realization of the sustainable development concept was another issue which engaged the attention of the world public at this conference.

No matter what the Rio Summit in 2012 was not resulted in any binding activities or binding document for further development, which many believe presents his greatest flaw, it is important to point out a number of guidelines that suggest a greater role of institutions in achieving the sustainable development concept. Thus, some of the key recommendations for improving the institutional framework for sustainable development are:[8]

- Strengthen international envrionmetal treaties;
- Manage conflicts among multilateral agreements;
- Fill regulatory gaps in international sustainability governance;
- Better integrate sustainable development policies within the UN system;
- Strenghten national governance;
- Streamline and strenghten public-private governance network and partnerships;
- Address equity concerns within and among countries."

Institutional mechanisms for the implementation of sustainable development concept and the strategy of sustainable development are specific to each country and depend on the specifics of each country's constitutional order. Regardless the regulation system of implementation, for each national economy it is important clear definition and transfer of the responsibility system for implementation.

Harmonization of national legislation with the European Union, as well as the integration and harmonization of objectives and measures of all

[8] *Transforming governance and institutions for a planet under preassure*, RIO+20 Policy Brief, http://www.earthsystemgovernance.org/publication/biermann-frank-institutional-framework-global-sustainability

sectoral policies are important prerequisites for achieving sustainable development. The most common challenges in creating an adequate institutional framework for the realization of the sustainability concept are:[9]

- Dealing with excessive institutional and administrative bodies and procedures;
- Efficiency of newly established institutions and bodies;
- Lack of strong political support and support from the level of key ministries.

For meeting these challenges it is necessary to build a modern and efficient public administration. Improving cooperation, coordination and consultation between sectors, as well as between government and the private and civil sector is a prerequisite for achievement of sustainable development. Development of an efficient institutional framework at all levels is a key foundation for the implementation of sustainable development goals. From the institutional point of view, it is necessary to strengthen the capacities of ministries and all other relevant institutions.

In order to fulfil taken international obligations towards the achievement of sustainable development, the Government of the Republic of Serbia is adopted the National Strategy for Sustainable Development in May 2008. Structure of the Strategy is fully adapted to the contemporary representation of the sustainable development concept shown in Figure 1. Functional links between elements of the Strategy, which reflect contemporary prism of sustainability to the example of Serbia, are shown in Figure 2.

To fit into the existing strategic framework, the existing sectoral strategies are analysed before making the Strategy, as well as the links between economic development and environmental protection, and the links between the environment and some social issues. Three working groups composed of the representatives of relevant institutions, dealing with the components of sustainable development - knowledge-based economy, social issues and the environment. This suggests that institutional component is important not only in implementation but also in the process of making of strategy and development plans.

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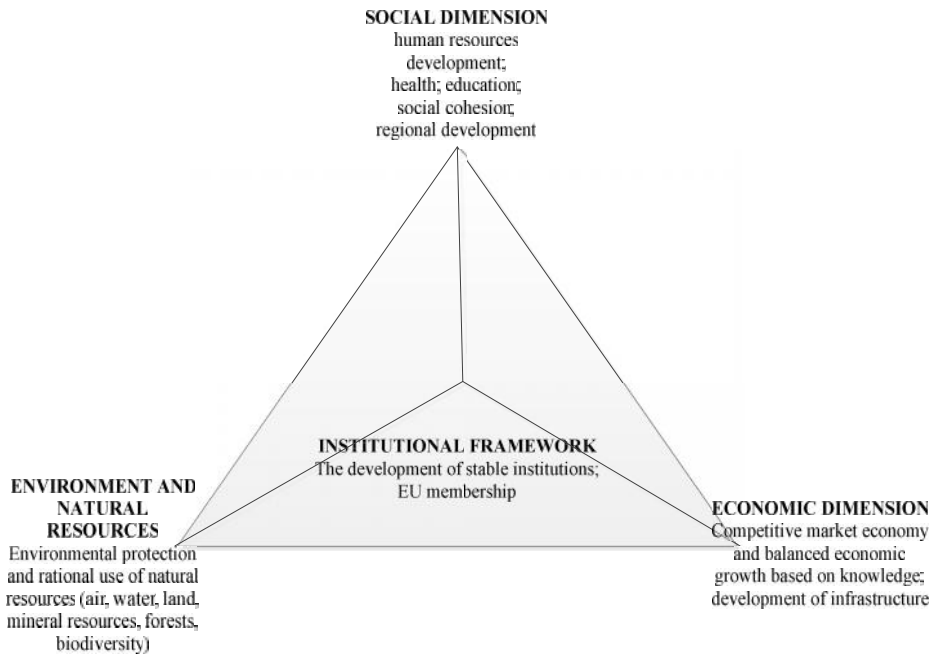
[9] According to: Jovanović, S., Radukić, S., Petrović-Ranđelović, M. (2011): *Teorijski i institucionalni okvir održivog razvoja*, Ekonomski fakultet Univerziteta u Nišu, Niš, 2011, p. 199.

Figure 2. *Functional relationships of elements of the National Strategy for Sustainable Development of the Republic of Serbia*



Source: *According to: Nacionalna strategija održivog razvoja, Službeni glasnik Republike Srbije, br. 57, 3. jun 2008, p. 8.*

It is important to point out that sustainable development is a holistic concept in which each dimension (economic, environmental, social, institutional) are equally important and equally contribute to its achievement. However, in the specific circumstances (at many conferences or in development policy in different countries), one of the dimensions has a more or less importance.

Strategic approach used to achieve sustainable development concept

A growing number of challenges facing the world today, in terms of globalization, pressure on the natural environment or high unemployment rate, require new strategic approaches to the development. In addition, the new development policy requires complementarity of various strategies. The reason for the mutual complementarity of development strategies and policies is their common base i.e. the concept of sustainable development.

One of the common goals of strategic documents should be greater efficiency in the use of available economic, environmental, and social resources for the provision of conditions on the pathway to sustainable development. At the European Union level, in order to achieve a more efficient and accountable management of resources, encourage employment and improving social and cultural cooperation, it is necessary connection between the various development policies and strategies. In this sense, the analysis of some elements of the most important strategies, such as *the Sustainable Development Strategy of the European Union, the Strategy "Europe 2020", the Strategy for the Danube Region*, it is possible to identify complementary activities, such as:[10]

- Joint activities and cooperation of European countries to reduce the emission of greenhouse gases;
- Providing conditions for greater energy efficiency;
- Encouraging the exchange of knowledge and investment in research and development of new technologies;
- Achieving the goals of social development in terms of poverty reduction and social inclusion;
- Cooperation in the field of environmental protection, due to the fact that environmental problems cannot be seen only within of the national economies;
- Different approaches to business cooperation in order to economic strengthening and development of underdeveloped areas.

One of the new approaches to achieve the objectives of a number of countries, such as sustainable development, economic prosperity, protection and improvement of the environment, is a *macro-regional strategy*. Macro-regional strategy represents a joint action by the group of countries in order to achieve certain goals. The *Danube Strategy*, together with the *Strategy for the Baltic region*, is an example of a macro-regional strategy. "The first EU macro-region strategy, which covers the Baltic Sea region, is old for more than a year. Its establishment was a challenge, but today, many leading projects are implemented in the framework of a comprehensive new strategy for this region. Lessons learned from this process are applied in the Danube region".[11] Following the example of the

[10] Ibid, p. 183.

[11] *Regionalna pitanja: šta Dunavski region može naučiti od regiona Baltičkog mora*, Panorama, Evropska unija, Evropska komisija, Generalni direktorat za regionalnu politiku, 2011, p. 22.

Baltic Strategy, the Strategy for the Danube Region has the potential to promote and strengthen regional cooperation with the aim of economic growth, solving common problems for a number of countries and overcoming common challenges.

The Strategy for the Danube Region is an important strategy for the European Union, not only for the countries that are located in this region. Its importance is reflected in the fact that it has the potential to contribute to achieving the objectives of the European Union. As concluded by the EU Council at a meeting in Luxembourg held on 13th April 2011 "a potential of the Strategy for the Danube region to contribute to the long-term goals, as well as, a "smart", sustainable, and inclusive growth of the European Union is assured".[12] Like all contemporary strategies, this Strategy is also based on the concept of sustainable development, that is, in this case, on the Sustainable Development Strategy of the European Union.

The Danube Strategy is particularly important for countries aspiring to join the European Union, as well as Serbia. This goal will be achieved by:[13]
- Promotion of regional cooperation,
- Better use of all development resources,
- Sharing knowledge and experiences and
- Joint actions in the areas of economy, education, and environment.

The result of this way of linkage and cooperation between a larger group of countries is to strengthen their stability. For the successful implementation of the Strategy for the Danube Region, it is particularly important to implement the "bottom-up" approach. This would mean strengthening the role of local communities, as well as the involvement of the whole society in the implementation of this macro-regional strategy. The success of the implementation of the Strategy certainly depends on the commitment of participants at all levels to strategic activities.

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[12] *Council conclusions on the European Union Strategy for the Danube Region*, Council of the European Union, Brussels, 13 April 2011.

[13] According to: *Стратегија Европске уније за Дунавски регион*, http://www.dunavskastrategija.rs/sr/?d

Influence of the strategic approach of sustainable development concept to the improvement of agriculture

A new strategy for the development of the European Union *"Europe 2020"* requires the adjustment of sectoral policies to the future business conditions. Especially important segment in the European Union development policy are certainly rural development policy and agricultural development policy. According to the new concept of development, the European Union rural development policy for the period up to 2020 was marked as "green". Agriculture has been identified as very important, because "some of the goals that will contribute to achieving the objectives of the Strategy *"Europe 2020"* are: stability in food production, initiation of innovations, appropriate measures to conserve soil quality, growing concern for climate changes, providing support for young people and so on".[14] Thus stated development goals of the European Union towards the realization of the concept of sustainable development are fully consistent with the goals of sustainable development were discussed at the World Summit *Rio+20* in Rio de Janeiro in June 2012.

Macro-regional *Strategy for the Danube Region* "fully supports and reinforces the goals of the rural development policy. This strategy supports all components of the sustainable development concept, emphasizes the role of energy use and use of renewable energy sources, improves the business environment, and provides an inclusive approach to the development of social communities, which is aimed at development of a number of European countries".[15]

Particularly important dimension of sustainable development of the Danube region is environmental dimension. In relation to the management of this dimension of sustainability it is important to draw attention to pollution that comes from agriculture in this region. One of the recommendations of the "Agricultural Forum 2012"[16], held in Budapest, is the wider use of "best agro-industrial technique", i.e. *"best*

[14] Jovanović, S., Radukić, S., Petrović-Ranđelović, M. (2011): *Teorijski i institucionalni okvir održivog razvoja*, Ekonomski fakultet Univerziteta u Nišu, Niš, p. 182.
[15] Jovanović, S., Radukić, S. (2011): *Komplementarnost različitih strategija u davanju podrške razvoju Dunavskog regiona*, Ekonomika poljoprivrede, specijalni broj, p. 277.
[16] *Agricultural Forum 2012*, International Commission for the Protection of the Danube River, www.icpdr.org

available technics" - BAT. This recommendation is addressed in particular to the decision makers at all levels (governmental institutions, foreign companies, non-governmental organizations) in order to reduce and control pollution caused by agriculture and improve the water quality of the Danube.

Many countries in the Danube region are facing a crisis in agriculture. The development of sustainable and environment-friendly agriculture, which is the basis of rural development, is a challenge for the less developed countries of this region. "A macro-regional strategy that prioritizes rural development and is sensitive to the special circumstances of agriculture in low and medium income DRB countries could serve a vital function in promoting development while maintaining or improving environmental quality".[17]

The Danube Strategy, as an example of a macro-regional strategy, should provide guidelines for creating such an environment that will allow easier and faster exchange of local knowledge and practices of the countries in the region. This is especially important for the exchange of best practice and experiences among neighbouring countries. Some recommendations for the sustainable development of agriculture of countries in the Danube region are:[18]

- Achievement of a stable incomes while avoiding the use of inputs that affect pollution.
- Use of good agricultural practice (reduced use of chemicals, better enforcement of the "polluter pays" principle).
- Expansion of organic agriculture (in the European Union more than 3.5% of the agriculture is organic, while in countries of the Danube region this percentage is less than 1%).
- Respect the baseline standards on farm to protect environment.
- Supporting partnerships, as well as regional and sub-regional economic and social cooperation.

[17] Antypas, A., *Environmental and the Purposes of a Danube Area Macro-regional Strategy*, Central European University, Budapest, p. 4, http://www.danubestrategy.eu/papers/papers/

[18] According to: Kremlis, G. (2010): *Environmental Dimensions of Agriculture and Rural Development in the Danube Region*, European Commission – DG Environment, Budapest, http://www.studmet.hu/

The Strategy for the Danube region emphasizes importance of the institutional component of the sustainable development concept. "A macro-regional strategy for the Danube Area should focus on increasing institutional capacities and adaptability in order to manage for the broad range of ecosystem goods and services at multiple scales and across long time frames".[19] Therefore, of particular importance for the policy of rural development is to support the "bottom-up" approach by identifying problems, proposing possible solutions, and initiating activities at the local level.

One of the national priorities for achieving the sustainable development in the Republic of Serbia is the protection and improvement of environment and rational use of natural resources. This includes the harmonization of national legislation with the EU, as well as the integration and harmonization of objectives and measures of all sectoral policies. Therefore, the priority importance has the adoption and implementation of the National Environmental Program and corresponding action plans, as well as the adoption and implementation the National Strategy for Sustainable Use of Resources and Goods (intersectoral strategic document which is implemented through plans and programs adopted by the Government for each individual natural resource). Then, it is necessary to adopt specialized programs, action plans and measures for more active role of the competent ministries in the sustainable development, especially those sectors whose functioning and development is directly linked to the exploitation of natural resources. In this sense, the *Strategy of Sustainable Development of the Republic of Serbia* includes an analysis of the impact of certain economic sectors on the environment and sustainable development.

The agricultural sector is marked as significant in contributing to the achievement of sustainable development goals. When it comes to agriculture, one of the major problems is the lack of concern for the environment. In order to overcome this problem, the Ministry of Agriculture, Forestry and Water Management, within the program of international aid, is began to work on the introduction of integrated production and good agricultural practice to reduce pollution, which is consistent with the Strategy of Agricultural Development of the Republic of Serbia and the National Environmental Protection Program.

[19] Antypas, A., *Environmental and the Purposes of a Danube Area Macro-regional Strategy*, Central European University, Budapest, p. 3, http://www.danubestrategy.eu/papers/papers/

Sustainable agriculture involves the creation of economically viable and environmentally friendly agricultural production, which is the basis for rural development and strengthening the competitiveness of agriculture in European and other markets. Rural development would have a positive social impact on the political, demographic, cultural, and even the security plan. The goals of sustainable development of agriculture include:[20]

1) harmonization of national regulations and actions in the field of agriculture with the law and practice in the EU;
2) encourage investments in reducing pollution from agriculture, conservation of agro-diversity and the traditional (combined) farm systems to preserve the biodiversity in sensitive agro-environmental conditions, development of the animal welfare protection system, reduce erosion, and preservation and enhancement of the environment as a whole;
3) increase the area under organic and other environmentally friendly agricultural production systems;
4) raising awareness of farmers on environmental issues, respecting the principles of protection of biodiversity and animal welfare;
5) introduction of the code of good agricultural practice.

Taking measures for the development of clean technologies, increase energy efficiency and use of renewable energy sources will certainly lead to the reduction of environmental pollution. All these measures have led to the development of agriculture, but would also have broader positive effects on the economy and society in neighboring countries.

Conclusion

There are some challenges on the pathway to achieving sustainable development: creation of a new environmental awareness; ensuring economic growth with preserving natural resources at the same time; inclusive growth and respecting social dimension of development; harmonization, coordination and regionalization of economic policies and strategies; management of sectoral policies with the aim of solving the problems of environmental protection and so on.

[20] According to: *Nacionalna strategija održivog razvoja Republike Srbije*, Službeni glasnik Republike Srbije, br. 57, 3. jun 2008. p. 106.

In order to meet the above challenges, it is necessary constantly improve the concept of sustainable development and emphasizing some of its elements. Thus, the modern approach to policy development imposes the necessity to anticipate future changes, emphasizing the importance of certain principles of sustainable development and the introduction of new elements in this concept. Current principle in contemporary development policy is the "principle of common but differentiated responsibilities" in the area of resource management and environmental protection. Then, more recently, institutional dimensions of sustainable development become more important. Development of an efficient institutional framework at all levels is a key requirement for the realization of the objectives of sustainable development. In addition, there is the stressing the institutional dimension of the concept of sustainable development at the World Summit on Sustainable Development "*Rio +20*".

One of the new approaches, in the strategic orientation of a number of countries to achieve sustainable development, is a macro-regional strategy. Its significance lies in encouraging regional cooperation, solving common problems of the group of countries, and creating an ambience for easier coping with the challenges posed by modern conditions and development. Strategy for the Danube region represents an example of macro-regional strategy development. This Strategy is one of the most important European regional strategies. It has the potential to contribute to achieving the goals of the European Union. One believes that it is still under-utilized potential of the Danube in the political and economic sense. Therefore, from the standpoint of the economic interests of Serbia, the adoption of the Danube Strategy will be one of the prerequisites for attracting investments in Vojvodina, as the Danube region, and in Serbia, as the Danube country.

The rural development and agricultural development policy occupies an important place in the policy development of Danube region countries. The development of sustainable and environment-friendly agriculture, which is the basis of rural development, is a challenge especially in less developed countries of the region. This goal can be successfully achieved by the exchange of best practices and experiences among neighboring countries. With the implementation of the Danube Strategy this will be enabled.

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THE ROLE OF AGRICULTURAL EXTENSION IN AGRI-ENVIRONMENT POLICY IMPLEMENTATION[1]

Stojan Kostić[2]

Abstract

The concept of multifunctional agriculture came as a result of large food surplus and growing pressure of agricultural production of the `80s towards the environment. Reformation of agriculture meant changes in the role of agricultural extension. As an important instrument of agricultural and rural development, extension was ought to solve complex problems ahead of the new concept by "producing" new knowledge. The new role came to the fore by formulation of agri-environmental policies and introduction of programs and measures necessary for achieving environmental goals. Examples of British agri-environmental programs (AEPs) showed that institutional framework, social and human capital, choice of advisory methods, etc. are necessary prerequisites for achieving environmental goals. Serbia has strengthened institutional framework necessary for implementation of AEP, but missed the opportunity to "tackle" some serious problems (lack of social capital in rural areas, negligence of the impact of extension on the processes of social learning, deliberation and negotiation).

Key words: *agricultural extension, agri-environmental program (AEP)*

Introduction

The crysis of modernization paradigm in agriculture at the beggining of `80s, caused by enormous food surplus and rising pressure of intensive agricultural production on the environment, forced policy creators in EU, USA and Australia, to make a radical turn and step away from the economy of scale.

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According to valid doctrine of that time, the basic role of agriculture was food production. The assumption of the new-multifunctional concept of agriculture is, however, according to Romstad and associates (2000:1), that agriculture, besides private, also provides a set of public goods, whose basic elements are: *landscape* (biodiversity, cultural heritage, etc.), *food related issues* (food security, food safety and quality) and *rural concerns* (rural settlement and rural activity).

Reformation of agriculture and the adoption of the new concept begin gradually to change the role of agricultural extension services, which meant that, by that time exclusive rule of *"unalloyed faith in science and its results",* according to which the modernization of agriculture and the application of research results in practice automatically result in benefits for farmers, ceased to have effect (Petrović, Janković 2010). During the time, the consequences of that approach caused adverse effects towards the environment which eventually resulted in new apprehension of agricultural extension and its role. Apart from these, the reasons for the change of role of agricultural extension, as Labarthe (2009) points out, were the new requirements ahead of the new concept of agriculture that could not be fulfilled without "production" of new knowledge. The new knowledge, which was ought to be conveyed to the farmers by extension service, should provide integration of all functions of multifunctional agriculture at the farm level. Also, the fact, stressed by Dobbs and Pretty (2001), that sustainable agriculture is *"human capital intensive"*, i.e. that production according to ecological principles requires continuous learning and accumulation of knowledge, emphasizes even more the importance of agricultural extension which should be farmers` source of free or affordable agri-environmental advices.

The objective of this paper is to, through the short review of the reached level of development of agricultural extension and advisory science (from the point of view of two most influential advisory schools), "light up" the role of agricultural extension service in the field of environmental protection, primarily through the use of voluntary agri-environmental programmes (AEPs). For that purpose practical experiences of Great Britain in implementation of AEPs are presented. The accent is also placed at the importance of social and human capital as prerequisites of successful implementation of these programs and generally conservation and improvement of nature and natural resources. The experience of Great Britain, together with existing proposal of Serbian AEP, is the basis for consideration of the possibilities of implementation of similar programs and measures in Serbia.

New apprehensions of the role of agricultural extension

As an important policy instrument of agricultural and rural development, agricultural extension service is, depending on specific conditions and needs of society, dedicated to achieving some of the following objectives: innovation and technology transfer, training and preparing farmers for the increasingly competitive market, the realization of the concept of sustainable development, etc. As a specific activity, extension is in close relation with development of agriculture, that is, modernization of agriculture and the development of advisory science can be considered as parallel processes. Thanks to the achieved high level of modernization of agriculture and the evolution of advisory science, new, much broader requirements are put ahead of the agriculture and agricultural extension (Janković et al. 2010). Accordingly, the apprehension of the main role of agricultural extension changed during time. About how long road has passed advisory science from the period when the idea of diffusion of innovation (and passive technology adoption by farmers) as a prerequisite for the modernization of agriculture has dominated, to the introduction of the concept of human resource development and "communications for innovations", is best illustrated by the two very influential advisory schools - German ("Hohenheim") and the Dutch ("Wageningen").

Petrović and Janković (2010) point out some important new moments in the view of extension from the perspective of the German advisory school, which was (the view), on the basis of definition of one the most influential German theoretician Harmut Albrecht, formulated by his successor Volker Hoffmann. Extension is viewed as a process of training the farmers, while emphasizing the partnership between advisor and the advised and influence on the development of the farmers' awareness of the existence of a particular problem. This means that the entire activity of advisor is dedicated to *farmer* and his needs. Feature of this approach is the existence of motivation for farmer to find and implement new solutions, as well as for continuous learning and personal upgrades that ultimately leads to transition of responsibilities to farmers and encourage the creation of farmers` entrepreneurial spirit as an assumption of market performance. In this way, the main objective of extension becomes *human resource development* which leads to the partial "rupture" with the paradigm of technology transfer. The main features of the Hoffman`s *problem solving approach*, as stated by Janković and associates (2010), is

farmer who solves problems and makes decisions, who identifies problems and according to their complexity requires information (from advisor or from other sources), who is aware of the importance of environmental protection and motivated to continue learning and improving, as well as to participate with other farmers in the creation of farmers' associations as a form of social capital.

Further development of advisory science, as inevitably interdisciplinary, imposed, in addition to the analysis of diffusion of innovation, the need for analysis of communication in extension work, habits of farmers and their training for active participation in "Agricultural Knowledge and Information System" (AKIS), etc. The success in comprehending the extension as a social process is only possible when *"the social context of work and life of both farmer and advisor is taken into account"* (Petrović and Janković 2010:11). The newest apprehension of advisory science originates from famous Dutch – "wageningen advisory school" which defines extension as „communication for innovation". In this apprehension of extension, as pointed out by Petrović and Janković (2010), the *professional dimension* of advisory work is emphasized and at the same time extension is considered as an intervention that is usually financed/subsidized by various external sources, whose objectives are often not compatible with the objectives of those who receive advisory services. Couple of things are emphasized here - the existence of *communication strategy,* which is basis for transfer of meaning between the people (through information), and a fact that extension is an activity directed toward cognitive changes, which initiates all other types of changes (e.g. changes in human practices, crops growing, the use of water resources, etc.), while the focus remains on process of learning. The authors point out that, according to new apprehension, the extension is a *process* (which consists of numerous communication interventions and interactions) and at the same time note that, apart from advisory activities, many other interactions take place between the people. *Inducing innovation* in the new apprehension means, not only their expansion, but the adaptation according to specific conditions, and also their reinvention in accordance to local conditions. The assumption is that the advisory activity is the one that should affect the resolution of *problematic situations*.

The role of social and human capital in environmental protection

As Pretty and Ward (2001:209) stated, for as long as people have managed natural resources, they have engaged in forms of collective action. Farming households have collaborated on water management, in labor sharing and marketing, etc. Such collaboration has been institutionalized in many forms of local initiatives, traditional leadership, farmer experimentation groups, etc. Although constructive resource management rules and norms have been embedded in many cultures and societies, from e.g. collective water management of Egypt and Mesopotamia, it has been rare for the importance of such local groups and institutions to be recognized in recent agricultural and rural development. This phenomenon, both in developing and industrialized countries, is the consequence of the fact that policy and practice has tended to be preoccupied with changing the behavior of individuals rather than of groups or communities. As a result, according to the before mentioned authors: *"agriculture has had an increasingly destructive effect on the environment."*

Social capital, as a "bridge" between disciplines within social science, is in tight connection with other forms of capital – financial, cultural, human and natural (DEFRA 2008). That connection is a result of the complexity of process of rural development which is characterized by numerous participants, dimensions and levels of observation, which was best discussed by Bourdieu (Burdije 1999). Rapid growth of interest in the term of "social capital", that began in the `80s and continues to this day, has resulted in its various definitions, here are two. According to Strategy Unit (2002) (cited by DEFRA 2008:17), social capital represents *„networks, norms, relationships, values and informal sanctions that shape the quantity and cooperative quality of a society`s social interactions."* For Putnam (1995), who gave an enormous contribution to the expansion of this term, as pointed out by Janković (2007:181), *"Social capital is comprehended as a resource which creates and sustains relationships between people, resource of people and organizations, the 'glue' that binds people together."* From these definitions it is possible, according to Pretty and Ward (2001), to note four key aspects of social capital, such as: **relations of trust; reciprocity and exchanges; common rules, norms, and sanctions; and connectedness, networks, and groups**. These elements are the basis of

(qualitative) conservation and improvement of social capital. Having that in mind, an important question is to what extent are social and human capital prerequisites for long-term improvements in the natural capital? Referring to natural capital, we should bear in mind that it is at least in part public good, i.e. a combination of public and private goods. According to Pretty and Ward (2001), and Dobbs and Pretty (2001), natural capital can be improved in the short term with no explicit attention to social and human capital. Regulations and economic incentives are commonly used to encourage change in (farmers') behavior, and include, e.g. establishment of strictly protected areas, regulations for erosion control or adoption of conservation farming, pesticide taxes, etc. However, there is considerable evidence to show that though these may change behavior, there may be little or no positive effect on (farmers') attitudes. Farmers commonly revert to old practices when the incentives end or regulations are no longer enforced. As Dobbs and Pretty (2001:82) pointed out, the social and human capital necessary for sustainable and equitable solutions to natural resource management comprise a mix of existing endowments and that which is externally facilitated. This means that external factors (such as, e.g. agricultural extension service) can affect the strengthening of existing or the creation of conditions for the formation of new social capital, primarily through education, skill development, improvements of leadership capacities, and motivation of individuals to act. Thus, Dobbs and Pretty (2001) emphasize that, when it comes to a formation of new groups farmers must be convinced that the benefits derived from joint or collective approaches will be greater than those from individual ones. On the other hand, external agencies must be convinced that the required investment of resources to help develop social and human capital will produce sufficient benefits to exceed the costs.

As it was already pointed out, agri-environmental regulations play an important role in encouraging adoption of sustainable practices, but the full effect is possible only if they are supplemented with processes that support communication and learning among farmers. Many surveys show that the relationship between attitudes and behavior is weak, i.e. that farmers may adopt new practices, but may do so only grudgingly. Examples from Denmark and Holland, presented by Dobbs and Pretty (2001), showed that many farmers adopted practices that resulted in the minimum change to conventional practices. Cause for this can be found in the fact that farmers perceived environmental regulations as a constraint

on them. There are, however, several 'soft' mechanisms, suggested by Dobbs and Pretty (2001:83), that can give an incentive to increased uptake of more sustainable practices: *Encourage farmers to work together in study groups; investing in extension and advisory services encourages greater interaction between farmers and extensionists; encourage new partnerships between farmers and other rural stakeholders, as regular exchanges and reciprocity increase trust and confidence, and lubricate cooperation.*

Many examples show the sheer volume of benefits (environmental and farmer directed) derived from group action. Pretty and Ward (2001) cite couple of examples. The first is one of Danish farmers organized into 620 crop protection groups (4300 members) who managed to make greater reduction in the pesticide use during production (both doses and frequency of applications) and in costs then those working alone. Also interesting is the second example from USA, i.e. of members of the Practical Farmers of Iowa who achieved much better production results than nonmembers in the same region; but those organized into groups within PFI outperform individual members even more – although their yields were roughly the same, group members used 52% less nitrogen and 65% less pesticide.

Estimates of Pretty and Ward (2001) show that, during the past decade of the 20th century, between 408,000 and 478,000 new groups have arisen mostly in developing countries (such as Kenya, Honduras, Burkina Faso, etc.). These groups have arisen in the following sectors: *Watershed and Catchment Groups* (e.g. in the USA exist 1000 local groups), *Irrigation water users' groups* (e.g. in Philippines exist between 3500 and 5000 groups), *Microfinance institutions* (development of credit and savings systems for poor families), *Joint and Participatory Forest Management* (e.g. in India exist around 15000 local groups), *Integrated Pest Management* (integrated use of a range of pest control strategies in a way that reduces pest populations to satisfactory levels) and *Farmers Groups for Research and Experimentation* (one of the objectives is experimenting under controlled conditions on research stations, with the resulting technologies being passed to farmers in accordance to their local needs). How important are these activities of farmers, in the best way describes Kroma (2004:752): *"Alternative management production as a dimension of sustainable agriculture is a process that helps trigger learning that is*

transformative because it encourages the active involvement of producers in experimentation and innovation that validates their role as cognitive actors."

The role of agricultural extension in implementation of AEPs – example from Great Britain

The reforms of the 1990s, i.e. especially Regulation 2078/92, lightly "greened" CAP EU. This Regulation required member states to implement an agri-environmental programme (AEP). It implied an obligation to governments to offer farmers voluntary incentive schemes for adopting environmentally- friendly forms of land management (Dobbs and Pretty 2008). Those programs, as emphasized by Morris (2004), represent an important, tangible step towards the development of more sustainable farming systems. The commitment within the EU and GB to increase the level of funding to AEPs[3] is indicator of the extent to which these initiatives are viewed as credible "greening" mechanisms by government, farming organizations, environmental NGOs and public alike.

As powerful means of agri-environmental policy AEPs offer regular payments to farmers in exchange for the provision of environmental management. Farmers` main task is achievement of environmental benefit through the maintenance or introduction of precisely defined management practices. Environmental benefit realized through these practices is far beyond the level of protection defined by regulations on environmental protection. Accessing these programs and measures by farmers is completely voluntary, whereby farmers need to conclude a contract with the authority responsible for AEPs (Ministry of Agriculture or Regional Agency). For these contracts, according to Keenleyside and associates (2010:52), the most common are: *a) requirements relating to the management of which farmer has to abide; b) plots on which these requirements must be applied; c) the period during which these requirements must be respected; d) payment that farmer will get for fulfillment of those requests; and e) penalties in case the set requirements are not respected.* According to the area of implementation AEPs can be divided into "zonal" and "horizontal". Most member states apply both programs simultaneously. As an example of combined application of both zonal and horizontal programs we present the experience of Great Britain (England) in

[3] The budget of the AEP has increased since 1993 for as many as twenty times. Today EU annually spends about € 2 billion on these programs, or about 4% of the CAP budget (Karoglan-Todorović, Znaor 2009).

implementation of *Environmentaly Sensitive Areas (ESA) and Countryside Stewardship Scheme (CSS).*

The ESA scheme was first set up in 1986 and it is the first AEP in EU. It`s main characteristic is its "geographical orientation" which implies that only farmers within the boundaries of ESA have right to participate. The ESA programs were taxpayer-funded programs administered by government agencies. It was implemented following concerns in wetland areas. ESA was funded by EU and the UK government, about half from each. Under the ESA system, farmers entered up to 10-year voluntary management agreements in return for annual payments. Environmental goals that the government attempted to achieve under the ESA program included: improved habitat for birds, biodiversity, landscape beauty, and historic preservation. Participation in England's ESAs had grown to 12,445 agreements by 2003, covering 640,000 ha, that is around 67% of the nearly one million eligible hectares. From 43 ESA schemes in Great Britain, even 22 have been implemented in England (Dobbs, Pretty 2008).

Launched as a "pilot" initiative in 1991 CSS was developed mainly because it was recognized that agricultural intensification is having a significant impact outside those special areas designated under other AEPs (such as ESA). In short, CSS was designed to "tackle" environmental problems in the wider countryside (Morris 2004). That is the biggest difference between ESA and CSS: within the CSS there are no restricted areas and it is implemented in the entire territory of England (CRER 2002). Although many environmental goals of CSS are coherent with those within the ESA, it`s worth noticing that ESA is oriented toward certain segments of ecosystem. As emphasized by Dobbs and Pretty (2008), the main purpose of CSS was to sustain the beauty and diversity of the rural landscape, preserve wildlife, conserve historic features etc. The CSS, as ESA, provides agreement holders with annual payments for the period of ten years. An important difference between these programs is that CSS used much rigid criteria in the application process, that is, so called two stage scoring system[4]. Since 2005, the CSS and ESAs have closed to new applicants and have been superseded by the

[4] Details about this scoring system are presented in: Dobbs and Pretty (2008): *Case study of agri-environmental payments: The United Kingdom*, Ecological Economics 65:765-775.

Environmental Stewardship scheme[5]. Some existing ESAs and the CSS agreements will, however, continue until 2014.

As AEPs have important environmental objectives, the question how schemes (programs) may contribute to creation and development of conservation-oriented thinking among participating farmers is now seen as critical factor for the assessment of the success of a scheme and will ultimately determine whether a scheme is impacting on farmers` fundamental attitudes/values towards farming. Understanding how AEPs may affect farmers` attitudes is vital specifically because of the fact that participation may ensure the continuation of environmentally-friendly farming practices, even if financial incentives for countryside management were to come to an end (Wilson, Hart 2001).

Given the characteristics of both programs, the assumption of their creators is that farmers possess at least some knowledge about the environment or, perhaps more significantly, that they are able to access the necessary knowledge (and information) to enable their applications to the scheme to be successful. This in turn implies a measure of literacy and social competence to access the necessary advice networks and also implies the importance of extension service as an instrument of environmental protection (Morris 2004). As Dobbs and Pretty (2008) point out, the main actors of these AEPs are farmers who decide whether or not to participate in contracts. When we focus at the activities of advisor within the AEP it is obvious that they come from all three sectors (public, private and nongovernmental). The first task of an advisor, from any sector, is to motivate farmer to join the AEP. Presenting the information about particular AEP (how to fill the application form, how to prepare production plan prior to AEP, etc.), through specific *communication strategy*[6], advisor provides farmer with an insight into the importance of participation in the program, in terms of environmental benefits, and the benefits for the farmers (annual payments). As stated by Coleman and associates (2010:66): *"The communications methods used to raise interest and persuade farmers to participate in receiving advice are therefore essential to the success of an advisory function."* For farmers, on the other hand, of biggest

[5] Environmental Stewardship is a key part of the government and EU funded RD Programme for England 2007-2013, and consists of four elements: Entry Level Stewardship (ELS), Organic Entry Level Stewardship (OELS), Uplands Entry Level Stewardship (Uplands ELS), and Higher Level Stewardship (HLS), http://www.naturalengland.gov.uk/ourwork/farming/funding/es/ default.aspx,

[6] According to Coleman and associates (2010), communication strategies which are used most among British advisors are: word of mouth; conference, workshops, events; websites; email-bulletin, newsletters; journals and publications; agricultural shows/markets; direct mail – fliers and other. The most popular methods used by advisors are group events and word of mouth.

importance is to have an easy access to free or affordable environmental advice. Consideration of motives for joining ESA or CSS is the first step in evaluation of farmers' attitude/way of thinking (Wilson, Hart 2001).

In the realization of AEP's goal, through the change, first of behavior and then the way of thinking/attitude of farmers, in terms of attitude towards the environment, the key role play methods of advisory work. Ingram and Morris (2007) emphasized that **the individual farm visit by an advisor** remains one of the most powerful and effective communication methods, and it is, at the same time, most valued by the farmer. Major impact on farmers can be achieved by organizing group meetings (on experimental demonstration farms (Farm walks); workshop - working with groups of farmers in the classroom through interactive sessions, etc.). In addition to these two groups of methods, there's been a spread in use of websites as sources of information for farmers, followed by various activities related to public relations etc.

Possibilities of implementation of AEP in Republic of Serbia

Experiences of the Great Britain proved that AEPs can be powerful means of environmental protection, only if some of the assumptions are satisfied, such as institutional framework, payment system, i.e. agri-environmental payments provided within the National agri-environmental programme (NAEP), developed social capital in rural areas, quality extension service and trained advisors, environmentally aware farmers, etc. Over twenty years of British experience in ESA and CSS implementation is a proof that mentioned assumptions can`t be satisfied in a short period. Despite the fact that Serbia doesn`t have an AEP, long period could be significantly reduced, in the first place, thanks to the rich experience of the member-states of EU. During the last couple of years Serbia made significant progress[7] towards something that, in the near future, could result in formulation of NAEP. That scenario seems possible, considering the fact that Serbia became candidate for entering EU and accordingly got the option of using IPARD funds. The key roles in formulation of Serbian agri-environmental policy play Ministry of agriculture and Ministry of environmental protection and areal planning.

[7] The progress is reflected in adoption and preparation of some important documents, such as: the National Biodiversity Strategy and the Action Plan, the National Rural Development Program, Law on Organic Agriculture, Law on GMO, etc.

Unlike the year 2004, since when support for rural development was established, when social and economic measures dominated, in recent years measures that contain "environmental dimension", such as *support for organic farming and breeding of endangered indigenous breeds of domestic animals,* have been introduced to the agricultural sector. These sub measures are included in the *Draft of strategy of rural development 2010-2013* within *IPARD Priority Axis 2*. Progress on resolving important environmental issues is evident, but nevertheless there are still no concrete plans for development of AE measures. This situation, on one hand, can be explained by the lack of financial resources and by total focus on the extent of organic farming, on the other hand. Two important documents adopted during 2010 – *the National Action Plan for development of organic farming in Serbia from 2010 to 2015 (NAP)* and *Law on organic farming* - reflect high level of commitment of the creators of Serbian agricultural policy to development of organic farming. Broad support, such as this, would be justified only if some prerequisites are present in the field (such as informed farmers with knowledge necessary for organic farming, extension service with trained personnel, etc.) (Čikić, Petrović 2010). According to data from NAP, total of 224 farms are included in organic farming system, while only 596 ha is under organic farming regime in Serbia. Researches also showed (Čikić, Petrović 2010), that the awareness of Serbian farmers of the importance of organic farming is low and that only one advisor deals with this exact form of production. All this testifies to the fact that the insistence on the extent of organic farming as a major development opportunity for Serbia has no real foundation. This doesn`t mean that this measure should be abandoned, especially when taken into account proved significant contribution of organic agriculture to the building of natural capital (Dobbs and Pretty 2001). It is necessary, according to agro-ecological and other conditions, to consider the introduction of other measures, such as protection of water and soil restoration and maintenance of grassland, etc. which would give more concrete results, and in the realization of which extension service would be able to come to the fore.

The practice of implementation of AEPs and measures has long tradition in EU countries of which some have already started the fifth cycle of AEP implementation. For country such as Serbia, whose dealing with environmental issues is at the very beginning, this could be an important resource of relevant practical experiences. According to that, Keenlyside and associates (2010) point out that lessons which Serbia should learn are primarily connected with design procedures of these programs, i.e. their quality and with importance of involving all stakeholders in the process. In AEP quality

workmanship we have to consider that it is important: *to give credit (through AEPs)to farmers for the "production" of public goods and services; to ensure stable budget and the necessary resources for the implementation and realization of the objectives of program; that programs are based on good scientific basis with a clear understanding of the relationship between farm management activities and the environment; that farmers are, in case of lack of understanding of the requests, provided by necessary advisory support; that programs and management requirements are, by acquisition of new experience and knowledge and change of conditions, improved and adjusted; to implement a quality monitoring with the incorporation of the obtained results in the next stages of development of programs and measures; in order to improve the acceptability of the program for farmers, to raise the level of their interest for participation and effectiveness of programs on the environment; to constantly consult and involve in all phases of program development and execution of measures (farmers and local experts) and with the support of advisory services, from sources farmers believe, exert effective promotion of specific programs and measures* (Keenlyside et al. 2010:56).

Proposed NAEP of Serbia stemmed partly from the activities within the project which, in cooperation with the Environmental Agency of RS, the Institute for Nature Conservation and the Green Network of Vojvodina, was executed by Avalon, IUCN, IEEP and Natura Balkanika[8]. In addition to these results, to NAEP's design also contributed recommendations and opinions of the project "Support to agri-environmental policy and programming in Serbia", conducted during 2008 and 2010, as well as information derived from the locations of the case studies.

Proposed NAEP (Table 1) consists of five schemes of which every scheme has minimum of one, and maximum of three sub-measures. These sub-measures consist of certain requirements on which the agreement holders would voluntarily agree and thus become entitled to payment on an annual basis for a period of five years. Farmers would be offered a set of agri-environmental measures from which they could choose the combination that best fits their land. In order to participate farmers will have to undergo a basic training program (under the guidance of extension service). Training involves exploring potential participants with opportunities NAEP offers, as well as clarifying the application procedures. Prerequisites for eligibility to participate in the AEP, as stated by Keenlyside and

[8] AVALON is nonprofit organization from Holland; IUCN - *International Union for Conservation of Nature*; IEEP - *Institute for European Environmental Policy; Natura Balkanika – regional NGO.*

associates (2010:67) is that: *farmers have to have registered farm household; to sign an agreement which will commit them to the implementation of agri-environmental activities in the next five years on the same territory and to have a minimum of 0.5 hectares of agricultural land.*

Table 1. *Recommendations for package of agri-environmental measures that should be included into NAEP*

Scheme	Organic production	Traditional breeds	High Nature Value Farming	Landscape characteristics	Conservation of soil and water
Sub-measures	Package of support to organic agriculture	Conservation of indigenous breeds	Restoration and management of natural grasslands of high value that are not used for grazing	Preservation of traditional orchards	Crop rotation to preserve soil and water
		Restoration of traditional pastoral systems	Grassland restoration and management of high natural values with excessive grazing		Erosion control basin
			Preservation of habitats of protected species in areas with arable area Important bird habitats		

Source: *Keenleyside et al. (2010): Razvoj nacionalnog agro-ekološkog programa za Srbiju, in Cooper, T. and Pezold T. (eds.), IUCN, Gland-Beograd, p. 66.*

Will the proposed NAEP have success depends on factors discussed in the previous part of this paper. It is necessary that institutions responsible for its implementation has credibility and that farmers have confidence in them. However, the fact that the Serbian farmers are, generally speaking, suspicion toward institutions, may cause, already in the initial phase a big problem. Also, the extension service, as a factor on which depends number of participants, and the result of the implementation of the program, has to be seen by Serbian farmers as a reliable partner. For advisors is crucial to be fully trained, prepared, and to represent stable support to farmers. The fact that Serbia has not yet implemented a pilot AEP, suggests that some funds need to be set aside for the necessary training of advisors regarding AEP[9]. The primary role of advisors, as well as in the examples above, comes to informing farmers about the AEP, in

[9] Around €3.1 million was spent in Sweden in 1999 for the purpose of training of advisors for AEP implementation (Kristensen, Primdahl 2004).

particular by direct contact, indirectly through printed publications or through organizing group meetings. In the first phase *(Preparation of farmers)* farmers should be assisted by advisors in the preparation of application forms and resolving concerns with concrete measures. The role of advisors, according to proposed plan, appears yet in the second phase *(Phase of Application and Selection)* where advisers review the situation on the farm and compare it with the data from the application form, with corrections where necessary. There is a concern, however, about the fact that long- term effects of AEP, where the key role concerning the influence on the behavior and attitude of Serbian farmers should be played by the extension service, are not considered in this proposal. This is confirmed by the fact that the problem of absence of social and human capital in rural areas of Serbia is also not addressed in the proposal. According to presented experiences, the role of Serbian extension services should be far more significant than one determined under the NAEP proposal. Extension service must be present in all stages of NAEP, from farmer preparation stage, to the stage of monitoring and evaluation. Over the long-term, the adoption of environmentally friendly behaviors and attitudes, harmonized with the principles of environmental protection, the most important is motivational role of extension services. However, none of these were discussed in the mentioned proposal. Obvious problem in the proposal is that neither the creators of the agricultural policy of Serbia, nor their partners who participated in developing of NAEP realize the complexity of agricultural extension service, i.e. that it significantly affects the processes of social learning, decision making, and negotiation, etc. This could be somewhat explained by current adverse situation (finance, personnel and organization) in our extension service, which implies that it is very important for Serbia to formulate a strategy for the development of high-quality agricultural extension.

Conclusion

The unsustainability of agricultural model oriented exclusively on production and creation of food surpluses became apparent due to the growing environmental problems during the `80s. Appreciation of the multifunctional character of agriculture has resulted in a reshaping of the objectives of agricultural policy in Europe and the world and also in partial rupture with the modernization paradigm. Accordingly, a similar scenario occurred in the development of advisory science. Development of extension ranged from the concept of technology transfer and its passive adoption for the purpose of productivity increment, through human resource development, to the concept of communication for innovation aimed at

conative and cognitive changes of farmers while at the same time emphasizing the importance of social learning and negotiation. The new role of agricultural extension in particular came to fore by establishing agri-environmental policies, in the EU, U.S., Australia, and by the introduction of programs and measures necessary for the implementation of environmental goals. From the examples presented in this paper it is obvious that extension service is (and should be) present in all phases of AEP implementation. According to the main goal of advisory work in AEP implementation – change of behavior and attitude of farmers – of crucial importance is choice of advisory methods. Although individual farm visit by an advisor is one of the most powerful and effective communication methods, major impact on farmers can be achieved by group methods. When it comes to group method, essential is to keep in mind the importance of social learning and quality of social and human capital as factors responsible for preservation and enhancement of the environment. Social and human capital, as necessary elements for achieving sustainable goals in management of natural resources, include combination of internal potentials and those whose development is fostered by various external factors. As an external factor, extension service can influence both on strengthening of existing and the creation of conditions for the formation of new social capital through, education, development of knowledge and skills, leadership capacity improvement, as well as through incitement of motivation of individuals to act.

When considering possibilities of AEP implementation in Serbia, it's worth noting that there have recently been some progress, both in terms of preparation and adoption of important documents and therefore affirmation of the environmental policy, and in terms of proposing concrete measures. Proposed NAEP should constitute the substantial part of the future strategy for rural development of Republic of Serbia. Of the potential measures, currently is, on a small scale, applied organic farming measure and the measure of endangered indigenous breeds of domestic animals. The proposed package is dominated by traditional measures that could have some success, especially bearing in mind the traditional suspicion of Serbian farmers when introduced to new practices. What is disturbing is the fact that, in this proposal, problem of the absence of social capital in rural areas of Serbia is not considered. It is commendable, on the other hand, that the considerable attention is devoted to the protection of water and soil as key resources for agricultural production, the institutional structure and capacity, as well as administrative tasks and processes. Adoption of AEP, as an instrument of environmental protection, should be priority of the Republic of Serbia for its own sake, not because it is one of the standards that must be met by any future EU

member. This particularly should come to the fore when deciding what measures should be included in NAEP, where "copying" can be counterproductive.

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INVESTMENTS AND COSTS OF IRRIGATION IN FUNCTION OF AGRICULTURAL SUSTAINABLE DEVELOPMENT*

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Abstract

The objective of this paper is to analyze the necessary investments and costs of irrigation in regional and local systems as one of the prerequisites for the intensive development of agriculture. In the Danube area in Serbia, there are possibilities for the construction of several regional irrigation systems . The funds needed for building these systems equal between €3000 and €5000 per ha, depending on the chosen technical solution and the size of the system. Investments in local irrigation systems which belong to agricultural ownerships are considerably lower, provided that a water intake is provided, and that the costs range between €3.000 and €4.500 per ha. In this area, there is a significantly larger number of smaller ownerships whose wish it is to solve the problem of irrigation. Because of this, their organized inclusion in the regional irrigation systems (those already built as well as those planned) is a problem which needs to be solved.The costs of irrigation depend on the technology chosen and water consumption, and they range between €250 and €400 per ha. The ways in which the construction of these systems is financed, as well as the methodology of the calculation of the price of 1 m^3 of water, also have an influence on the costs of irrigation. Because of the possibility of water shortages, a full cost recovery method is advised.

Key words: *regional and local irrigation systems, investment, costs, financing*

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Introduction

Numerous studies have been conducted, researching the influence of irrigation on the development of agriculture in our country. The bases for these were the analyses of land suitable for irrigation, as well as the identification of potential land areas. A lot has been done on testing water quality for its suitability for irrigation. However, research on the economic aspect of development, especially rural development, has been scarce.

Irrigated agricultural production involves the intensive usage of soil (two sowings) and the delivery of water to the plant through already built irrigation systems. The water which is used for irrigation, regardless of its origins (surface or underground waters), should be technologically and economically usable. From the technological aspect, the water must not have damaging consequences on the plants and indirectly on humans and animals. As from the economic aspect, the price of the water should be affordable so that farmers could have an interest in using it.

Taking into account that in the Republic of Serbia, land areas are limited to 0.65 ha of arable land per capita, and that water resources are partially limited (due to draught years) a different economic principle must be established. Including the aspects of sustainable development, agricultural production should, for maximal economic effect as well as for rational water consumption, in irrigated conditions, be oriented singularly towards the maximum of agricultural product per $1m^3$ of water.

Based on the data from the Water Resources Development Master Plan of the Republic of Serbia, surfaces eligible for irrigation in the "Danube" river basin district make up around 475 000 ha. If we calculate that average water consumption equals 2500 m^3/ha per year, the amount of irrigation water that needs to be made available is 2 billion m^3 per year. Natural watercourses in this area, as well as the already build regional systems and reservoirs, do not provide the necessary amount. Taking into account that other river basin districts in the Republic of Serbia (PWE "Sava" around 132 000 ha and PWE "Morava" around 188 000 ha) are planning to develop irrigation systems by the year of 2021, it is necessary to set the priorities for the building of individual regional systems.

This paper is the result of researching the required investments for the development of irrigation in the Danube region. The main and concept designs, as well as the studies of the justifiability of the planned undertakings have been taken as the basis for the research. With the goal of collecting data on the amount of needed investments, the costs of building regional systems and subsystems have been considered in both large and small irrigation systems. In practice, there is also the methodological problem of determining the price of one cubic meter of water. New principles of calculation and costs allocation over users have been suggested.

It is understandable that plans as big as this one cannot be realized without changing the way in which the construction of both regional and local irrigation systems is financed. A public-private partnership should be explored in this particular case, especially if the building of regional systems is in question.

The influence of irrigation on sustainable development

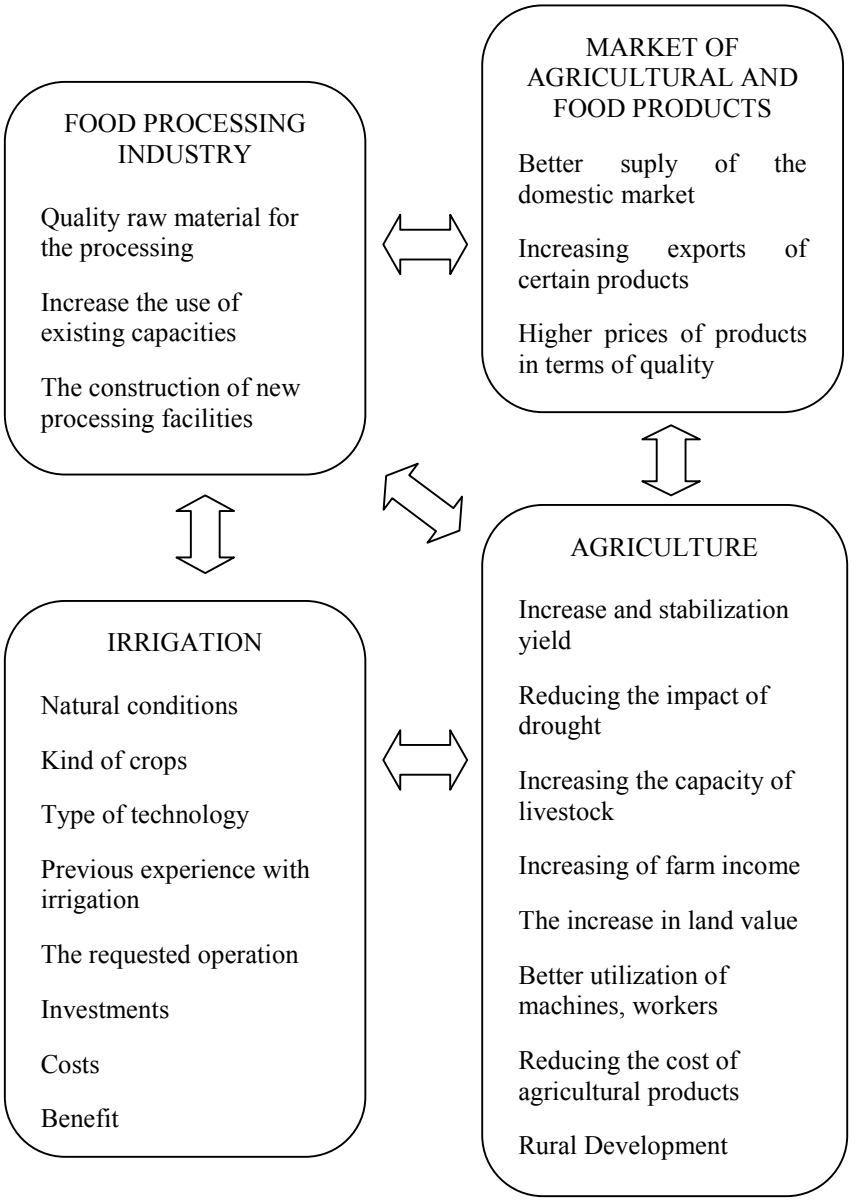
There are positive and negative effects which irrigation can have on sustainable development. In scheme no. 1, a systematization of the factors, through which irrigation has positive or negative effects on the development of agriculture and indirectly on the development of the food industry and the agri-food products market has been done. A mutual relationship is shown and a selection of several parameters on which irrigation has the biggest influence has been done. All of these parameters can be valorized in the Danube region in Serbia.

In agriculture, irrigation has a great influence on the increase and stabilization of harvest for all crops. Nonetheless, irrigation requires investments and costs. An increased income should be able to cover these. Furthermore, there is an increased financial risk because of the newly invested capital. If these additional costs cannot be covered, irrigation cannot be sustainable. This is why it is necessary that the justifiability of the construction of every system is checked and proved.

In the further course of the research, the necessary investments in certain systems in the Danube region (regional and local) are analyzed and shown. The various approaches and methodologies of determining the

price of one cubic meter of water are also analyzed on the example of these systems in order to achieve the comparability of the received data.

Scheme 1. *The impact of irrigation on sustainable development*



Source: *Author`s own illustration.*

Investments in the development of irrigation

The amount of investments needed for the realization of irrigation in the Danube area depends on various factors and it is dependent on the technical equipment of certain systems. The means necessary for the building of these, according to research (Potkonjak S., Božić M., Bajčetić M., 2011)), have been organized on the levels of:

- Regional irrigation systems (RS "Ključ", RS "Srem");
- Regional subsystems (RPS "Inđija");
- Large local irrigation systems on agricultural farms (PD Sava Kovačević in Vrbas);
- Specialized irrigation systems for perennial plantings (in Čelarevo, Bačka Palanka);
- Small local systems on agricultural farms in Srem (vegetable irrigation).

Undoubtedly, it is the construction of regional irrigation systems that requires the biggest investments. The means which are needed for the building of these systems must secure the building of a water management infrastructure which is made up of channels, reservoirs, primary pumping stations, dams, water-gates, etc. Local irrigation systems are used to supply crops with water and they belong to agricultural ownerships. Additional investments in irrigation – specialized machines, roads, plantations, building of livestock objects, buying of livestock, etc. – (Potkonjak S., Bošnjak B., 2011.) are also needed, and these complete the process of agricultural production.

The research (Nikolić G., Potkonjak S. at al., 2006.) includes an analysis and suggestions for technical and economic solutions for the problem of irrigating the Negotin plain. Two technical alternatives as well as zones for them (three zones for the first alternative and four for the second) were suggested. After an analysis of techno-economic parameters, the second alternative was suggested to be realized. In table no. 1, the necessary investments for this alternative are shown, and they equal $3,826. For the zones suggested, the effects which determine the priority and ranking of constructions were established. The largest part of investments, in this case, goes to system equipment (hydro-mechanical, mechanical and electric equipment). The planned sum of all investments should secure the complete construction of the water management

infrastructure of the "Ključ" regional system, which will enable irrigation for 10,915 ha (table 1).

As for the "Srem" regional system, the large part of which also belongs to the Danube region, the construction of a subsystem on the territory of the Inđija municipality (21.900 ha) is planned. Considering that the surface area of what will in the future become RS "Srem" makes up around 200.000 ha, it is the plan that the building and realization be done through subsystems due to limited funding. The plans for the construction of the future subsystem (Božić M., Potkonjak S., 2011.) refer to the area which belongs to the Inđija municipality. Two technical alternatives are suggested for the realization of this, the first including an area of 21,900 ha, the second the surface area of 14,500 ha. According to both alternatives, water from the Danube, already existing watercourses and micro reservoirs are to be used. Within these alternatives, phases have been defined, and these can be realized separately until both the subsystem and the system are finished. The techno-economic parameters of efficiency have been calculated for both alternatives, and based on these, the alternative solution can be chosen.The variant 1 is showed in table 2.

Table 1. *Total investment for the construction of regional irrigation system „Ključ", variant 2*

No	Items	Amount, USD $	% of partake
1	Civil works and buildings	8,610,689	20.21
2	Equipment	29,075,153	68.24
3	Research and design	3,666,902	8.61
4	Working capital	413,527	0.97
5	Intercalary interest	835,325	1.97
6	Total	42,601,597	100.00
7	Unit investment ($/ha)	3,826	
8	System area (ha)	10,915	

Source: *Nikolić, Milošev, Potkonjak, 2006.*

Investments in irrigation include the construction of local irrigation systems which belong to individual agricultural ownerships. Depending on whether the irrigation system in question is small, medium or big, it is necessary to calculate the costs for their construction for each system individually. The amount of the investment, according to research up to

now (Potkonjak S., Mačkić K.,2010.), depends on a larger number of parameters, the most important of which are:

a) *The size of the irrigation system.* (small, medium, large)

b) *Irrigation technology* (surface, sprinkler, drip, micro irrigation)

c) *Water intake types and distance from the system* (river, canal, reservoir)

d) *Types of irrigation systems* (solid, semi-solid, mobile)

e) *Fixed-line disposition* (pipelines, canals).

f) *Types of supply machinery and water distribution over parcels.*

g) *Types of hydro-mechanical equipment*

h) *Types of mobile equipment with artificial rain* (pivot, rainger, typhon).

Table 2. *Structure of investment for subsystem Indjija*

No.	Items	Amount, EUR	% of partake
1	Civil works	45,562,522	48.41
2	Pipelines and fittings	28,882,459	30.70
3	Hydromechanical equipment	8,206,323	8.72
4	Electrical equipment	6,129,596	6.51
5	Research and design (project, supervision of work and so on)	4,439,045	4.71
6	Worging capital	887,809	0.95
	Total investment	94,107,754	100.00
	System area (ha)	21,900	
	Unit investment (€/ha)	4,297	

Source: *Božić,Stojadinović,Potkonjak,2011.*

The research (Božić M., Potkonjak S., 2007.) includes a calculation of the investments for the construction of a local irrigation system for PP "Sava Kovačević" in Vrbas, whose net irrigation area equals 1,813 ha (table 3).

In order for the irrigation to function successfully, it is not enough to just build a regional and local system, but, depending on the choice of the structure of the agricultural production, there are additional investments which need to be made. These additional investments may surpass the investment into the irrigation system. Furthermore, additional investments

are required in order to lower the risk of damage from hail, frost etc. in agricultural production, especially with perennial crops (Table 4). Research on apple orchards in Čelarevo near Bačka Palanka (Potkonjak S., Bošnjak B., 2011.), shows the full amount of investments needed to attain the necessities for agricultural production.

Table 3. *Investment for the construction of irrigation system in Vrbas*

No.	Items	Amount, €	% partake
1.	Pipeline of subsystem 1	791,057.34	14.04
2.	Pipeline of subsystem 2	1,794,587.37	31.85
3.	Equipment for irrigation (center pivots, linears and typhons with several sprinklers)	1,134,670.73	20.14
4.	Pumping station-civil works	211,293.24	3.75
5.	Pumping station-hydromechanical works	451,722.80	8.01
6.	Pumping station- electrical works	930,877.27	16.52
8.	Research and design	265,710.44	4.71
9.	Working capital	53,142.09	0.94
10.	Total	5,633,061.28	100.00
	Unit investment,(din/ha, €/ha)	3,107.04	
	System area (ha)	1813.00	

Source:*Božić,Nikolić,Potkonjak,2007.*

The majority of agricultural ownerships in the Republic of Serbia, as well as in the Danube region, are small surfaces up to 5 ha in size. While awaiting for a regional irrigation system to be built, these ownerships are forced to solve the problem of providing a water intake, which they most often do by constructing wells which are usually shallow, up to 15 m. When it comes to the agricultural ownerships in Srem, whose main objective is to produce vegetables in irrigated conditions, a calculation of the investments for two technologies, sprinkler and drip irrigation, has been made (Potkonjak S., Mačkić K., 2010.), in table 5. It can be concluded that irrigation by drip requires more funding than irrigation by sprinkler irrigation.

Table 4. *Investments for intensive apple production (per ha)*

No.	Kind of investment	€/ha	Structure(%)
I	Land preparation and orchard planting	34,745.91	64.02%
II	System for irrigation	3,840.23	7.08%
III	The anti-hail system	5,767.97	10.63%
IV	The anti-frost system	9,917.76	18.27%
	Total investment	54,271.87	100.00%

Source: *Potkonjak,Bošnjak,Marjanović,2011.*

Table 5. *Investment for sprinkler and drip irrigation technoligies (2 ha)*

Position	Sprinkler, €	Drip, €
1. Water source	140	140
2. Mainline pipe	125	140
3. Hydromechanical equipment	960	1.005
4. Mechanical seal coupler	170	731
5. Mobile equipment	1,400	1.830
5.1. Pipe networ with sprinkler	1,400	-
5.2. Lateral with in-line emiters	-	1,830
6.Cost of supplying,transport and montage	279.5	384.6
7. Cost of projecting, supervision and investor	139.75	192.3
8. Total investment ,EUR	3,214.25	4,422.9
9. Unit investment,EUR/ha	1,607.12	2,211.45

Source : *Potkonjak,Mačkić,2010.*

As can be seen from the examples provided, irrigation offers a wide range of investment possibilities in Serbia, especially in the Danube region. Taking into account that irrigation has been given a greater amount of attention in the last few years, it is necessary to further invest in the development of agriculture. Furthermore, research needs to be conducted on the amount of available water for the purposes of irrigation, as well as the surface area of soil which is eligible for irrigation. Since projects for several irrigation systems in Serbia have already been made, it is necessary to rank and realize these projects.

The costs of irrigation and their distribution among users

There are several ways to calculate the cost of water intended for irrigation in practice, on actual systems, and there are several charging policies that one may hold to. Based on their simplicity these policies may be ranked in the following way:

1. The price of water in a local irrigation system which has its own water intake;
2. The price of water in a local irrigation system whose water intake comes from a regional irrigation system;
3. The price of water in a regional irrigation system which will be charged to users, e.g. agricultural ownerships, buying water.
4. The price of water on a multipurpose regional system where, other than for irrigation, the water is used by other users for: fishing, navigation, supplying industries with water, tourism and recreation, drainage, the drainage of wastewater discharged into the canal net.

In the Danube region, all the cases mentioned are possible. This is why it is important to set the principles and the methodology based on which the calculation of the water price will be done.

Depending on the type of the system ownership (public, private mixed), it is possible to use different economic principles and methods while forming the sales price of water. In this case, the possible choices are:

- **The cost principle** – Only the costs of the functioning of the system are covered;
- **The benefit principle** – the costs of the functioning of the system are covered, as well as an additional gain which is shared by the owners of the public-private partnership.
- **The marginal principle** – the economic price of irrigation water is set so that it includes the elements of basic and extended reproduction with a certain gain;
- **FCR – FULL COST RECOVERY**, may contain several types of costs. These are: 1) Operational and maintenance costs; 2) Capital expenses; 3) Opportunity expenses; 4) Resource expenses; 5) Special expenses; 6) Ecological damage expenses; 7) Long-term marginal expenses.

Table 6. *Total costs of exploatation for subsystem Indjija*

No.	Costs	for Q=1000 m3/ha	for Q=2500 m3/ha
		Amount, in €	Amount, in €
I	I Fixed costs	4964114	4964114
1	Amortization	2787099	2787099
2	Maintenance	1606711	1606711
3	Insurance	515584	515584
4	Full time employees	54720	54720
5	Interest on credits		
II	II Variable costs	379920	939480
6	Energy	367920	919800
7	Seasonal workers		6480
8	Operating expenses	12000	13200
III	III Overheads expenses	248205.7	248205.7
IV	Total costs (I+II+III)	5580239.7	6151799.7
	Unit variable costs, €/m3	0.017347945	0.017159452
	Unit total costs,€/m3	0.254805466	0.112361638
	Unit total cost without amortization, €/m3	0.128088616	0.061455721
	Area of subsystems, ha	21900	
	Planned annual consumption,m3	21900000	54750000
	Irrigation costs per ha for 1000 m3 water/ha	255.35	
	Irrigation costs per ha for 2500 m3 water/ha		280.90
	Unit fixed costs, €/ha	238.00	238.00

Source: *Božić,Stojadinović,Potkonjak,2011.*

Regardless of the principle which is chosen in order to valorize the price of water, it is necessary to create a projection of the annual operating expenses.

By using the **Cost principle** on the example of the Inđija regional subsystem, the total annual and unit irrigation costs (€ and €/ha) have been calculated (table 6), by supposing the annual water consumption of 1000 and 2500 m^3/ha. Other expenses can be added to these. Depending

on the charging policy the regional system owner chooses, as well as the functional demand for water, the sales price for the current year can be set.

The economic price of one m^3 of water delivered to agricultural ownerships for irrigation (the **marginal tarification principle**) is calculated separately from the financing conditions of this investment, the suggested technical solutions and the planned annual water consumption. The calculation of the economic price of distributed water (economic long run prices) was, in this case, adapted to the infrastructural type of the analyzed irrigation system. The economic prices which were calculated for the different discount rates represent the base for the forming of sales prices. These should provide that the formed income, on average, throughout the economic usefulness of the system, covers the capital costs (investments and replacements), as well as operating costs. They should also enable an accumulation in the amount of the applied discount rate (the discount rate varied, in this case, from 0 to 10%). Based on the example of the regional Inđija subsystem, using an average consumption of 2500 m3/ha per year, the economic price of the water was calculated according to the marginal principle, as shown in table 7.

Table 7. *Economic price of water, variant 1 (for q=2500 m3/ha)*

Discount rate, %	**Economic price (EUR/m^3)**
0	0,13
7	0,21
8	0,22
10	0,25

Source: *Božić,Stojadinović,Potkonjak,2011.*

A more simple way of the calculation of the price of water is based on the example of the local irrigation system whose water intake is the regional Donau-Tisa canal hydro system. The price of water used for irrigation is calculated by the summing up of the fixed and variable expenses of this local system, adding to it the price of water which is paid at the Donau-Tisa-Donau system water intake (Božić M., Potkonjak S., 2007), table 8.

Table 8. *Total costs of exploatation on irrigation system in Vrbas*

No.	Costs	Amount, SRD	Amount, €
I	Fixed costs	52880125	644879,57
1.1.	Amortization	27678540	337543,17
1.2.	Renewal and maintenance	5939843	72437,11
1.3.	Insurance	1674262	20417,82
1.4.	Wage full-time employees	6705000	81768,29
1.6.	Interest on credits	10882480	132713,17
II	Variable costs	17102675,4	208569,21
III	Total costs	69982800,4	853448,78
2.1.	Water cost at water intake, din/m3,€/m3	*0,51429*	*0,0064286*
2.2.	Energy,0,5 kWh/m3, din/m3, €/m3	*4*	*0,05*
2.3.	Seasonal workers	*1800000*	*21951,22*
	Unit fixed costs, SRD/ha, €/ha	28720	359
	Area of the system, ha	*1813*	
	Area of the double crops, ha	*445*	

Source:*Božić,Nikolić,Potkonjak,2007.*

A problem appears because this system is treated as a primary means in agricultural ownerships, and the crops which are irrigated are the cost drivers. This is why, in the next phase, it is important to find a way to apportion costs by crop cultures. Research shows that in cases like these, the best alternative is to use the binominal tariff. The fixed expenses of irrigation are to be apportioned by ha, while the variable expenses of irrigation should be apportioned by the consumed, or the planned consumption, amount of water (m^3/ha). Taking into account that agricultural production also includes stubble crops planted behind the main crops, the fixed expenses of the irrigation should be distributed in a 70:30 ratio (main crops : stubble crops). Following this principle, the crops which use more water (m^3/ha) will have bigger expenses, both variable and fixed.It is showed in table 9.

In the case of a small local irrigation system which provides a water intake of its own, the irrigation expenses can serve as one of the criteria for the choosing of the suitable irrigation technology. For a local irrigation system of 2 ha (for which investments were calculated), the

annual irrigation costs were calculated for two technologies – sprinkler and drip irrigation – based on a division into fixed and variable expenses.

A partial conclusion which can be arrived at in this case is that sprinkler irrigation solution when investing, while drip irrigation expenses during exploitation (table 10).

Table 9. *Costs of irrigation distributed by crops*

No.	Crops	Area ha	Partake %	Irrigation reguirement, m3/ha	Fixed costs of irrigation, din/ha	Variable costs of irrigation, din/ha	Total costs of irrigation, din/ha
I	Wheat	245	13.5	900	20104	4217.6	24321.6
II	Barley	100	5.5	800	20104	3766.2	23870.2
III	Spring barley	100	5.5	600	20104	2863.4	22967.4
IV	Maize	344	19.0	2000	28720	9208.0	37928.0
V	Soybean for seed	290	16.0	1800	28720	8280.2	37000.2
VI	Sugar beet	344	19.0	2400	28720	10988.6	39708.6
VII	Sunflower		0.0	1000	28720	4694.0	33414.0
VIII	Silo maize	100	5.5	1600	28720	7402.4	36122.4
IX	Maize for seed	290	16.0	2400	28720	11013.6	39733.6
	Total	1813	100.0				
	Double soybean	245		1200	8616	5571.8	14187.8
	Double sunflower	200		800	8616	3791.2	12407.2
	Total	2258	124.5				

Source:*Božić,Nikolić,Potkonjak,2007.*

The financing of the advance of irrigation

Research until now (Smith R., at all., 2010.) shows that financing the sustainable development of irrigation requires the realistic determination of the price of 1 m^3 of water, the choice of a rational irrigation technology (preferably precision irrigation), the optimization of singular system parts and the efficient maintenatce and operation of these systems, with the goal of lowering water losses. Regardless of whether the system is owned by the state, or if it is a private system, the problem which may arise is the

question of whether a small or a large system should be financed. Should the state finance only regional systems, while the local systems are financed by the owners?

Table 10. *Comparison of irrigation cost for sprinkler and drip irrigation*

Costs	**Sprinkler irrigation, €**	**Drip irrigation, €**
I Fixed costs	273	375
1. Amortization	161	221
2. Repair	40	55
3. Insurance	16	22
4.Credit interest	56	77
II Variable costs	1 045	811
1. Energy	635	586
2. Labor Power	370	170
3. Maintenance	40	55
Total (I+II)	1 282	1 186
Unit costs, €/m^3	0, 45	0, 42

Source: *Potkonjak,Mačkić,2010.*

The potential sources of financing in the current conditions are:
The budget of the Republic of Serbia, The budget of the Province of Vojvodina, The National Investment Plan of the State, APV development funds,EU funds (IPA, etc.), Municipality budgets, The investors' own means (agricultural producers for local systems), Donors (domestic and foreign), Private capitals (public-private partnerships) Loans (domestic and foreign).

A public-private partnership is one of the possibilities which is available to municipalitie in order for them to finance important infrastructural projects – water management services in this case.

The contract which may result in this case should be based on a long-term cooperation of the public and the private sectors. The range of this cooperation is much wider, and it includes the financing, implementation and the operationalization of projects belonging to the construction of water management infrastructure and the offering of water management services.

The models of the partneships which could fit the financing of the constrution of regional hydrosystems (Bajčetić M., Potkonjak S., 2011.) are the following:

Operation & Maintenance Contract (O&M) – the private enterprenour runs the public property based on the contract and under the conditions from the contract, while the property belongs to the state.

Build-Own-Operate-Transfer (BOOT) – the private enterprenour uses a franchize to finance, construct and operate the object (as well as the right to charge for his service) throughout a certain period, after which the property over the asset is given over to the public sector.

Operation License – The private operator gets a permition or the right to offer public service, usually for a certain period of time.

Finance Only – The pricate sector is usually the financing company which directly finances the project, or a part of the project, and uses various mechanisms, such as long-term lease or bond issue.

In the case of the Danube region, several potential irrigation financing models can be developed. The choice of a concrete model depends on the development strategy of water management and agriculture.

Conclusion

- The research about the influence of irrigation on the sustainable development of agriculture in the Danube region in Serbia is significant in more than one way, taking into acount that it can be applied to other activities in whose interest it is to use water resources in this region.
- Irrigation can significantly influence the sustaiable development of agriculture and water management because an intensive usage of soil and water is at hand.
- A twenty-year plan predicts the enabling of around 475.000 ha of arable land. When looked at from a macroaspet, this could considerably influence the development of the food industry, as well as the agri-foods market.
- For the realization of these undertakings, the average annual water demand on an agricultural production structure of medium intensity equals about 2 billion m^3.
- A part of the necessary water can be supplied through the already built Danube-Tisa-Danube hydrosystem and constructed water

reservoirs. The rest of the needed amount could be supplied by building new regional systems, subsystems and reservoirs.

* The studies and projects in this field, until now, point to the possibility of a technical solution to this problem whit a significant use of capital.
* The economic effects of the construction of an irrigation system can be improved by determining the full price of water. Thusly, a structure of agricultural production which can bear the high costs of irrigation needs to be created. On the other hand, an economic water price helps a more thriftly usage of water resources.
* Investing into irrigation is impossible without new ways of financing. The model of the public-private partnership (PPP) needs to be adjusted to the infrastructural character of water management.
* In the area of the Danube region, there are also other users who have an interest in the common water resources (energetics, navigation, fishing, tourism). This is why an integral management of waters is the main condition for the sustainable development of water management in this area.

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RENEWABLE ENERGY AND GREEN ECONOMY AS A SUPPORT TO RURAL AREAS[1]

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Abstract

Green economic development is based on the definition of national resources and identifies the most appropriate sectors of the state economy on its path to achieve sustainable development. As a realistic and promising way to achieve green economic growth in rural areas this paper highlights the use of renewable energy and agricultural biomass. The potential for farming and manufacturing, as the major source of agricultural biomass for the period 2001-2010 is analyzed, covering the Metropolitan area of the Belgrade-Novi Sad, which for this survey includes 11 municipalities. It was found that the most realistic source of agricultural biomass according to the current seeding structure, lays in the production of cereals, industrial crops and fruit. Appropriate use of these resources could attract new investments in rural areas, labor employment, less dependency on the national energy networks and revenue diversification on farms.

Keywords: *Sustainable development, green economy, renewable energy, rural development*

Introduction

Energy stability is the key to economic, social and environmental dimensions of social sustainable development (Dincer, 1999). Sustainable development requires a energy supply from renewable, cost effective and

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with no or minimal social impact resources. As the previous development of primarily economically powerful countries is based on the exhaustion of not renewable fossil fuels, thus no viable with reserves steadily decreasing, it is clear that further growth on such grounds is not realistic. On the other hand, nature provides green sources of energy sustainable over a long period and thus completely acceptable from the sustainable development viewpoint (Dincer and Rosen, 2004). The term renewable energy means energy sources that are found in nature and reproduced in whole or in part, particularly energy streams, wind energy, solar energy, geothermal energy, biomass and others. Dincer and Rosen (2005) point out that renewable energy resources and the development of supporting technologies can be a key component of sustainable development for three reasons:

1. Using green energy causes less impact on the environment than other energy sources, and a variety of green energy sources provides a wide range of its use;
2. If green energy sources are used rationally and in sustainable way it can provide reliable energy supply in almost unlimited period;
3. Favors a system of decentralization and local solutions that are somewhat independent of the national network enabling the realization of economic benefits, especially in rural areas.

In addition, the current global economic crisis and available increasingly scarce financial resources make a renewable energy more important because of the ability and aspirations investment from a number of different funds, which are seen as an opportunity, especially in developing countries. Because of all this renewable energy is the focus of a green economy that is seen as the realization of the sustainable social development fine direction concept (UNEP, 2011).

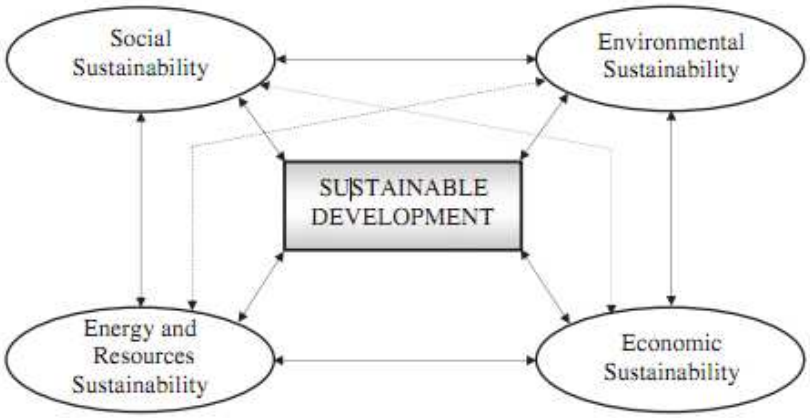
The concept of the green economy is not new, but in the last decade, it is more and more mentioned because of global interest growth in environmental protection. In addition, the last definition given by UNEP (2011) in its report "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication" promote the role of this concept as a mean of achieving social equity and poverty reduction, especially in rural areas, where diversification and farm income through the use of renewable energy is considered as a chance. In rural areas, most of the natural resources are placed representing therefore a real basis for the production and use of renewable energy in exactly these areas. Regarding

the draft Rural Development Strategy Plan 2009-2013.rural areas in the Republic of Serbia comprises approximately 70% of the territory inhabited by 43% of the population and it is of great importance to the creation of favorable conditions for the greening of the rural economy through the available resources. The rural areas of Serbia represents a significant potential of agricultural biomass (solid, liquid and gas) which currently manages an inappropriate way, and it would be the correct policy, simultaneously, to support the use of renewable energy sources and encourage the development of rural areas.

The concept of green economy basis

Politics of renewable energy sources in the past few decades has evolved differently depending on the objectives of national interest in different countries and regions. Interest in the use of renewable energies with the increased awareness of the need for environmental protection appeared in first debate on the relative advantages of nuclear power over fossil fuels beginning in the 1960s. Even then it was pointed to the unsustainability of social development on reserves of fossil fuels and the need for finding alternative directions to meet energy needs. During the mid-1970s and 1980s, interest in renewable energy has increased as a result of the energy crisis caused by decreasing oil supplies and rising prices of other fossil fuels. Since the 1990s, interest continues to grow due to the expansion of concerns about the state of the environment on a global and local level, particularly after the publication of the report" Our Common Future" (World Commission on Environment and Development, 1987.) and the definition of the concept of sustainable development. Then the approval of a number of environmental agreements came such as the United Nations Framework Convention on Climate Change (1992), the Kyoto Protocol (1997) and many others who have supported the principles of sustainability. The focus of sustainable development pays an attention on three points: economy, society and environment, and the essence of a balanced relationship between economic growth, social progress and environmental protection. However, Dincer and Rosen (2005) offer a model by which sustainable development includes four pillars: environmental sustainability, economic, social and sustainability of energy resources (Figure 1). Through this approach the concept of sustainability, green growth strategy can be considered as an appropriate framework of policies.

Graf 1. *Factors affecting sustainable development and their inter-dependences*



Source: *Dincer I., Rosen M (2005;184)*

Justification placing sustainable development at the four pillars rose prior to the summit in Rio de Janeiro in the 2012 because they were increasingly able to hear the loud criticism that sustainability goals placed up in 1992. are not even half realized and there is a need to be approached in a more sophisticated and specific manner and alternative strategies for the development of society must be applied.

The concept of green economy to achieve sustainable development goals largely depends on changes in the economic sphere and is seen as a very realistic and promising direction for future development of the company. According to UNEP (2011) definition of a green economy as "the economy which results lead to improvements in human well-being and social equity, while significantly reducing environmental risks." The idea is based on transition to a green economy, growth in income and employment thus encouraging public and private investment in "clean production" - the new promoters of social development, with the aim of reducing emissions of greenhouse gases and pollution of the area, increasing energy efficiency and preserving biodiversity. Green economy represents a new impetus to the growth and generator of new jobs, as well as the necessary strategy for current poverty reducing, especially in rural areas. The basic assumptions and objectives of this concept can be defined in a few points:

1. Awareness of resource and energy efficiency, diversification of energy sources;
2. Sustainable production and consumption;
3. Sustainable use of natural resources;
4. Reduction of environmental pollution;
5. Conservation of biodiversity;
6. Fighting of climate change and desertification;
7. Create greater opportunities for sustainable development, including rising incomes, reduce poverty and improve the quality of life;
8. Clean energy, green jobs, economic competitiveness, and investments in renewable energy can benefit the entire population.

Based on the above it can be said that energy touches on almost all aspects of social development, and energy efficiency and conservation of natural resources is defined as the green economy and renewable energy sources pillar and green agriculture as a measure of its implementation (UNEP, 2011). Renewable energy can be an answer toward the challenges of the environment protection by reducing greenhouse gas emissions, and other socio-economic benefits in the form of equal population with energy supply can be achieved simultaneously creating jobs through investments in this area, which is in line with the principles of green economic development . Increased investment in renewable energy can be the backbone of economic development and energy security, especially in developing countries and their rural areas where the population is significantly dependent on traditional energy obtained using different types of biomass. Globally, the proportion of biomass in the total consumption of renewable energy dominates (Renevables 2012 Global Status Report, 2012) and this paper will discuss the potential of biomass as a natural energy resource.

The potential production and use of agricultural biomass in Republic of Serbia

According to Fischer and Schrattenholzer (2001) renewable energy sources can be determined theoretically, technically or economically. *The theoretical potential* is primarily determined by natural conditions and describes the amount of biomaterials that can be created during the year. *Technical potential* depends on the available technology and is therefore changeable as the technology matures. Economic potential is the most

variable as economic conditions fluctuate, sometimes dramatically over time.

Technically feasible renewable energy potential OIE in Serbia is significant and estimated at over 4.3 million tones of oil equivalent (toe) per year - of which about 63% of the total potential OIE is biomass utilization (2.6 million toe per year), 14% is the share of energy from small hydropower plants, share of 5% is wind power, 14% is the share of solar energy and a 4% share of geothermal energy (Regulation amending and modifying the Regulation on the Identification of the Energy Development Strategy of the Republic of Serbia until 2015. For the period 2007-2012). The share of renewable sources in total primary energy consumption in 1990 was 4.7% and in 2010. 8.2%, representing an increase of 64% at an average rate of 2.5% (National Report for the "Rio +20" with a focus on the Green Economy, 2012).

According to the EU directive 2003/30/EC dated 08.05.2003. under Article 2: "Biomass is defined as the biodegradable part of products, waste and residues from agriculture, forestry waste and related industries as well as the biodegradable components of industrial and municipal waste." It can be used for heat, electricity and fuel for transportation. The main characteristics of the biomass as an energy renew ability, calorific value and CO2 neutrality, but the main problem is the small value of the energy per unit mass and the biomass is processed to obtain a form suitable for transport and storage - biofuels (pellets, biodiesel, bioethanol, biogas). Biomass for energy can be used directly and indirectly.

- ✓ Direct use, often named as *the traditional use* of biomass, which is primarily related to the combustion process. The energy thus obtained is usually used for cooking, space heating and industrial processes. The direct use of biomass is the most prevalent in developing countries;
- ✓ indirect use or *modern commercialized ways of using biomass* are related to advanced processes of biomass converting into useful energy. This includes the creation or production of heat and electricity and is current in developed countries like the U.S. and the European Union.

According to Brkic et al. (2004, 2005), Serbian agriculture produces 12.6 million tons of biomass with the use of energy of 30 to 50% of this amount, which would mean 3 to 5 Mt of biomass, or 1, 0 to 1.6 Mtoe of

oil equivalent. In central Serbia, the largest potential renewable energy resources represent a solid biomass, while in Vojvodina it is represented by crop production remains. However, the same authors point out that over the past decade, the amount of biomass generated in farming, fruit growing and viticulture at Republic of Serbia was reduced by 19%, and the level of 32.3% is noticed in Vojvodina (Brkic and Janic, 2011). Although many difficulties affected the decrease in the volume of agricultural production, biomass in Serbia remains one of the most realistic sources of energy for the substitution of conventional fuels.

Lack of investment, modest cross-border cooperation in the field of renewable energy, and many other factors make the use of modern technology and the commercialization of green energy consumption imposible. Thus, agricultural biomass in Serbia is used primarily in industry primary in sunflower oil factories where in a specially constructed plant sunflower shell burns, usually in combination with dust silo and fossil fuel.

Among the other significant industrial users soybean plants "Sojaprotein" from Bečej, Is also important, burning soybean stubble in specially constructed boiler plant. In some cooperatives and farms bales of soybean and wheat or corn cobs to produce thermal energy for heating and drying facilities are used. When it comes to the use of biomass drying is commonly used for the grain crops, mostly corn seed, and for herbs. The most frequent users are individual households with smaller combustion chamber using different biomass in different ways for space heating. Diverse solutions for using thermal energy from biomass are represented: from individual furnaces for local space heating to smaller boilers for central heating of entire buildings.

Potential production of agricultural biomass in the Metropolitan area of Belgrade-Novi Sad

Metropolitan area of Belgrade-Novi Sad includes for this research the administrative area of the City of Belgrade (17 municipalities) and Novi Sad (2 municipalities) and the municipalities of the shaft Belgrade - Novi Sad, which gravitate to the Danube: Beočin, Irig Sremski Karlovci Inđija, Ruma, Pećinci, Stara Pazova, Pancevo and Smederevo. The goal is to analyze farming and fruit production and determine the production potential of biomass as an energy source.

According to the Statistical Office of the Republic of Serbia data from 2011. the Metropolitan area Belgrade-Novi Sad has 744,600 ha of agricultural land, which makes 72.5% of the area. Arable land makes up 95% of total agricultural land. The structure of agricultural land in this area is dominated by arable land with 84%, followed by orchards with 4.7%, pastures with 3.9%, meadows 3.6% and vineyards from 1.4%.

Analysis of data of the Statistical Office of the Republic of Serbia for the period 2001-2010. in the Metropolitan area of Belgrade-Novi Sad has underlined that the main potential for utilization of agricultural biomass for energy purposes primarily is in the cultivation of cereals, industrial crops and fruit, and in the efficient use of these production in the rest of the production of thermal energy and liquid biofuels (ethanol and biodiesel).

Cereals cover 63% of the arable area observed at an average rate of depletion of -0.7% in the last ten years. The most common crop structures are corn, wheat, barley and oats. Rye, and particularly triticale are in this area intensively cultivated since 2006., however, due to the given interval 2001-2010. the production of these two crops has not been analyzed in this paper.

Table 1. *Areas under most abundant grain in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in hektares*

Crop	Average value (ha)	Variation interval		Rate of change %	Structure %
		Min	Max		
Corn	189.191	181.660	202.481	0,84	64.57
Wheat	82.919	67.315	99.434	-4,00	28.22
barley	14.721	12.291	18.174	-2,96	5.01
Oats	3.576	2.868	4.208	-4,17	1.22

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

The crop structure is dominated with the corn covering 64.57% of the total area under cereals, with a slight increase at the rate of 0.84%. Wheat is the second most abundant crop in the structure, which is grown on approximately 82,919 ha.

Paradoxically, the increase in area covered with wheat globally, is not followed by one in Serbia and thus analyzed in the field, and it is constantly declining at an average rate of -4%. The smallest surface of bread wheat was sown in 2010. covering only 67,315 ha. Barley production is also getting smaller and the cultivation of this crop performs

an average of 14,721 ha. The structure of sowing accounted for 5%, and the surface is reduced by average rate of nearly 3%. Oats is the least represented in the crop structure, with only 1.22%, grown to an average of 3576 ha, while reducing size by an average of -4.17%. Because of the many problems in agriculture and the inability of an intensive and effective reduction of production area directly reflected in the total production of some crops, which is strongly expressed in wheat (Table 2).

Table 2. *The most common species of grain production in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in tons*

Crop	Average value (t)	Variation interval		Rate of change %	Structure %
		Min	Max		
Corn	981.683	687.284	1.191.449	2,13	71,75
Wheat	317.395	218.433	439.156	-6,00	23,41
barley	48.733	34.006	66.934	-4,31	3,58
Oats	7.374	4.229	9.440	-4,50	0,54

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

Only the corn has a positive average rate of total production movement of 2.13%. At the same time, corn and grapes makes actual production of wheat (71.75%), with an average of 981,683 tons. The high impact of weather variation to interval and lowest and highest scale maize production is very broad and ranges from 687-1200 tons, and the same goes for other crops.

Table 3. *Average yields most common species of grain in in Metropolitan area of Belgrade-Novi Sad in period 2001-2010.,in kg/ha*

Crop	Average value (t/ha)	Variation interval		Rate of change %
		Min	Max	
Corn	12.831	9.048	15.699	1,71
Wheat	5.480	3.578	7.349	-4,61
barley	3.292	2.151	4.512	-1,29
Oats	19.843	1.088	2.093	-2,51

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

Average yields of wheat in the observed area exhibit a tendency to decrease, most significantly expressed. Slightly lower average rate of -2.51% and -1.29% have oat and barley respectively. Slight increase in average yields in the period 2001-2010. was presented only in maize (Table 3).

Industrial crops are covering 12.2% of arable land in Metropolitan area, which are in the analyzed period increased at an average rate of 2.6%. Areas under industrial crops are most common in Pancevo, Novi Sad, Belgrade, Ruma and Pecinci. Given the increasing demand for oilseeds in order to feed, and biofuel production in the future is expected to be a significant growth area under these crops. The most significant growth area in the analyzed period is recorded in canola and soybeans, which can be a good basis for other than use of biomass and create conditions for proper cultivation of these crops for the production of liquid biofuels.

Area under rapeseed show growth at an average rate of 16.72% (Table 4). The largest increase was in 2007 when the rapeseed planted area 1.3 times more compared to 2006. In 2009. the oilseed rape was grown on 2657 hectares representing the record. Positive growth surface at an average rate of 6.08% recorded in soybean and so that it covers almost 40% of industrial plants and has grown to an average of 19,867 ha. Although no positive average change is noticed in the reporting period, sunflower, however, is significantly represented in the crop structure and a third of the area is under industrial crops. Sugar beet crop structure is represented with 21.84% of its surface and show a positive rate of change of 2.21% and the average of growth is placed on 11,051 hectares.

Table 4. *Areas under most abundant industrial crops in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in hektares*

Crop	Average value (ha)	Variation interval		Rate of change %	Structure %
		Min	Max		
Sugar beet	11.051	7.364	14.958	2,21	21,84
Sunflower	18.366	13.931	22.403	-1,52	36,64
Soybean	19.867	14.226	24.190	6,08	39,20
Rapeseed	1.188	162	2.657	16,72	2,32

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

Movement in the area is positively correlated to the production of crops listed. Thus, a positive average rate in the total production of all crops except sunflower, whose production is reduced, are noticed The total production of industrial crops has the largest share of sugar beet (83.57%) with an average output of 486,515 tons, while the share of oil one is at the minimum representing only 0.5%. In all crops variability in volume production is achieved as evidenced by the wide variation interval, referred to minima and maxima (Table 5).

Table 5. The most common species *industrial crops in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in tons*

Crop	Average value (t)	Variation interval		Rate of change %	Structure %
		Min	Max		
Sugar beet	486.515	328.037	672.916	4,56	83,57
Sunflower	39.510	29.618	51.456	-0,08	7,25
Soybean	49.697	33.930	72.396	8,79	8,68
Rapeseed	2.918	277	7.633	18,34	0,50

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

By observing the values of grain yields per unit area of individual crops it can be seen that growing of soybean and rapeseed made the biggest move in the adaptation of technology which resulted in an increase in earnings in the period observed (Table 6). Sunflower and sugar beet had no significant shifts in the average yields for the period and it can be explained by insufficient investment in raw materials, inadequate agricultural technology and application of high impact of weather conditions

Table 6. *Average yields most common species industrial crops in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in t/ha*

Crop	Average value (t/ha)	Variation interval		Rate of change %
		Min	Max	
Sugar beet	31.841	19314.39	36539.83	1, 02
Sunflower	1.978	1764.23	2259.63	1,19
Soybean	2.231	1694.34	2741.5	9,62
Rapeseed	1.279	571.65	2510.22	7,81

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

The use of agricultural biomass for energy producing in Metropolitan area of Belgrade - Novi Sad has significant capacity in farming and in fruit production. According to the RSO data from 2011. the fruit orchards accounted for 5% of arable farmland. Observing by the number of trees growing apples, plums, peaches, pears and apricots, in Belgrade, Novi Sad, Smederevo and Pancevo are dominated.

According to the given data reduction is noticeable for the number of pear and plum trees, while the number of peach and apricot trees grow (Table 7). According to the calculated average rate of change of 0.67% it can be said that the number of apple trees in the last ten years has stagnated.

Table 7. *Number of fruit trees, the most abundant species in Metropolitan area of Belgrade-Novi Sad in period 2001-2010.*

Fruits	The average number of trees	Variation interval		Rate of change %	Structure %
		Min	Max		
Apples	4.106.748	3.495.598	4.451.343	0,67	38,78
Pears	844.782	576.723	966.486	-5,58	7,98
Apricots	596.680	507.445	692.051	3,15	5,64
Plums	2.620.143	2.277.929	2.756.739	-1,66	24,75
Peaches	2.421.003	2.014.076	2.972.412	2,97	22,86

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

From the aspect of biomass energy efficiency this situation is quite favorable. Specifically Radojevic et al. (2005) point out that the remains of residual peaches and apricots have the highest heating value of 19.4 and 19.3 MJ / kg. In this sense, the use of these residues can be obtained by a solid amount of renewable energy to replace fossil on heating facilities in the farm (houses, barns, greenhouses).

Table 8. *Production of most common species of fruit in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in tons*

Fruits	Average value (t)	Variation interval		Rate of change %	Structure %
		Min	Max		
Apples	46.233	19.749	59.496	5,7	31,06
Pears	8.629	5.743	11.097	-1,21	6,00
Apricots	12.625	5.825	26.604	17,16	8,50
Plums	39.951	18.736	51.492	2,87	27,11
Peaches	39.594	26.366	52.301	7,02	27,34

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

In the structure of total volume of production the most represented species are fruit apple with 31.06% share, followed by peach and plum with 27.34% and 27.11% respectively. The share of the actual production of apricot and pear in total fruit production is low (Table 8). Observed through changes in the average rate achieved, most apricot production increases as a result of the number of its trees increase. According to the data of Table 8 a wide interval of variation in the volume of production of all kinds of fruits is visible.

Table 9. *The yield per tree most common species of fruit in Metropolitan area of Belgrade-Novi Sad in period 2001-2010., in kilograms*

Fruits	The average value (kg/tree)	Variation interval		Rate of changes %
		Min	Max	
Apples	16,63	6,42	22,86	4,28
Pears	12,67	5,57	17,02	1,13
Apricots	13,26	6,95	21,55	1,11
Plums	14,55	6,12	19,3	0,27
Peaches	14,59	9,64	18,5	3,56

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

The yield per tree of all these fruits have quite wide interval of variation as a result of weather events high impact in the production (Table 9). However, it is important that in this period there was no reduction of yield per tree proven by the calculated average rate of change. In all these species it is positive. The lowest increase in yield per tree in the analyzed period was recorded in the plum, and the largest in apple and peach. In addition, the average yield per tree in this area are higher regarding on average on the national level. Based on the average value of the acreage under different crops and their average yields in Table 10 gives an overall budget and the amount of biomass that could be used for energy purposes.

Table 10. *Potential production of agricultural biomass in the Metropolitan area*[3]

Crop	Surface 10^3ha	Yield t/ha	Total biomass, t	Biomass for energy purposes (30% of the total), t
Corn	189,2	12,9	2.427.510	728.253
Wheat	83	5,5	454.396	136.318,8
Barley	14,7	3,3	48.462	14.538,6
Oats	3,6	19,8	70.959	21.287,7
Sunflower	18,4	2	36.328	10.898,4
Soybean	20	2,2	44.324	1.3297,2
Rapeseed	1,2	1,3	1.520	456
The total crop production			3.083.499	925.049,7
Fruit	25.351	3,4*	86.193,4**	86.193,4
In total			**3.169.692**	**1.011.243,1**

Source: *Statistical Office of the Republic of Serbia and authors' calculations*

* Pruning residues yield per hectare, source: Brkic and Janic (2011)

** Total pruning residues mass during the year

[3] Residues in sugar beet (root head, tail root and leaf rosettes) have poor energy performance not used for energy purposes, as is the case with the remains of other crops mentioned bodies in Table 10. In technological terms the most significant is the root of sugar beet and it's used for bioethanol production

According to these data, the Metropolitan area has the potential to produce an average of 3,169,692 tons per year of agricultural biomass. If one takes into consideration that due to the maintenance of soil fertility for energy producing purposes the percentage 25-30% of the available agricultural biomass is reached, then annual yield in this area can count on the 857.068 - 1.011.243 tons of biomass used as an energy source, and that amount would change 0.26 million tons of oil equivalent. However, it might be counted on the change in the existing planting structure, for which certainly potential exists given the land resources in order to obtain sufficient material for serious production of liquid biofuels.

The advantages of using agricultural biomass as a fuel in development of rural areas

According to the OECD classification, rural areas in Serbia covers 85% of the territory with 55% of the population, while the national classification of rural areas cover 70% of the territory inhabited by 43% of the total population (Network for Rural Development Action Plan 2011-2015). Approximately 50% of the total rural population is employed in agriculture, which is a clear statistical indicator of low diversified activities of the rural sector, and therefore the income of the rural population (National Rural Development Programme 2011-2013.). Therefore, the diversification of economic activities in rural areas is crucial to mitigate "rural poverty", and exhaustion of natural resources and their sustainable use. Within agriculture it is possible to introduce new forms of production, such as the production and use of biomass for energy purposes. Available renewable agricultural resources will be not just simply transformed into food, but could be included in green agriculture and rural development.

Use of agricultural biomass in the Metropolitan area of Belgrade-Novi Sad represents the real possibility given the structure of plant production and availability of agricultural land. Calculated use of available crop residues would create conditions for the development of rural areas through self-employment, additional involvement of local labor for the production of energy from biomass, attracting investment and infrastructure development. In this way, the working population would be retained in rural areas and in sparsely populated and industrially underdeveloped areas. Production of renewable energy from biomass would require the association of farms in clusters in order to supply

sufficient quantities of raw materials and provide ongoing energy production, which has wider benefits in terms of greater access to innovative methods of production, the creation of new employment opportunities and better living conditions.

One of the first steps that must be done is to support farmers in the direction of a rational and appropriate use of agricultural biomass. If the increasing number of households are qualified to produce renewable energy from its own resources it would reduce the use of conventional energy sources on farms, increase reliability of energy supply, energy development, establish sustainable development and improve standards of living in rural areas, while the production of sufficient quantities of food will not been compromised. Intensive cultivation of energy crops will improve the overall profitability of the farming business, thereby increasing the profitability of agricultural production on the farm. In this way, it would significantly influence the development of the state, because the diversification of energy supply reduce dependence on imported fossil fuels and increase energy security.

In addition to all the advantages that its use should have to an economic and social point of view, its environmental aspects and appropriate use of agricultural biomass, primarily through reduced emissions of greenhouse gases released during the burning of crop residues in the fields, which is analyzed in a common area of practice, are very important.

Conclusion

Green economy is a new growth momentum that promotes economic development based on the recognition of national capacity and most appropriate sectors of the economy of a country on the path to achieve sustainable development. The focus of the green economy is on the ecosystem conservation, energy efficiency, establishment of social equality and poverty reduction. As the two most important areas for further resource development companies globally recognized green agriculture and renewable energy. In this sense, a great opportunity for development may have very rural areas, because most of the potential of renewable energy sources is actually located there. In the development of the rural economy in Serbia, as great potential, this paper highlights the production of renewable energy from agricultural biomass.

Analysis of the data of the Statistical Office regarding the Metropolitan area of Belgrade-Novi Sad leads toward conclusion that the main potentials for the use of agricultural biomass for energy purposes are primarily in the cultivation of cereals, industrial crops and fruit, and in the efficient use of the rests estimated to production of 3,169,692 tons of biomass. Bearing in mind the importance of the remains in maintaining and improving soil fertility, at least 25-30% of the total biomass potential or 857.068 - 1.011.243 tons, could replace 0.26 million tons of equivalent for energy purposes. With the current seeding structure use of biomass for heat and ethanol production is promising, while a change in planting structure by increasing the area under oilseeds create a solid base of raw materials for biodiesel production, The European Union toward we strive is a world leader in that segment. Through the use of agricultural biomass as an alternative energy source it would contribute to the self-employment, job creation and labor expansion, diversification of activities and sources of income holdings, and hence can greatly affect the development of the rural economy and poverty reduction, which is one of the goals of the green economy concept.

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INFLUENCE OF ANTHROPOGENIC FACTORS ON THE PARAMETERS OF THE COMMON BLACK EARTHES

Valery Tskhovrebov[1], *Vera Faizova*[2]

Abstract

The number of microorganisms can be used as an indicator to determine the direction of the process of soil formation. The needs to study these changes are related to the conservation and improvement of soil fertility.

Keywords: *soil formation, black earth, raw land, arable land, the phase of vegetation, microorganisms, ammonifiers, cellulolytic microorganisms.*

Introduction

The main factor of soil formation and the associated physical and chemical processes, in our opinion, is the changes in the composition of living matter. In ecological systems, including willows soil, biological balance is established and it is disrupted by the human impact. Agricultural use of black earth affects the size and activity of microbial populations in soil.

The aim of our research is to identify the variation of the main physiological groups of microorganisms (bacteria, actinomycetes, cellulolytic microorganisms) and daily and seasonal dynamics of the potential and pH on common black earth, which has an agricultural impact on it virgin counterparts in phases of growing season of winter wheat and corn. Mikrobiocoenosis of soil and plant is directly related to each other, the activity of one has a direct impact on the ability of other to grow and reproduce. Relationships between microflora inhabiting the rhizosphere zone and higher plants are diverse and complex.

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Higher plant is not only a source of food for the rhizosphere's microflora but it is also an environmental factor which influence their variability (Novikov A.A., 2004). Currently enough evidence is accumulated that the plants are in constant interaction with microorganisms and change their composition and activity (TshovrebovV.S., 2005; Nikiforov A.M., 2011; Faizova V.I., 2011, Esaulko A.N., 2010)

Objects and methods of research

The studies were conducted on common carbonate medium loamy black earth on loess loam of central Caucasus on the following key areas: 1-virgin, 2-arable land.

Virgin sward is presented by forb-grass assocition. On one square meter several dozen species of plants grow. Here the germination, flowering, ripening and dying come and go throughout the growing season.

During the years of research arable land was sown by winter wheat or corn. Cultivation of monoculture affects the frequency of incoming organic matter of root secretions, the intensity of which depends on the phase of plant development. This, in turn, determines the dynamics of the soil's microflora.

The whole complex of field and laboratory studies was conducted in the seasonal dynamics of the main phases of the crop growing season. For winter wheat: sprouting, spring tillering, booting, flowering, milk-wax stage, post-harvest period. For corn: 3-4 leaves, flowering, milky-wax ripeness, post-harvest period. The research was hold in the virgin areas at the same time as in the plow. The selection of soil samples for analysis was produced from the rhizosphere zone at the same time.

The number of microorganisms of different physiological groups were accounted according with methods proposed by the Department of Soil Microorganisms Institute of Microbiology, Academy of Sciences of the Russian Federation:

- On MPA (meat-and-peptone agar) the number of bacteria metabolizing organic forms of nitrogen was determined;

- On SAA (starch-ammonia agar) the number of microorganisms assimilate mineral forms of nitrogen and the number of bacteria metabolizing organic forms of nitrogen was determined;

- On medium-Hutchinson the number of cellulolytic bacteria was determined;

- Determination of the diurnal and seasonal dynamics of the ORP and pH of the soil (insitu) - the method of ion-selective pairs.

Results and Discussion

According to the environmental conditions, vegetation and physico-chemical properties of the soil microbial community, which is characterized by the particular soil type, is formed. (Dorogko G.R., 2011). Our results demonstrate (Tables 1-2) that the total number of microorganisms in the plowed field surpasses the same numbers in several times in the virgin soil. This pattern is observed regardless of the crop which grows in experience. Crop itself, of course, makes some adjustments in the general population and in the relationship between the physiological groups of microorganisms. However, it has the greatest impact on the seasonal dynamics of microbial indicators.

Virgin areas have relatively stable indicators of microorganisms during the growing season. This is due to the richness of species diversity of virgin vegetation, where the phases of herbs consistently follow each other throughout the growing season. Minor seasonal changes are associated with temperature control and moisture regime, as well as increase of the value of plant biomass.

On arable land, as opposed to virgin soil, there are significant seasonal variations in terms of microbial proteins communities. Ammonification is the first-microbiological process for the conversion of nitrogen compounds in nature. It occurs at a temperature of 10 ° C and specific humidity. The role of microbes in nature putrid is high: decomposing animal carcasses and the remains of plants and microorganisms, they clean the soil and give food to higher plants. Ammonification process can take place in both aerobic and anaerobic conditions. Ammonification occurs mainly with the participation of bacteria. However, proteins are decomposed with actinomycetes and fungis, but their ability of ammonifying is expressed in varying degrees. Protein degradation occurs under exoenzymes. In the process of ammonification, large amounts of ammonia, which are on the synthesis of nitrogen-containing compounds, are formed.

Table 1. *The Seasonal dynamics of the number of microorganisms in the common black earth soil.*

Year	Virgin lands				The arable land (corn)			
	3-4 Leaves	Colour	Milk-wax stage	Post-harvest period	3-4 Leaves	Colour	Milk-wax stage	Post-harvest period
Ammonificator (mln. CFU / 1 g)								
1989	35,9	58,9	64,0	41,4	64,3	160,0	100,0	36,8
1990	36,8	44,2	61,5	25,9	70,5	135,0	74,0	18,6
1995	41,4	40,6	71,0	40,0	59,6	180,6	91,4	29,0
2000	21,6	44,0	50,0	40,6	38,7	133,4	80,6	21,1
2006	37,2	50,3	44,3	55,2	58,7	104,7	67,8	32,1
2009	26,1	37,8	76,5	69,1	15,2	94,2	141,3	49,0
Average	33,2	46,0	61,2	45,4	51,2	134,7	92,5	31,1
Microorganisms which use mineral nitrogen (million CFU / 1 g)								
1989	26,0	28,0	41,0	31,1	86,4	210,0	78,0	36,0
1990	57,6	29,0	42,0	26,8	36,0	154,4	120,2	37,9
1995	48,8	47,0	73,3	60,0	60,8	244,0	102,0	35,4
2000	24,4	51,1	49,4	44,6	40,7	159,6	97,4	25,2
2006	40,1	60,2	40,1	60,4	67,4	131,3	48,5	43,8
2009	25,0	25,0	66,2	75,3	13,7	55,7	140,4	63,2
Average	37,0	40,1	52,0	49,7	50,8	159,2	97,8	40,3
Cellulolytic microorganisms (th. CFU / 1 g)								
1989	48	79	125	200	76	22	200	1800
1990	36	46	59	125	52	11	151	2528
1995	42	56	79	164	65	24	186	1440
2000	56	80	208	260	81	37	270	3040
2006	91	60	42	147	56	30	41	1985
2009	40	85	162	283	41	50	130	2776
Average	52,2	67,7	112,5	196,5	61,8	29,0	163,0	2261

Source: *Own research.*

Table 2. *The Seasonal dynamics of the number of microorganisms in the common black earth soil (winter wheat)*

Year	Young growth		Spring out		Booting		Flowering		Milk-wax stage		Post-harvest period	
	V	A	V	A	V	A	V	A	V	A	V	A
Ammonificator (mln. CFU / 1 g)												
2007	10,3	6,5	25,8	37,5	50,3	67,3	42,5	161,0	64,5	87,0	32,9	26,6
2008	12,9	15,5	28,7	40,2	42,9	55,1	78,9	197,2	94,6	200,9	28,8	23,2
2010	6,9	5,3	25,8	37,0	46,1	62,4	58,0	89,7	33,4	54,6	27,8	32,1
2011	14,3	12,5	22,0	30,4	67,8	88,5	98,5	184,6	105,2	132,0	78,5	81,4
Average	11,1	10,0	25,6	36,3	51,8	68,4	69,5	158,1	74,4	118,6	42,0	40,8
Microorganisms which use mineral nitrogen (million CFU / 1 g)												
2007	7,8	5,1	19,6	26,0	51,3	80,2	39,0	144,4	53,0	87,2	30,8	23,9
2008	14,6	9,3	24,4	25,2	34,7	43,6	78,5	150,3	88,1	167,0	27,2	30,6
2010	6,0	4,0	22,1	31,7	28,5	43,0	40,1	61,2	21,2	45,8	15,5	26,4
2011	12,7	8,5	16,4	21,3	58,4	72,2	84,5	150,7	92,4	130,2	76,3	78,5
Average	10,3	6,7	20,6	26,1	43,2	59,8	60,5	126,7	63,7	107,6	37,5	39,9
Cellulolytic microorganisms (th. CFU / 1 g)												
2007	25,0	50,0	74,0	44,8	50,7	42,8	59,4	65,7	100,0	125,0	208,7	150,5
2008	32,0	70,9	110,5	64,0	73,2	78,7	80,9	105,2	93,3	113,9	200,0	253,3
2010	42,3	94,6	62,5	52,5	44,0	37,4	50,5	72,5	123,0	80,0	173,7	125,0
2011	34,8	114,2	91,3	59,1	55,4	83,3	65,6	114,2	262,5	125,0	300,0	265,0
Average	33,5	82,4	84,6	55,1	55,8	60,6	64,1	89,4	144,7	111,0	220,6	198,5

Source: *Own research.*

During all the years of research on virgin soil there were not significant fluctuations in number of ammonificators.The smallest number of them is in autumn and early spring periods : average 11.1 - 33.2 million KOE/1g of soil. The largest is in summer: 61,2-74,4 million KOE/1g of soil. This

can be attributed to the optimal conditions of moisture and favorable temperature conditions which have influenced the activity of virgin vegetation, as well as the increase in total plant biomass. In the plow there is a sharp change in the number of microorganisms according with the phase of cultural development. The smallest number of ammonificators was during initial phase of growth and development of crop. It is natural for both wheat and corn.

During the spring phase of tillering and booting of winter wheat there is a sequential increase of number of microorganisms in the plowed field, respectively, in 3 - 6 times. During the flowering stage and milky ripeness of microorganisms grow and during the flowering phase the average number was the highest - 134.7 million KOE/1g in corn crops and 158.1 million KOE/1g in winter wheat. In some cases, there is no significant differences in cereals in the flowering stage and milky ripeness stage. Within a few years of research in the development the top of corn ammonifying microflora accounted for milky ripeness phase.

This dynamics is consistent with the phases of crop development. It is the top of secretory activity, which occurs during the flowering and milky ripeness. Root exudates are the food for microbes (Kalugin D. V., 2010). In the phase of active growth and development of crop, the difference in number of ammonificators comparing with the initial period is average 5-7 times, and comparing to the virgin 2-3. By the end of the growing season and post-harvest the number of microbes drops sharply to values of the beginning of growing season or even lower.

Such dynamism is clearly linked to the intensity of root exudates in different phases of the development of crop. The root system is the most active during critical periods of the beginning of flowering and ripening. In the absence of crop soil microflora dramatically reduces it number.

In nature ammonium nitrogen, resulting from the ammonification nitrogen compounds, can be consumed by plant organisms to build cells or bacteria or to oxidize nitrite and nitrate in the process of nitrification. The processes of nitrification mean the oxidation of ammonia to nitrite and nitrate. This transformation of ammonia occurs in two phases, it is caused mainly by two kinds of nitrifying bacteria: Nitrosomonas and Nitrobacter. Optimum conditions for the growth of nitrifying bacteria are temperature 25-30 º C and pH 7.5-8.0.

Nitrifying bacteria ensure the accumulation of nitrates in the soil and thus contributes to higher harvests of crop. As a result of research it was found that the number of microorganisms using mineral forms of nitrogen was different in the virgin lands and in the fields of studied soil types. The greatest variability during the season was observed at the plow.

During the growing season on virgin soil of common black earth the average significant fluctuations weren't found. The least amount of tested organisms was at the time of the wheat seedlings phase (10.3 million c/ 1 g of soil). In spring on the virgin land during the tillering phase there was an increase in number of nitrifiers in 2 times. On the virgin lands during the flowering stage and milky ripeness of winter wheat and corn the greatest number of nitrifiers was noted (53.0 million c / 1 year). In autumn at the plow the smallest number of microorganisms was noted: winter wheat average 6.7 million c. / 1 and in spring during the phase of tillering and post-harvest: corn (50.8 million c/ 1 g of soil and 40, 3 c./1g 3 million).

In the flowering stage of nitrifiers sharply increases and reaches maximum values: 126.7 million kl. / 1 g of winter wheat and 159.2 million cells. / 1 g corn. In the phase of milk ripeness there is a slight decrease comparing with the previous phase. In the post-harvest period there is a further reduction in the number of microorganisms: average 2,9-3,3 times comparing with the phase of maximum development of microorganisms. It should be noted that the difference in the amount of nitrifiers in the critical phase of growth and development of the crop between virgin and arable land was average in 2 - 4 times.

Thus, there is a close connection between metabolic microorganisms grown on MPA and SAA on common black earth on virgin and arable land. That's conformed on the general idea of the development and the relationship of these microbes. Cellulolytic microorganisms are micomycetes and bacteria. They play a significant role in the transformation of plant residues. This group of organisms is widely present in nature and provides a decomposition of cellulose in both aerobic and anaerobic conditions, with a large range of temperature, acidity, temperature and humidity. The increase of number by the end of the growing season is typical of cellulolytic microorganisms. During the phase of active growth and development of crops the number of cellulolytic microorganisms is low. This is consistent with the rate of incoming pulp in the soil with root' litter. In the growth phase there is no

crop litter, dying off of vegetative plants' parts or root' systems is slow. After harvesting dyed off nutrient substrate appears, as the result the number of microorganisms increases. It should be noted that the increase in the number of cellulolytic microorganisms in the fields of agricultural lands disproportionately with their virgin counterparts. For example, after harvest on common black earth the group of microorganisms of corn reaches an average of 2.3 million cells/1 g of soil. Excess comparing with virgin is 13.9 times.

Living compound of soils determines the intensity and direction of the physical and chemical processes. Human activities, as described above, changes common biological indicators cause significant seasonal changes. Considering the degree of influence of each component of the living phase of soil on physical and chemical processes, it is definitely that the first place should be given to the difference of plant communities of virgin and cultivated land, root exudates which change significantly the geochemical conditions as a dynamic heterogeneous environment, which soil is, adapting it to serve as a supplying power. Soil without plants is a dead system. Settlement of plants on the soil causes the flow of energy that causes the dynamism and heterogeneity of composition, properties and processes responsible for soil formation.

In the soil energy comes mainly in the form of chemical bonds of organic matter. This substance is the food for microorganisms. The quality of the organic material depend on the physiological characteristics of culture, and the number of phases of plant vegetation and the rate of photosynthesis. Phase of the growing season causes changes on a seasonal level, the rate of photosynthesis - within day. Daily and seasonal dynamics of indicators such as ORP (oxidation reduction potential), pH in area of the rhizosphere of plants (insitu) were examined. Obligatory condition of research was a clear sunny weather, on which depends the largely amount of incoming energy of plant, and therefore the intensity of root activity. Oxidation-reduction potential (ORP) of the soil reflects the intensity of the oxidation-reduction reactions in the soil at given time. OR – condition, which determineds mainly by transformations of oxygen and hydrogen ions. Its intake depends on aerated soils, and biological factors, including microbial activity and activity of the root system of plants. We must remember that the effect of plants on the soil environment is determined not only by the intensity of secretory activity. The root system absorbs mineral nutrients from soil. The quantity and quality of absorbed ions also affect its agents - the condition at the interface of the root\soil.

We present on comon black earth carbonate the data from 1989. Repetition of studies in 1990 and 1995 pointed that the figures in 1989 are the same. Research was carried out on virgin and arable land. The change in the Eh soil test during daylight hours has the same pattern: the lowest values observed in the morning (7:00), top at 13-16 hours, after which there is a gradual decrease of indices. However, the severity of changes in the soil of the virgin and arable plots is different.

Virgin area characterized by minor changes of the redox potential in the daily dynamics and seasonly (Fig. 1). Its maximum values were in the range 470-540 mV, and the average daily 484-531 mV in 1989 with δ = 15-20 (Table 3). Minor fluctuations in the diurnal cycle of Eh result in a more stable performance of variation coefficient (CV) for the season (3,41-4,22). It confirms the suggestion that the diversity of virgin vegetation reduces the heterogeneity indicators. On arable land in the phase of 3-4 leaves corn figure slightly exceeded the ORP of virgin soils while maintaining the difference between the morning and afternoon performance (35 and 50 mV).

Daily average in the period is to 492 mV, the deviations from daily 13.52 mV and value Cv = 2.7. The highest rates of oxidation-reduction potential are during the flowering stage. The difference between the minimum and maximum daily rates is 95 mV at the maximum values of 565 mV. According to this daily average increases: 20 mV to 4.71 Cv (Table 3). Obviously, this is due to the intensity of photosynthesis and plant emissions. In the phase of milk ripeness, there is some, albeit small, decrease in ORP (or maximum performance up to 545, a daily average to 508 mV and CV to 5.41).

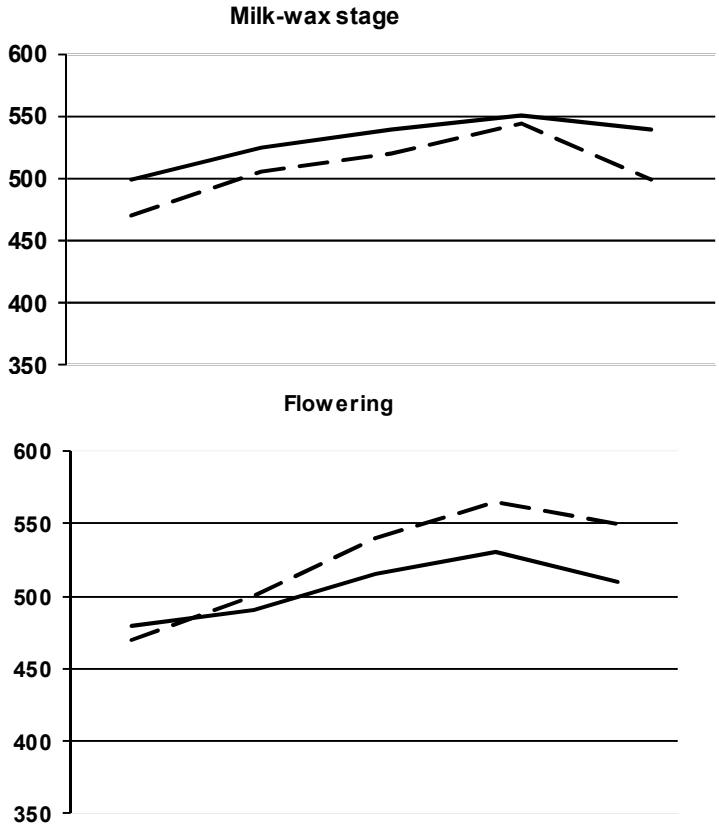
After harvest there is further reducing of ORP and erasing the difference between morning and afternoon figures in decreasing to 1.46 Cv. Closely related to the change in redox conditions there is medium' reaction. The results of the studies of pH dynamics in the common carbonate black earth soil show the presence of diurnal cycles which change these parameters. Maximum values are usually observed in the morning. Then there is a clear decrease in pH, reaching minimum values at the afternoon period (13-16 hours), followed by a gradual increase of the studied parameters. This is due to the activation of root exudates, which increase with increasing intensity of solar radiation.

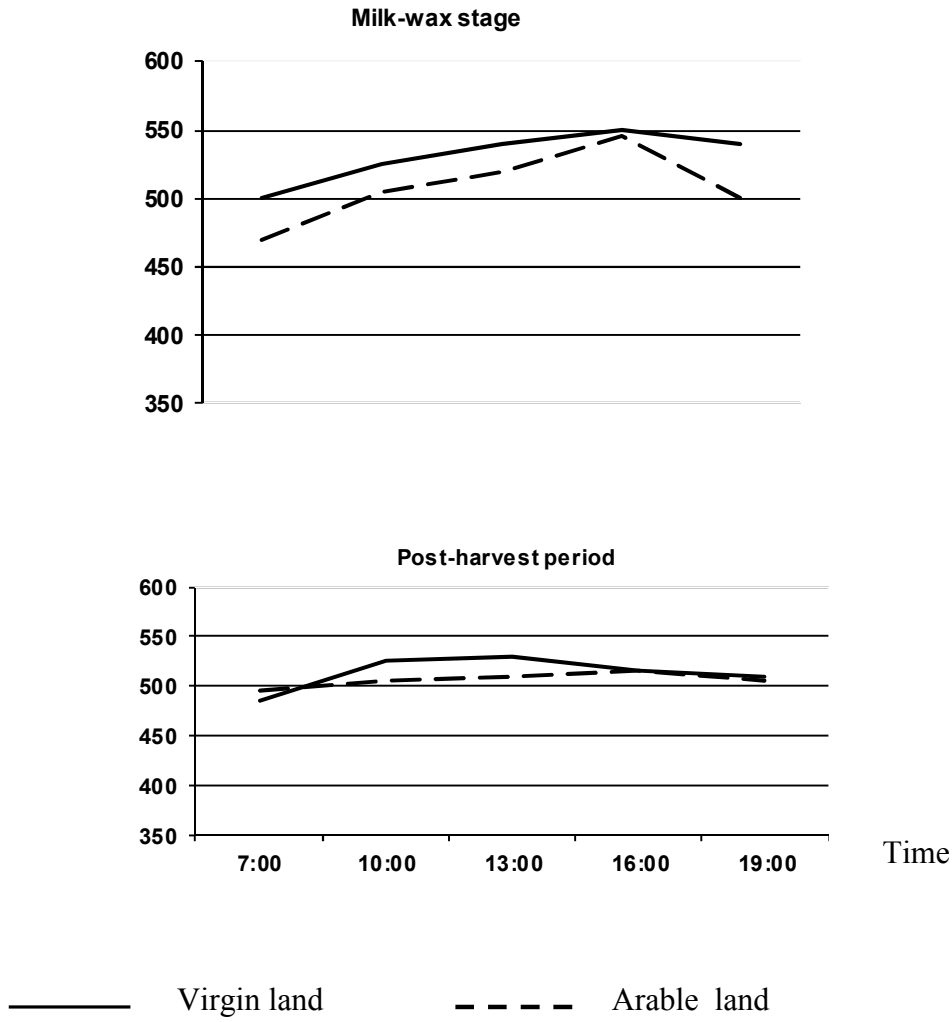
Table 3. *Redox and acid-base characteristics of common black earth soil, Note: 1 - virgin, 2 - arable land*

Variant	Eh			pH			r
	$\overline{X}$	σ	Cv	$\overline{X}$	σ	Cv	
3-4 leaves							
1	484	20,4	4,22	7,66	0,25	3,27	-0,98
2	492	13,5	2,74	7,71	0,14	1,91	-0,92
Flowering							
1	505	20,0	3,96	7,51	0,20	2,72	-0,90
2	525	39,1	7,43	7,39	0,24	3,33	-0,96
Milk-wax stage							
1	531	19,5	3,67	7,58	0,14	1,90	-0,9
2	508	27,5	5,41	7,54	0,17	2,26	-0,9
Post harvest period							
1	513	17,5	3,41	7,77	0,13	1,73	-0,48
2	506	7,4	1,46	7,84	0,04	0,53	-0,96

Source: *Own research.*

Fig. 1. *Daily and seasonal dynamics of ORP (mV) in common black earth soil*





Source: *Own research.*

At relatively the same pattern of daily changes there was a significant difference between the studies in the seasonal dynamics. Seasonal changes in pH comparing with arable land and virgin soil wasn't so significant (Fig. 2). The pH values were in the range of 8,1-7,4. There were minor variations in daily values: 7,5-7,9 and variation of coefficient: 1.3-2.7.

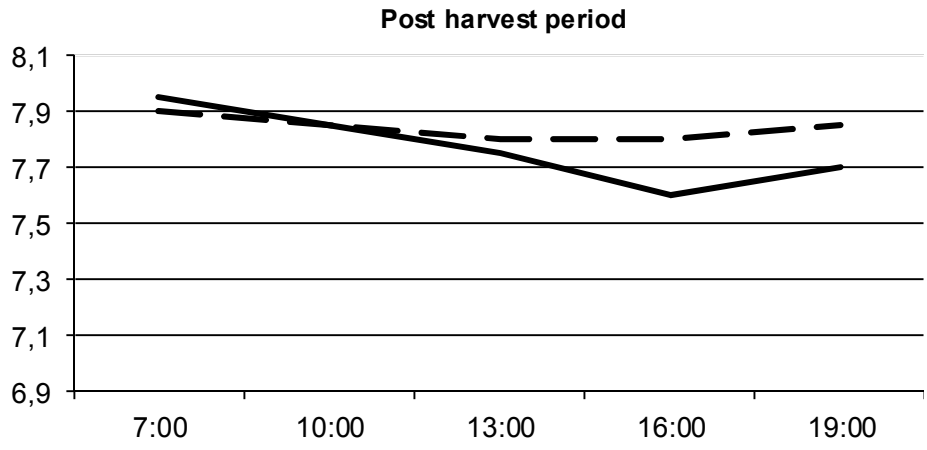
There is a decrease of daily pH at the plow comparing with virgin soil, but the upper values are very close to each other. Consequently, the increase in acidity occurred mainly during the day, indicating a strong influence on the plant.

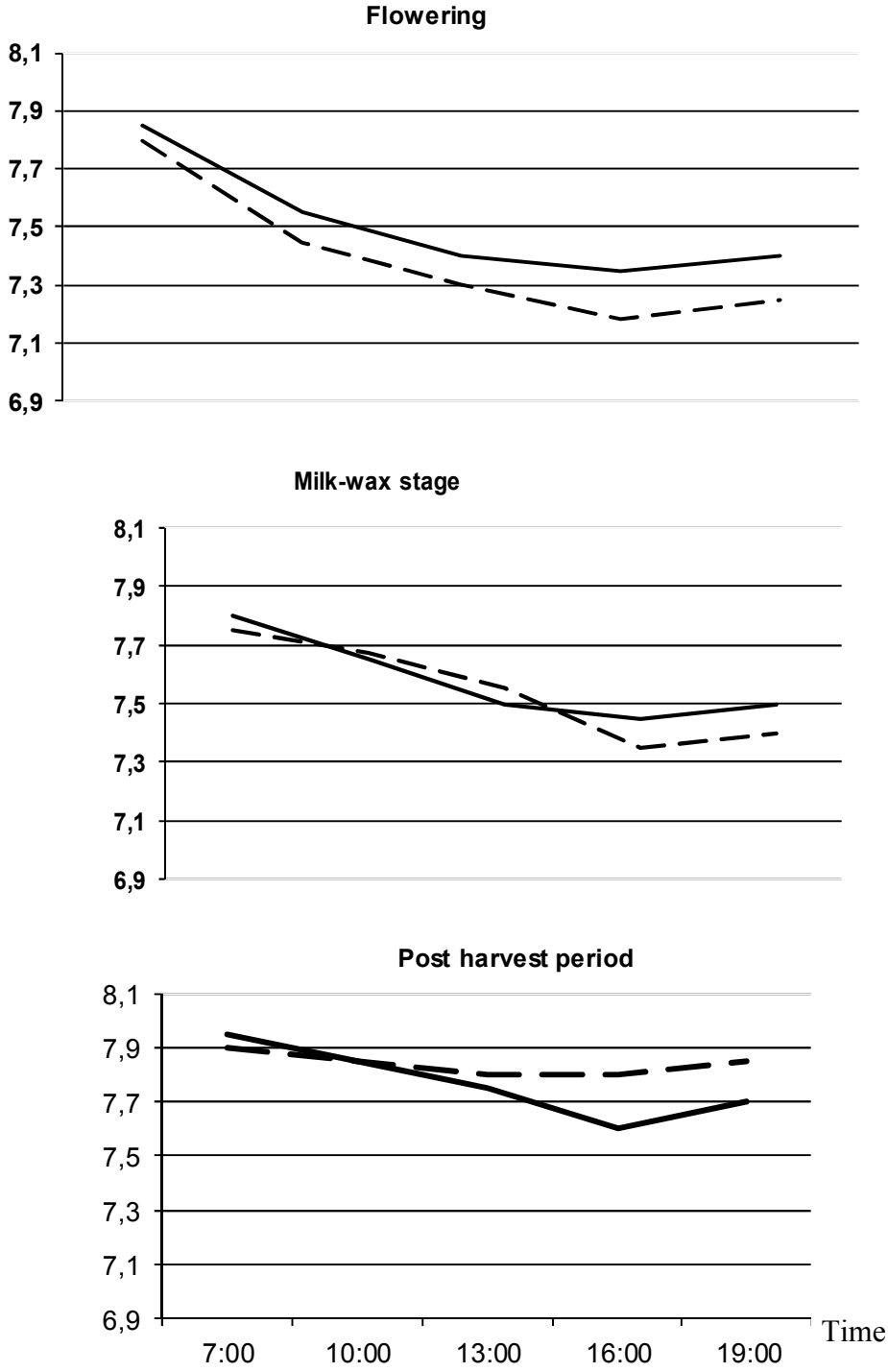
It may also affect the intensity of microbial activity, which increases and due to this process the temperature and nutrient substrate come together to the root secretions. This is consistent with microbiological studies.

The number of rhizosphere microorganisms in the arable lands is higher than in the virgin lands. The seasonal cycle of the lowest pH values were in the phase of active growth and development of corn, especially in the flowering phase (pH 7.18). We noted a slight increase: 1.2-1.4 Cv.

This is consistent also with the microbiological data, when the greatest number of microorganisms was during this period. After harvesting the corn pH level and the homogeneity of daily performance increases (Fig. 2).

Fig. 2. *Daily and seasonal dynamics of the pH in common black earth*





Source: *Own research.*

Conclusion

Thus, here are following conclusions:

1. During the analysis of ammonificators we revealed that there was the smallest number of it in the autumn/cold period. The greatest number was in the spring at the plow in the flowering stage of winter wheat and on virgin land during milky ripeness of wheat. It should be noted that the active periods of plant growth on virgin land exceeds arable land on this indicator.

2. Mikroorganizmy using mineral forms of nitrogen are in a close and direct relationship with metabiotic ammonifiers. Their dynamics are similar to ammonifiers. The largest numbers are recorded in the flowering phase and milk-wax stage of winter wheat.

3. In summer on virgin land there is an increase number of cellulolytic microorganisms. At the plow their number depends on the content of organic material. There is a considerable increase of microorganisms in the milk-wax stage of ripeness and postharvest period during activating of destruction of the plant material with the accumulation of litter. The number of bacteria reduces during the phase of active growth and development of crops.

4. Physicochemical indicators of the direction of the soil formation process, are closely connected with the live phase of the soil.

5. On virgin lands, comparing with arable lands the dynamism of the investigated variables is expressed weakly, both during the day and during the season, due to the rich variety of virgin grass. The plow, the growth of monocrops with much greater needs for food, than the virgin grass, there is a strong dynamism of the seasonal and daily performance.

6. Acidification of soils in arable land in the day-night cycle is much stronger than in the virgin soil, it may affect the heightened pace of weathering mineral foundation soils.

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CURRENT STATE AND PROSPECTS OF THE SERBIAN AGRICULTURE[1]

Vedran Tomić[2], Nikola Ljiljanić[2]

Abstract

The current state and the prospects of the Serbian agriculture are defined by a large backlog of problems that have occurred over time and became more and more severe. In the race with the competition from day to day agriculture is losing momentum, strength and potential for growth. Ownership structure, the problems of competitiveness and the farm disorganization, unregulated agricultural markets, rural depopulation and the role of the state are aspects which show the current state of agriculture. The focus of the observation is the farm, as the most sensitive subject. Highlighted are a number of weaknesses that indicate that small and medium-sized farms do not have a mechanism for adjusting to the increasingly frequent price fluctuations and market trends. Mitigating the negative consequences and the gradual improvement of agriculture, primarily related to survival and development is possible primarily through the increased activity of the state in the form of greater access to affordable credits, initiating the establishment of farmer associations and creating various programs for returning young people to rural areas.

Key words: *ownership structure, the competitiveness of farms, agricultural commodity market, rural depopulation, the role of state, transition.*

[1] The paper is a result of the project "Sustainable agriculture and rural development in the function of realizing the strategic goals of the Republic of Serbia within the Danube region "(III-46006) and the project "Rural labor market and rural economy of Serbia - the diversification of income and poverty reduction "(OI-179028) funded by the Ministry of Education, Science and Technological development of the Republic of Serbia.

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Introduction

The current condition of the Serbian agriculture is a result of inadequate attempts to solve current problems and create long-term development plans primarily related to rural development and agriculture in general.

Looking at the farm as a basic subject in agricultural production, as well as the chain of distribution and sale of goods on the market, and the different groups of consumers, we can identify numerous problems. Most of them can be seen on the farm: small farm size, dated techniques and technological equipment, high cost of inputs versus low purchase price of the product, the problems of selling products on the market are some of the major problems that generate a picture of most small and medium-sized farms as the most sensitive spots of the Serbian agriculture. A large number of farms has no competitive production and are therefore using natural agriculture.

Required is a larger initiative by the state, because only that has a strong enough mechanism to change the situation in the field. Through a variety of programs for youth education and promoting life in rural areas, the construction of the necessary infrastructure, selective equipment of farms in order to increase their productivity, favorable credit loans, and of course the improvement of infrastructure in general, Serbian agriculture could take its rightful place in the competitive structure. According to many experts, agriculture is the main driver of the overall economy of a country. It is important to note that in addition to fighting for the regeneration of our agriculture, Serbia has suffered another severe blow in the form of the global economic crisis, which has a relatively indirect influence on it.

The global financial / economic crisis led to the collapse of one of the major banking systems in the world, and a catastrophic drop in prices on world markets, and the disappearance of several major investment banks.[3] In addition to the direct impact that it has made the U.S. economy, the crisis had and continues to have an impact on the world economy and global politics.

[3] Tomić, V., (2012): *Modern economic crisis and its impact on the agriculture of the Republic of Serbia*, Monograph, Andrejevic Foundation, Belgrade, p. 9

The indirect impact of the global economic crisis is visible through various balance of payments problems in Serbia, falling exports, reduced volume of loans and investments, higher interest rates, and other negative financial indicators.

These effects are evident in varying degrees within all industries, and they can be seen in agriculture as well. However, the question is whether the crisis had the same impact on agriculture as on other industries.

Materials and methods

In this paper, research methods and procedures specific to the economy and agricultural economy were used[4]. Indicators that the authors have chosen are: agricultural ownership structure characteristics, problems of competitiveness and disorganization of households, unregulated agricultural markets, rural depopulation, and the role of the state.

Results and discussion

The crisis in our agriculture has lasted for a very long time. After the crisis cycle from 90s of the last century, agriculture of the Republic of Serbia still suffers severe consequences.[5] The relationship between the government of Serbia and agriculture is inadequate. Data on the share of the agricultural budget in the overall state budget ranged from 8.3% in 1996 and was reduced to 2.6%[6] in 2011 which indicates an unfavorable economic situation of our agriculture.

As a result of bad investments in the period from 2000 to 2008 the indexes of agricultural production were negative in six years (2000,

[4] By: Pejanović, R., On some methodological stages and processes in the economy (and agricultural economy), Chronicle of scientific papers, Faculty of Agriculture, Novi Sad, no. 1/2007, p. 174-186.

[5] Pejanovic, R., Cvijanovic, D., Njegovan, Z., Tica, N., Zivkovic, D. (2009): Problems of Serbian agriculture and measures to overcome the crisis, Agricultural Economics 2/2009, Belgrade, p. 222

[6] Božić, D., Bogdanov, N, Ševarlić, M. (2011): *Agricultural economics*, University of Belgrade, Agricultural faculty, Belgrade 2011, p. 351

2002, 2003, 2005, 2006, and 2007) and positive only in 2001, 2004, 2008 and 2009.[7] Our agriculture is Processes of land reclamation and the abandonment of villages are present in our agriculture.

The literature states that our agriculture is affected by several groups of issues: ownership structure characteristics of agriculture, competitiveness and disorganization problems on farms, unregulated agricultural markets, rural depopulation and the role of the state.

Characteristics of the ownership structure in agriculture

As a result of the transition process, Serbia is characterized by a complex ownership structure of agricultural land. There are various forms of ownership structures – from small farms owned by poor peasants or heirs of returned land to small family-owned and mixed farms as well as large farms and privatized large landholdings that were owned by agricultural conglomerates.

A research conducted in 2002 confirmed that most of the agricultural products are used for personal consumption (75%) and only 20% of the products are being placed on the market.[8] Prior to the restructuring, there were four forms of ownership of agricultural land: private, cooperative, social and state.

Most of the agricultural land, about 86% was privately owned, and the remaining 14% was either cooperative, social or state property. Private ownership was the dominant form of ownership of all agricultural land in the Republic of Serbia, which is 5.1 million acres. Of the total area of arable land (4.2 mil. Hectares), 86% belonged to small farms (3.6 mil. hectares).

The relationship between the total number of farms compared to the total usable arable land area during the 1991 – 2002 period is shown in *Table 1*.

[7] RZS – Bulletin – *Agriculture, 2009*, p. 16
[8] National rural development program 2011 – 2013, p. 11

Table 1. *Ownership structure of farms in Serbia (1991 - 2002)*

Land size	Census from 1991.		Census from 2002.	
	Farms		Farms	
	Number	%	Number	%
Without land	1,145	0.1	6,288	0.8
Up to 1 ha	270,033	27.1	208,100	26.7
1.01 – 3.00 ha	322,872	32.4	254,832	32.7
3.01 – 6.00 ha	235,626	23.6	177,505	22.8
6.01 – 10.00 ha	122,062	12.2	89,094	11.4
10.01 – 15.00 ha	32,390	3.2	27,731	3.5
15.01 – 20.00 ha	8,570	0.9	9,041	1.3
Over 20.00 ha	4,537	0.5	6,300	0.8
Total	997,235	100	778,891	100

Source: According to Bogdanov, N., Božić, D.: *Family farms of Serbia in transition, p. 93-94*[9].

"Analysis of the change in the number of farms in 2002 compared to the census of 1991 clearly indicates the reduction in the total number of farms in Serbia by as much as 218,344 which is 21.9% less."[10] This downward trend is caused by a reduction in the number of farms of size less than 15 ha, and increasing the number of farms of size over 15 ha. In addition, there is a dual structure of farms which is typical of northern Serbia (Vojvodina), as well as the Sava and Danube areas where the land market, especially the land rent market, is much more active. Converting state / public property to private property represents the basic change that has occurred in the agrarian structure of Serbia during the transition.

On the other hand, the exchange of land between private land owners was not expressed, because investors did not buy up private lands (small family farms), only large estates with infrastructure, machinery and buildings. Unfortunately, it is impossible to make a correct analysis of the changes in the structure during the transition period because of unreliable results of the Census of Agriculture in 2002.

A more reliable indicator are the results of the SLSP in 2002 and 2007 listed in Table 2, regardless of the fact that this data does not include the period during which there were the most intense changes in the ownership

[9] Bogdanov, N., Božić, D. (2005): *Family farms of Serbia in transition,* Institute for agricultural economy, Agricultural faculty, Belgrade, p. 93-94
[10] Ibid, p. 94-95

structure after the return of confiscated land and privatization of public / state property. They are reliable enough to indicate the general trend of change - strengthening the dual structure of farms.

Therefore, it can be concluded that changes in the structural characteristics of the farms in recent years, are as follows:

- reduced number of farms, which resulted in the polarization according to land size;
- predominance of small farms with little utilized land [11]
- reducing the average size of agricultural land to 4.34 hectares, which was the case in 2007, i.e. by 6% compared to 2002, with land used per farm increased to about 5 ha, suggesting the activation of the land market

Table 2. *Indicators of land market in Serbia*

	2002	**2007**	**Index 2007/2002**
Farms that provide land for lease (%)	9.2	6	65
Farms that take land for lease (%)	6.7	11.7	175
The average area of arable land per farm (acres)	301	336	112
Area that is leased (acres)	220	299	136
Leased area (acres)	377	513	136
Used agricultural land (acres)	329	493	150

Source: *Survey of Living Standards (2007).*

In the province of Vojvodina, especially in sparsely populated areas where the depopulation is present, expressed the tendency of converting farms into large commercial farms and businesses.

[11] Results of the SLS (2007) indicate that farms with less than 5 hectares account for 73% of the total number of farms, which is lower than the SLS in 2002 (80%) and the 2002 Census. (78%);

Much of the area of these farms has been taken on lease. In addition, parts of Central Serbia, where mostly extensive agriculture was present and where there are specific types of farms, exhibit dual tendency in terms of ownership structure.

Looking at the average size of holdings in these areas, it can be concluded that there is no significant difference compared to the national average. However, it is known that about a third of the land is not used because of poor quality, inaccessibility, the high cost of processing and the like. On the other hand, rents for higher quality and better positioned land fetch high prices, so that these areas have a higher population density.

Generally, this form of ownership structure contributes to the problem of competitiveness of small and medium-sized farms on the agricultural market.

Competitiveness and disorganization problems on farms

Looking at the farm as the initial point of agricultural production, then the chain of distribution, sale of goods on the market, and different groups of consumers, we can identify many problems. Most of them can be identified on the farm. Small farm size, dated technical and technological equipment, high cost of inputs and the lack of appropriate certificates are some of the major problems encountered on most farms.

What is also characteristic is that production is still largely naturalized. This situation on farms is, in most cases, followed by problems such as the low purchase price of products, poor conditions of purchase, unstable demand tailored to the needs of purchasers, the uncertainty of marketing, a small number of pre-contracted productions, unregulated system of payment and others. Given the above, it can be concluded that the agriculture of the Republic of Serbia is characterized by costly and inefficient agricultural production, a high degree of extensiveness, unfavorable business environment, non-compliance with EU standards (HACCP, GLOBALGAP and ISO 9001), and underdevelopment of the distribution, promotion and entrepreneurship, of which the end result is the problem of competitiveness of agriculture.

One solution for this situation can be seen in the establishment of farmers' associations both in branch and on a geographic basis, depending on the comparative advantages of the region, the current production structure to

them and market fluctuations. The benefits of association that farmers can achieve, and that should be the mainstay of their survival and development of farms is as follows:

- better supply of suitable raw materials on the market;
- easier placement of products through integrated offerings, which is a considerable relief when applying for large sales centers;
- Easy access to obtaining various certificates, and reduced costs in obtaining them;
- better and easier access to the market through creation of brands;
- better access to and participation in trade fairs;
- better legal protection for members of the association,
- Faster and more efficient transfers of knowledge through organized lectures and education[12].

Unregulated market for agricultural products

Our agricultural industry through has achieved neither efficiency nor profitability during the transition process, and consequently, did not reach the necessary level of competitiveness in the increasingly demanding world market. Almost all agricultural prices are formed freely, i.e. influenced by supply and demand. However, we see that it is not always to the benefit of all farmers, because the state rarely backs up their production with guaranteed prices. The market with all its mechanisms often brings manufacturers in the situation where the placement of the product on the market can not cover the cost of their own production. In such a situation, the question is how to run a production for next season. This puts in question even reproducing a minimum required for work continuity. These sorts of problems occur at small farms that do not have the quantity of production or absorption mechanisms to buffer the impact of market fluctuations.

[12] Paraušić V., Hamović V, Arsenijević Ž. (2008): *Farmer associations as a means to improve the competitiveness fo domestic agriculture* . International Scientific Meeting: "Multifunctional Agriculture and Rural Development III – rural development and (un)limited resources", 4-5 December 2008, Agricultural Faculty – Zemun, Beograd, volume I, p. 491-497;

The agricultural market in the Republic of Serbia has been quite disorganized and unprepared for a long time. What makes it such is the extensive and semi-intensive production that involves high production costs, the inadequate structure of crop production, lack of adequate storage capacity, uncontrolled export and import of agricultural products and the severity of cycles in all branches of agriculture.[13] All this results in an unstable price of agricultural products with large fluctuations and influences the manufacturers to diversify their production in order to perform the best possible dispersion of risk and achieve the necessary revenue. Compared to foreign markets, the domestic market for agricultural products is in need of a large reconstruction.

The depopulation of villages

The depopulation of villages with all related consequences is one of the major problems that calls into question the future of agriculture. There are various reasons that have led to the depopulation of the villages and the process of industrialization has played the biggest role in the migration from rural to urban areas. *Table 3* indicates the declining trend of total, active and dependent rural population that is on average five times lower in each of these categories in the period since 1961 – 2002.

Table 3. *The structure of the agricultural population in Serbia 1961 – 2002*

Population	1961	1971	1981	1991	2002
Total Population	100.00	100.00	100.00	100.00	100.00
Total agricultural population	56.13	44.03	25.37	13.35	10.90
Active agricultural population	29.69	24.49	15.23	9.25	7.05
Supported agricultural population	14.17	19.54	10.14	4.10	3.85

Source: *SGS for the aforementioned years, Republic Statistical Office of Serbia (by Jelić, Suručlija)*[14]

[13] Ognjenović, M., (2009): *Fruit and vegetable market in Serbia,* Agricultural commodity market in Serbia, Publication, Belgrade, p. 2

[14] Data from 2002 is referring to Central Srebia and Vojvodina, without Kosovo

„The villages are becoming empty, and according to the research, in a few years almost one in four villages in Serbia will be without population. Resources of the villages such as empty houses, land funds and infrastructure are unused. The consequence of such changes in population trends and the exposure to a very advanced demographic aging, resulted in a decrease in the total population of Serbia. Rural areas have experienced a true "demographic collapse" and at the beginning of the first decade of the 21st century, many towns and cities have been declining in population. The basic trait of the population was basically a reduction of the agricultural population. Also, the reduced proportion of active and supported rural population ...“[15]

On one hand, we have a situation where intense land reclamation is present, where village population is experiencing declining fertility and increasing mortality, senilisation, de-vitalization and similar processes. On the other hand, we have a very high impact of the economic crisis on the other hand, it is questionable whether there is capacity and capabilities for agricultural development. Also, agricultural policy measures are met with a large dose of skepticism with regards to the notion that they can have a rapid effect on the large-scale agricultural development, with the aim of trying to make up for the issues in Serbian agriculture that prevent it from being competitive.

The main factor for having young people stay in rural areas and restoring the working age population in villages can only be a state at this time. This could be achieved through a variety of programs to stimulate and promote life in the countryside.

The role of the state

The state should be an encouraging and important factor in the development of agriculture, because subsidies and subsidizing production can compensate the funds which farms are often unable to provide in-house due to various factors that are present in our agriculture for a long time. All of these factors are associated with a lack of money and market trends that are often at the expense of small and medium-sized farms.

[15] Jelić, S., Suručlija, Ž. (2012): *Migration tendencies of the population from rural to urban areas in Serbia*, collection of works on *Population and Development, Institute of Social Sciences, p. 203*

An important source of funding for agriculture comes from the agricultural budget of the Republic of Serbia, which was established in 1994.[16] Although it can be concluded that the amount of funds since the start of the agricultural budget was relatively modest in recent years, the amount of money dedicated to the agricultural budget has registered a decrease (in 2004 it amounted to 5% in 2010 it was only 2.5% of the national budget) and in 2011 it amounted to 2.6%.[17]

Bigger spending for agriculture within the agricultural budget occurred in 2004 when the agrarian budget was doubled and when the funds were channeled only to registered farms, which represented a shift in the strategic orientation and the mechanisms of implementation compared to the previous period. However, this amount is insufficient for the purpose of encouraging the development of Serbian agriculture. A large number of experts from the field of agriculture think that the agricultural budget should be at least 5-10% of the total national budget, while a certain portion of them suggests that it should be 15%.

Animal husbandry is the agricultural branch which provides more uniform utilization of labor in the production and significantly increases the level of intensity of agricultural production as a whole because it valorizes primary production through its own products. If, as a measure of agricultural development we take into account the share of animal husbandry in agricultural production, which should amount to about 50%, we realize that our agriculture is underdeveloped, with the share of animal husbandry around 30%.

In support of this fact we can state that the Serbian agriculture is based more on primary production. One of the steps towards the rapid development of agriculture would be just in the sphere of processing raw materials and obtaining finished products. Based on these facts, and in the context of development, we can conclude what is necessary to increase the budget for agriculture and start the selective

[16] Bogdanov, N. (2007): "*Small rural households in Serbia and rural non-farm economy*," UNDP, Belgrade, p. 71
[17] Božić D., Bogdanov N., Ševarlić M., (2011): *Economics of agriculture*, Agricultural faculty, Belgrade, p. 291

enforcement of reconstruction to equip the new farms with more productive breeds of livestock, crops and more modern types of machinery that should together make agriculture more efficient.
The authors point out that the state has encouraged the development of agriculture through specific measures such as incentives for production and services within the various regulations pertaining to increasing the capacity of agriculture.

It should be noted that in 2012, the state attempts to help farmers through incentives for diesel fuel for spring and autumn planting, as well as through measures to ease the drought, which has hit the entire country in.

Conclusion

The current state of the Serbian agriculture is not as farmers want it to be. The difficulties faced by farmers have negative implications for the future development as well as for the survival of farms, especially in central Serbia.

In determining the starting point in solving the pressing problems of Serbian agriculture there are a number of issues to be resolved, which through their joined impact make the situation more complex.

There are many factors limiting agriculture in Serbia. First of all, the existence of a large number of privately owned small farms and a small number of large commercialized farms. It is this large number of small farms the use most of their products for natural consumption, while large farms are actually those who put their products on the market. Then, there is also the reducing the number of farms, the dominance of small farms with little utilized land and the reduction of the average size of agricultural land owned by farms.

The agriculture in Serbia is also influenced by the fact that the land market is far more active in Vojvodina than in Central Serbia, as well as the small farm size, dated technical and technological equipment and the high cost of inputs.

The low purchase price of the products, unstable demand tailored to the needs of purchasers, the constant uncertainty of product placement, a small number of pre-contracted productions and an

unregulated system of payment together with the lack of various forms of associations are also limiting factors of our agriculture.

The bad situation in Serbian agriculture is contribute to significantly by the large fluctuations in prices, reducing the number of total, active and dependent rural population, expressed by rural depopulation, revitalization, declining birth rates in the rural areas, the selective agricultural policy of the state, inadequate efforts by the government to solve the problems of agriculture and insufficient allocations for agricultural budget.

Some of the suggestions that might be helpful to address the current situation and improve the perspective of agricultural production are:[18]

- taking certain actions and measures in order to stop the negative trends followed by the transition, and the effects of the global economic crisis on our agriculture. The global economic crisis requires adjustments in all areas including agriculture. One of the measures to mitigate the impact of the global economic crisis on agriculture is to stimulate the development of agriculture, through subsidies and favorable loans and investing in irrigation systems, and the like.;

- changing the liberal attitude of the state towards a new concept of agriculture that is based on a partnership role of the state and regulated market protected from monopolistic influence, on which there is free competition;

- Establishing firm "rules of the game" and the conditions for their application which participants will adhere to strictly and consistently, leading to stable business;

- adoption of an appropriate national strategy for agriculture and rural development would help to create a foundation for the development of the overall economy, as well as the rapid development of other industries;

[18] Pejanović, R., Cvijanović, D., Njegovan, Z., Tica, N., Živković, D., (2009): *Problems of Agriculture of the Republic of Serbia and the measures to overcome the crisis*, Agricultural economics 2/2009, Belgrade, p. 226-228.

- allocating significantly larger sums to the agricultural budget to revive agriculture and villages, as well as to implement European competitiveness and rural development projects;
- development loans at minimal interest rates;

- new agricultural policy that would include greater involvement of the state in promoting agricultural and rural development, regulating agricultural markets, agricultural products, foreign policy, etc.;

- acceleration of the adoption of the new, modern agrarian legislation and its implementation. It goes without saying that it must be based on the standards and principles of the EU if Serbia wants to be competitive on that market;

- land policy should be a set of measures that can affect the rational and sustainable use of agricultural land. It should be the policy of pooling together small land parcels, because the small land holdings constitute serious impediments to market development of agricultural production. A business network of farms through different forms of associations, cooperatives, chambers of commerce, etc. is needed;

- adoption of appropriate legislation on cooperatives in order to solve the problem of social ownership of most cooperatives. Establish better cooperation between large, small and medium farms. Encouraging the development of entrepreneurship and marketing in agribusiness will develop multifunctional agriculture, and thus will speed up local economic development;

- the establishment of associations of various types, which should be able to preserve the small and medium-sized farms;

- investment in knowledge, science, education, extension, which also increases the yield of the farms.

It takes a certain amount of time in which with the help of a well thought out strategy and financially supported by the state, it would be possible to significantly alleviate the current problems, and permanently resolve some of them.

The expected results for the whole of agriculture would be reflected through the creation of family commercial farms which would conduct high-quality agricultural production planned through the idea of sustainable development of natural resources and the strengthening of the agricultural sector in general.

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THE IMPROVEMENT IN BIODIVERSITY AND SOIL FERTILITY THROUGH THE ADOPTION OF ORGANIC FARMING[1]

Vladimir Filipović[2], Vladan Ugrenović[2]

Abstract

The globalization of agriculture, the adoption of 'superior' genes and monocultures in farm fields all around the world, the increasing demand for food, and climate changes on planet Earth are only some of the reasons and causes of rapid biodiversity loss and agricultural land degradation. Regrettably, profit is the reason why many developing countries and some developed countries are rapidly destroying their centuries-old biodiversity heritage and hundreds of hectares of fertile land. The recognition of organic farming as an important segment of sustainable agriculture, puts the conservation and improvement of agrobiodiversity at forefront. Furthermore, certain directives and activities of the European Union focus explicitly on biodiversity and agro-biodiversity. Thus, from the very beginning of the development of organic agricultural systems, biodiversity has been considered a key issue, equally important as soil fertility.

Key words: *biodiversity, fertility, soil, control, methods, organic farming.*

Introduction

Our knowledge of soil processes and soil biodiversity is worryingly limited, and though humus-rich topsoil, a precondition for healthy and sustainable agriculture, is in theory renewable, the time scale of renovation basically

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renders it non-renewable (23). Already today, some 16% of EU soil is affected by degradation (21), 45% of soils show a low organic matter content, and 9% of Europe's land is sealed (9). In the press release issued during the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture (CGRFA) of the Food and Agriculture Organization (15), held in Rome, 14-18 October 2002, the importance of soil biodiversity was singled out in several points as being the foundation of sustainable agriculture, as follows:

1. Given the escalating population growth, land degradation and increasing demands for food, achieving sustainable agriculture and viable agricultural systems is critical to the issue of food security and poverty alleviation in most, if not all, developing countries. It is fundamental to the sustained productivity and viability of agricultural systems worldwide.

2. Sustainable agriculture (including forestry) involves the successful management of agricultural resources to satisfy human needs while maintaining or enhancing environmental quality and conserving natural resources for future generations. The sustained use of the earth's land and water resources - and thereby plant, animal and human health - is dependent upon maintaining the health of the living biota that provide critical processes and ecosystem services. However, current technologies and development support for increased agricultural production have largely ignored this vital management component.

3. Improvement in agricultural sustainability requires, alongside effective water and crop management, the optimal use and management of soil fertility and soil physical properties. Both rely on soil biodiversity and soil biological processes. This calls for the widespread adoption of management practices that enhance soil biological activity and thereby build up long-term soil productivity and health.

4. FAO considers the issue of soil biodiversity and soil ecosystem management of great importance to the achievement of sustainable, resource-efficient and productive agriculture. Soil biodiversity has been identified as an area requiring particular attention under the programme of work on agricultural biodiversity of the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD).

In order to halt the still ongoing loss of biodiversity and ecosystem degradation, on 3 June 2011 the European Union adopted the "EU Biodiversity Strategy to 2020," aimed at "reversing biodiversity loss and speeding up the EU's transition towards a resource efficient and green economy " (13). The very formulation of the aim of this new strategy indirectly acknowledges that all the activities and measures to date were more or less unsuccessful (22). Strategies and other documents on biodiversity conservation have been created in many developed and developing countries throughout the world. Similarly, in 2011 our country also adopted the Biodiversity Strategy for the period 2011-2018 (35). The importance of this document should be acknowledged primarily in the fact that the territory of Serbia is characterized by a rich genetic, species and ecosystem diversity, which is emerging as a response of living biota to the geological, climatic, hydrological and orographic diversity of Serbia, alongside all the complex historical changes which have occured in the past in this region (46).

The aim of this paper is to show that organic production is an available option and an important segment of sustainable agriculture which by its methods can contribute to the protection, conservation and enhancement of the existing soil biodiversity, while conserving and improving soil fertility.

What is soil biodiversity?

Soil biodiversity reflects the mix of living organisms in the soil. These organisms interact with one another and with plants and small animals forming a web of biological activity. Soil is by far the most biologically diverse part of Earth. The soil food web includes beetles, springtails, mites, worms, spiders, ants, nematodes, fungi, bacteria, and other organisms. These organisms improve the entry and storage of water, resistance to erosion, plant nutrition, and break down of organic matter.

One of the most commonly cited definitions of soil biodiversity was given at the first summit on environmental issues held in Rio de Janeiro, 3-14 June 1992, where soil biodiversity was defined as the variation in soil life, from genes to communities, and the variation in soil habitats, from micro-aggregates to entire landscapes (41). The research of a group of authors (31) into the decrease in soil biodiversity, i.e., decrease in organic matter content, has shown that the long-term use of synthetic nitrogen fertilizers promotes the development of microorganisms in the soil which feed on

organic matter, thereby decreasing its content in the soil. The decomposition of organic matter results in a decreased capacity of soil to retain organic nitrogen. A large part of nitrogen in the form of nitrate then runs off and pollutes surface waters, while another part enters the atmosphere in the form of nitrous oxide (N_2O), the gas which creates the green-house effect and which is almost 300 times more dangerous than carbon dioxide with respect to trapping the sun's heat and increasing the global warming.

One of the more important segments of biodiversity is agrobiodiversity, which refers to the diversity of animals, plants and microorganisms that are important for agriculture, i.e., as food for humans and animals.
Agrobiodiversity is a critical area of biodiversity as a whole, because many plant species are used as food for humans and domestic animals. Man has discovered the plant species and livestock breeds which are more productive for his needs, whereas other plant species and less productive animal breeds are subject to extinction.

Agrobiodiversity in the Republic of Serbia includes species and habitats of cultivated plants and animals, as well as species and ecosystems which are important for the production of food and fodder (species in agro-ecosystems, pastures and meadows, forest and aquatic ecosystems). Traditional knowledge and cultural heritage are also an important component of agrobiodiversity in the Republic of Serbia.

The role of agrobiodiversity lies in supporting food production and safety, and in reducing the pressure on different ecosystems (including the vulnerable ones), forests and endangered species. It also contributes to the stability and sustainability of agro-ecosystems, diversity of organisms in nature, conservation of soil fertility, conservation of other ecosystems etc. (35). In organic farming systems, the significant increase in the number of plants occurs because of wild plants, which are economically and ecologically important for food production and agriculture in general (forage plants, medicinal and aromatic plants, ornamental plants, honey producing trees and wild fruits).

The current state of agricultural soil and its importance

Soil is the foundation of agricultural production and consequently the survival of mankind. It is an invaluable natural resource, which is created and renewed very slowly. The formation of a 2-3 cm thick soil layer

requires thousands of years, from 1,500 to 7,000 years on average (10; 38). Agricultural soil is of vital importance to the survival and development of communities. For this reason, every country is giving special attention to the protection, improvement, landscaping and rational use of agricultural land, while taking into account the current needs but also the needs of future generations. The Republic of Serbia is also taking appropriate measures in that direction (26). One of the objectives in environmental conservation is to preserve the fertility of agricultural soil (33).

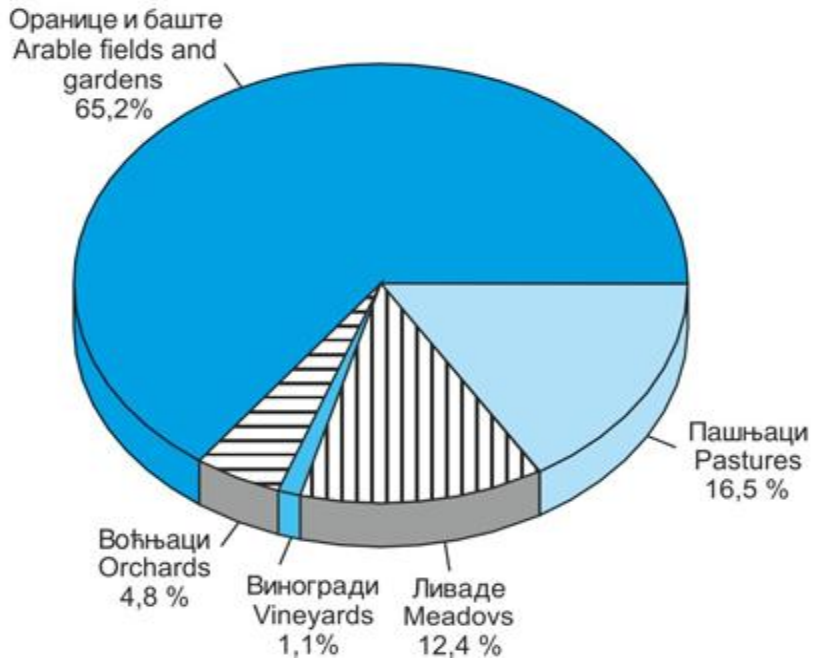
Unfortunately, as with many other natural resources, we treat the soil irresponsibly. Agricultural soil is a four-phase dispersion system consisting of solid, liquid, gaseous and biological phase. In order for biophase to exist and function properly, it requires organic matter as a source of energy (14; 37).

Aiming to increase their profit, many conventional farmers exploit the agricultural soil uneconomically, ignoring the need to preserve its fertility and to protect the existing ecosystems (18). Some degradation processes caused by the human influence include: inadequate use of synthetic matter (pesticides, synthetic fertilizers, etc.), soil compaction caused by heavy machinery, insufficient application of organic fertilizers and green manures, depletion of high quantities of nutrients by highly-productive hybrids and sorts, inadequate plant waste management, practising monocultures, ignoring crop rotation, etc. Increased application of nitrogen fertilizers in many countries, particularly in developed countries, has led to a series of new problems, and especially to the increased content of nitrate in soil, ground waters and plants. Apart from causing a series of ecological problems, accumulation of nitrate in the environment is directly jeopardizing human and animal health (27).

The most severe agricultural soil degradation occurs in soils under intensive agriculture, whose practices include heavy use of synthetic chemicals (pesticides, industrial mineral nutrients, growth stimulants, etc.), intensive irrigation, heavy machinery, crop residue removal etc.

Such intensive cropping is most prevalent in the production of fruit and vegetables, and some field crops and grapes. In the structure of agricultural land-use, arable fields and gardens account for the largest part, or 2/3 of the total area, while the remaining 1/3 is made up of meadows, pastures, orchards and vineyards (Figure 1).

Figure 1. *Agricultural land use in the Republic of Serbia in 2010 (without Kosovo and Metohija)*



Source: *Statistical Yearbook of the Republic of Serbia 2011, Statistical Office of the Republic of Serbia 2011.*

According to the estimates of the author, if more farmers were to convert to organic methods, this would soon result in improved soil fertility, primarily due to the increased soil organic matter (SOM) content.

Soil organic matter (SOM)

Organic matter decomposition serves two functions for the microorganisms, providing energy for growth and suppling carbon for the formation of new cells. Soil organic matter (SOM) is composed of the "living" (microorganisms), the "dead" (fresh residues), and the "very dead" (humus) fractions. The "very dead" or humus is the long-term SOM fraction that is thousands of years old and is resistant to decomposition. Soil organic matter has two components called the active (35%) and the passive (65%) SOM. Active SOM is composed of the "living" and "dead" fresh plant or animal material which is food for microbes and is composed of easily digested sugars and proteins. The

passive SOM is resistant to decomposition by microbes and is higher in lignin. Microbes need regular supplies of active SOM in the soil to survive in the soil. Long-term no-tilled soils have significantly greater levels of microbes, more active carbon, more SOM, and more stored carbon than conventional tilled soils. A majority of the microbes in the soil exist under starvation conditions and thus they tend to be in a dormant state, especially in tilled soils.

Dead plant residues and plant nutrients become food for the microbes in the soil. Soil organic matter (SOM) is basically all the organic substances (anything with carbon) in the soil, both living and dead. SOM includes plants, blue green algae, microorganisms (bacteria, fungi, protozoa, nematodes, beetles, springtails, etc.) and the fresh and decomposing organic matter from plants, animals, and microorganisms.
Due to the reduction of soil organic matter content, soil becomes susceptible to compaction (hardening) which in turn inhibits the growth of plant roots. Furthermore, such soil is increasingly losing its ability to retain water, which makes crop production increasingly dependent on irrigation. At the same time, such soil becomes vulnerable to rainfall (torrential runoff) and susceptible to erosion (24).

Humus is an organic portion of soil, brown or black in color, which consists of partially or wholly decayed plant and animal matter, that provides nutrients to plants and increases the ability of soil to retain water, structure and heat, thereby providing optimal conditions for plants (1). The decerease of humus content leads to decrease in crop yields (11). Humus content in AP Vojvodina is decreasing intensively, but the situation varies from one field to another, depending on soil type and farming methods. A drop in humus content of 0.5% to 1% has been recorded in our soils, which is an extremely high decrease (42). This is confirmed by more than 200,000 results of soil tests in Vojvodina, which have been done by the Institute for Field and Vegetable Crops in Novi Sad over the past 20 years. *Vučić* (43) estimates that the annual humus loss in Vojvodina's soils amounts from 1,000 to 1,500 kg per hectare. Because of this, it is necessary to incorporate 10-15 t ha^{-1} of well rotted manure, 16.5-25 t ha^{-1} of straw manure, or 5 – 7.5 t ha^{-1} of dry straw mixed with nitrogen fertilizer (30).

The EU should work together to build a solid ground of healthy humus for Europe and the world, and not get bogged down in pure economic thinking and political quagmire (23). Over the last several decades the

composition of soil microorganisms has been considerably changed and impoverished. One of the causes is the change in farming technology which has effected the reduction of soil biodiversity, in which microrganisms have a prominent place (39). Microorganisms are the living component of soil. Their metabolic processes enable the cycling of matter, synthesis and mineralization of humus and plant nutrition (25). Thanks to all of this, microorganisms are an indicator of soil fertility. Their presence in soils exploited by conventional agricultural methods is constantly decreasing. This process represents the erosion of agricultural biodiversity, which is reflected in the loss of genes and various species, and losses within particular species. This erosion is causing a decrease in agricultural soil fertility, which can be restored by adopting sustainable agricultural systems such as organic farming (3).

The role and place of organic farming in biodiversity conservation and soil fertility improvement

Organic agriculture is aimed at maintaining and increasing soil fertility, protecting natural resources from pollution, preventing erosion, conserving biological diversity and maximum exclusion of off-farm inputs. The use of organic farming methods conserves, maintains and increases the fertility level in agricultural soil, a resource which we have borrowed from posterity. This type of agriculture requires constant planning and a multi-disciplinary approach. In comparison to non-organic farms, organic farms have about 30 percent more butterflies, soil microorganisms, earthworms, different insects and small mammals (5). Organic famers who have such understanding of biodiversity conservation and improvement are adopting a logical and economically viable approach. In this kind of practice all biodegradable materials are used, nothing is wasted, and little is spent on expensive off-farm inputs. In relation to this, the obtained product is certified, often more expensive and by far more valuable biologically (19). An example of such good practice, i.e., regular monitoring of the applied organic methods, can be found in the organic demo-field of Tamiš Institute (N 45°01´, E20°44´, 111,3 m.s.l.). In this organic demo-field the aforementioned principles have been established through the application of various agro-technical measures.

From the moment when the experimental field was set up, soil fertility testing was performed regularly, micro-elements content was determined, and soil was tested for residues of dangerous and harmful matter (17). In

an adequate crop rotation, the effects of applied measures on maintaining soil fertility, reduction of weed, the number of pests and disease agents in plants was examined, along with the conservation of populations useful for man and nature. Tillage and fertilization were done by using methods prescribed by Law and Rulebook on organic production (34; 36). This led to a partial achievement of the stated aim of maintaining or increasing soil organic matter content, improving soil stability and biodiversity, and preventing soil compaction and erosion. For instance, the application of manure in organic farming, when compared to conventional plant production without manure input, has resulted in the increase of microbial C biomass, increased the total number of bacteria, azotobacter and aminoheterotrophs, as well as the activity of enzymes dehydrogenase and urease. Application of manure has had no effect on the number of fungi and actinomycetes (12).

Hereinafter we will show some of the methods which are used in organic farming, and whose objectives are, *inter alia*, the improvement of the existing biodiversity in organic farms and conservation and renewal of agricultural soil fertility. Some of the necessary methods will be stated: composting, nitrogen fixation, mulching and adopting the multi-field organic crop rotation.

Compost in organic farming

Compost is an organic fertilizer 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. Burning of organic materials is not allowed in organic farming, i.e., all organic waste from the farm has to be composted and returned back into soil in the form of compost. Organic standards promote composting, anaerobic digestion, aeration of slurry and correct storage of manure. For example, organic certification agencies recommend manure should be composted prior to land application (7). These treatments greatly reduce pathogen loads in manure by increasing the range of biological activity, which helps to suppress pathogenic microbial populations, and by heat pasteurisation. A well-managed aerobic digester or aerobic compost heap will reach temperatures of 55 °C to 65 °C, and will be maintained at this temperature for three days to destroy weed seeds and pathogenic bacteria.

In addition, aerobic composting results in the stabilisation of nutrients, giving the compost nutrient release characteristics that are more in tune with the demand of crops throughout the seasons (32).

True composting of manures, i.e. aerobic decomposition at temperatures of around 60 °C, results in fundamental physical and chemical changes to the manure. Composting results in some losses of nitrogen through volatilization in the form of ammonia, however the soluble nutrients, particularly nitrogen, are stabilized and hence subsequently less liable to leaching. Composted manure thus has a more long-term role in building soil fertility, and has been shown to be more effective in building soil microbial biomass and increasing activity than uncomposted manure (16). Compost is most commonly used in the rates of 0.5 – 6 kg/m² as a part of soil mixture or for the mulching of soil in gardens.

Legumes and nitrogen fixation in organic agriculure

Elemental nitrogen (N_2) is the largest constituent of air (about 78% by volume), but nitrogen can be assimilated and converted to biomass by plants and soil microorganisms only in a mineral form. The most important natural process is the nitrogen fixation in soils by nitrogen fixing bacteria. These either live freely in soil or symbiotically in certain plant families, which contain symbiotic bacteria within nodules of their root system. These nitrogen-fixing root nodule bacteria have developed a highly efficient way to reduce elemental nitrogen (N_2) from the atmosphere to ammonia (NH_3) or ammonium ions (NH_{4+}). Because this reaction depends on anaerobic conditions, the bacteria need a specific habitat which they find in nodules produced by the roots of symbiotic plants. Legumes are a family of plants which produce root nodules and benefit from the fixation of nitrogen by the bacteria. Important leguminous crop plants include soybeans, peas and beans. Members of the legume family are also used as green manure. Green manure plants are grown for a specific period and afterwards ploughed under. Clover, lupine and vetch are important green manure crops. Biological N fixation comprises an important economic service provided by the soil biota, particularly in agricultural ecosystems. Here leguminous plants may fix more than 100 kg N / ha / year.

Besides biological nitrogen fixation in soils, soils also receive nitrogen in the form of nitrogen oxide, which is produced through the enormous energy of lightning which splits gaseous nitrogen molecules (N_2) present

in the atmosphere to form nitrogen oxides. The same happens during the combustion of air and fuel in motor engines. The nitrogen oxide produced by both lightning and the internal combustion engine is deposited on the surface of the soil in rainfall in a process called atmospheric nitrogen deposition.

There are fundamental interactions between soil biodiversity and the gaseous elements of air - oxygen, nitrogen and carbon dioxide - these interactions are vital for soil organisms, and, vice versa. Efficient nitrogen fixation between soil bacteria, the so called rhizobia (bacteria from the family *Rhizobiaceae*), and leguminous plants (fam. *Fabaceae*) provides for about 50% of the total amount of nitrogen fixated on Earth, which makes this symbiotic community the most efficient agricultural system for biological nitrogen fixation on Earth. Artificial inoculation of seeds or soil with rhizobial inoculant as a micro-biological N fertilizer prior to sowing is an important agro-technical measure in legume cropping, which is applied in order to improve the soil's nitrogen fixation capacity or compensate for the absence of autochtonous rhizobium strains (8).

In the production of legumes inoculation is justifiable for several reasons: nodule bacteria in legumes are scarce in our soils, which is particularly the case with soils of acid reaction. Incorporation of effective and acid-resistant strains of these bacteria during the sowing of beans and lucerne increases nitrogen fixation and enables the cultivation of these crops on less fertile soils. Pea nodule bacteria are plentiful in agricultural soils, however autochtonous strains are often insufficiently active which can be seen by numerous tiny and pale nodules in the pea root. The application of effective strains increases yield and nitrogen content in the grain, and large and reddish nodules are formed at the central root. Aided by nodule bacteria, legumes for the most part provide themselves with the required quantities of nitrogen, i.e., inoculation reduces the need for mineral nitrogen fertilizers, which is of economic and environmental importance. In our country, research on the viability of inoculation in the production of vegetable and forage legumes has been conducted for years (29).

Mulching in organic farming

Mulching of soil is a very useful measure applied in organic farming. Different materials can be used for this purpose. Straw, hay, grass, leaves, compost, timber waste or some other materials that help to supress weeds, maintain soil moisture, protect soil from erosion and maintain favourable

soil structure are used. Mulched soil retains water more efficiently, weeds don't grow as much on it, and when they do it is easier to pull them out. Apart from this, soil surface is protected with mulch, so that after the rain or watering the crust is not formed and there is no need for hoeing. The timing of the application of this method varies. Mulching is usually done when plants grow to full height, with some of the aforementioned materials. During the vegetation period, mulch protects the soil from drying out too much and from excessive weeds, and it gradually decomposes, enriching the soil with soil organic matter (SOM), which in turn provides for a better soil structure.

Compost is considered to be an excellent mulching material, especially if it is mature, because not only does it cover the soil, but is also a fertilizer whose incorporation into the soil increases fertility and activates soil microorganisms.

Organic crop rotations

Crop rotation plays a central role in the basic design of organic farms (6, 45), also pertaining to maintain and improve soil quality (28). Crop rotation integrates the maintenance and development of soil fertility with different aspects of crop and livestock production in organic systems (44). Crop rotation is a system where different plants are grown in a recurring, defined sequence. Crop rotations, including a mixture of leguminous ˝fertility building˝ and cash crops, are the main mechanism for nutrient supply within organic systems. The proportion of legumes and grasses in organic crop rotations is quite high. In such crop rotations, legumes and grasses make up 20% to 40%, whether through establishing artificial meadows and pastures, or through introducing annual and perennial legumes (4). Through this approach, the aspiration "don't feed the plant, but feed the soil as a source of life and biologically active environment" is achieved. Rotations can also be designed to minimize the spread of weeds, pests and diseases (2). The development and implementation of well-designed crop rotations is central to the success of organic production systems (28; 40).

Organic rotations are divided into phases that increase the level of soil nitrogen and phases that deplete it (2). The nitrogen building and depleting phases must be in balance, or show a slight surplus, if long-term fertility is to be maintained. This type of rotation provides the basis for forward planning of nitrogen supply, necessary in the absence of soluble

nitrogen fertilizer. A typical rotation on a mixed organic farm with a three-year grass and clover ley will support two or three years of arable cropping (28). This may be extended by including a nitrogen-fixing cash crop, such as beans, or by including a short period of nitrogen fixing green manure such as vetch between cash crops (40). In order to make maximum use of the large quantity of nitrogen released following ley incorporation, crops with a high demand for nitrogen, such as winter wheat or potatoes, are usually grown at the start of the cropping phase (28).

Crop rotation also modifies the physical characteristics of the soil both directly and indirectly. The accumulation of organic matter during the ley phase plays a major direct role in soil structure formation (20). The multifunctional crop rotation is thus a key component in organic farming. The design of these crop rotations is a major challenge for farmers as well as for agronomic research (45).

Conclusion

Soil biodiversity is a central part of our natural systems. But it is also under ever increasing pressure from human activities. While currently prevalent farm practices risk damaging soil fertility and destroying biodiversity in an irrevocable way, sustainable farming systems that create diverse landscapes and employ a wide range of crops and cover crops can significantly contribute to biodiversity. It has been shown that organic farming is a way to increase species numbers and promote a greater abundance of organism groups relative to conventional farming, in particular with respect to species diversity and density of insects, plants, soil micro-fauna and soil macro-fauna. Organic farming protects and improves soil biodiversity, through its methods it controls and increases soil fertility, protects the environment and applies the highest standards in plant and animal health protection. The existing national regulations and farmers' interest in organic farming indicate that it has an important role in agriculture. In relation to this, it is an available option and an important segment which can contribute to the protection, conservation and enhancement of the existing soil biodiversity, thereby conserving and improving soil fertility.

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PRODUCTION OF THE TRADITIONAL BUILDING MATERIAL AS AN ELEMENT OF RURAL DEVELOPMENT*

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Abstract

Building material should provide rational energy consumption and necessary living conditions. Use of traditional materials and recycling of waste improves preservation of resources since the exploitation of mineral raw-material is directly reduced. In the foreseeable future, the rural sector will not be able to rely on development of high technologies, which means that it has to be developed within more affordable activities. Production of ceramic tiles and bricks implies production of approximately 5% of waste. Such substances can be smashed and used for preparation of mortar which has common ecological advantages. Besides, since the reed is traditionally used in Vojvodina, it is necessary to support its exploitation as building material. Development of the observed activities should be supported through the establishment of funds and institutions for favorable crediting of new plants and development of the existing ones, through stimulation of use of alternative building materials and development of tax exemptions and other exemptions.

Key words: *recycling, traditional building material, rural development.*

Introduction

The period of transition included significant changes in the ownership structure in the rural part of Serbia. Changes within the social system mainly influenced disappearance of farms owned by small producers and forming of large privately owned estates. This was a significant change, since the census of 2002 indicated that the majority of farmlands were

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running production for their own needs (75%), whereas the minority of farmlands was oriented towards the market production. Today, the situation is significantly different because the producers are mainly engaged in commodity production. On the other hand, in terms of the ownership structure, there have not been so many changes so far. According to the Geodetic Institute, 67% of land is currently in the private ownership. Dominance of large estates exists in the northern part of the country, which is Vojvodina, Posavina and Podunavlje; land market is there as well, especially the rental market which is much more active as compared to the south of the country. According to the aforesaid, it can be ascertained that the transitional changes in agrarian structure of Serbia mainly related transformation of the socially owned estates into the private ones. The tendency of transformation of family farms and socially owned enterprises into privately owned large commercial estates and modern factory-farms is especially present in Vojvodina.

Regardless the ownership form of the established agricultural enterprises, the observed changes create conditions for rational running of all resources. Apart from the intensive capital investments which influence the increase of debt of the agricultural sector, the labour force is rationally utilized. Due to that, the issue of the rural parts also includes unemployment problem which, until now, existed only in latent form within the socially owned enterprises and family farms. The solution for the unemployment problem within the rural regions can be found in specific forms of the rural development. In terms of a new concept of development of the rural regions, it will be especially important to include wide range of activities in making of development plans for the rural areas. Rural areas are quite important, although they do not represent the driving power, because they: 1) represent existential base for significant part of the population, especially for the part of population which has no prerequisites to get involved into the official economy, 2) rural areas represent the base for feeding of the entire population, 3) represent the base for the wide range of ecological resources such as water, air, bio-diversification, bio-energy and touristy sites, and 4) they are especially significant for utilization of bio-energy resources. Although rural resources themselves do not represent the safety factor in terms of satisfying the basic needs on the sustainable base, they represent very significant part of rurally diversified household budget (Rauch *et.al.* 2001). This is quite significant, especially if we know that the rate of unemployment in rural areas is very high, 21% (Rural development

strategy draft, 2010 - 2013) and it clearly directs to the problem of lack of employment capacities. Another significant circumstance is the fact that the young people have rather bad position on the labor market in rural areas, because the rate of unemployment of people up to 25 is three times higher as compared to the average. This condition can be improved only by means of serious investments made into development of the rural regions. It is quite important not to look at the rural regions in the narrowest sense, which means only investments made into production plants. Namely, such concrete investment activities, as a rule, are preceded by investments made into the development of technologies which are convenient for implementation in small capacity plants, and which are generally constructed within the rural regions.

The selection of building material for certain purposes, as a rule, is performed in accordance with functional, technical and financial conditions. However, consideration of the idea of sustainability and/or sustainable development (an important criterion which has existed within the last few decades) changes the classic approach to the evaluation of the building material. It is known that the civil engineering, directly or indirectly causes significant level of the annual ecological damage. On the other hand, an adequate exploitation of recycled and waste materials can significantly contribute to the sustainable development. Realization of the aforesaid objectives will only be possible through the process of invention of ecologically acceptable materials and construction methods. One of the solutions is recycling and reuse of the given material, which directly influences sustainable production and/or exploitation of the renewable resources. Development of sustainable technologies is very important, since the civil engineering consumes 60% of the raw-material extracted from the lithosphere (Wadel G, 2009). Construction of buildings takes 24% of the total extraction. In Europe, 4.8 tones of mineral raw-material are used for construction annually, per capita. Regardless the fact that the most significant part of the environmental pollution origins from materials produced in the process of building demolition (Van den Dobbelsteen, 2002) other types of material also have significant influences on the environmental damage. Earlier researches indicate that the construction industry must respect sustainability and consider its influence on the environment (Speth JG, 1990; Ehrlich P, 1990). One of the ways to preserve the environment is the exploitation of materials which represent the waste originating from production of brick products, as an aggregate for mortar and concrete used for revitalization of the monuments of cultural heritage. Such exploitation of the waste material

does not only influence the reduction of the environmental pollution, but it also stimulates preservation of the social resources, because it reduces exploitation of the raw material and provides the substitute for materials such as cement, for which the production process requires significant level of the raw material, energy and means for production. Recycling of the brick industry waste is very efficient and flexible way of transformation of the waste into the building material. In this way, one of the basic issues of the recycling centers can be solved, because the continuous production of the brick products enables supply of the required material as well as the problem of disposal of the produced waste.

Analyzed technology has a number of advantages: 1) it reduces the exhaustion of the natural resources, 2) it is more efficient in terms of energy, because through the substitution of cement, it will reduce the energy consumption, 3) the recycling process is flexible since the waste can be simply stored and used for other purposes. The basic objective of this research (Zekić *et. al.,* 2012) is to demonstrate the potentials and the possibilities for use of the brick industry waste in production of the pozzolanic mortar. Wider frame of the research implies the invention of the model for establishment of the sustainable development of construction industry and the total society through the process of waste recycling. The analysis of the aforesaid issue was executed through the Feasibility Study of the waste processing plant, in accordance with the previously implemented methodology (Kohler G, 1997), where the listed stages are performed in a form of a study for the region of Serbia: A. Evaluated production of brick industry waste in Serbia, B. Analysis of market conditions, C. Analysis of investments, D. Evaluated expenses of the recycling plant. The listed frames represent a good base for making conclusions about possibilities and expenses of the said technology. On the other hand, nonexistence of market prices of the final product sets limitations for making conclusions about potential economic profitability.

Besides, during the last two decades, the growth of interest for the global sustainability issues led to the need to increase the sustainability of the utilized ways and construction techniques. In the developing countries, such market represents the opportunity to connect sustainability, on one hand, with better planning performance, construction and functionality of the building on the other hand. Such logic should be set opposite the global trends relating the constant growth of production, consumption and market (E. Papargyropoulou, 2012). In conformity with the aforesaid, it

will be necessary to find new methods of sustainable increase of production and employment. Such needs within the agricultural production are most tightly bonded to the utilization of potentials which concern less productive land. Namely, the significant part of the agricultural land is under ponds and reed. Out of the total land under the management of the Public Company Vojvodinašume, 12.406,68 ha are under ponds and reed (Tomović *et.al*, 2007). This area is not insignificant at all, so it is necessary to find out new methods for efficient utilization of the said potential. This waterlogged and wetland offers oodles of reed. As opposed to the general opinion, exploitation of the reed fields will have positive effects on the environment. If the young reed is not cut, it often becomes overgrown with weeds and cannot be used as such; with time, it will rot and decompose, which consumes the oxygen from the marshes, and which is necessary for other organisms.

In accordance with the aforesaid, it is possible to exploit the marsh reeds from the said areas, for production of the various types of building material. Namely, the process of machine pressing of the reed stalks offers quite simple way of production of the building material good for insulation of the buildings. Because of its good features this material can be applied in civil engineering as thermal and acoustic insulation. Such insulation systems provide a number of advantages. Reed boards have extremely low coefficient of thermal conductivity, which provides good insulation characteristics. Their embedding provides great energy savings, through the reduction of loss, which is significantly noticed in the reduction of expenses of heating and air conditioning. Apart from thermal insulation, the reed is a good acoustic insulation as well, and it also provides excellent radiological, electromagnetic and other insulation properties. Reed will not lose its characteristics with time, which means that it will remain the same as it was when embedded. That means that after 50 or 100 years, its insulation properties will not be reduced, as it is the case with some other insulation material (Styrofoam). Prior to embedding, the reed can be protected against humidity, which will prolong its life for even 200 years, which is not the case with some other materials applied in construction nowadays. Apart from the aforesaid, use of traditional materials has many other advantages which should be taken into consideration in planning and construction (Quiteria Angulo-Ibáñez *et.al*, 2012), so the construction industry must appreciate the criterion of sustainability and take into consideration the effects to the environment (Speth J.G.,.Ehrlich, P., Ehrlich, A., 1990).

Besides, the reed can be exploited in production of plastering and/or single row reed mesh, where the reed stalks are banded with wire or PVC material. During the earlier times, plastering was mainly used as reinforcement in construction of mud walls, mortaring, walling in, etc. Today, because of its attractive appearance, functionality, easy assemblage, and low prices, it is much more often used. Low density plastering is used as a base for mortaring of walls and ceiling, because it enables adhering of mortar onto flat surfaces; further it is used in covering of greenhouses, for decoration, and it has many other purposes. High density plastering is used for protection against sun, indoor and outdoor decoration, production of screens, partitions, etc.

The basic aim of the research (Zekić *at.al*, 2012) was to illustrate the potentials and the possibilities for exploitation of marsh reeds in production of insulation material for civil engineering. As in previous case, the wider frame of the research implies the invention of the model for establishment of sustainable development of construction industry and the society in general. In all that, as the basic direction of development, we will observe the optimal exploitation of the resources of the rural areas.

The analysis of the said issue was executed though the Feasibility Study of the Plant, and/or technical and technological construction for production of marsh reeds insulation boards, which is assembled from harvester and weaving machine. The purpose of the presented models is to provide social organizations and companies with the base for making adequate decisions on allocation of the resources, in order to achieve the best total effects. Because the market is supplied with similar materials which provide the same function in construction of buildings (Styrofoam and glass wool) and since there is the market price for reed insulation boards, it is possible to execute adequate economic analysis. Another significant point is the development of other technologies, where the dominant share goes to renewable energy resources (Jovanović *at.al*, 2004).

Materials and methods

The work consolidates and compares the results of two previously executed and published researches. The first research concerns potentials and possibilities for utilization of waste originating from production of bricks and tiles. The dynamics of turnover of the available raw material

and/or potential development of this production was analyzed by means of change rates within the observed period (2006 - 2010). Change rates were observed through the exponential function. The calculation of expenses of the brick industry waste starts with the calculation of investments into production plant and/or granulating of the waste material to the desired granulation. It was made from the existing technical and technological project. The calculation of expenses is based on establishing of total expenses (Jakovčević, Klara 2008). The calculation of the expenses of material was performed in accordance with the actual price of the brick waste on the market. Depreciation was calculated in accordance with the assessed investments and the assumed life of individual assets. Salary expenses were calculated in accordance with the average salary in the Republic Serbia, reduced in accordance with the required qualification structure. The expenses of the consumed energy were established in accordance with the level of consumption and the market prices. The expenses of maintenance of facility and equipment were calculated according to the experience. The opportunities of the expenses of financing and utilization of land were calculated according to the usual interest rates for long-term loans on the Serbian market, and the insurance costs were calculated according to the premium rates of insurance companies.

Plans for production of the marsh reeds building material are based on implementation of the collecting harvester with the capacity of 56.000 usable reed bundles annually and 8 weaving machines, Berger type. Calculation of the next annual production was made in conformity with the norms of work and consumption, as follows: 1) insulation boards- 5 cm 13.300 m2, 2) insulation boards - 3 cm, 13.300 m2. Calculation of expenses is also based on calculation of the total production expenses, where the arrangement of expenses is derived from the calculation of division. It was planned to engage 4 people, and the salary calculation was based on the gross income, where the said is calculated in accordance with the average income in agricultural sector of Serbia.

The results of the research and the discussion

Construction represents one of the basic human activities. The volume of construction works has been increased with the development of the human civilization so the modern civil engineering, directly or indirectly, causes the significant level of the annual environmental damage. The adequate use of recycled and waste materials could significantly

contribute to sustainable development. This can be achieved through the utilization of the ecologically acceptable materials and construction methods. Development of ecologically acceptable technologies can be of a great significance, since the civil engineering consumes approximately 60% of the raw material extracted from the lithosphere (Wadel, 2009). On the other hand, the adequate use of recycled and waste material can significantly contribute to sustainable development. Realization of the said objective is possible to be completed only through the invention of the ecologically acceptable materials and construction methods. One of the solutions lies in recycling and reuse of the referred material, which directly contributes to the sustainable production and/or exploitation of the renewable resources. Development of sustainable technologies is of a great significance since the civil engineering consumes 60% or the raw-material extracted from the lithosphere (Wadel, G., 2009). Out of the total volumes, construction takes 24% of the total extraction. In Europe, construction process consumes 4.8 tones of the mineral raw-material annually, per capita. Regardless the fact that the most significant part of the environmental pollution origins from materials produced in the process of building demolition (Van den Dobbelsteen, *et.al.* 2002) other types of material also have significant influences on the environmental damage. Earlier researches indicate that the construction industry must respect sustainability and consider its influence on the environment (Speth J.G., Ehrlich, P., Ehrlich, A., 1990).

The study considered possibilities for production of materials which can be used in construction, from the standpoint of implementation of natural and traditional materials and/or recycling in production of the building material. Besides, the referred technologies should create the base for development of the entrepreneurship within the rural regions.

Building material is often selected only upon completion of the construction project or during the process of composing of the project documentation, which represents wrong methodological approach. The selection of the material which will be used in the construction process represents the base, as for the quality of the building so for the development of the own industry of the building material and the society in general. Constructors have always aspired to use materials which were present around them and easily available. In accordance with that, the materials used in construction are still used even today. Great number of innovations achieved so far with regard to technology, mechanical characteristics and other, requires studious and comprehensive approach

to the implementation of the material. Besides, the behaviour of traditional materials in the process of exploitation, in modern conditions of micro and macro climate changes and from the viewpoint of environmental and ecological protection of the environment, requires strict control and constant testing. Only by means of adequately established technologies can it be possible to create the real base for the development of entrepreneurship.

From the aspect of potentials for product realization, it is necessary to point out that the value of the works completed at the territory of the Republic of Serbia in 2010 was 179.876 million RSD, which is for 2,7% less as compared with 2009. Taking into consideration the actual crisis, the said reduction is not so significant. From the viewpoint of the type of buildings, 48.9% of the value was realized in construction of buildings and 51.1% in construction of other facilities. Besides, the contractors from the Republic of Serbia realized abroad, in 2010, the works in the total value of 13.256 million RSD. Such construction activities in the foreign market were recorded in Montenegro, in amount of 17.1% out of the total value of the completed works. In 2010, 18,648 apartments were completed, which is 2.4% less as compared to the number of apartments completed in 2009, which is in conformity with previously presented data (Statistics Yearbook of the Republic of Serbia, 2011).

In the process of development of production materials and technologies, and later implementation of the said through the models of entrepreneurship development, it is necessary to provide the correct interpretation of the European model of agricultural development. European trend of agricultural development is based on concrete, multifunctional and sustainable agricultural model. The idea of multifunctional confirms the fact that the agriculture plays many different roles because, apart from production of agricultural products and food, agriculturalists keep and maintain the safety of the food they produce, through good agricultural practice, they protect the environment, take care of the environment and contribute to economic and social development of the country, by providing, at the same time, valuable public domain of the entire society (Rural Development Strategy Plan – draft, 2009-2013). This multifunctional agricultural model observed in such way should be the base for exploring of capabilities of the referred sector in intention to contribute to development of the rural economy trough production and development of traditional technologies. Majority of traditional technologies refer to technologies applied in the field of production and

processing of the agricultural products and creation of the foodstuff articles with authentic features and geographical origin. On the other hand, development of the rural areas should not be limited only to the sector of agricultural foodstuff production, but this development should be extended to other sectors as well. In accordance with the said, the production of traditional building material can be quite valid resource for opening of new working positions and their maintenance in the rural areas of Serbia. This is especially significant for the rural areas which do not have any other sources for employment on their disposal. In this way, we will provide environmental protection which represents another element for creation of the social wealth.

In this way, it will be possible to realize the objectives defined on the level of the Rural Development Strategy. The expansion of the business areas, for the population living in undeveloped rural areas, would significantly contribute to sustainability of the family income through the reduction of unemployment. Development of the technologies which require the skilled structure of the employees would influence the reduction of poverty and social exclusion. Besides, in this way, it will be possible to influence, directly and indirectly, the protection of the environment, which represents prerequisite for the future development of the rural economy in total. Increase of the social income would create the base for improvement of the economic and social infrastructure in the rural Serbia.

The process of improvement does not necessarily need to be in connection with development of industry and high technologies, but first of all, with creation of the base for the dynamic entrepreneurship. Possibilities for this type of development are provided exactly by the application of the traditional technologies adapted to the market economic model. In order to create favorable ambience it will be necessary to overcome the whole range of limiting factors: 1. Absence of the socially – economic motivation for innovative behavior and productive entrepreneurship, 2. Poor availability of qualified and internationally competent labour force, 3. Poor quality of regional, sub-regional and local infrastructure, 4. Orientation of the regional financial infrastructure towards the crediting of import activities and the population 5. Poor efficiency of regional, sub-regional and local state authorities and services in removal of such problems (Adžić Sofija, 2006). In the light of these notions, it is clear that the development of the rural sector cannot rely, in the foreseeable future, on development of the high-tech industry, but must

find the solution for their problems in more affordable activities. Resources of the rural regions are, as a rule, quite dispersed which conditions specific and/or local character of their exploitation. This is exactly the fact which provides possibilities for wider involvement of the traditional technologies and recycling into the expected growth of this sector.

Average amount of the total production of the Serbian brick industry within the last five years (2006 - 2010) is 3.267.589 tones 22 (Internal documentation of the Association for Construction, 2011). The largest part of this production (82.5%) refers to bricks and blocks, whereas the small part refers to tiles (17.5%). Regardless the fact that the annual production rate is decreasing (-20.81%), significant volumes of waste are being created. The estimated annual volume of waste is 76.813 tonnes, out of which the largest part (70.2%) refers to the waste originating from production of bricks and blocks. Some of the years within the observed period reached significantly higher level of waste, which went up to 100 thousand tones annually.

The said type of waste is very favorable for recycling and application in rehabilitation of cultural heritage facilities, for the following reasons: 1) homogenous structure and composition, 2) it does not depend on periodical processes such as construction of roads and bridges, and unplanned events such as natural disasters, 3) it is available throughout the year and can be stored cheaply. On the other hand, the volume of this waste depends on the level of growth and total economic development which is defined by the level of production of the building material, and/of the level of construction and renovation. In accordance with the previously listed data and estimations, the table 1 gives the composition of ten types of mortar.

The very process of grinding of brick and tile waste to the desired granulation is technologically simple. Calculation of expenses was performed on the example of the standard plant which consists of: 1) loading machine, 2) baked scrap feeder, 3) transporter for delivery to the grinder, 4) grinder and 5) transporter for removal. Besides, it was planned to make investments into the baked scrap storage, necessary construction works (foundation for assemblage of the equipment and the line for removal), equipment for electrical control, dust remover machine, and investments into designing and obtaining of permits and consents. Researches performed so far (Nunes KRA *et.al.*, 2007, Symonds Group

Report 1999) indicate that the construction and the capacity of the plants for recycling of the building material is mainly determined by the capital expenses and the possibility to provide sufficient volumes of waste for processing. Thus, the operational profitability of such plant mainly comes down to economy of volumes and transport expenses. Since in the observed case there is no significant transport distance, it was much simpler to perform the analysis of profitability. The total price of material was calculated according to the expenses of the process of recycling of the brick industry waste and/or production of the brick powder and market prices of other raw material required for production of mortar. Analyses of expenses of material required for production of mortar indicate that the price of the consumed material is growing in substitution of the natural sand with the brick powder. On the other hand, there is significant change in the coefficient of thermal conductivity.

The results lead to conclusion that the increase of price of expenses of material, as a rule, is higher than the level of decrease of thermal conductivity. On the other hand, it is necessary to consider the fact that the use of mortar in its final form (embedded into facility) also generates the expenses of embedding which are, as a rule, multiply higher than the expenses of material, so the expenses of embedding will make between 75% and 80% of the total expenses (material and embedding). If we compare the changes on the level of the total expenses, it will be possible to ascertain that the level of increase of expenses is less than the level of improvement of the thermal-insulation properties of the material.
Necessary evaluation of the observed technology can be executed through the complete investment analysis. This is the only way to reach the value of the investment which the investor can invest into the said plants, and/or expenses of recycling, which can be covered from the realized income. The methods of the investment analysis must be based on the market price of products and realized incomes. Since in Serbia there is still no wide market implementation of the brick powder it will not be possible to provide the complete investment analysis.

In the process of production of the reed insulation boards, the first stage of production includes collection of reed with the harvester. Cut reed is sent to machine pressing, and the process results in the board shaped product, with standard dimensions of 3 cm and/or 5 cm of thickness, although it is possible to produce boards upon order. Such boards represent an excellent thermal and acoustic insulation, similar to Styrofoam, which is widely used in modern civil engineering. Pressed

reed boards, 5 cm thick, have the coefficient of thermal conductivity from 0.035 W/mK to 0.04 W/mK, and the noise reduction is 32 dB. These properties are very close to Styrofoam, and the reed has a whole range of other advantages. In calculation of financial results, the starting point is calculation of the total income.

Besides, by methods of divisional calculation we calculated the price of insulation boards. In accordance with the accrued expenses the cost price for the board 5 cm2 thick will be 273.12 d/m2, whereas the price of the board 3 cm2 thick will be 171.67 d/m2. If the quoted price is compared to the Styrofoam of the same thickness, it can be established that the cost price of the reed thermal insulation boards is significantly higher. Namely, the price of 17 gram Styrofoam of the thickness is 210 d/m2, whereas the price of the Styrofoam of 3 cm of thickness is 129.00 d/m2. Since the selling prices of the reed are significantly above the quoted ones, it is clear that in the foreseeable future it will not be possible to expect mass introduction of the reed as the building material. Besides, in actual production conditions, the producers, as a rule, direct 70% of their production to the plastering, because it reaches 3 – 3.5 times lower price on the market as compared to insulation boards of 5 cm of thickness, because its production price is up to 10 times lower.

Based on the planned production and calculated profit and loss account, it is possible to provide economic indicators. Calculated profitability of the project is 4.45% which cannot be considered favourable since the quoted rate is much lower than the bank interests. The profitability coefficient is acceptable – 1.28. On the other hand, in case the selling price is calculated on the basis of the equivalent material and/or Styrofoam of the adequate thickness, the final result of the production would be negative. The quoted difference is conditioned with relatively high investments made into the observed production and indicates to the existence of the financing problems.

Conclusion

As it was previously stated (Zekić, 2011), it is clear that the development of the rural sector cannot rely, in the foreseeable future, on development of the high-tech industry, but must find the solution for their problems in more affordable activities. The resources of the rural regions are, as a rule, quite dispersed which conditions the specific and/or local character of their exploitation.

In the earlier stages of development of the human society, materials used in construction were characteristic for the specific regions and climates. Technology development provoked the changes in the construction industry which mainly reflect in replacement of the locally available traditional technologies with the modern ones. Materials entered new, modern age of construction, so their production technology allows them to fit in and adapt to the specific requirements of individual buildings. The selection of the building materials for specific purposes, as a rule, is performed according to the functional, technical and financial values. However, if we respect the idea of sustainability and/or the sustainable development as an important criterion that has existed during the last couple of decades, that will change the classical approach to evaluation of the building material. It is exactly in this domain of evaluation that the traditional construction techniques find their place, as well as materials produced from recycling process. In conformity with that, and since the opportunities for development of small entrepreneurship in the rural regions mainly refer to the field of agriculture, tourism, and small capacity light industry, the production of building materials represents the possible way of development.

Besides, the process of approaching to the European Union implies significant changes exactly in this rural sector and/or it implies the radical restructuring and changes in approach to the rural regions. In order to realize the adequate development of such areas it will be necessary to make significant investments as well as technical and infrastructural renewal. Besides, it will be necessary to provide education and trainings, and/or to create the conditions for changes in the way of life in rural areas. The concept of integral rural development, as a part of the regional development policy, represents good substitution to the classic industrialization and it is very attractive in the countries with the large rural regions, such as Serbia. In conformity with the aforesaid, and in order to include the concept of rural development into the governmental planning, it would create conditions for solving of the whole range of issues and realisation of the harmonious development of the entire country.

We also presented comparative analysis of the economic parameters in exploitation of the brick industry waste material as a substitute for cement and natural sand and production of marsh reed insulation boards. Calculation of expenses of recycling of the brick industry waste indicated that the observed technology has both, technological potentials and

economic justification. In conformity with that, the recycling of the brick industry waste should be involved into the wider context of the sustainable resources and the waste management, with adequate understanding of interaction between the crucial elements of production, deposition, recycling and transport. Only in cases where, apart from the ecological sustainability, the economic sustainability can be proved as well, it will be possible to expect higher volumes of production and application of the said material.

On the other hand, according to the projection of production and the calculated profit and loss account, the obtained profitability and economy coefficients are acceptable. It is important to mention that the price used in calculation is much higher than the price of the equivalent material and/or Styrofoam of the same thickness. High production expenses are conditioned with relatively high investments into the fixed assets which indicate to the existence of the financing problems.
In order to reduce the level of the investment risk for the investors, economy and policy instruments must provide, in advance, financial support for the referred technologies and regulation of the market of the building material in its entirety.

This can primarily be achieved through the consistent application in the use of traditional and recycled material, and financial support through the influence of taxes on storages and production plants, as well as through the direct influence through subsidizing of the production plants and recycling centers or recycled secondary raw-material and materials produced in the traditional production process.

In conformity with the aforesaid, the special measures applied in planning of stimulation of development of the said sector will include: 1) development of technologies and adequate technical solutions; 2) research of purchase and selling market; 3) introduction of technological solutions to potential users; 4) establishment of funds and institutions for favorable crediting of new plants and development of the existing ones, 5) stimulation for use of alternative materials in construction 6) development of tax and other exemptions, 7) construction of zones for allocation of land under favorable conditions with arranged utility and other infrastructure for the listed purposes, 8) initiation of the process of establishment and activities of technological parks.

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PROSPECTS AND CHALLENGES FOR THE DEVELOPMENT OF BEEF CATTLE BREEDING: CASE STUDY OF BULGARIA

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Abstract

During the last years the role of the animal husbandry production for society has considerably changed. Beef cattle breeding in Europe face the challenge to work out a new conception for an efficient and sustainable animal raising and feeding in the area of beef production. The conception that economic, social and ecological results in animal husbandry production are inseparable and positively related has been winning recognition. During the last 20 years a process of massive reorganization has been done in Bulgarian agriculture which has led to changes in cattle breeding: a decrease in the number of farms and animals raised, and, respectively, of the production obtained. Emphasis must be put on to the trend towards increasing the producers' interest in beef cattle breeding. This determines the special attention the present study pays to the strong points and weaknesses of this sector in Bulgaria, as well as to the opportunities and challenges it faces.

Keywords: *beef cattle breeding, Europe, prospects, Bulgaria*

Introduction

Both the whole economic system and the animal husbandry face challenges having global, European and national dimensions. The unsustainable use of natural resources, climate changes, the increasing demand for high-quality and safe food products, produced with a care for animal health and welfare, require that science, practice and state policy pay more special attention to the possibilities of the different countries for the sustainable production of food products, including beef meet.

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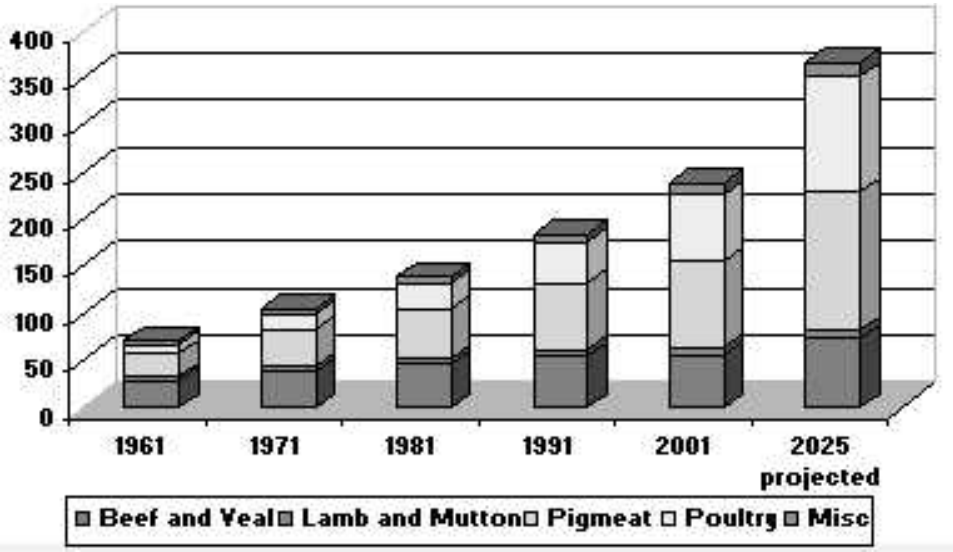
Indisputably, animal husbandry (including beef cattle breeding) plays a significant role in the food supply and, particularly, in the supply of high-quality animal proteins. The demand for animal husbandry production, including meat, is increasing and will continue to increase, particularly in the developing countries. According to FAO data (FAO, 2010) the world population is expected to increase by more than 30 % as of 2050.

This will result in the rise of food products demand by 70%, which comprises a presumable double increase of the world meat consumption. According to estimations of FAO and OECD the consumption only of beef meet will increase by 1,5% for the 2010-2020 period (FAO-OECD, 2011). Figure 1 presents the trend in the consumption of the different meat types.

Figure 1. *Global Meat Consumption by Type, 1961-2025, Millions Metric Tones*



Source: *FAO and Dr. Thomas Elam, http://www.world-ostrich.org/demand.htm*

The expected increase in veal consumption is due both to the world population increase and to the transformation of nutrition models in the developing countries (FAO, 2010). Veal consumption in some Asian countries such as Japan and South Korea increases, which is related to the favorable economic conditions of these countries *(Table 1)*.

Table 1. *Beef consumption in EU and some other countries, 2010 and 2025*, 1, 000*

Country	2010	2025	2025/2010	2025/2010 (%)
EU-27	8 200	8 102	-98	98.8
United States	11 865	13 631	1 766	114.9
Brazil	8 008	11 395	3 387	142.3
China	5 528	8 464	2 936	153.1
India	2 150	2 848	698	132.5
Argentina	2 303	2 602	299	112.9
Australia	760	868	108	114.2
Russia	2 235	2 110	-125	94.4
Japan	1 207	1 364	157	113.0

Source: **FAPRI, 2011.*

Although priorities in climate changes restriction and optimizing of meat production are considered, as a whole, as contradictory and conflict tasks, it is increasingly admitted that animal husbandry production, economic, social and ecological results are inseparable and positively related. (Hocquette, Chatellier, 2012). Animals offer a lot of benefits for the eco systems – they provide means for the pasture support as well as meat and dairy products for people. Society is paying more and more attention to the "green type" farmer systems.

Thus the role of the animal husbandry production for the society has changed during the last years and these changes continue happening and become intensified. That is why stock-breeders are compelled to adapt their farmer systems if they want to preserve their income and to offer products, intended for the market needs as well as for the healthy, ecological practices, accepted by society.

In the beef sector the international trade represents 10% of the world production. In the years to come trade flows are expected to increase and to be determined by the production costs, trade policy (tariffs) and sanitary measures.The scientists and farmers together have to look into the future to work out and put into practice new models for animal breeding in order to increase the benefits. The challenge is to work out a new conception for efficient and sustainable raising and feeding, particularly in the veal production.

Beef must be produced by using less resources and more sustainable breeding systems, which include environmental, economy and social aspects (Capper, 2011). The support of farmers-producers is vital for the existence of viable village communities and the development of the rural areas as a whole.

The veal market in the EU

In the 27 state-members of EU meat consumption was 77 kg/capita on average in 2010. Veal was 21% of the total amount of meat consumed – 16 кg/capita, with 41 кg/capita of pork; 17 кg/capita of chicken; 3 кg/capita of lamb and goat meat. The meat consumption in EU, indicated above, is less than in Argentina, Brazil, the USA, Australia (FAPRI, 2011). In these countries the veal consumption share is the biggest (Argentina – 58%). But meat consumption in EU is bigger than in Russia, China, and Japan. The EC expects a decrease from 1,1 кg/capita until 2020 (with 16,4 кg/capita in 2010) in veal consumption in Europe (European Commission, 2010). 8 million tones of the world beef production (12 %) belong to Europe, which is 19% of the total meat production in the European Union. Since 2002 the EU has not met its needs by its own production (Ernst & Young - Government Services, 2007). In the future the levels of beef production will be connected both with the dynamics in the dairy sector and the policy, conducted by WTO и CAP, as well as with the price balance "grain-animals".

Beef sector is characterized by low competitiveness which is due primarily to the long production cycle and to the lower efficiency in the forage utilization, compared to that in chicken and swine. In the 12 member states, recently admitted in the EU (Table 2), where the purchasing power is lower than that in the other 15 states, pork is the much more preferred meat - beef is consumed at the rate of 4 кg/capita, (with 12 кg/capita in Germany, 19 кg/capita in the UK, 25 кg/capita in France). Beef consumption in EU is not connected only with economic factors, but consumers are influenced by the technological innovations which make the meat well adapted to their expectations (practical use of the product, taste, tenderness, nutritional value and safety to human health).

Table 2. *Beef consumption per capita (kg/year) in some member states of European Union, including new member states (NMS), 2010*

Country	2010 (kg/year)
France	25.0
Germany	12.9
United Kingdom	19.7
Ireland	19.5
Spain	10.7
Italy	23.1
Netherlands	15.0
Belgium	14.6
Austria	17.6
Denmark	20.0
Poland	3.5
Romania	1.9
Czech Republic	9.1
NMS (12)	4.1
EU-27	15.2

Source: *European Commission, 2011.*

Another factor, influencing the consumption level in EU, are health crises in animals – for example, in Germany the "mad cow" disease led to a considerable decrease in veal consumption in 1996 and 2001. Moreover, some ethical factors (animal welfare, animal slaughter) and the environment protection (water quality, bio diversity) are more and more being complied with by European consumers.

According to FAPRI, EU will be the fourth in the ranking of consumption level of beef (after the USA, Brazil and China) as well as the fourth beef producer (after Brazil, the USA and China) in 2025 (Table 3). FAPRI forecasts indicate that in 2025 veal production in EU (7,68 million tones) will be less than domestic consumption(8,10 million tonnes) (13% of the world consumption), which determines the trade balance as negative (-0,41 million tons). The EU forecasts confirm this trend (-0,54 million tones) in 2020.

Table 3. *Beef sector in European Union and some other countries, 2010 and 2025 perspectives*, 1 000*

Country	2010	2025	2025/2010	2025/2010 (%)
EU-27	7870	7689	-181	97.7
United States	11 781	12 982	1 201	110.2
Brazil	9 789	14 955	5 166	152.8
China	5 550	7 957	2 407	143.4
India	2 850	3 555	705	124.7
Argentina	2 600	3 119	519	119.9
Australia	2 080	2 579	499	123.9
Russia	1300	946	-354	72.8
Japan	510	431	-79	84.5

Source: **FAPRI, 2011.*

In the countries where specialized beef cattle breeding is developed, three types of production farms are formed: pure breed farms in which the breeding animals, bulls and cows, are raised and the selection in this field is made; herds where cows from dairy breeds are raised for the production of offspring for fattening and the third type are the farms for calf fattening.

The sector of the beef cattle breeding in Europe is characterized by heterogeneity with regard to the specialization, intensification, animal type, (suckler cows, calves, heifers, young cattle, bulls, castrates), production systems (animal breeds or feeding systems) (Hocquette, Chatellier, 2012). This heterogeneity is connected with the natural facts (soil potential, climate, altitude, topology), traditions in the agriculture, state policy. The expected decrease in beef production could be explained basically by the fall in the total number of cows in Europe. The rise in the milk yield, which is the result of genetic progress, leads to the decrease in the cow number in all the countries of EU (Table 4), which also results in the decrease of the beef supply. The number of the beef cows (suckler cows) remains stable (in 2010 - 12, 4 million). This number depends on the profit (not very good as of the present moment) in this sector as well as on the direct subsidies given to the producers in compliance with the sector policy. Lasting trends towards the increase in the beef cows number can normally exist in some countries, characterized by favourable forage resources, but the implementation of this trend requires a better price and the maintenance of an efficient tariff defence.

Table 4. *Bovine cattle and suckler cows in some member states of European Union, including new member states (NMS), 2010, 1 000*

Country	Bovine cattle	Suckler cows	Suckler cows/ Bovine cattle (%)
France	19 307	4 189	21.7
Germany	12 810	717	5.6
United Kingdom	10 115	1 658	16.4
Ireland	6 617	1 107	16.7
Spain	6 277	1 992	31.7
Italy	6 056	424	7.0
Netherlands	3 970	80	2.0
Belgium	2 601	529	20.3
Austria	2 019	264	13.1
Denmark	1 642	112	6.8
Poland	5 724	118	2.1
Romania	2 501	16	0.6
Czech Republic	1 403	182	12.9
NMS (12)	13 322	543	4.1
EU-27	89 341	12 429	13.9

Source: *European Commission, 2011.*

According to EC the beef export will represent only 1% of the domestic production in 2020. The beef import comes mainly from the Mercosur countries. The import is expected to reach 0,6 million tons in 2020 (8% of the domestic consumption).

The beef European market is very differentiated and segmented because of the presence of many national and European trade brands and high quality signs from bio farms, or signs for origin based quality. (Hocquette, Chatellier, 2012). We should not forget that in Europe safety and competitive prices of food products are the main motives in consumption and will remain very important.

Beef cattle breeding in Bulgaria

During the 60s of 20th century the first attempts at creating beef cattle breeding in Bulgaria were made. A work module with suckler cows of the gray breed and other dairy breeds, raised by new technologies, was used. (Dardjonov, 2011). After the unsuccessful results during the 80s a plan for

the creation of a contemporary beef cattle breeding was made. It was based on the use of dairy cows, unable to reproduce (the so called passive part of the dairy cows) and these cows were crossed with bulls of the Hereford breed. Male offspring were used for fattening and female cross-breeds were crossed with bulls of the large beef cattle breeds Simmental, Charolais, Limousin or Blonde d'Aquitaine. Both female and male offspring, having three quarters of their blood from the beef cattle breeds, were intended for fattening. In order to make this model function, cows from the passive part of the dairy population were introduced every year. This model was borrowed from Hungary. Small groups of mothers or other beef cattle breeds such as Aberdeen Angus, Limousin, Salers were imported but these experiments did not lead to the creation of a contemporary branch of proper dimensions.

During the last 20 years a process of massive reorganization in the agriculture has been occurring and it influences cattle breeding and the products, obtained from it. The number of the farms, animals, raised in them and the products obtained have considerably decreased. The organizational, structural, and normative changes, imposed by the membership in the EU, the necessity of observing the requirements, imposed by the application of the CAP as well as the economic conditions in our country influence this process. One of the reasons for the additional decrease in beef production in Bulgaria is the loss of traditional markets in the ex USSR, the Middle East countries and North Africa.

As a result in 2006 there were 11 000 cows which were not milked (3.0 % of all cows). They were represented by a small number of herds, primarily of Polled Hereford, in herds of scientific institutes and some farmers' herds. These cows were of different crosses and breeds without distinct beef cattle qualities. They were not related among them. They were not organized in breeding associations. Beef cattle breeding association was not founded until 2011.

During the last years the interest in beef cattle breeding has been increasing. In 2010 the number of farms, where beef cows are raised, has increased by 2%, the number of cows in them – by 17% and they reached a total number of 18 643 (MAF 2011). This trend is a positive, but a slight one, and the main source of beef in the country remains the cattle from the dairy breeds of which the biggest relative share – above 70% - are those of the Black and White breed. Farms with 1-2 dairy cows decrease by 21,9%, and the 3 to 9 beef cow farms, along with the animals, raised in

them, increase almost twice. In spite of the trend for an increased share of the beef cows the total beef, produced in 2010, has decreased by 1,1% , compared to 2008, and by 10,1%, compared to 2009 (Agrostatistic, 2011).

The following aspects can be indicated as **strong points** of beef cattle breeding in Bulgaria as of the present moment:

- Pasture resource available. During the year 2011 (MAF, Agrostatistics, 2011a), out of 11 100 000 ha which is the territory of Bulgaria, 1 678 308 ha are covered by grasslands and meadows which is 33 % of the farm land used, arable meadows used all year long - 428 724 ha; highland pastures – 129 360 ha; low productive grasslands – 1 101 028 ha; meadows, orchards - 19 196 ha. In addition to that, 398 624 ha are not arable land. Except for the pasture resources for: the dairy population of cattle, sheep and goats, horses and the like, the rest (highland and low productive pastures and meadows) may provide for the feeding of more than 300 000 beef cattle. The territory of areas with low-mountain, middle-mountain and high-mountain relief covers 27,5% of the country territory, which is a pre-requisite for the raising of specific beef cattle breeds and crossbred animals of beef cattle.

- Beef cattle breeding can be a cheap production by a maximum use of the pasture resources available and with low-labor cost. It does not require massive premises for sheltering, the cows are raised free range and they rarely go inside buildings or shelters. A lot of the famous beef cattle breeds are also raised in the open in winter with waterproof equipment in the right place.

- Beef cattle breeding can provide for animal health and welfare.When raised in conformity with nature animals become more resistant, more resilient and they get adapted to the environmental challenges more easily. In the Treaty of Amsterdam (1997) EU admits that animals are conscious creatures and states that agricultural production has to comply with animal welfare.

- Animal husbandry systems offer a number of benefits: food production from sources, unusable for people; preserving the ecosystems' function, recycling of food nutrients in plants, providing for social benefits, conservation of biodiversity, preserving landscape for tourism purposes.

➢ Stability of purchase price of animals for slaughter. Table 3 presents the dynamics of purchase price of animals for slaughter during the last 3 years in Bulgaria.

Table 3. *Purchase prices of fattened calves, euro/kg live weight, without VAT, Bulgaria 2010-2012*

Year / Month	2010	2011	2012	2012/2011 (%)
January	1,33	1,34	1,39	3,8
February	1,32	1,34	1,4	3,8
March	1,31	1,34	1,41	5
April	1,31	1,34	1,41	4,6
May	1,31	1,33	1,41	5,4
June	1,31	1,34	1,4	4,2
July	1,31	1,34	1,4	4,2
August	1,31	1,34	-	-
September	1,31	1,34	-	-
October	1,31	1,35	-	-
November	1,34	1,37	-	-
December	1,34	1,38	-	-
Average	**1,32**	**1,34**	**1,4**	**-**

Source: *Analysis of the market of main animal products, http://archp-bg.com/index.php/component/k2/item/785.*

➢ Beef cattle breeding does not cause competitiveness with the land used for: people feeding, forage production for animals and other agricultural and non agricultural use of the land.

As of the present moment some **problems and weaknesses** of the beef cattle breeding, which is coming into existence in Bulgaria, can be clearly outlined:

➢ The absence of genetic stock – enough animals of beef cattle breeds.

➢ Unprepared animals – resilient and tenacious - to the specific conditions in the country and for the challenges of the environment – deteriorated quality of the grasslands, pastures and meadows, more frequent droughts, more prolonged cold periods during winter.

➢ The utilization efficiency of the exchange energy for weight gain is low (30-50%), compared to that, necessary for the maintenance, which leads to low efficiency production.

➢ The animals fattened are bought up at live weight unlike the right approach, practiced in Europe, which is buying up at slaughter weight. It is known that the difference in quality – meat content in each kilogram live weight – is not a constant value. This difference depends on the breed, age, the fattening rate and other factors. Because of these changing conditions a fixed live weight price cannot exist. The purchase price is twice as low as the average one in EU.

➢ There are no traditions in beef consumption in Bulgaria. The FAO statistics show that in Bulgaria 45.3 kg meat is consumed per capita, or this is almost the double below the average quantity in EU. While people of other nationalities prefer beef or pork, chicken is the most consumed meat by Bulgarians. Out of the total amount of 45 kg meat /per capita/per year 20kg are chicken, 18 kg-pork and 5kg-veal.

The **opportunities**, which must be used in support of the beef cattle breeding, can be summarized in the following way:

➢ A free market niche in Bulgaria – production of quality beef. Fresh meat is hardly sold in Bulgaria; deep- frozen meat is widely offered which makes its price lower than that in the other European countries. For the time being 90% of the beef is imported – the Bulgarians depend on the traders' import. Bulgarian consumer's interest of quality and natural food products is more and more increasing (natural production of meat of known origin). Moreover, people are convinced that ruminants, raised for meat, must be fed on grass, which is a cheap and natural product, provided for by the pastures.

➢ In addition to the population of beef cattle herds for the production of beef meat, created now, the practice of industrial crossing of the dairy cows, excluded from the breeding stock, can be applied. In Bulgaria the main quantity of beef comes from the male calves and the female ones, excluded from the breeding stock for the time being. They all are of breeds, raised for milk production.

➢ A niche exists for quality beef on the European market. The ability of Europe to produce beef by its own resources decreases. The principal

importers of veal to Europe are Argentina and Brazil which are situated at 12 000 km by air from Europe. The long transport routes increase the greenhouse emissions which contradicts the principles of sustainable production and supply of food products. Moreover, the increase in the beef demand in South America and China and the price rise for Brazilian producers will lead to the restriction of the meat amount exported for Europe.

- More and more liberal trade of animals and meat, including the east markets, the opening of the world market to the animal products as a whole increases considerably the opportunities of Bulgarian producers. The EU suggestion about CAP after 2013 is to allow payments for the beef cattle herds (suckler cows) as an exception to the common principle of full decoupling. Thus a support, connected with the production, can be provided for the member states which apply for this.

- The Europe 2020 strategy, the National program for development Bulgaria 2020, the European strategy for bioeconomics and others have the following priorities: policies and programs for sustainable management of the natural resources, protection of the environment, stimulation of the resource efficiency, stimulation of the adaptation to the climate changes, the use of local potential, enhancement of the competitiveness of small and medium enterprises and the like. All these priorities are prerequisites for the support of the beef cattle breeding sector in Bulgaria.

- The international economic integration is imposing more and more a unified system for qualifying the production which is a prerequisite both for the free movement of goods and for their control. Nowadays different systems for categorization and buying up of the slaughter cattle are used in different countries and regions of the world. The majority of them are based on the quantity and quality of the meat produced. In 2010 the EU scale for the classification of carcasses (S) Europe was introduced in Bulgaria. In 2011 there was an increase in the classified cattle by about 15% compared to 2010. National additional payments were made by the State Fund Agriculture to producers who give their animals to slaughter houses, working in the framework of (S) Europe. The total introduction and use of the EU system for the qualifying and payment of the cattle fattened will contribute to the successful integration of Bulgarian producers both to the European and

world markets. The better payment for certain beef qualities will stimulate particularly the wider spreading and use of specialized beef cattle breeds.

➢ In 2011 several purebred herds of beef cattle breeds – Limousin, Aberdeen Angus, Galloway were imported to Bulgaria which is a prerequisite for higher income from better production results, a more high-grade and expensive product.

➢ The latest acquisitions in genetics and genomics in Europe will allow the study of the regulation of the phenotype variation in animals, including the efficient forage use, emissions of greenhouse and other gases (nitrogen, phosphorus), health, a quality product, robust and resistant under unfavorable conditions.

Threats and challenges

➢ In the long-term plan the beef cattle breeding sector in EU will be susceptible to the decisions, made at the following agreements of WTO, and the decisions in the framework of CAP. Doha Round, which began in 2001, but has not been completed yet because of disagreements of the countries, regarding the European agriculture. The financial support for the export of agricultural goods decreases – from 10 billion euro in 1990 it fell below 1 billion euro in 2010. In the next agreement with WTO this support will probably be banned. The export will probably comprise special beef (high-quality) and certain live animals (export of genetic know-how). Since prices in the beef cattle breeding sector in the EU are higher than those in the importing countries the big tax reduction may lead to the beef price decrease in the EU. Lower beef prices will result in lower farmers' income and this will restrict the possibility to maintain a sustainable development of rural areas in some parts of Europe. Specialized beef cattle farms will be very susceptible to a change of the direct financial aid amount. In the framework of the new CAP and the financial means for the 2014-2020 period the issue about the distribution of the direct aid will be of decisive importance for the beef cattle breeding sector. The long term support of this sector means a better distribution of the direct aid having in mind the environment protection and keeping the employment level in rural areas. The production level will also depend on the relationship "grain-agricultural production". Beef cattle breeding need more stable prices because of the big duration of the production cycle and the low capital return. In regard to this in the future CAP will have to support some instruments for market regulation (state intervention in the

case when prices fall under a certain level) as well as for stimulating young farmers' start in this sector.

- Beef production in the EU will react to the changes in the dairy sector (that is to the rate of the milk production development in order to respond to the increasing world demand for dairy products). In some European countries, under the influence of the quota system, in spite of the well developed beef cattle breeding an increase in the number of calves for fattening of the diary breeds has been reported (French, 2010). If a necessity for the increase in the beef cattle population arises in order to maintain a certain level of veal production the potential of the rural areas with low density population and forage resource will be used.

- The consumers' purchasing power is a key determining factor for meat consumption per capita. This is particularly true about beef whose price is higher than that of the other forms of animal protein. The economic crisis and the worldwide recession restrict the purchasing power of the population. During the last two years Bulgarian consumers have turned back to the consumption of food products of a lower price range which has led to even more restricted demand for beef.

- The average income of the producers in the beef cattle breeding has not increased during the last 20 years notwithstanding the big financial aid from the EUC (Veysset et al., 2005). This brings the issue about whether the economic efficiency increase of the production is still possible.

- The dispute between the stages in beef supply chain - all the disagreements along the chain of beef supply (for example between farmers and slaughter houses, between slaughter houses and wholesalers) not only decrease the efficiency of the quality guarantee process for the consumers but it also leads to unequal distribution of the value added among the participants in the chain. The consequence of the discussions between the participants in the chain is the failure to guarantee quality to consumers and to give them truthful and exhausting information. Thus the whole organization of the chain for beef supply represents a challenge.

Conditions for successful implementation of the project about the development of beef cattle breeding in Bulgaria and production of natural beef meet:

- In regard to the conditions, the integration of the chain of beef supply and the building of a competitive system with much more relations among the participants and the interested parties (farmers, slaughters, manufacturers, wholesalers, retailers) must become a priority.

- Working with the institutions – local, regional, national, European, with the purpose to look for opportunities for additional stimulation of producers.

- Building a system for an efficient relationship between science and the farmers for all embracing consultancy activities (soils, pastures, breeding activities, veterinary protection and prophylaxis) as well as for creating trademarks of the beef produced.

- The conditions under which the veal is produced in Bulgaria must be changed to a great extent – they must comply with aspects such as animal welfare, environmental protection, pasture systems for raising cattle, etc.

- A prerequisite for the development of specialized beef cattle breeding is the formation of highly efficient herds for the production of offspring for fattening. The problems in these herds go into two directions. On the one hand the raising system of the cows for the production of calves must guarantee production efficiency. On the other hand – the fattening of the offspring produced depends on the right choice of the mother's breed which can be a purebred or a crossbred one. In addition we consider as an important factor for efficiency using the cows for much longer periods. Videv, V. (1994) has established that the combination ability of Bulgarian Brown Cattle with Limousin is a very good one and this combination can be used as a base for the creation of herds of the female crossbreds for the production of offspring for fattening. Ferrell C. and T. Jenkins, (1998; 1998a) indicate that for the creation of such patterns for three-breed meat crossbreds it is important to study the combination ability in order to use the heterosis effect at the maximum, particularly in regard to the carcass quality, marbling rate of the meat, ratio of the bone and fats to the meat, etc. For the needs of the more unfavorable regions and conditions this combination ability must include some more qualities such as resistance and robustness.

- Under the conditions of a stable market and prices the beef cattle breeding can become a profitable sector if it increases the cattle energy efficiency use. A number of authors have established the influence of the

beginning age and the live weight on the fattening (Yerturk et al., 2011), the ration type, the ratio of different forages, (Djurbinev et al., 2001), the type of animal breeding during the fattening process (Stoykov et al., 2006) as the main factors. The raising system is a factor which influences directly not only the economic indices during fattening, but also influences the carcass quality and the meat of the animals fattened (Jurie et al., 1998; Sinivirsky et al., 1986). However, there is a growing need for parallel assessment of economic results as well as of the influence of the production system on the environment.

Conclusion

The development of the beef cattle breeding is one of the principal ways of meeting the meat needs both with regard to the quality and quantity. Beef cattle breeding is one of the sectors, which could easily meet the requirements of protecting and improving the environment and keeping animals according to demanded welfare – the forage sources for beef production could be those, which are not used as food for people – forage (grass) from land unsuitable for plant crops, waste products from the plant growing, by products of the food - and-tobacco and forage industries; applying more extensive and animal friendly production systems.

The strengthening of beef cattle breeding positions in rural areas will lead to the development of other activities which is particularly important for the economic development of the less favored areas (mountain ones, etc.). Mainly pasture animal husbandry of ruminants can be developed there, which is a prerequisite for the production of typical local meat products.
Meeting the challenges and changes in the contemporary dynamic world by the beef sector is possible by dint of: a) fixing the right and sustainable framework, supported by the instruments of the European and national policy, by providing for additional payments in the field of the beef cattle breeding – additional payments for a suckler cow with a calf, for raising a one-year calf and more and for a fattened animal having distinct slaughter qualities, offered for slaughter; b) improving the genetic characteristics of the beef cattle breeds with the purpose to increase the quantity and enhance the quality of the meat obtained, as well as by creating robust animals to the specific environmental conditions; c) implementation of different crossbreeding methods of the dairy and mixed breeds with beef cattle breeds in order to create crossbreds, characterized by fast growth, resistance to diseases, excellent utilization of the roughages, a higher meat yield and meat quality; d) by a maximum use of pastures, meadows

and the biomass according to the specific characteristics of the different region types; e) beef cattle breeding can strengthen its positions as a successful economic sector in Bulgaria only by complying with the competitiveness of the whole chain for beef supply.

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DETERMINANTS OF SUSTAINABLE AGRICULTURE AND ORGANIC FOOD PRODUCTION IN SERBIA

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Abstract

This study presents the conditions and possibilities of sustainable agriculture and the organic food production in Serbia. The concept of organic agriculture was considered in the function of the organic food production. The principal characteristics of adjustment of cropping practices and procedures of establishing and realisation of the organic food production are pointed out. Furthermore, biological control in the realisation of the organic agricultural production is indicated. Fundamental procedures of biological control in organic agriculture are related to providing quality of soil, water resources and feed. Moreover, the alternative forms of crop protection products are indicated. Specificities of alternative programmes are studied with the aim to produce organic food. The necessity to adjust the education of producers and experts to perform the organic food production is also indicated.

Key words: *sustainable agriculture, organic production, organic food, agroecology, biological control, organic manure*

Introduction

The development of sustainable agriculture and thereby of the organic production are determined by ecological and economic conditions. On the basis of harmonisation of these two factors the possibilities to produce organic food are established (*Bošković et al., 2003*). Greater requirements of consumers, especially during the last ten years have resulted in a significant increase and development of organic agriculture all over the world. Although organic agriculture covered only 3% of total arable areas

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in the EU countries in 2000, it should not be forgotten that it is the most dynamic sector of agriculture in those countries. Organic food is basically the eldest form of agriculture on the planet. The agricultural production without chemicals, based on oil (chemical fertilisers and pesticides) was the only option after the II W.W. However, the technological advancement that followed resulted in significant economic advantages, but also in pollution and degradation of the environment (*Schmidhuber, 2003*).

Effects of the conventional agriculture

Monocultures spread all over the world leading to soil use for growing one crop species several years in a row. Available data suggest that crop diversity per unit of arable areas significantly decreases (*Magretta, 1997*). There exist political and economic forces that encourage gaining of higher profit from transformation of production on huge agriculture areas into monoculture, simultaneously implying that such production fits into the world market. Technologies that allowed shift toward monocultures are mechanization, improvement of different varieties and hybrids of crops and development of certain chemicals for fertilization and weed and pathogen control (*Atkinskon and McKinlay, 1995; Altieri and Nicholls, 1999*).

From ecological point of view, regional consequences of the monoculture specialization are many-folded:

1) Agricultural systems in which on huge areas are grown specialized crops lack former components of farms and are almost completely deficient in links or are entirely non-complementary in regard to crop production, soil, crops and animals.

2) Circling of nutrients, energy, water and waste materials does not exist any more and the circle, in regard to natural ecosystems remains open.

3) Part of instability and susceptibility toward diseases of the agroecosystem can be linked with the adoption of monoculture type of production on huge areas, that enabled concentration of food source for specialized harmful herbivores and increased areas available for pest immigration.

4) Spread of certain crop species outside natural borders of spreading brings them into contact with potentially harmful pathogens.

5) Industrial type of agricultural production confronts with ever-lasting offer of new varieties and hybrids that should replace old ones due to the occurrence of biological stress, or changes on the market.

6) Need for maintenance of monoculture production type demands increased use of pesticides and fertilizers. However, effects of their use fall and yields of the majority of basic cultures reached the highest levels.

The concept of sustainable and organic agriculture

The World Commission on Environment and Development point out to the basic changes in the human population growth, the necessity for a strategy to maintain the production of safe food and the necessity to conserve natural resources. The definitions of sustainable agriculture are usually focused on the need for agricultural procedures that will be economically vital, meet requirements of people for organic food, but at the same time, that will positively affect the protection of the environment and the improvement of qualitative nutrition of people. Since these aims could be achieved by numerous different means, sustainable agriculture is not related to any special technological procedure (*Kent and Groah, 1996*). Also, sustainable agriculture is not entirely dependent on organic farming. The initial notion of sustainable agriculture was close to terms of its adaptability and flexibility to meet requirements of qualitative food (high and low). Its demands are orientated towards natural resources for production and possibilities to protect soil and other resources. This aim requires the efficient employment of technology in the most suitable way for sustainability.

Organic agriculture is a holistic system that promotes and improves health of agroecosystm, including biodiversity, biological cycles and biological activity of the soil. It gives priority to the application of the production practices of tillage over the application of procedures outside agricultural areas.

The crop rotation provides diversity in crops, feed and less utilised plants, and it improves the complete production and soil fertility, and also

facilitates conservation of plant resources (*Atkinson and McKinlay, 1995; Thompson, 1998*). The integration of the animal production into the sustainable agricultural system provides the additional income via organic meat, eggs and diary products, and also makes available the utilisation of animal draught. Planted fruit trees and forests integrated into a wider ecological system provide not only food, yield, fuel and wood, but also the protection against the sun and winds. There are also different aquatic plants that are integrated into diverse organic agricultural systems (*Webster,1997*)

The most important motifs for engaging into organic agriculture are economic ones, and then the production of organic food and the interest in the environmental protection. All organic farmers avoid the application of synthetic chemicals, although methods they employ differs from one another. The scope of organic farmers is very wide - there are farmers that absolutely avoid the application of any external agent and use exclusively sources obtained in the farm, such as compost, and stimulate insect actives via food conservation. Also, there are farmers that increase soil fertility and control pests by external inputs. The philosophy of the latter ("input substitution") has been advertised much longer than organic agriculture.

In the period of intensive development of commodity production in economy praxis and theory, existed comprehension on primacy of the principle of the social production efficiency. Such position and behavior of the economical subjects, commodity producers were based upon presumptions on unlimited economy resources. The starting point of these presumptions were that resources can be used intensively, without taking care on possibilities of their use in future and on need of reproduction and protection of restorable resources in such conditions in policy of development based upon principles of technical and technological accomplishments in the second half of the 20^{th} century. At the same time, with the achievement of the positive economic and production effects, processes of degradation and pollution of all ecological system were demonstrated.

Emerged tendencies were especially obvious in the most developed capitalistic countries in the phase when intensive development and increase of material production is achieved under influence of merciless competition and elemental influence of commodity production laws.

Consequences of the aggressive behavior of the economy subjects toward nature in whole were economical and irrational spending of natural resources. In these processes, reproduction in nature, especially normal restoration of biological and ecological resources is noticeably disturbed. In last four decades of the 20th century developed knowledge on irrational and improper use of natural resources (*Jovanović et al, 2003; Hojka et al., 2005*).

In 1990, the concept of sustainable development was adopted by European Union, and two years later, the same was done by United Nations. In the period 3 – 14 June 1992 in Rio de Janeiro the Second Conference of United Nations on environment and development was held. On this meeting a significant declaration that legalized concept of the sustainable development was adopted. It became evident that environment can not be preserved and improved by partial politics and measures, but that it is possible to achieve by use of the sustainable development concept.

In early years of the 20th century organic agriculture originated from theory and praxis, including diversity of alternative methods of agricultural production, mostly in northern Europe. There existed three main directions:

- biodynamic agriculture, that occurred in Germany and was defined by Rudolf Steiner;
- organic agriculture originated from England, based upon theory that was developed by Albert Howard in his Agricultural testimony (1940);
- Biological agriculture that was developed in Swiss by Hans-Peter and Rusch and Hans Muller.

Regardless on some differences in approach, mutual base of all these tendencies is accent on elementary connection between agriculture and nature and consideration of the rule of the natural equilibrium. Named directions of alternative methods development of agricultural production moved away from other approaches to agriculture that tended to maximize yield through use of various kinds of synthetic products.

In order to define the concept of the organic agriculture, it should point to definition by Codex Alimentarius, based upon contributions of experts from all over the world: “Organic agriculture is holistic system that

promotes and improves health of the agro ecosystem, including biodiversity, biological cycles and biological soil activity. It gives priority to use of production praxis of soil cultivation in regard to application of procedures outside agricultural areas. This is maintained where it is possible by agronomic and biological methods, contrary to use of synthetic materials, in order to fulfill any specific function in the frame of the system". Codex of the organic agriculture system is directed toward:

- Increase of biological diversity in the frame of the system in whole;
- Increase of biological soil activity;
- Maintenance of longer period of soil fertility;
- Recycling of plant and animal origin waste, thus reducing use of unrestorable resources;
- Support of healthy soil, water and air use, as well as reduction of all forms of pollutants that emerge from agricultural procedures;
- Maintenance of agricultural products with the stress on the methods of the process in order to maintain organic integrity and vital product quality, and
- Stabilization of the existed farms over the conservation period, as well as it's length that is determined by external specific factors that refer to soil history, type of crops and animal products.

Biologic control witnin organic agriculture

Interests of the public and consumers of agricultural products in pesticide residues in food and serious impairment of the natural integrity of the environment led to the higher interest in control in agriculture. There is a reliable proof that pesticides directly adversely affect human health, hence some countries introduced strict legal regulations on the application of certain types of pesticides in the plant production. It is obvious that a drastic reduction in the number of acceptable chemical products, as well as, in the number of their users in agriculture will occur in the very near future.

Beside the food safety increase, and a reduced level of pesticides in the environment, the advantage of biological control lays in the fact that agricultural workers are less exposed to pesticide effects. Biological control, also, contributes to avoidance of harmful plants, provides the development of beneficial insects, and contributes to the mitigation of problems related to resistance of harmful insects to certain chemicals.

Once established, biological control in agriculture is in fact relatively inexpensive. Biological control of citruses performed during the last 100 years resulted in great practical advantages. Annual saving in protection costs for only four insect species was estimated to 100 M dollars.

Contemporary studies relate to the development of plant varieties that can maintain or improve yields and quality, even under conditions of higher UV radiation caused by a rarefied ozone layer.

Managing water and soil resources for better conservation of available water, improvement of their quality and conservations encompasses the improvement of practical practices on a large scale, from soil conservation to plants with long roots that can use soil moisture and nutrients bellow the level reached by a common root system.

The question of the improvement of the production of fibrous feeds and breeding of domestic animals is one of essential questions of biological control. The point is to develop such fodder crops that will have the maximum gain of green matter during autumn. In such a way, the grazing season of ruminants can be significantly prolonged, and by this, costs of animal nutrition with expensive formula feed can be considerably reduced, with the simultaneous increase of feed consuming efficiency. The aim of animal breeding is to develop animals that will provide a higher meat and milk production per a kilo of consumed feed regardless of its origin.

Under conditions of the organic agricultural production that is developing today, biological control provides the base for control of various pests, but selective pesticides have often to be used. The aim is not to destroy pests, but to maintain their population under the level of economic losses. Since methods of biological control have been spreading, the reduced application of pesticides will result in greater damages in pests than via food alone.

Sound soil is the base for all systems of organic agriculture. Beside appropriate soil fertility, organic farmers have a tendency to biologically active soil with a rich population of micro-organisms necessary for the cycle of nutrients. The crop rotation is necessary for all types of nutrients, such as nitrogen in the case of leguminous crops, or biomass rich in carbon for the development of useful soil micro-organisms. If necessary,

limestone should be used to provide soil pH of 6-7. Beside limestone, manure and composted manure are the best forms for the soil improvement in organic agriculture. In the case of field and vegetable crops, the use of immature manure is permitted three, i.e. four months, respectively, prior to harvest, in order to provide an adequate degradation or to avoid possible problems with bacterial contamination of products. The application of immature (unfermented) manure on frozen or snow covered soil is not permitted. Composting is an advantageous method in manure stabilisation.

Spreading the information on organic agriculture and organic food in the function of the national diet improvement

At the end of the 60's and especially the 70's of the 20th century, the importance of organic agriculture in relation to the awareness of the necessity to protect the environment and to improve the national diet increased. New associations were established. These associations encompassed producers, consumers and other concerned about ecology and the style of living more harmonious with natural laws.

However, since 1980 in the majority of European countries, and also in USA, Canada, Australia and Japan, organic agriculture has been improved significantly via the development of new methods in the production in accordance with the consumers' interests.

The consumption of products of organic agriculture has been increasing all over the world. The greatest part of this increase can be explained by the requirements of consumers for agricultural products that did not contain genetically modified organisms (*Bošković et al, 2010*). Since the use of GMOs is not permitted in the organic production and processing, organic products are separately displayed in the markets. Considering consumers in Europe, their greatest demands for products of organic agriculture show the highest increase in The Netherlands, Scandinavian countries and Germany.

In Italy for instance, about 4% of total agricultural areas are under organic production, while this percentage in Austria amounts to 10% with the increasing tendency. The Prince of Wales has established the farm for organic agriculture with a system by which the government supports farmers to start this form of the agricultural production. Large chains of

supermarkets and restaurants in Europe offer a wide scope of such products. Information on the ever increasing importance of nutrition quality in the function of health maintenance and improvement of the reproductive and creative abilities of the population has been spreading all over the world. Therefore, besides providing optimum quantities of agrarian products, demands for a greater supply and consumption of safe (organic) food have been more severely stated. A deficit in high quality and safe food has been appearing in the food demand structure in the most developed countries. From the aspect of our market orientation one should bear in mind that in these countries the production, and surplus of supply of strategic products (cereals, sugar, meat, oil, etc.), which relatively decreases our export possibilities, on one hand, have been increasing, while on the other hand, the deficit of safe food is pronounced in the structure of the production and supply of agrarian products. Broaden information on the application of methods and technologies of the safe organic food production resulted in a new approach to the development of the organic production and better understanding of a positive relation between diet and human health, as well as, to a possibility to maintain and improve health of different population age groups.

The least and the most developed countries mutually approached better understanding of a great economic and human price of chronic malnutrition in countries that were not able to provide safe food or adequate nutrition of their population due to either economic and technological limits or to wars and natural catastrophes. Factors related to the environment and the effects of chemical and microbiological pollutants on nutritive values and safeness of food are being discovered and considered. The development of a wide scope of new safe organic food products provides the improvement of the food nutritive value in favour of human health. Globally observed, a greater responsibility and expectancy of world institutions are required for increasing the production of safe food. The stress is put on the constructive role of international organisations such as FAO, which, often cooperating with other organisations and donors, establish a relation between a potential to improve human nutrition and quality of living with a struggle to eradicate famine, malnutrition and consumption of unhygienic food that jeopardise population health.

Development of sustainable and organic agriculture in Serbia

Available natural riches in Serbia and Montenegro play a key role in economic and especially agricultural development. This fact results from their diverse ecological structure and comparative possibilities of development. Common natural conditions have significant role for agriculture, for development of its diverse structure, as well as for application of the concept of sustainable development and environmental protection. This is also manifested by available orographic diversity and differential climatic conditions. In establishment of the agriculture sustainable development, adequate measures for protection and improvement of the climate are necessary to be applied. With the aim of protection and management of the agricultural areas, the analysis and permanent adaptation of the production structure by ecological demands is necessary and important (*Hojka et al., 2005*).

In their structure and comparative characteristics natural potentials directly determine possibilities of agriculture development. Serbia possess with relatively convenient and diverse natural conditions that enable development of highly productive and quality agriculture production in a whole, and especially animal husbandry with suitable financial investments. The fact that animal husbandry in the structure of agriculture has a role of the key branch is indisputable, for conditions for more convenient economical valorization of the plant production, especially in regard to field crops is are carried out over it.

In development of agriculture in Serbia, animal husbandry fails to progress significantly, despite the fact that there exist convenient comparative advantages. Relative underdevelopment of the animal husbandry influences inconveniently to use of the available forage. Great portion of this food remains insufficiently used or even decays. This suggests examples of unused maize stalks in significant areas in which maize is grown. Similar situation refers also to other field crops such as sunflower stalks, hay and sugar beet top. In regard to the above stated, a fact that holding back of the animal husbandry inconveniently reflects to soil quality and fertility should also be taken into account. Broad development of the field production that influences on decrease in working productivity in animal husbandry is caused by extremely low availability of livestock in agricultural enterprises and cropping farms, in regard to hectare of agricultural land. At the other hand, insufficient

technical and technological direction of field production is inconveniently reflected to the intensity level of the animal production. This tendency is even more expressed in agricultural enterprises of the former social sector in regard to the private one. However, facts clearly suggest that stimulation of animal production leads to creation of stimulating conditions for faster growth of field crop production. Manure production is enlarged with the increase in animal units. It means that assumptions for intensification of the production are created by increase of livestock, for increased use of manure, increase of active ingredients from organic fertilizers enables increase in volume of biologically high-quality commodity production in regard to hectare of arable land and per worker, raise working productivity and income, i.e. profit increase in agriculture in whole. This suggests that effects in field crop production are expressed by economical effects of animal products and their processed products (*Hojka et al., 2006*).

In agrarian sector, in development of agriculture and this sector in whole, livestock represents especially significant path of advancement and biological resource not only of animal husbandry, but of agriculture in whole. Depending upon livestock size and structure, emerge accomplishments and results in animal husbandry in this sector. This is especially achieved if reflection of commodity production, specialization and motivation of the economic subjects in agriculture, i.e. farmers is to use more rational other resources of development, such as working labor, natural riches, soil, economic objects and etc.

Cropping farms in conditions of market economy, under convenient economic position of animal husbandry have opportunity to increase ecological conditions and soil quality through animal production, growth rate, meat and other processed products simultaneously gaining positive results based on this. In these circumstances of increased livestock and maintenance of highly productive animal production, cropping farms achieve higher level of employment of the available working labor. This enables achievement of satisfactory level of valorization and other production factors (*Simić et al., 2004*). Maintenance of certain livestock level in agrarian sector is highly dependent upon existence of very convenient natural conditions for development of diverse and highly productive animal production in Serbia.

In the frame of the strategy of agriculture technological development, together with animal production, the aim is encouragement of more complete use of the available natural resources, which is highly significant for field crop and animal production development. In regard to accomplishment of this goal, the following is to be achieved:

(1) Providing of significantly higher consumption of organic fertilizers is needed in order to enable achievement of optimal technological and economical effects, improvement of biochemical soil properties and providing of ecological equilibrium with increase of economy and rent ability of animal production.

(2) For enhanced use of organic fertilizers, number of animal units is to be increased per hectare and quality manure collection and spread is to be provided. According to data for 1998 in our country there were only 32 animal units per 100 ha of agricultural land. In West European countries, according to data for 1995, there were 45 animal units per ha of arable land.

With the increase of livestock, significantly more convenient conditions are to be created for development of field crop production, above all through increase of green forage, especially leguminous fodder crops. Increased use of these cultures by production of silage would provide significantly cheaper animal production of higher biological quality.

In the period of intensive development of commodity production in economy praxis and theory, existed comprehension on primacy of the principle of the social production efficiency. Such position and behavior of the economical subjects, commodity producers were based upon presumptions on unlimited economy resources. The starting point of these presumptions were that resources can be used intensively, without taking care on possibilities of their use in future and on need of reproduction and protection of restorable resources in such conditions in policy of development based upon principles of technical and technological accomplishments in the second half of the 20^{th} century. At the same time, with the achievement of the positive economic and production effects, processes of degradation and pollution of environment and jeopardizing of all ecological system were demonstrated. Emerged tendencies were especially obvious in the most developed capitalistic countries in the phase when intensive development and increase of material production is achieved under influence of merciless competition and elemental influence of commodity production laws. Consequences of the

aggressive behavior of the economy subjects toward nature in whole were economical and irrational spending of natural resources. In these processes, reproduction in nature, especially normal restoration of biological and ecological resources is noticeably disturbed. In last four decades of the 20th century developed knowledge on irrational and improper use of natural resources (*Bošković et al., 2008*).

From ancient times humans recognized that use of organic fertilizers increases plant appearance and yields. In 19th to 20th century period various opinions among scientists existed in regard to the question if organic fertilizers are nutrients for plants or not. It is interesting that positive opinions in regard to this replaced negative ones, which resulted with more massive use of mineral fertilizers. It is a fact that only a small portion of organic fertilizers can be used as nutrients from plants directly. However, it is also true (and proved by the most recent studies) that mineralization process all down to the level of ion would be almost impossible without regular intake of organic material into soil. Not only this, organic matters intook into soil increase availability of nutrients to plant, i.e. enable photosynthesis. In numerous studies it is determined that organic matters indirectly or directly influence to metabolism, i.e. to plant growth, development and productivity. Effect of organic matters to plants is not based to assimilate content. This makes their role in soil fertility maintenance irreplaceable by complete substitution of mineral fertilizers.

Organic matters of the soil enable uniform and harmonic plant nutrition. By its complex action it simultaneously increases plant resistance toward conditions of stress such as frost and drought. This is why lately it's wider ecological role, especially intensive plant production and healthy food production has been emphasized. Based upon presented facts, and with the aim of achievement of stable and high yields of higher biological value, use of organic fertilizers in future should be paid greater attention (*Grubišić et al., 2011*). Organic fertilizers are matters of human and animal origin. They are permanently produced and pollute environment. Prevention of environmental pollution is possible in two manners. One is destruction that demands significant quantity of consumed energy without any use. The second one is use in agriculture, that also demands energy, but in far less volume. This, second manner refers also to use of energies from originating matter. That is why we must gravitate toward use of organic fertilizers with the lowest possible loss of the matter.

There are many different studies on complex effect of organic fertilizers to soil. Numerous trials performed in the foreign countries suggest that comparisons of effects and studies of mutual effect of organic and mineral fertilizers require more decade period. Long-term trials prove positive effect of organic fertilizers. It is manifested in physical properties, microelement content, biochemical processes and regulation of the soil chemical reaction. Organic matter in soil binds to incoherent soils, and makes heavy clay soil incoherent. Positive effect of organic fertilization of heavy clay soil is proved by experience of West European countries. According to trials in our country, use of organic matters proved useful in soil structure restoration. Use of organic fertilizers permanently increases capability of binding soils cultivation. Organic matter has significant role in providing soil by nutrients. Organic matters bind 96 to 99% of nitrogen, from 35 to 40% of phosphorus and 10 to 30% of sulfur in soil. Depending upon type, microelements also bind to organic matter in various proportions. Organic fertilization potentially enables control of biochemical processes that are responsible for mobilization, i.e. binding of nutrient matters.

Question of economic profitability of organic fertilizers use arises only on farms that do not have production of organic fertilizers. Question of economic feasibility must not be arisen for the places in which great quantities of environmental harmful organic matters are produced. Human and animal exudations, as well as waste of organic origin can be the most sufficiently neutralized in soils rich in humus matters. In such soils occurs acid and base material neutralization, and their biological activity is enhanced by organic fertilizer destroy pathogenic organisms. Organic waste application in soils resolve two problems, from one hand, placement of harmful matters without negative effects, and from the other hand increase in soil fertility. However, capability of soil detoxication is limited. Concentrated use of harmful matters in soil can contaminate it.

In the period of naturalized production, for soil fertility increase, matters available on farms, such as lime and waste of plant and animal origin were used. Priority was given to fertilizers of animal origin, whose positive effect to plant growth and development was noticed even by nomads. Up to 50^{th} years of the 19 century in Europe in agricultural production for fertilization were used exclusively matters of organic origin, i.e. animal excrements predominantly. In the 19 century scientific researches were developed in regard to the problems of plant nutrition,

knowledge of soil properties and making of different fertilization systems. Lei big studies contributed to creation of mineral fertilizers. However, their production did not remove need for organic fertilizers, especially for manure.

Parallel with the experience acquired by use of mineral fertilizers, enlarged also experiences and observations in regard to manure use and manipulation. Exudations of various kinds of animals in different age, as well as used bedding were analyzed in details. A large number of fertilizer fermentation systems were created. By the end of 19 century and the beginning of the 20^{th} century, contrary to the increased use of mineral fertilizers, manure kept its dominant role. Intensive use of mineral fertilizers was the only way for fast soil supply by nutrient matters. Due to the significant increase of fertilization by mineral fertilizers, yields of field crops tripled.

In the course of the time, approach to use of organic fertilizers changed. Manure is a useful by-product that is predominantly used in field crop production for soil fertility increase. Beside, this is the easiest manner for avoidance of pollution effect by manure. Agricultural use of manure is motivated by the nutrient matter content; however, its other effect should also be taken into consideration. By organic matter content it significantly improves water regime of sandy and clayey soils. Concentration of nutrient matters of plant origin is lower in manure in regard to mineral fertilizer, meaning that quantities of used manure must bi significantly higher. However, these kinds of nutrient matters for transport need only energy. It is well known that production of mineral fertilizers and especially nitrogen fertilizers requires high quantity of energy. Fertilizers with bedding in average per 1 t contains 5.0 kg N, 2.5 kg P_2O_5, 6.0 kg K_20 and 6.0 kg CaO, for which industrial production 511 MJ of energy is needed. One of the important indicators of industrial production is quantity of energy needed for production of single unit of a product. The best production system is one that in the given circumstances produces the lowest loss of row materials and energy. In the past, field crop and animal production complemented each other nicely. From the aspect of mutual use of by-products, in the future, these branches of agricultural production must be closely tied.

Cheap production of cattle and milk is possible only by fodder plants. Part of maize stalks and hay can be used in cattle feeding, and the obtained

manure can be used for fodder plant production. In brief, close interconnection in regard to marketing of row crops and energy between filed crop and animal production is not only to be reduced, but organization level from this aspect is to be raised in every farm.

Conclusion

In several last years consumers growing demands toward healthy food led to significant increase and development of organic agriculture in the world. Simultaneously with expression of inconvenient tendencies, in increased number of inhabitants there rise a consciousness, especially in developed countries on necessity for adoption of a new value system in which important position belongs to the method of organic agricultural production and processing of agricultural products in safe manner. This method is affirmed as sustainable agriculture and as organic production, biofarming and eco-agriculture that produces healthy food. Biofarming obey the most contemporary ecological approach in food production. Sustainable agriculture as strategic base of organic production establishment enables increase in production volume of healthy and safe food. Gained experiences and developed consciousness on significance of organic agriculture for improvement of population nutrition in the world suggest that in our country also exist significant possibilities and perspectives.

In the frame of the strategy of agriculture technological development, together with animal production, the aim is encouragement of more complete use of the available natural resources, which is highly significant for field crop and animal production development. In regard to accomplishment of this goal, the following is to be achieved:

1) Providing of significantly higher consumption of organic fertilizers is needed in order to enable achievement of optimal technological and economical effects, improvement of biochemical soil properties and providing of ecological equilibrium with increase of economy and rent ability of animal production.

2) For enhanced use of organic fertilizers, number of animal units is to be increased per hectare and quality manure collection and spread is to be provided.

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_____II SECTION_____

STRATEGIC PLANNING AND INSTITUTIONAL-POLITICAL DIMENSION OF AGRARIAN AND RURAL DEVELOPMENT

CONSIDERATIONS REGARDING PROJECT RISK MANAGEMENT IN AGRICULTURE

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Abstract

Risk and uncertainty are inherent in agriculture in usual activities and, especially, in projects. As consequence, all the experts from agricultural field are increasingly seeking practices, tools and effective strategies to cope with these inherent risks. Given these needs, the research aims to identify the most appropriate definitions, methods and risk management methodologies that can be applied in agriculture. The paper presents the definition and sources of risk in projects and realizes a classification of the risks corresponding to each stage in the life cycle of a project. The most important elements and the specific aspects are described for each stage of the risk management - the identification, the evaluation, the response, the monitoring and control of the risks. Also are presented the phases and the implementation levels of a complex methodology for project risk management. As sources of information research is based on secondary data use, observation and interpretation.

Key words: *risk management, identification, evaluation, monitoring and control*

Introduction

The notion of risk management has its origin in the insurance activities, being considered in traditional approach as an interdisciplinary science that is dealing with the pure risk of the organizations. In present, the risk management is practiced in all domains of the economic and social life, specific instruments and techniques being developed.

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Although the private sector is the one using and developing specific instruments for the risk management, this domain is increasingly better represented in the public sector. Besides the constant preoccupations for the risk management in situations of natural disasters or products as result of human actions (which belong to the studies category regarding the environmental risk management), a special attention is given to the risks of different type projects, especially the ones in agriculture.

The agricultural sector is exposed to a variety of risks which occur with high frequency. These include climate and weather risks, natural catastrophes pest and diseases, which cause highly variable production outcomes. Production risks are exacerbated by price risks, credit risks, technological risks and institutional risks. Risk management in agriculture ranges from informal mechanism (like avoidance of highly risky crops, diversification across crops and across income sources) to formal mechanisms, like agriculture insurance, minimum support price system and future markets.

Given the pervasiveness of risks, farmers' agro-enterprises, international agencies, and governments are increasingly seeking effective and sustainable strategies and approaches to mitigate, transfer, or cope with these inherent risks.

This paper is designed to help farmers develop their own integrated risk management strategies, ones appropriate to their own attitudes and circumstances. First, the paper reviews the content of project risk. Then it discusses sources of risk, and information to improve the project risk management process. Third, it outlines risk management strategies available to producers. The paper concludes with a brief discussion of posibilities to use risk modelling in project risk management.

Review of the project risk definitions

The traditional approach considers the risk as a negative element that "threats" the reaching of a project's objectives. Thus, in the sense of the decision's classical theory, the risk is considered to be *a doubtful but possible element, which permanently appears in the process of the social-human activities, whose effects are detrimental and irreversible* [32, 33].

The Explicative dictionary of the Romanian language defines the risk as an exposure to the possibility of loss or damage and OCDE (1983)

appreciates that "*the risk is constituted by the possibility that a fact with unwanted consequences might be produced"*.

Under these conditions, most applications regarding the risk in projects are concentrated on managing the threats, and the instruments and techniques available for the practitioners are oriented on the risk's negative aspect.

Recently, the risk's approach started to also include the positive aspect represented by the possibility to generate opportunities through proper management and specific strategies. This determined the including of the positive elements within the framework of the risk's definitions. Thus, the project risk is defined in the project management's guide published by the Project Management Institute (2004) as being "*an event or a doubtful condition, which if it appears, has a positive or a negative effect on the project's objective… The project's risk includes both the threats to the project's objectives but also the opportunities to improve these objectives*".

The ISO 31000 (2009) /ISO Guide 73:2002 definition of risk is the „effect of uncertainty on objectives". In this definition, uncertainties include events (which may or not happen) and uncertainties caused by ambiguity or a lack of information. It also includes both negative and positive impacts on objectives. Many definitions of risk exist in common usage, however this definition was developed by an international committee representing over 30 countries and is based on the input of several thousand subject matter experts.

All risk's definitions assign to it two dimensions, namely: *the uncertainty,* as the risk is something that has not happened yet and *the effect on the project's objectives*.

The notion of *uncertainty* is present in all risk's definitions, but the risk and the uncertainty cannot be confused because while for the risk there can be made some anticipations of the events that might be produced as well as of the probability associated to their production, in the case of the incertitude the decision-makers cannot identify all the events possible to be produced and they cannot estimate the probability of their production [13, 17].

Thus the probability and impact terms are introduced for describing the two dimensions of the risks, where the probability shows how possible the production of the event or of the risky condition is, and the impact shows what will happen if the risk materializes.

The risk is determined in an agrarian project by a multitude of **objective causes**, like: the change of the economic, political and social conditions in time, fast technological changes, imperfect knowing of the exogenous variables, optimistic or pessimistic attitude of the project team, errors of the technical or economic analysis, interferences of the state, the impact of the environment (climate and weather), modifications of the prizes or of the exchange rate etc.

The projects' paradox is that these ones have variable costs and fix benefits – the benefits are fixed through scope and objectives, and the costs depend on the chosen solution and imply the entire organization. These aspects determine the apparition of two **risk classes** within the projects' management [23]: risk of the project itself (current risk) and the organizational risk, respectively the exposure of the organization/the business in case of a project's failure.

Regarding the current project risk, this one might be classified in various categories, a classification that also represents an important stage in applying the risk management.

Similar to the products that represent a life cycle composed of launch, development, maturity and decline, the projects have their own life cycle, which determines the different classification and approach of the associated risks.

Thus, *in the project preparing stage* there are defined the activities that compose the project, the necessary resources, the participants and their competences within the project, there are identified the internal and external influence factors. Among the risk categories specific for this stage, there might be enumerated risks that appear when establishing the project specifications and the resources necessary, generated by factors like:

- the existence of more technological and constructive alternatives that sometimes lead to choice difficulties from the project's team side,

- the lack of anterior experience in projecting or executing some activities, the wish to finalize complex activities in a very short time,

- ambiguity in defining some quality objectives, tolerance, durability, reliability, maintenance etc. or their misunderstanding by the executant,

- frequent specification modifications determined by the resources available at the moment,

- frequent competences and responsibility modifications during the implementation determined by institutional changes,

- lack of logic (incoherence) in the project's specification,

- the failure to identify all necessary resources or the insufficient knowledge of some resources' characteristics etc.

The risks analysis in *the project's execution stage* begins with the study of the project's technical characteristics, the execution team, the exogenous parameters (mainly macro-economic ones) susceptible to affect the necessary sums for the funding. In this stage there might appear:

- the technological risk referring in general to the degree of technological news;

- the risk of costs overrun, which the one realizing the project complies with in the situation in which there have not been mentioned any costs actualizations in the contract;

- the risk of delay (overrunning an established duration) that leads, on the one side to a raise of a financing need (inclusively of the afferent interest, in case of a project's financing through credit), and on the other side to a delay of entering in exploitation;

- the interface risk is generated by the connection between among different executants in the project. It is a risk that derives from the executants' coordination or from the incoherence between the different clauses of the execution contract,

- the risk of subcontractors which the contract holder complies with when treating subcontract works, etc.

In the *project's exploitation period* the most frequent problem is linked to the project beneficiary's capacity to correspondingly exploit the realized physic objective, i.e. to be capable to reach the established performance level without overrunning the planned costs and in this stage there appear: the risk of overrunning the exploitation costs, the risk of supplying with raw materials and necessary materials, force majeure risks, political risk (of not repatriating the incomes) or legislative risk.

The most important classification of the project risks is the one that groups them in *the four phases of the project management* (strategic, defining, technical and operational), corresponding to the reference moments in developing the project, namely: signing the contract, establishing the specifications of the objective ("product") that will be realized through the project and the project's finalization.

The strategic phase represents the moment in which the correlation is realized between the project and the organization's strategic plan, the defining phase represent the choosing moment of a variant for obtaining the specifications of the "product" that is being realized through the project, the technical phase is the one in which the product is finalized and implemented and the operational phase is developed after the product has been delivered to the beneficiary.

Depending on their effect, the risks might be classified as common (trivial), these ones have a high frequency and can be handled without difficulty; minor risks, with a medium apparition frequency; major risks, with unwanted high effects and low frequency, which can be accepted if they are distributed in costs on long time periods. The most rare ones and with destructive effects (for example natural calamities) are the catastrophic ones [3, 7, 24].

The risk's dimension is given by a person's perception degree of the risk, a case in which it might be discussed about a **subjective risk** and an **acceptable risk** [7].

The subjective risk indicates the measure in which a person feels threatened by a certain risk. This one might be influenced by the consequences' grossness, by the measure in which knowledge about that risk is available, by the familiarization with the risk, by the aversion degree to the risk, by the measure in which the risk is voluntarily assumed or not and by the psychological factors.

The acceptable risk expresses the subjective risk's level, which a person or an organization considers that it might assume and it depends on the deciders' personality, as well as on the concrete conditions in which the organization develops its activity.

The risks classification is very important firstly for the elimination of all confusions between causes, effects and consequences in the risk's analysis. A systematic approach of these ones implies the respecting of four rules [4, 33]:

Rule no. 1: A risk must be framed only in one classification and the measuring of the impact must be realized only in one measuring unit;

Rule no. 2: A risk might have one or more causes and there might be common causes for more risk categories;

Rule no. 3: Any risk without a direct financial impact must be directly or indirectly oriented towards one or more risks with financial impact (finally, it should be expressed in cost terms);

Rule no. 4: There will be calculated separate costs for each risk with financial impact.

The variety of the enumerated risks confirm the idea that regardless of the accumulated experience level in developing the projects, the risks apparition is a phenomenon that might not be avoided, but whose proper exploitation might generate multiple opportunities. This underlines the necessity that each project manager should adopt a structured approach of the risk as an integral part of the project management, an approach that is generically named – project risk management.

Specific issues in the process of project risk management

The efforts to introduce the risk management in agricultural projects have been determined by *two characteristics*: on the other side the growing tendency of the risks, which is explained due to the acceleration of the technological progress, of the activities' dimension and interdependency, as well as of the social transformations, and on the other side the organization's growing need of security.

The project risk management is defined in the approach of the Project Management Institute (2004) as *"the systematic identification, analysis and response process to the project's risk. This one includes the effects' maximizing of the positive events and the effects' minimizing of the adverse events"*.

The standardization need in the project risk management determined the elaboration through the EUREKA E530 project of risk management methodology named RISKMAN that incorporated the best domain practices in Europe.

The RISKMAN methodology develops the project management function within the organization and proposes that the risk management should be realized 8 steps. Six of them form the risk management's essence and include: the risk's identification, evaluation, diminution, the elaboration of the plan and of the budget for unexpected situations, monitoring and control. Here will be added the risk's audit and the insurance of the risk management's development and continuous improvement.

Any risk management methodology might have more **appliance levels** within the organization (RISKMAN methodology has three). The proper level for each organization is selected depending on five criteria characterizing its capacity to assume risks and the protection need from risk (Table 1).

The project risk management process is based on three fundamental components: ***identifying and evaluating the risk, developing a strategy to manage the risk*** and ***risks monitoring and control***.

The risks identification phase supposes the determination of the risks that might appear during the realization of an activity (undeveloped yet) and the establishing of their characteristics.

The basic condition for the functioning of the risks' management system is represented by their correct identification. Practically, the risks identification is fundamental for establishing an optimal protection level for a certain activity. If the risk is undervalued, the protection level will be insufficient for covering the loss, and if it is overvalued, the protection cost in excess will diminish the gain obtained from the respective activity.

The risk evaluation consists in *estimating the apparition probability of the risks and their effects and in using the information obtained for the risk quantification*. The realization of this process permits a correct and complete evaluation of the relationship between the risk and the potential gain to the decisional factors.

Table 1. *Implementation levels of the risk management in projects*

Appliance level of the risk management	**The company's capacity and the necessary protection**				
	Project management abilities (MP) necessary for developing the project	Experience in the risk management (MR)	Manager's attitude for the risk	Exposure to financial risk	Clients' attitude
Base level: Identification, Classification of the risk, Mitigation	Minimal usage of MP	Reduced	Aversion for risk	Reduced financial exposure	Minimal towards medium request for MR
Intermediary level: Base level + Quantitative approach, Prioritization, Risk budget	A good MP	Limited	Minimal assuming of the risk	Medium financial exposure	Medium towards maximal request for MR
Advanced level: Intermediary level + Modelling,, Decision analysis, techniques for evaluation	An experimented MP	High	Maximal assuming of the risk	High financial exposure	Strong request for MR

Source: *Carter B., Hancock T., Morin J-M., Robins N., Introducing RISKMAN methodology. The European Project Risk Management Methodology, NCC Blackwell, OPL (Spain), 1994*

The development of a response system to the risk represents the action phase within the risk management process, in which a capitalization of the opportunities and the diminution of the negative results is intended. To the period in which only the negative effects of the risk were

recognized correspond specific practices. These ones consist in the **answer strategies to threats**:

- *avoiding the risk,* i.e. the attempt to eliminate the incertitude that is the easiest and fastest response technique;
- *transferring the risk,* towards a third part that might overtake its management (example: insurance companies and specialized firms in realizing some parts of the project – outsourcing) [26].
- *mitigation the risk* by reducing its apparition probability (through a corresponding appointment of the activities, personnel's training) or by reducing the effects in case of its apparition (by closing insurances, forming costs or time reserves);
- *accepting the risk* that might be active (by developing a contingency plan that identifies alternative strategies, which might be applied for ensuring the activity's success in case of a certain risk's apparition, by developing a risk management plan or by creating costs or time reserves) or passive (by accepting a low level of the profit in case certain activities are not fulfilled in time or at the foreseen quality standards).

The recognition of the risks' positive aspects determined in the last years the preoccupation for establishing some response strategies capable to exploit the opportunities (Hillson, 2001); each of them having a correspondent within the response strategies to threats (Table 2).

Table 2. *Generalizing the responses to threats in order to exploit the opportunities*

Response to threats	Generic strategies	Response to opportunities
Avoidance	Eliminating the incertitude	Exploiting
Transfer	Allocating ownership to the risk	Sharing
Mitigation	Modifying the exposure to risk	Amplification
Acceptance	Inclusion in planning	Ignorance

Source: *adapted from Hillson D., Effective Strategies for Exploiting Opportunities, Proceedings of the Project Management Institute Annual Seminars & Symposium, November 1 – 10, 2001, Nashville, USA*

The risks' control and monitoring represent the last phase of the risk management process and supposes the usage of the risk management plan and of the other instruments during the project implementation. The risks control is also based on a permanent identification strategy of some new risk categories that might interfere during the development of the respective activities with the purpose of foreseeing and reducing them.

During the realization of this stage it is intended to revise and improve the risk management plan, by permanently ritualizing the data included in this plan and through routine controls developed with the purpose of identifying new risks or of observing the previously identified risk factors.

For an easy tracking, the identified and evaluated risks might be registered in a data basis and in the **"risk registers"** [1, 23, 30, 33]. These ones might have different forms and fields, depending on their appliance level of the risk management practiced by each organization and by the specific of the developed projects.

Generally, it is necessary to include a list of risk grouped on categories, the estimated probability and impact, the activity at risk, the factor that might generate it, the person responsible for tracking the risk and the response strategies. Furthermore, there might also be included registrations regarding the estimated moment of starting the event and the current situation of applying the response actions (this field is completed and actualized as developing the project).

Based on the detailed risk registers, there will be realized periodically summary situations that address to the project managers. Moreover, any new risk has to be presented to the project's leadership and to the ones involved in that activity.

An important action is the one to permanently verify how much was spent and how much it was left from the contingency fund (risk budget).

In their turn, the project managers have to present reports regarding the risk to the firm's leadership through two modalities [23, 32]:

- when realizing the reports regarding the general stadium of the project they will attach the most important information regarding the project's risks;

- when realizing the financial reports regarding the projects there will be included elements regarding the losses and the risk budget.

In order to transfer in the future the experience achieved in projects, it is important to carefully keep all registrations regarding the risk management actions and finally to realize a summary accompanied by

conclusions and generally valid recommendations for the project risk management.

Risk modelling in projects

Economic-mathematical models have an increasingly higher application in the agricultural sector's management and in the decisional activity. The projects, in their turn, are planned as an interdependent activities listing, for which models are being used in the calculation of the intermediary and final realization terms, of the material, human and financial resources and of the project's final cost. Once the terms, resources and costs have been calculated, the elements are taken into account that might generate deviations from the planned levels and there are being applied risk analysis models obtaining value intervals, possible deviations and other indicators that show "what if …" the identified potential risks would manifest.

The approach of the risk through quantitative methods needs a certain specialty knowledge level and the use of the computer, because in the last years computer products have been developed that have implemented various risk analysis methods and techniques. Under these conditions, in order to introduce such techniques within an organization there exist two possibilities: each member of the team should use specific techniques for his field of action or it might be reached to a specialized analyst (usually an external consultant).

The techniques that might be used for the analysis and risk management might be grouped in 4 categories [12, 13]:

- Methods for identifying and classifying the potential risks;
- Numeric analysis methods used for evaluating the risk's impact and the apparition probability;
- Methods for defining the mitigation actions, the response strategies and the backup plans;
- Techniques used for specific situations that might appear in certain projects.

A part of these techniques have not been realized with the purpose of being used in analysing the project risks, but they are also applicable in such situations. Domains like Operational Research and Quality Control

furnished various modelling methods that might also be used in the project's risk analysis; the most used ones being enumerated in table 3.

Table 3. *Mathematical models for project risk management*

Stages and applications in the risk management	Methods and models examples
Risks identification	Ishikawa diagram, Markov chains
Projects' programming	Critical path methods – PERT, Monte Carlo simulation
Evaluation and quantification of the risks	Probabilities, Decision tree, Statistic analysis method, Sensitivity analysis of the financial results
Decisions under risk conditions	Utility functions, the expected value method, Decision tree

One of the most important conditions for analysing the risk is the insurance of the necessary information. In case of insufficient statistic data, in practice it is recommended to apply the estimation by experts and the arrangement methods according to the risk's rank that is based on simple appreciations. Such approach methods require the arrangement of the examined events according to their probability level, consequence's and risk's gravity in some groups (categories, ranks) like, for example, with high, medium or low risk level.

Usually, the high risk's level is considered unacceptable, the medium risk level needs the effectuation of certain diminution activities, while the low level risk is admissible, and the insignificant level in general is not examined.

Conclusions

In recent years the field of agriculture has seen, more than ever before, the particular challenges caused by unpredictable environmental changes, high variability of production outcomes, high consumer demands, and unexpected changes in regulations that influence farmers' activities.

Projects in agriculture, for which there is an increasing concern in recent years, tend to be increasingly more complex and require multidisciplinary efforts for development and implementation. All these changes have increased concerns for risk and its management.

In this context, numerous concepts, methods and tools specific to projects in other industries are transposed in agriculture.

The paper tried to develop an integrated framework to identify, to analyse and to treat risks in agricultural projects. This framework is based on the best practices in risk management and will be used for further development of the project risk management in agriculture.

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THE HUNGARIAN EXPERIENCE OF FARM ADVISORY SERVICES

Erika Székely[1], András Molnár[2]

Abstract

Farmers have to face continuously with new challenges, which require appropriate knowledge gained one way or the other. The picture based on statistics and interviews show significant lagging of farmers training and knowledge. If appropriately configured and ran Farm Advisory Services (FAS) could play a central role in the knowledge transfer process. However, our finding indicate that overlapping roles and inadequate motivations undermine to serve the stated purposes. In the short run institutional reforms are needed to clarify the roles and responsibilities of the FAS stakeholders. Considering international tendencies, the long run goal should be a system with increased efficiency with flexibility and market driven focus.

Key words:*knowledge, advisory/extension services, agricultural policy*

Introduction

The conventional four capital model of neo-classical economics is nowadays extended with a fifth one that is often called information or knowledge. This fifth element arises as a result of scientific research activity, while its utilisation and improvement are supported via different channels and forms of education. Furthermore, its widespread distribution is provided with the provision of information communication services.

The constantly changing modern market economy with fast technological development requires more and more knowledge, and is

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often referred as the 'knowledge economy'. The success of businesses depends greatly on the amount and quality of knowledge acquired in the process of constant adaptation under the pressure of competitiveness (Swanson, 2008). Agriculture is not an exception to this rule, where according to Berde (2003), constant professional training and instant access to the latest information are key elements of competitiveness. 'Agriculture is still a sector largely composed of a multitude of very small, geographically dispersed units, in which the level of tacit knowledge remains high' (Laurent *et al*., 2006).

According to Pető and Nagy (2002), a 'peculiar problem in Hungary, that many farmers are unable to access to information by themselves required for competitive management decisions as the range of such information and their channels top farmers are not developed properly'. However without up-to-date information about market trends it is almost impossible to pursue agricultural production (Székely, 2009). There is a widespread consensus among professionals that a lack of information often causes economic loss and has effects on the entire sector. The EU agrifood sector places special requirements on farmers. This raises the question whether Hungarian producers are at an advantage or disadvantage in their qualification and knowledge compared to their EU competitors. Another, related question is the channels used by them to acquire relevant information and also the efficiency of these channels.

Methodology

The study uses a mix of quantitative and qualitative approaches. Firstly an extensive literature review is compiled, covering both Hungarian and international results available in the field. This part focuses mainly on the experience of farm advisory services from an institutional perspective on one side, on the other hand from the farmers' standpoint. The qualitative part draws on structured personal interviews among farmers in the vicinity of Budapest. The limited number of interviews does not allow drawing any representative conclusions. However it certainly provides insight into the actual situation.

Professional preparedness of farmers

According to the latest Hungarian statistics, the improvement of the professional preparedness of domestic producers still requires further

efforts. Although the level of qualifications of farm managers have improved, more than 85% of them still have no or very limited education and often inadequate experience. Supporting the findings of Székely and Pálinkás (2007), the lack of up-to-date information and knowledge related to planning, strategy development, sales and finances cannot be replaced with practical experience which at the same time is essential in production (Table 1).

Table 1. *Level of professional qualifications of farmers in Hungary*

	Agricultural qualification (%)		
	No or only practical experience	**Basic level**	**Medium and high level**
Sole holder holdings			
2003	87,6	4,8	7,6
2005	87,6	4,9	7,5
2007	86,8	5,7	7,4
2010	85,9	5,3	8,8
EU27 (2005)	*80,1*	*11,4*	*8,5*
EU15 (2005)	*77,5*	*11,6*	*10,9*
EU12 (2005)	*81,8*	*11,3*	*6,9*
Holdings producing for market*			
2003	72,2	8,0	12,1
2005	73,4	8,8	12,2
2007	71,6	9,9	12,5
2010	68,9	9,6	13,6

* only for market and for market over own consumption
Source: Hungarian Central Statistical Office (CSO)

When analysing the data, it has to be recalled that the CSO takes into account every production unit that is engaged in agricultural activities and reaches the economic threshold, from which only a portion can be considered as professional, market oriented units. Professional qualifications of farm managers are higher among the ones producing for market. Practical experience is the most common in their group too but the ratio of qualified managers is twice as high and increasing. The age of the farm managers and the size of the farms show a positive correlation with the professional qualification. Younger (under age 45) farm managers and managers of larger farms are tend to be more

qualified. In a European Union (EU) comparison, the professional training of Hungarian farmers is below average. Within the EU Romania, Bulgaria, Cyprus, Greece and Malta have the worst ratios; more than 90% of the farmers have only practical experience. Overall the Hungarian farmers' qualifications are also below the EU average but the ratio of the medium- and high level qualified farmers matches the EU average and compared to the EU12 average it is even better. According to the available data, production based on practical experience only shows a decreasing trend between 2000 and 2005 within the whole EU and more and more farmer are obtaining – mainly at a basic level – specific agricultural qualifications. When considering those farm managers who produce for market, a better picture can be seen. Their qualification levels are higher than the EU averages.

Based on the results of a survey conducted in five countries Székely and Pálinkás (2007) emphasise the importance of realising the need for further training and the need for raising farmers' awareness for it. The survey examined farm characteristics using questionnaires of 200 farms per country. Regarding farmers' professional qualifications the authors concluded that 85% of the interviewed Hungarian farmers considered their previously acquired knowledge sufficient and only 15% of them are involved in professional training. In the Netherlands two-thirds, and in Poland one-third of the farmers participate in further training. The authors also found that among Hungarian and Spanish farmers the most common form of access to information is to gain it from other farmers. Obtaining information from the press, from television and radio programmes, from books and from own data collections are also common. In the Netherlands and in Poland however, more than 80% of the farmers ask consultants for help.

In these countries, less than one-fifth of the interviewed farmers faced difficulties when selling their products (market price, product quality), while in Hungary three-quarters of the farmers encountered this type of problem. This is on the one hand due to inadequate quality management (less than one-fifth of Hungarian farmers use any kind of quality management systems, while this ratio is 68% in Poland, 75% in Spain and 82% in the Netherlands). On the other hand this can be explained by the fact that only one-third of them had stable sales channels before beginning the production. In the other countries surveyed this ratio was between 47% and 76%. A variety of associative and cooperative forms organised for marketing seem to be highly

effective in these countries. While Spanish farmers have the worst position concerning the level of qualifications, barely 18% of them faced sales difficulties, which presumably can be explained by the fact that more than 50% of them sell their products through a cooperative channel! In Hungary this form of sales is below 10%. The survey indicates how the lack of information can cause farmers to lag in comparison to foreign competitors. The preparedness of farmers can be improved effectively through agricultural extension and the training of farmers.

Institutional framework of information provision

The advisory system plays an important role in most Member States in raising the level of professional level of agriculture. According to international experience, it contributes to the improvement of the competitiveness of producers by the broadening of their professional knowledge. For the establishment and operation of an advisory system, farmers' learning needs have to appear as a market demand. According to Pulay (2009) the creation of a demand-driven market is an essential requirement for the improvement of adult education. This requires, beside the development of an education system that enables rapid acquiring of knowledge and competences, organising the appropriate information provision and creating an information network. Cser (2001) adds that 'the long-term professional advisory service should be based on the professional collection and provision of information, and the most efficient way of information transfer is the combination of consulting and training as demanded'.The transmission of agricultural information through advisors was common practice in Europe even in the seventeenth century (Soltész, 2000). Agricultural advisory systems are different from country to country which is due to differences in the overall goals, methods, the circle of clients and the financial systems of extension (Kozári, 2000). Mis (2009) explains these differences due to historical and cultural backgrounds, traditions as well as the level of development of agriculture. She states that nowadays the funding of extension is shifting more and more from government funding towards the private or market-based advisory services. In addition, the functions of extension have changed as well; beyond technological questions, socio-economic and rural development issues have also emerged. On the other hand, technology related knowledge transfer has more and more shifted towards input company representatives, who incorporate this area as additional support for their products.

International experience of agricultural extension

In most EU countries, the most important goal of extension is increasing knowledge, while others primarily intend to optimise resource use and achieve self-development or to raise living standards (Cser, 2001). In the United States, agricultural extension is considered as the distribution of special knowledge; its main purpose is the exchange of information through dissemination. Primarily training programmes aiming at problem solving are organised but advisory services to meet individual needs are also provided. Academics take part in the research, training and consultancy tasks as well.

Within the EU, similar systems operate in the Netherlands, in Finland and in Scotland as in the United States. When establishing the Hungarian advisory system after the political and economic transition, most professionals wanted to introduce this form, but finally it could only partly happen. Hungarian academics rather participate only in the training of advisors and farmers; they rarely take part in research, training and consultancy at the same time. Enese (1997) and Magda (2003) consider educational institutions as the intellectual background of extension services as their continuity and validity are threatened less in these institutions by the interests different from the original goals.

Old Member States of the EU have very diverse advisory systems. According to the role of public funding two main groups exist: state-controlled and fully private consulting. The state-controlled and state-funded advisory systems became popular in countries where governments intended to foster agricultural production and to raise farmers' living standards (Tóth, 2005). These are usually top-down systems. After establishing the state initiated system, when farmers' professional skills are strengthened, the state is gradually withdrawing from the process. In this way the farmers themselves can take over the management and the operation and create a bottom-up advisory system. This top-down form of advisory service is available free of charge in Hungary through village extension specialists and customer service advisors at Chambers. The majority of their clients are smaller, generally undercapitalised producers producing rather for their own consumption, so in the short term state withdrawal is not likely.

In developed countries farmers' organisations are able to operate independent advisory systems (Tóth, 2005). This is due to their strength deriving from the full membership of producers and the ability to represent agricultural actors as a whole. Denmark is a good example: where the government initially provided 100% funding and then gradually reduced their support to 10-15% for such organisations. The Danish advisory system operates through 95 regional centres of farmers' organisations and is financed by membership fees paid for these organisations. Each centre serves 500-2000 clients with 20-70 employees. Farmers are in constant contact with the advisory service (just like with the processor and the bank) and broaden their farms with their help (Gallusz, 2008). The state did not withdraw completely from the financing, since for service charges support is available from European sources. In Hungary this form of extension is represented by farmers' organisations which provide professional advice mainly for their members. One of the shortcomings of the Hungarian system is that these organisations include either large or small farmers and there is no one single organisation that brings together and represents all actors. In the Netherlands and in Finland extension services are provided also by farmers' organisations.

In some Member States such as France and some regions of Germany the most important players in extension are the Chambers of Agriculture. Similarly to the farmers' organisations they finance their operations from membership fees. The effectiveness of this system lies in the fact that majority of the farmers realise the advantages of Chamber membership in acquiring needed knowledge. In Hungary however, after abolishing compulsory membership, the number of members decreased significantly so the regional Chambers of Agriculture are in the process of repositioning themselves. In Germany, when developing the new advisory system in the former East German provinces it was accurately identified who can be involved in the state-sponsored advisory services offered. The forms of support, the method of financing and the desired service quality were specified in detail (Hoffmann *et al*., 1994). The current advisory system has evolved over the past decade due to these improvements. Consultants operating as entrepreneurs after obtaining the adequate permissions usually specialise in a sub-area. In Hungary the consultants registered in the Agricultural Advisory System established in accordance with EU requirements can carry out such activities, mainly as a secondary occupation as an income support. Commercial extension service is a

specialised form of private advisory services which is provided by agents of agricultural input producer companies, typically by specialising in certain themes and branches. This form of extension services can be found in Hungary as well, but usually larger, capital-intensive farms are able to make use of it.

In Hungary, as in several member states, the above form of extension services is mixed. We agree with Vér and his/her co-authors (2007) that organisational form does not affect the effectiveness of the advisory system. The extent to which local customs, traditions and opportunities are taken into consideration is much more important.

Agricultural extension services in Hungary

In Hungary, agricultural extension is defined by Regulation (MRD) No. 73/2007. An advisory service can only be supported from EU funds if it complies with the Regulation and so take place within the framework of the so called Farm Advisory System.

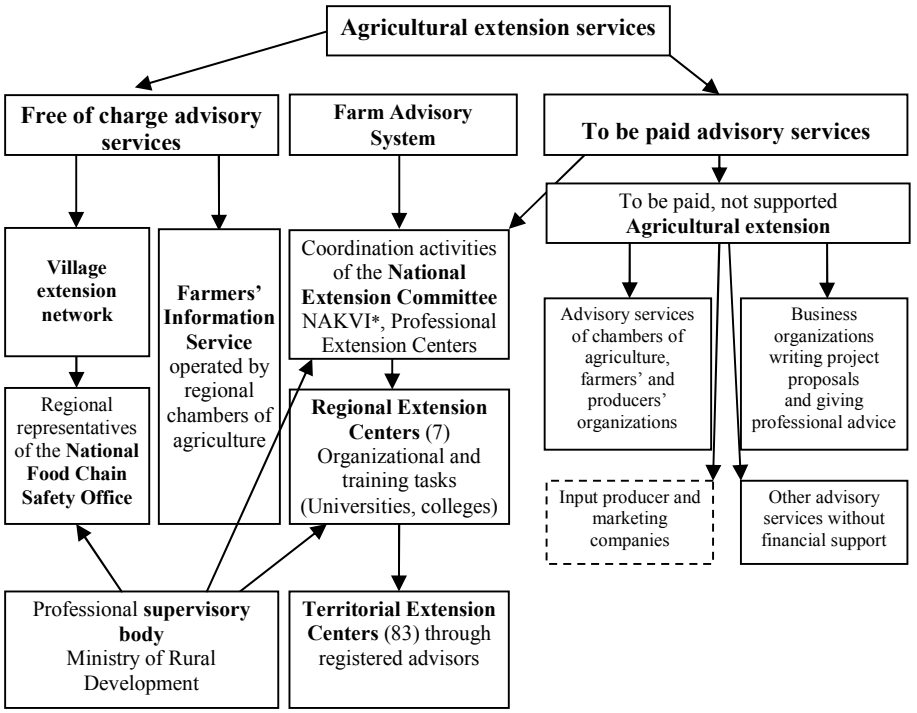
The Hungarian agricultural advisory system has historical traditions. The first official government advisory body was established in the 19th century and operated mainly based on the institutions of agricultural vocational education. Between the two world wars smallholder farmers received substantial state support (Soltész, 2000). Extension services began after World War II, from 1965 based on large farms and jointly carried out by agricultural higher education and research institutions. Farms achieving outstanding results in production established production systems to which other farms could join as partners in the form of a contractual relationship or joint venture. By the 1980s these production systems became nationwide in scope and reached all of the large-scale farms (Kozári, 2000). According to Tóth (2005) it was easier to keep contact with the large-scale farmers since their number was less then the number of farmers today. Kozári (2000) adds that the few private farmers and the small-scale producers integrated by large-scale farms could not or could rarely access professional advisory information. However both authors and many others agree that advisory services provided by the production systems contributed to the improvement of the quality of Hungarian agricultural production.

In Hungary, following the transition period, the farm management and organisation, the ownership and land use structure went through significant changes in agriculture, accompanied by the rejection of previous practices. However, at the same time, a new organisation preparing and informing agricultural stakeholders was not created. The foundations of the current advisory system were laid down in 1993, when the government's aim was to develop a principally market-based, publicly supported extension service. Some professionals urged the development of a system based on existing educational institutions and infrastructure, while others considered advisory services provided by farmer organisations and Chambers of Agriculture as the key to an effective system. Both agreed, however, that in the given circumstances only a state-supported advisory system can prepare farmers for the challenges of the market economy ahead. This was recognised by the government as well, so from 1994 a publicly-funded network (village extension network) appeared in the system which provided extension services free of charge to farmers. Since then, the institutional structure of extension has changed many times, which most frequently meant changes in the number of advisors and the institutional arrangement.

In Hungary, agricultural extension services are provided through parallel institutions with different forms, functions and financial sources (Figure 1). The free of charge (also known as customer service) extension is implemented by the village extension officers (about 600 people) and by the Farmers' Information Service (202 persons). They operate in two different organisational forms and are under different supervisory bodies, but both are financed from national and European sources. Apart from their communication activities, village extension personnel also act as authorities in certain areas (issuing certificates, auditing) which functions are often in conflict with their assisting role.

Until July 2010 (their abolition) Local Rural Development Offices (174 people) also provided free of charge extension services the scope of which were broader than agriculture, they also dealt with rural development issues. In the 'to be paid' advisory services (as depicted in Figure 1) more players are involved. It should be mentioned that input producers cannot actually be considered as extension personnel in the traditional sense, since their motivation is to sell their products in larger amounts and in a wider range. Experience has shown, however, that they are one of the biggest competitors for the advisors working in the Farm Advisory System.

Figure 1. *Actors of the Hungarian Agricultural Extension Services*



*National Agricultural Advisory, Training and Rural Development Institute

Source: *Own composition.*

The Hungarian agricultural extension system corresponds to the so-called Farm Advisory System (FAS), which is required to be operated by each Member State since 2007, and is eligible for EAFRD funds. The structure of the system however depends on the Member States' decision. In Hungary it operates in a network structure. The system is designed to supply and complete the knowledge and intellectual capacity necessary to improve quality production, to apply adequate production methods and to run an economically viable farm.

In the Hungarian FAS the National Extension Committee, a consultation forum for organisations concerned in extension, is intended to serve cooperation which however is only a possibility as yet, since the Committee is not in operation. In reality the National Agricultural Extension, Training and Rural Development Institute of the Ministry of Rural Development acts as a national centre and main coordinator at the top level. The regional centres (universities, colleges)

are involved particularly in coordinating, and organising activities. Professional Extension Centres established mainly at agricultural research centres provide assistance for advisory organisations dealing with customer service or agricultural and rural development extension, to solve specific problems within their area of expertise.

Territorial Advisory Centres (TAC) operating at the next level have an intermediary role between farmers and advisors and at the same time they supply the latest information to extensionists. The farmer enters into a service contract with the TAC, and the TAC contracts with the registered advisor for the actual provision of the service. Thus, in the system extensionists appear as subcontractors. The TAC submits the applications for support of contracted clients to the competent agency of the Agriculture and Rural Development Office . Currently a contract for supported advisory services can be signed only via the TAC. According to the Hungarian legislation only a registered and licensed person can provide advisory services. There were 900 registered extensionists in 2009 (NAKVI, 2009) out of which the advisory activities of 100 people were suspended for different reasons.

The analyses of the performed advisory contracts have shown (Vincze, 2008 and 2009) that due to the limited demand for "to be paid" extension services. In 2008 only 43% of the active consultants had a contract, which means that virtually half of them were "unemployed". So with this in mind, the number of extension professionals compared to the number of farmers is insufficient. However from the aspect of the limited demand for the advisory contracts, their number can be considered excessive.

EU support of advisory services

The shift of farm advisory services towards private funding is prevailing among EU Member States' farming policy. Among old Member States – e.g. Belgium, Ireland, Finland, France, Slovenia, Austria and Sweden – support for farm advisory services cannot be found in their RDP measures (Szilágyi, 2009). There are different reasons for this, for example in France the overall budget of the RDP decreased by 16%, which left no resource for less stressing issues.[3] However, there are exemptions as well. For instance advisory services

[3] Note that about half of the farmers have at least intermediate qualification.

are supported under the Danish RDP even though one can find one of the most developed advisory networks in Europe.[4] There are Member States (e.g. Germany, Italy), where the support differs between regions. In other Member States – Luxemburg, Portugal, Lithuania, the Netherlands – preference is given to farmers receiving less than 15,000 Euro in direct payments. Among New Member States – except Slovenia – RDP support typically follows the maximum amount given in the EU legislation. Difference can be found only between the number of possible users of the measure, due to national priorities.

The related Hungarian RDP measure has a 15 billion Forints (11 EU and 4 National) budget for the period 2007-2013. In 2007 about 9,500 beneficiaries submitted their support request, which is far less than was expected. This figure even decreased in the next year, indicating problems with the measure. In a recent study Székely and Halász (2010) found that the current state of farm advisory services in Hungary is quite unfavourable. Among the difficulties, the unnecessary complexity and time consuming nature[5] of the support process is identified. Moreover, the frequency and the amount of available subsidy is not harmonised. Finally, the problems stem from the FAS itself and the unwilling cooperation of stakeholders.

FAS from the farmers' perspective

In 2010, 43 professional farmers residing in three villages in the hinterland of Budapest between the ages of 26 and 63 were interviewed in order to get an overall picture of the farmers' view of advisory services. This small sample is certainly not enough for any representative findings but it can be seen as an appropriate source to describe the general conditions and to indicate shortcomings. Most of the farmers (56%) had only basic education and less then one tenth (7%) had received any higher education. Looking at the specific agriculture education we see an even worse picture: 15% of them had basic, 23% secondary and 5% higher education, while two thirds declared different lengths of practical experience. In general, they were open for increasing their knowledge by learning or by other ways, however they were reluctant to make any financial sacrifice.

[4] However, the intensity of support is rather low.
[5] It often takes 1 to 1.5 years from submission to the actual payment!

The interviews showed that farmers have only vague knowledge about the institutional framework of the Farm Advisory System and have limited interaction with such professionals. The customer service based extension/advisory services provided by Chamber personnel are thought to be available only for members, which we believe is the failure of the provider's informing activity. The farmers indicated having contact only with village extension and input sales personnel. This is partly due to the limited activity of potential service providers. Even though the income of advisors listed on the registered national advisors' registry depends on the 'market', similar to any input supplier sales person, most of them do not contact with the farmers at all. The reason for this is partly because advisor activity in most cases is taken as a potential source of additional income, with no real effort taken. Advisory activity of input suppliers is not seen as part of the standard advisory system that focuses on increasing the knowledge base. However the real life experience suggests that, beside the registered advisors, input supplier salesmen can be seen as the closest competitor.

Farmers see differently the possible advantages that could be gained by using advisory services. Using such services provided via the village extension network increased the available information and saved time, and made the decision making process more easy overall. However, they also believe that the use of advisory services makes no significant difference in the economic performance. Surprisingly, advice provided by input suppliers representatives is presumed to have more direct and significant consequence on quality and quantity of their output, and therefore on the overall market success and profitability.

Conclusions and suggestions

In an EU comparison Hungary is among the countries having more constrained training of the farm managers. Although decision makers have an above EU average level of practical experience, secondary and higher education training is below the EU27 average. On the other hand, Hungary performs somewhat above average amongst the New Member States. The largest challenge the advisory system has to face is how to increase the actual usage rate. Farmers are aware of the entire spectrum of possible advisory services only to a limited extent. Village extension network and input suppliers are the most often involved stakeholders. Extension services are used to support farmers fulfilling the administrative duties, while input suppliers are more involved with

production and technology related decisions. The latter are strong competition for the registered advisors and also revaluate the role of input suppliers.

There is only a very limited and often formal cooperation between the stakeholders of the Hungarian Farm Advisory System. Institutes and Research Centres with education and postgraduate focus serve as a reliable base for farmers and advisory professionals alike. On the other hand there is a systematic deficit in taking advantage of a holistic approach, where each stage – education, research and advisory services – benefits from each other.

Our findings confirm that the main reasons for limited use of any kind of advisory services are lack of trust, time and financial resources. There is a strong preference towards personal interaction – preferably on the farm – while the use of IT solutions remains limited. Farmers believe that the most important impact of the advisory services is having easy, reliable and up-to-date access to policy and subsidy information. However, they consider that advisory services have only an indirect impact on their profitability. On the other hand, a similar activity of input supplier staff makes a significant contribution to the quality and profitability of production. We found a strong correlation between the size of the farm and the need, the propensity and the form to use advisory services. Subsistence and semi-subsistence farms tend to visit the village extension network, mainly for help in the obligatory registration process related to direct payments. Mid-size farms most often make use of the charged but subsidised advisory services, which go beyond administrative issues. Large farms use professional specialised companies or hire people with such competence.

Based on the above mentioned observations, the supported fee-based advisors are trained to follow legislation changes, collect information about different support possibilities and receive scattered farming practice related postgraduate knowledge. Though improving, farmers willingness to gain new knowledge and receive support for their business is low. They tend to attend postgraduate courses mainly if it is required to receive some rural development subsidy. The Hungarian Rural Development Program 2007-2013 has a specific measure for supporting the use of advisory services, which was underused from the very beginning of the programme and it even decreased throughout the year. Evaluations show that this is party the result of the time

consuming nature of the scheme and delayed payments. There are a limited number of good examples available and no effort has been taken to popularise them.

Therefore we can conclude that the in the short term the most effective way to improve the use rate of the advisory services is to simplify the administrative burden of the RDP measure, increase the speed of payments and facilitate the cooperation between stakeholders. On the basis of this, additional (not free) services could also boost this field. This requires more activity and promotion of the providers and increased service quality as well. The advisors would be better motivated with the increase of financial gains. This could be a positive feedback and lead to a development circle. From the demand side, farmers should be provided with as much freedom as possible in setting the type of services used by them.

From the current system any assessment of the farmers' satisfaction is completely missing. The assessment in place focuses only on the activity level of the advisors but paying no attention to usefulness of the service provided. Conflict of interest is also often part of the reality, but this circumstance is also not considered.

There are many options available to put in place incentives for the use of advisory services: minimum training requirement for land acquisition, setting up a new farm, prioritising farmers in different RDP measures using advisory services.

Recent reorganisation of the agriculture administration limited the role of village extension personnel almost entirely to authority duties. This naturally questions the status quo role of advisory activity as it is in conflict with authority function. This tension is relaxed by the fact that farmers have long term, confidential relationships with advisory staff.

From a policy perspective, the most challenging issue the FAS faces is defining the short and long term goals and targets. Considering the international trends, the long term goal should be a system with increased efficiency and market driven focus and flexibility. In the short term institutional anomalies should be sorted out, clearly assigning the roles and responsibilities. Also, the current system has certain overlaps which certainly reduce efficiency and reliability. An

appropriate forum should be set up for stakeholder conversation and continuous evaluation and assessment of the system.

The free part of the service should cover issues that do not go hand in hand with economic gain, such as providing information regarding administrative and authority related questions or information about subsidy possibilities. Anything more than this – filling out forms or preparing applications in particular – should be provided only as charged but subsidised advisory service. The subsidy scheme should be set up at differentiated rates (e.g. depending on size or number of occasions).

An interesting related question whether training and/or the use of advisory services should be obligatory with regard to a certain activity? There are many different example around the EU Member States where land acquisition above a certain size is only possible with minimum related training.

The results of different related research activities should be efficiently channelled into the advisory system. On the other hand, practical experience could be used as feedback in order to better concentrate and focus on demanded issues. More flexibility should be provided to attain required knowledge; training and advisory services should be – at least to a certain extent – substitutable with each other. Finally we conclude that the best incentive is the success of farming.

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SOME ROMANIAN EXPERIENCE IN ACHIEVING THE BEST COMMON AGRICULTURAL POLICY RESULTS. HOW MUCH HAS THE AGRICULTURAL SECTOR HAS BENEFICIATE?

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Abstract

Adopting the Common Agricultural Policy (CAP) has represented a major challenge for Romanian agriculture and it has generated massive changes on nation agricultural sector. This paper makes a short and descriptive analysis regarding the CAP effects on Romanian agriculture during the accession period, in general context of valuing national agricultural potential. It is analyzed some of the effects on the inland agricultural system on the new CAP requirements.

Key words: *agricultural, direct payments, market measures, CAP*

Introduction

Romania's integration in the European economic space was the most important objective of external policy assumed by our country, after the Revolution of 1989, which enjoyed a broad support from both the population and political deciders, being assumed at all the levels of the economic and social life. The problems regarding the relationships between the structural policies and their implementation in the new member states economy and the possible effects on the structural changes in agricultural succession has been analyzed in many studies as: Gibbard (1997), Taylor (1999) or (Csaki and Lerman, 2000).

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The evolution of Romanian agriculture and its submission to the European economic and social space is tightly bounded by the conditions imposed in the application of the Common Agricultural Policy (CAP) principles and its compliance with the European Union (EU) requirements. In this respect, in literature, (Rusu et al. 2007), estimate that *'the foreseeable development of agriculture and rural Romanian space under the impact of CAP implementation, is based on two realities rather independent: on the one hand, Romania's situation in general and on the other hand, the main trends and driving forces that will shape the European agriculture over the next 10 years'.* (Rusu et al. 2007, p.27*).*

The negotiation process regarding agriculture has been one of the most sensitive chapters of negotiations, agriculture being an important sector in the national economy, and its integration into the CAP requires an extensive process of compliance to these new realities.

Adequate capitalization of the Romania's agricultural potential can be made under the conditions of the integration of national agricultural mechanism and the adaptation of the farming structures to the community ones. Under these conditions, as Manoli et al., 2004 remarks, '*with 14.8 million hectares of agricultural land (62.2% of total), Romania ranks second after Poland in Central and Eastern European countries and after the accession in 2007, it might take the 7th place in the EU -27 after France, Spain, Poland, Germany, Italy and England, with a share of 8% of the total utilized agricultural area'.* (Manoli et al. 2004, p.32)

Romania's negotiations with the European Union on national agriculture were carried out in Chapter 7 of negotiations and aimed to establish the criteria and parameters for the implementation of the agricultural policy measures, in the framework of the CAP, being carried out based on same negotiation framework applied in other Member States, which joined the first wave of EU enlargement. The requirements imposed by Romania in the negotiations, as claimed in a study made by EIR, '*compared to Poland or the Czech Republic, Romania is quite modest in its position document. The main question is whether Romania's position document indeed reflects reality. This is a key issue, since any EU negotiation start here'. (*Piotet et al., 2002, p.69)

Agriculture accounted for Romania a very important economic sector with strong influences, not only in rural communities, but for the entire economy, understand it as a whole. The many changes required to adapt the inland Romanian agricultural realities to the European agricultural model, needs a

major reconsideration which can result in strengthening the production priorities in using proper the land and human resources in order to capitalize the national agricultural potential.

The importance of the agricultural system in Romanian economy is emphased by the values of some indicators such as: Gross value added produced by this sector, agricultural employees, inhabitants and the land in rural regions. In the table no.1 is presented the values of these indicators for 2007 – the year of Romanian accession to EU.

Table 1. *The importance of the Romanian rural areas in 2007*

Regions	Romania/EU (%)	Area Km^2	Population `000 inhabitants	GVA -million Euro-	Employment `000 persons
Predominantly Rural regions (PR)	Romania	136438.5	9 882.2	37300.4	3954.2
	% of total area	59.3	45.9	33.8	42.2
	% in EU-27	56.6	23.7	16.6	21.4
	% in EU-15	56.0	19.2	15.7	17.3
	% in EU-12	58.4	40.8	29.8	37.6
Intermediate Regions (IR)	Romania	91781.0	9427.4	47679.4	4345.8
	% of total area	39.9	43.8	43.2	46.4
	% in EU-27	34.3	35.5	31.8	34.6
	% in EU-15	33.9	34.6	31.4	33.7
	% in EU-12	35.3	38.6	36.1	37.9
Predominantly Urban regions (PU)	Romania	1757.4	2237.0	25362.7	1064.7
	% of total area	0.8	10.4	23.0	11.4
	% in EU-27	9.2	40.9	51.6	44.0
	% in EU-15	10.1	46.2	52.9	49.0
	% in EU-12	6.3	20.6	34.1	24.5
Total area	Romania	229976.9	21546.6	110342.5	9364.7

Source: *Author`s own selection based on European Commission, DG Agriculture and Rural Development, 2010 Rural Development Report.*

As it is presented in table above, in Romania, the predominantly rural regions holds about 59.3% of total area, with 9882.2 thousands inhabitants, from which 3954.2 thousands are employed and produce 37300.4 million Euro in terms of Gross Value Added (GVA). The Romanian predominantly rural regions has an important share at the EU-27 rural economy level, with values almost double than European registered level. In this context, the number of Romanians living in predominantly rural regions shares 45.9% of total, almost double than the EU-27 level (23.7%), the same situation is also for GVA produced (33.8% for Romania and 16.6 for the EU-27) and in the employment sector (42.2% in Romania and 21.4% in EU-27).

From the data presented in the table above, it can be concluded that the role and place of the rural economy, dominated by the agriculture as the main economic sector, is not only to produce agricultural products and work the land, is wider and has significant impacts of the rural communities.

Understanding proper the importance of the agricultural sector in the Romanian economy, becomes more important than following rules and politics, which not all the time are healthy for the economy.

Starting from such a supposition I believe that it has been tried, at least in words to achieve the best conditions for establishing the financial package designed for Romanian agriculture, determining the areas guaranteed and the production quotas as specific operating instruments within the CAP. In summary, the objectives aimed within the negotiations have mainly focused on (MAPDR, 2007):

a) Establishing the measures for the gradual introduction of direct payments (SPS) over a period of 10 years, according to a time scheduled, with defined stages so that 25% in 2007, 30% in 2008, 35% in 2009, 40% in 2010 and by 2016 about 10% per year in addition, from the maximum level established for each Member State).

In the case of Romania, during the negotiations, it has been obtained the possibility to cumulative increase both the national allocations and the European ones, outrunning the schedule established for the other countries, so it reached shares of 90% in 2010 and the maximum allowance of about 183 €/ha in 2011, with five years earlier than the reference period -2016;

b) Determining the quantitative references related to the operation of the level of direct payments granted within the CAP - based on historical reference data on agricultural production

c) The possibility of supplementing the funding for agricultural policy measures by completing the direct payments with a maximum of additional complementary national payments (*top-up*) – of up to 30% annually, from the national budget.

Financing the Romanian agriculture is realized both through the CAP funding mechanism, and through, the European Agricultural Guarantee Fund (EAGF) and the European Rural Development Fund (ERDF), but also through direct

national financial allocation from the national budget through the Ministry of Agriculture and Rural Development (MARD) and the Romanian Agency for Payments and Intervention in Agriculture (APIA).

Within the negotiations Romania requested, since the beginning, establishing transitional periods in order to comply with the criteria imposed in the accession process and to correct some unfavorable sectorial situations, with negative effects on the future development of agricultural production. It should be considered, as noted in the studies made, that '*the negotiated transition periods are accompanied by the conditions of application, which prohibit the new member states to use them to gain competitive advantage induced by the temporary non appliance of the community acquis'. (*Manoleli et al., 2004 p.60*)*.

In the following subsection is presented the transitional periods granted by the European Commission for complying with the EU requirements imposed in the accession process.

Transitional terms

In the negotiations with the European Union on agriculture, Romania has obtained the following transitional periods, not mainly as professionalism of the negotiators, but as a result of the main frame of the EU negotiations as follows (MAPDR, 2007):

• a period of 8 years, until the end of 2014, to eliminate from the culture of direct producers hybrid vineyards;

• a period of 5 years, expiring at the end of 2011, for the adoption of safeguard measures regarding the imports of agricultural products from the Community to prevent and eliminate any possible disturbances on the market of Romanian agricultural products;

• a 4 year term, expiring at the end of 2010, the inventory the vineyards and organize a Community register of them;

• Periods of 3 years, expiring at the end of 2009 for:

- implementing at national level the non-vaccination policy for classical swine fever;
- modernizing and upgrading the meat cutting and processing units;
- modernizing and upgrading the milk processing units and organizing the collection centers and milk standardization;
- complying with EU requirements on dairy farms and raw milk quality.

The transition periods granted to Romania are part of the general lines of EU negotiation with all Member States and should not be understood as incentives or concessions made to our country, or presented as victories of the Romanian negotiators, especially since some states have registered in their position documents requests and derogations more numerous and consistent than those which Romania limited to include.

To these transitional periods, presented above, which are exceptional and limited as functionality over time, were obtained additional rights, such as (MAPDR, 2007):

– The recognition and protection of generic names, of origin and geographic for some alcoholic products, for a total of about 13 alcoholic products made from plums and five drinks distilled from wine, including palinca, horincă, tuica, and vinars.

– The exemption from veterinary rules, in the case of dairy products using traditional tools and technologies. In this case is about 58 types of cheese and dairy products from cow milk, sheep, goat and buffalo

– Additional planting rights on 1.5% of the total area planted with vines for wine grapes and top wines with controlled name origin

– The right to use additional sucrose to improve musts and increase wines' alcoholic potential

– Additional funding of direct payments by shifting 20% of the funds designed for rural development

Overall, the result of negotiations with the EU on agriculture were largely favorable to our country, and reflects on one hand the importance of this sector to the national economy and the fact that Romania, according to statistics, has a significant agricultural potential, being the second agrarian economy of EU after Poland.

If we refer, for example, to the plant sector, although in the negotiations Romania has presented data for the period 1995-2003 to determine the references regarding the crop and the area of eligible agricultural crops were accepted only the values for the period 2000-2002. In table no.2 is presented, for exemplification the synthetic data, which has led to the decision`s grounding, took in this area.

Table 2. *Matrix calculation and the results of negotiations in vegetable sector*

Arable crops	Surface in 2002 (ha)	Surface distribution in EU reference (ha)	Estimated yield in 2007 (t/ha)	Production reference 2007 (t)	Estimated domestic consumption requirement in 2007	Theoretical deficit or excedent
Wheat+ rye	2.309.800	2.272.809	2,65	6.022.944	4.290.000	1.732.944
Barley	578.800	569.531	3,10	1.765.545	1.450.000	315.545
corn	2.894.500	2.848.145	3,50	9.968.508	8.385.000	1.587.641
sorghum	2.800	2.755	1,50	4.133		
sunflower	906.200	891.687	1,30	1.159.194	825.000	334.194
soy	71.800	70.650	2,00	141.300	350.000	-208.700
textile plants	1.400	1.378	3,50	4.822	-	-
other cultures	361.500	355.711	-	-	-	-
Grand Total	7.126.800	7.012.666	-	-	-	-

Source: *According to Ministerul Agriculturii şi Dezvoltării Rurale, Rezultate privind închiderea negocierilor în cadrul Capitolului 7 Agricultura.*

In order to determine the level and volume of direct payments for arable crops, Romania has calculated according to the European regulations an area of eligible basis for direct payments for eligible crops of 6891100 ha and has got 7012666 ha approved by the European Commission with an efficiency of 2.65 tons/ha, much lower than the national potential.

Although the reference surface obtained is greater than the value required by Romania, the low yields, make the Community financial allocations to be much lower than those of other EU member states. In some specialized studies it is estimated that '*Romania should not concentrate on increasing production, but on solving the mechanisms needed for a modern agricultural economy'. (*Piotet et al., 2002, p.72*).*

In table no.3 are presented the main characteristics regarding the size of the reference and eligible surface, for some cultures and quantities guaranteed, to receive direct payments under the CAP mechanism.

Table 3. *Reference surfaces and quantities guaranteed in some cultures cases*

Eligible crops	Referenced surface eligible for direct payment
Nuts - guaranteed area	1.645 ha
Rice - guaranteed area	500 ha*126 €/ha
Hops - guaranteed area	198 ha
Tomatoes - guaranteed quantity for processing	50.390 tonnes
Peaches - guaranteed quantity for processing	523 tonnes
Tobacco - guaranteed quantity	12.300 tonnes
Flax and hemp - guaranteed quantity	963 tonnes
Total surface: 7.012.666 ha Reference yield: 2,65t/ha	

Source: *Author's own processing on the basis Ministerul Agriculturii şi Dezvoltării Rurale, Rezultate privind închiderea negocierilor în cadrul Capitolului 7 Agricultura.*

Summarizing the results of the negotiations, it can be seen that better results were obtained in the case of (MAPDR, 2007):

– sugar, which, although based on the data from the reference period Romania has requested a quota of 65,734 tonnes, after the negotiations it has been achieved a total quota of 438,164 tonnes (consisting of a sugar quota of 109,164 tons of beet and a quota of 329,000 tons of raw sugar cane processing) but has been reduced to 104,000 tonnes in the reforms in this sector,

– tomatoes for processing from 49,032 tons required by Romania to 50,390 tons resulting from the negotiations;

– the national ceiling for sheep from 3312000 heads requested by Romania, to 5,880,620 sheep heads resulting from the negotiations and an amount of bonuses totaling 6216782 Euro;

– the bonuses for the lactating cows obtained for all registered herd of 150,000 head, which means 100% of the effective, and the special bonus for male bovine animals at fattening obtained for 452000 heads, although initially it was only asked for 438667 heads.

Failures were recorded in the milk sector, where, though Romania's request was of 5,000,000 tons and a reserve share for restructuring, the results were only of 2,743,000 tons, well below the national production potential. Another aspect is the bonus for cattle for slaughter or export achieved only for 1.233 million head, value much lower than the average statistics of slaughtering in the referred

period, or abandonment of the production quota for isoglucose of 13.913 tonnes for the restructuring financial aid. In the table no.4 is presented the results of the negotiations, ceilings and additional payments in case of livestock production.

Table 4. *Ceilings and additional payments in the livestock production*

Category	Cap level/surcharge raw number of animal heads
Sucker cows	150.000 heads
Cattle for slaughter	1.233.000 heads
First fattening cattle	452.000 heads
National sheep ceiling	5.880.620 heads
Total additional payment for cattle	858.260 €
Total additional payment for sheep	6.216.782 €

Source: *Author's own processing based on Ministerul Agriculturii şi Dezvoltării Rurale, Rezultate privind închiderea negocierilor în cadrul Capitolului 7 Agricultura.*

The results gained in the animal production sector, as are presented in the table above, reflects mainly a lack of negotiation skills form the Romanian negotiators. The negotiated values are under the real values and potential of the national production capabilities. Romania agrees important losses, by neglecting the sector production potential. Total additional payment for cattle (858260 €) and total additional payment for sheep (6216782 €) may substitute in a smaller perspective the accepted losses in this sector, but the values are still under the last result value of the EU-27 average.

The CAP expenditures and Romanian agriculture

Regarding the evolution of the main aspects of the CAP expenditures during 2007-2009 periods (table no.5), reflects the authorities' interest for thorough integration of the national agricultural sector in the European Economic Area. From this perspective, the effort`s analysis for the first three years period of Romanian membership presents a particular significance in the whole context of in the national experience in dealing with EU agricultural CAP framework and its main directions of action.

Table 5. *The evolution of CAP expenditure, in Romania, during 2008-2009*

Measures	2008	2009	2007-2009 -%-	
Decoupled direct aids	412 709.7	531 157.9	25.5%	99.7%
Other direct aids	582.9	2 270.8	0.1%	0.3%
Additional amounts of aid	-	-	-	-
Direct payments	422 292.6	533 428.7	25.6%	100.0%
Cereals	10.2	0.0	0.0%	0.0%
Food programs	22 993.4	27 578.4	1.4%	39.4%
Wine sector	35 050.2	42 148.9	2.3%	65.6%
Milk and milk products	391.2	2 506.1	0.1%	2.3%
Market measures	51 907.0	69 473.1	3.4%	100.0%
Rural development	1 146 687.7	1 502 691.5	71.0%	100.0%
TOTAL	1 620 887.3	2 105 593.3	100.0%	-

Sources: *Author own processing based on 2007-2009 EAGF Financial Reports and Commission Decision 2006/636/EC, European Commission, DG Agriculture and Rural Development.*

Decoupled direct aids, Direct Payments and Rural Development represented the main areas with the highest registered absorption rate for Romanian agricultural sector. In this domains Romania has managed a nearly complete usage of the allocated funds. If in 2008, the decoupled direct aids mobilize nearly 412709.7 Euros, representing about 25.5% of the allocated funds, during the 2007-2009 period the absorption rate was 99.7%. In case of direct payments has registered a full absorption rate for the same period of 2007 to 2009. If in the first year of accession, the rate was only 25.6%, at the end of 2009, Romania has used 533 428.7 Euros, represented 100% of total allocated funds.

Rural development has represented a major political component not only for Romanian authorities but also for the CAP in a wide context of EU major politics. Developing the rural communities need major investments, not only in rural infrastructure as mainly policymakers believe but also in the rural economy and rural communities as direct beneficiary of the EU, rural development policy. For Romania achieving a high rate of founds absorption means that rural communities haves started to become awareness of the importance of this financing source which became very accessed but not used at the full capacity. In terms of financial results, Romania has achieved in the negotiations a financial allocation for the year 2007-2013, in the case of agriculture, of 6539200000 Euro, for both direct payments and market measures. The amounts allocated to direct payments represent 83.67% of the total financial allocation for the entire period, while the allocations for market measures represent only 16.33%. The annual breakdown of these amounts is presented in the table below.

Table 6. *The evolution of financial allocations for direct payments and market measures for Romania, 2007-2013 -Millions €-*

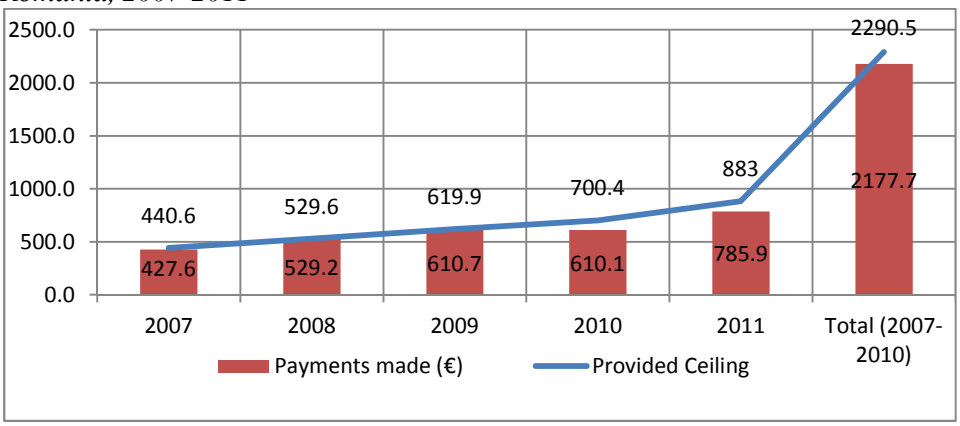
Payments types	2007	2009	2011	2013	Total 2007-2013
Direct payments	440,0	618,1	883,0	1236,2	5471,2
% in total	64.0	76.8	86.9	96.8	83.7
Market measures	248,0	187,1	133,6	40,4	1068,0
% in total	36.0	23.2	13.1	3.2	16.3
Total allocated amounts	688,0	805,2	1016,6	1276,6	6539,2

Source: *Adapted from European Commission.*

Analyzing how each financial component was used by our country, we see that the way and degree of achievement of absorption of EU funds for agriculture is best achieved when the direct measures for supporting the Romanian agriculture and farmers and less the use of the tools to support markets involves refined measures. In what concerns the direct payments, as observed in graphs no.1 and no.6, the absorption rate is approaching the maximum allowances due to their explicit particularities.

The significant amounts allocated to Romanian farmers through direct payments would have to determine an increase of the farmers' competitiveness and the coverage of the domestic demand for agricultural products. In the graph no.2 is presented the evolution of the volume of direct payments and the ceiling designed for Romania in 2007-2011.

Graph 1. *Evolution of the volume of direct payments and the ceiling provided in Romania, 2007-2011*



Source: *Author own computation based on APIA database, 2011*

In this context, the distribution of the direct payments taking into account the beneficiaries and size-class of aids reflects the largely crumbled character of agricultural owners in Romanian agriculture and also the high aggregation of farm structure around the small and very small farm types. In Table no.7 is presented the size-class distribution of aid for all the direct payments during the 2009 financial year.

Table 7. *The size-class distribution of aid for all the direct payments during the 2009 financial year, in Romania*

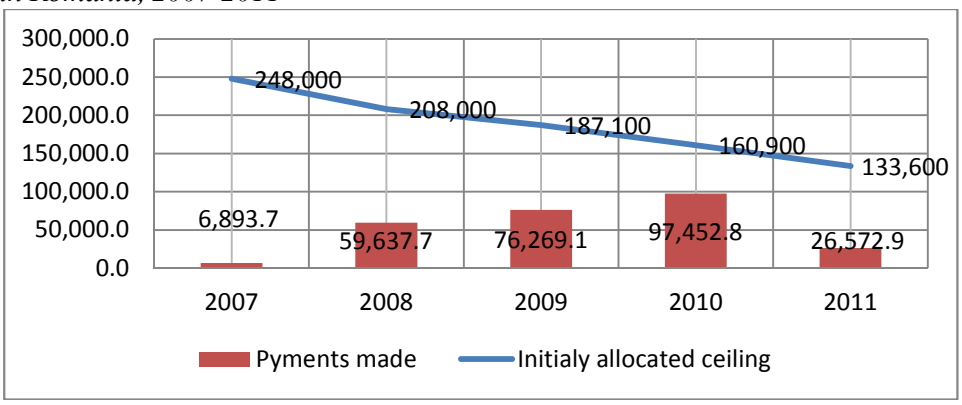
Size-class of aid (all direct payments)	Beneficiaries		Payments in EUR	
EUR	x 1 000	% of total	x 1 000	% of total
< 0	1.21	0.11	-447	-0.08
≥ 0 - 500	993.40	92.11	166399	31.31
≥ 500 -1250	53.29	4.94	38061	7.16
≥ 1250 - 2000	8.41	0.78	13199	2.48
≥ 2000 - 5000	10.38	0.96	31962	6.01
≥ 5000-10000	4.62	0.43	32743	6.16
≥10000-20000	3.36	0.31	47348	8.91
≥20000-50000	2.77	0.26	84930	15.98
≥50000-100000	0.81	0.08	54924	10.33
≥100000-200000	0.24	0.02	32142	6.05
≥200000-300000	0.03	0.00	7306	1.37
≥300000-500000	0.01	0.00	5194	0.98
≥ 500000	0.02	0.00	17680	3.33
Total	1078.55	100.00	531441	100.00

Note: numbers less than 10 have been made invisible in this table.

Source: *Author`s own processing based on European Commission, DG Agriculture and Rural Development, Agricultural Policy Perspectives. Member States factsheets. Romania – May 2011.*

As it can be noticed form the data presented in the table above the major direct payments made in 2009 are for the interval ≥ 0 – 500 Euros, which holds 31.31% of total payments and about 993.40 thousands beneficiaries and 92.11 from total beneficiaries. Another reviled aspect is the aggregation of 26.31% of the direct payments beneficiaries to the interval of ≥20000-100000 Euros, which designates a total of 3.58 thousands large payments beneficiaries. Just 2000 of beneficiaries managed to receive payments ≥300000 Euros and it represents only 1.31% of total payments. In the case of the measures designed to support the market, the situation is completely different from direct payments. As it can be seen from the data presented in figure no.2 the period under review registers low levels, well below the ceiling set, which shows the poor knowledge of the mechanisms of intervention and also a lack of interest in their use.

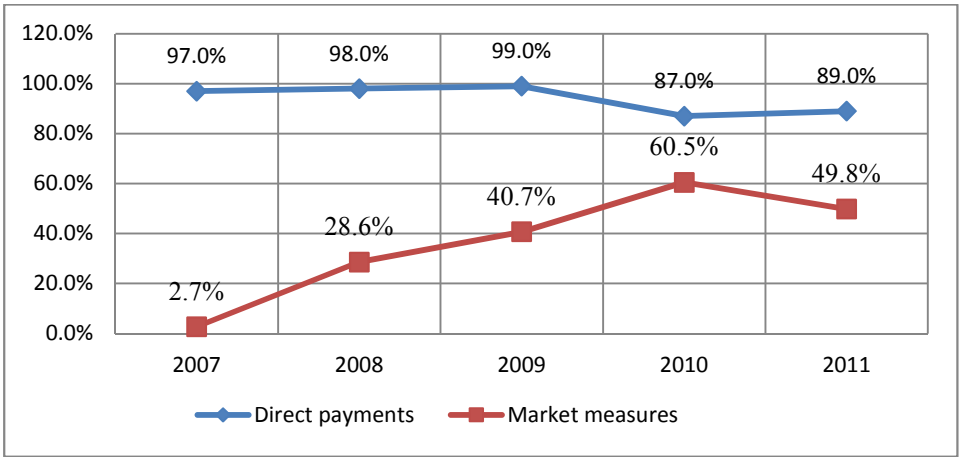
Graph 2. *Developments in the use of EU funds allocated for market measures, in Romania, 2007-2011*



Source: *Author own computation based on APIA database.*

To get an overview on the development of the efficiency in using the Community funds in national agriculture, the chart below presents the evolution of the absorption degree, on purpose of the Community financial allocation for the period 2007-2011.

Graph 3. *Evolution of Romanian financial allocations absorption degree, 2007-2011*



Source: *Author own computation based on APIA database.*

If for direct payments we notice levels of absorption of community fund of over 97% in the first three years of operation, with a slight decrease in 2010 and 2011, this is not the case for the market measures, where the degree of achievement is

the highest, of 60%, recorded in 2010. I agree that, at least *for Romania CAP adoption is an issue of application and not of transposition, because it is easier to transpose, but difficult to apply. (*Piotet et al., 2002, p.66).

Effects on Romanian agricultural trade and income

The effects of CAP on Romanian agricultural are much visible when comes to agricultural trade. In terms of agricultural trade, the effect of European agricultural policy on the Romanian agricultural sector is major and it designates a tight dependence. The agricultural trade is a real mirror of the sectorial efficiency in a larger context of valuing agricultural potential. A greater rate of exports into EU`s space means a competitively advantage of the Romanian agricultural products. In fact the integration of the Romanian agricultural sector into EU meant a loss of competitivity. The Romanian inland market has been flooded with cheap and poor qualitatively products which destroyed a large portion of the agricultural producers. For example, in the table no.8 is presented the agricultural trade, from Romanian perspective, in 2010.

Table 8. *The Romanian Agricultural trade in 2010 - Million Euro-*

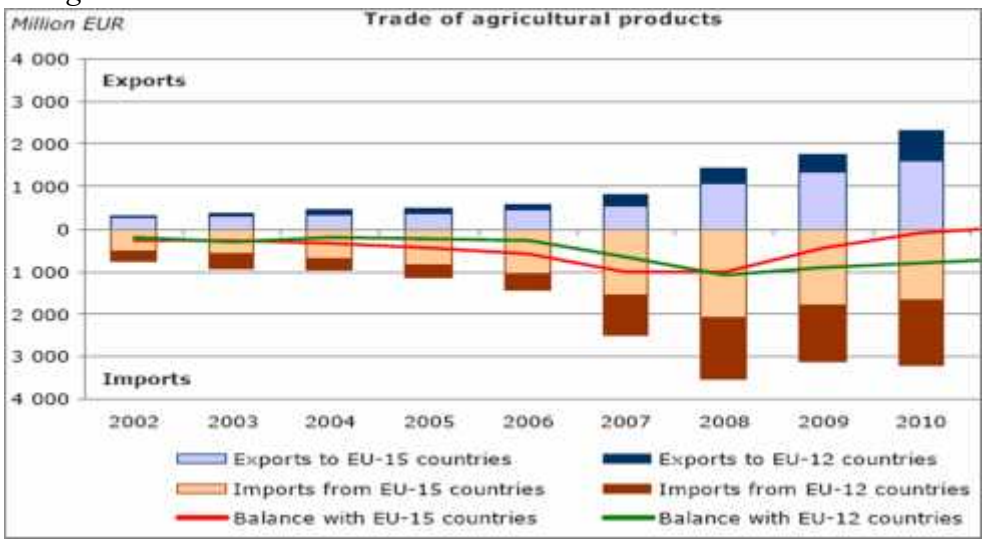
By category of product	Total trade	Trade with EU countries	Trade with non-EU countries
Exports			
Commodities	857.6	388.4	469.2
Intermediate	1 093.3	852.7	240.5
Final products	920.1	802.8	117.4
Other products	39.4	30.7	8.8
Total agricultural products	2 910.4	2 074.6	835.8
% of total exports	8.3%	8.4%	8.1%
Imports			
Commodities	386.2	299.6	86.7
Intermediate	1 098.5	764.6	333.9
Final products	2 027.6	1 741.2	286.4
Other products	118.3	115.4	2.9
Total agricultural products	3 630.6	2 920.8	709.8
% of total exports	8.3%	9.4%	5.5%
Balance			
Commodities	471.3	88.8	382.5
Intermediate	-5.2	88.2	-93.4
Final products	-1 107.5	-938.5	-169.0
Other products	-78.9	-84.7	5.8
Total agricultural products	-720.2	-846.3	126.0

Source: *Author own processing based on European Commission, DG Agriculture and Rural Development, Agricultural Policy Perspectives. Member States factsheets. Romania– May 2011.*

The agricultural trade balance reviles a total deficit of 720.2 million Euros, which 'hides' a much greater one, around 846.3 million Euros as part of trade with EU countries. So, the Romania has become a net importer of agricultural products. Romania imports final agricultural products, instead of producing it by 2027.6 million Euros.

In this context, Romania has not manage to valuing its own agricultural potential and became a sell market for the EU`s agricultural policy. For a detail representation of this aspects, in graph no.4 is represented, based the evolution of Romanian agricultural trade with the EU countries during 2002-210.

Graph 4. *Evolution of the Romanian agricultural trade with the EU countries during 2002-210*

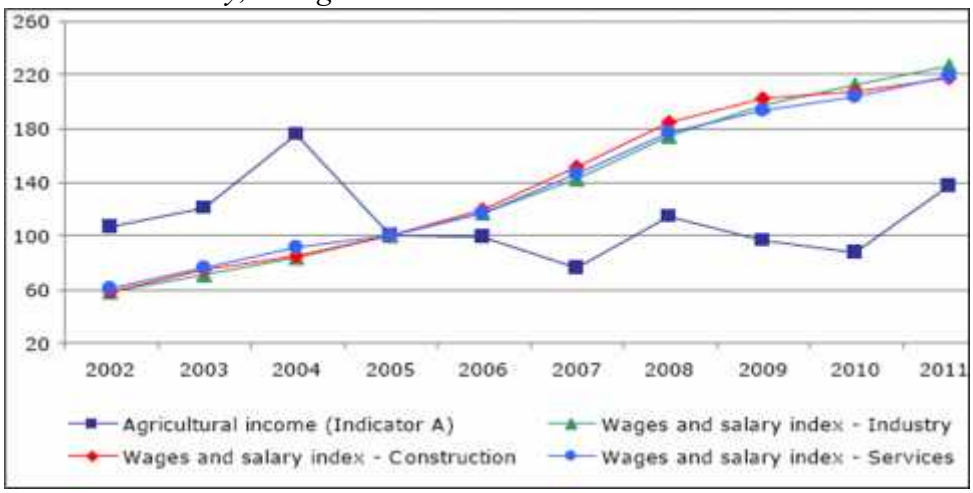


Source: *Author own processing based on European Commission, DG Agriculture and Rural Development, Agricultural Policy Perspectives. Member States factsheets. Romania– May 2011 and Eurostat database.*

From this perspective, Romania must improve the agricultural relations to the European sector by valuing in a higher manner the agricultural resources and the availability of the rural working force in a more competitively way – the farmers must understand the role of the market in providing wealth and stability by selling agricultural goods not only on regular market but both cooperating in building agricultural and food industry. Taking into account the level of incomes, the Romanian agriculture is still under the other branches earnings level as: industry, services and constructions. The agricultural income is mainly dependent on the evolution of the selfconsumtion which has increased during

the last period. With a low productivity and a high number of a rural unemployed working force, agriculture has increased its social role and functions in the rural communities. In graph no.5 is presented the evolution of agricultural income versus wages and salaries in Romanian economy, during 2002-2011.

Graph 5. *Evolution of agricultural income versus wages and salaries in Romanian economy, during 2002-2011*



Source: *Author own processing based on European Commission, DG Agriculture and Rural Development, Agricultural Policy Perspectives. Member States factsheets. Romania– May 2011 and Eurostat database.*

The evolution of agricultural income reviles the decreasing role of agricultural sector in the Romanian economy in providing financial revenues both for the workforce and rural communities and a massive switch to selfcoumption for rural households.

Analyzing the data presented in above graph, it can be considered two distinct periods. A period where the agricultural income is higher than other sectors, mainly due an active agricultural inland policy in promoting agriculture and second period when the agricultural income starts to decrease and the role of agriculture is mainly peripheral. After the accession, the Romanian agricultural income has a sinusoidal evolution and it is still with a lower level than the other sectors.

Conclusions

Analyzing the effects of Common Agricultural Policy (CAP on Romanian agriculture after five year of accession reviles a contradictory picture between the inland expectations and the current realities. Although some significant changes took place, there are still significant gaps between the Romanian agricultural system and the European agriculture model.

Romanian has not manage to use in a proper manner all the CAP instruments and mechanism in valuing the inland agricultural potential. Both positive and negative results were achieved. When comes to positive results, Romanian rural communities has beneficiate the most from the financial allotments and the farmers from direct payments and other EU financial founds.

As negative impacts on Romanian agriculture it can be mentioned that Romania has become a net agricultural product importer, since the first year of accession and the agricultural trade balance registers a heavily deficit, the evolution of agricultural income has declined, the inland agricultural production has lost its competitivity and the internal market has been flooded with cheap and poorly qualitative products and so on. Romania has not managed to have a high rate of agricultural funds absorption and to use functionally the agricultural market intervention mechanism due to lack of experience and bureaucracy. In synthesis it can be conclude that Romania has still to learn how to efficiently use the CAP mechanism in achieving the best results in agricultural sector.

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REFORM OF MODERN AGRICULTURAL EXTENSION SERVICE

Marija M. Nikolić, Jasmina Arsenijević[1]

Abstract

The trends in transformation of modern agricultural extension services (AES) are analysed in the paper and pointed to different forms of this service in the world. The advantages and disadvantages of some development strategies of AES are underlined and presented the examples of best practice in reform of extension work in agriculture. The observed trends of increased private sector participation in extension and establishment of the so-called institutional pluralism is generally considered desirable, since it increases the quality of the services provided, but there are some limitations regarding total privatization of AES, which will also be discussed in this paper. Therefore, it is extremely important that the public sector continually participate in the establishment of an adequate quality control system of advisory work in agriculture.

Key words: *agricultural extension service, models of organization, reform, institutional pluralism*.

Introduction

Agricultural extension service can be defined as "service or system which, through educational procedures helps farmers in improving the methods and techniques of agricultural production, farm management, increase of revenue and productivity, raising living standards and social and educational standards in the village." (Mauner, 1973 according to Petrović and Janković, 2010: 3) Agricultural extension, therefore, involves the transfer of new knowledge and technical-technological innovation from scientific-research institutions to farmers.

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Model of organization and efficiency of the agricultural extension services depends on degree of economic development of the country, and especially from development of agriculture. Socio-economic and educational characteristics of user, or in other words farmers, and the nature of their requests, determine the type and form of information and extension work that will be used in practice. In the initial stages of development, agricultural extension services worldwide was usually organized and funded by the state. However, in the later stages of development, as aims of extension works changed, other actors such as private companies, NGOs and farmers' organizations involved in the process of knowledge and information transfer.

The paper consists of three chapters. Various factors that led to the need for reforming the agricultural extension service are analyzed in the first part of this paper. The second part explains different models of transformation of AES in the world, covering both market and non-market reforms. Market reforms can be classified into four groups: revision of public extension, extension system based on cost recovery, pluralism of extension service and total privatisation of extension. Non-market reforms of AES include decentralization to lower tiers of government and delegation of responsibilities to other entities providing extension services. Advantages and disadvantages of different models of AES are pointed in the third part of the paper, followed by concluding remarks.

The need for transformation of agricultural extension services

In the mid 1980's, advisory services in the world, until then largely organized by the state, were subjected to detailed analysis. Reducing agricultural budget in most countries required a substantial reduction of costs, and the state extension service in most cases become too cumbersome, burdened by bureaucracy and inefficient. This represents a turning point in the development of AES and the beginning of a process of transition.

Deetatisation of agricultural extension was carried out in three directions: reducing the number of employees,[2] reduction of the volume of advisory

[2] According to FAO, at the beginning of the 1990s there were about 600,000 agricultural extension personnel in the world, with 95 percent of these working in public agricultural extension systems. (FAO Report of the Global Consultation on Agricultural Extension, 1990, Rivera and Cary, 1997: 245) These data were confirmed in a subsequent analysis of 124 extension organizations (research included only organizations with more than 20

tasks that are executed through public extension service and transfer of part of these activities to other entities who, until then, were less involved in extension, such as private companies, NGOs and farmers' organizations as agricultural cooperatives.

Monopolistic public extension service is considered obsolete and "accused" that it did not comply with the requirements of the competitive market-oriented agriculture, which led to the need for its transformation. Changes of AES were aimed at creating a revitalized and expanded extension services with dual role: poverty reduction in rural areas and fulfilling market and other needs of agricultural producers in order to improve their competitiveness. (Alex, et al., 2004: 1-2) In order to achieve this, it was necessary to engage various stakeholders, as the public AES were not able to meet such diversified needs of users in terms of reduced funding.

Modern extension, as a system, includes public, private and other organizations that fund and implement extension activities in order to improve not only agriculture, but rural areas as a whole. The so-called institutional pluralism, in addition to public extension service, engage also private companies that can be both profitable and non-profit oriented. Profit-oriented private companies include consulting firms whose primary activity is the provision of advisory services and other private companies that provide specific information to farmers beside their main business, such as companies for production and supply of agricultural inputs. Non-profit private organizations can be divided into organization of farmers, such as cooperatives and farmers' associations and non-governmental organizations (NGOs).

Private organizations (especially profit-oriented) are flexible, focused on the needs of farmers and represent an important factor in the transfer of technology. Typically they are engaged in providing market information, which can increase the competitiveness of agricultural producers and the volume of agricultural production. However, when advisory services are delegated to private organizations there is a real possibility that their services and advice are not solely motivated by the welfare of producers, but also with other motives, especially if their services are connected with

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employees), when it was established that the 87 percent of these services are funded by the state, and 81 percent were under the direct control of the Ministry of Agriculture. (Barcza et. al., 2000: 6)

the sale of inputs. Organizations of agricultural producers are also aimed at increasing competitiveness, but solely for its members, and in that sense they have smaller target audiences. However, these organizations are engaged in advisory activities as a secondary activity, and only if they have the personnel and financial resources. Farmers' organisation fund extension from their own funds, usually on the principle of cost-sharing with users, and to a smaller extent from donations. Non-governmental organizations can be a major resource for the implementation of extension activities, especially in the reformed AES, which aims to provide information not only from agriculture but also from rural development, environmental protection, and improving the quality of life in rural areas. NGOs can provide general services and information[3] or can be specialized in a particular area. They are extremely flexible in work and can cooperate with a specific group of users, such as poor or disabled. NGOs disadvantage is that their funding depends on donors, public funds, available projects and other periodical sources, which makes it difficult to provide continual work.

Agricultural extension, regardless the system of financing and/or performance of extension activities cannot function without a continuous flow of information and innovation from scientific-research centres to final users. One of the major downsides of so-called privatized extension[4] is tearing these connections, weakened system of creation of new knowledge and limited access to innovation. This is why the state has very important role in institutional pluralism, whereby following questions are particularly important (Alex et al., 2004: 5-6):

(1) Coordination of AES;
(2) Providing coverage of the entire rural population;
(3) Ensuring the quality of services provided; and
(4) Capacity building and forming relationships between AES and research organizations.

In institutional pluralism of extension systems, implementation of advisory activities is entrusted to a number of different types of organizations in terms of the ownership structure, so it is necessary to

[3] This role has NGO Agromreža in Serbia.

[4] Fully privatized extension service, in terms of total transfer of organization and financing of extension activities to private organizations, without any participation of the public sector, is extremely rare in the world. Most often it is a form of division of advisory work between different types of entities, or in other words ***institutional pluralism***.

have an authority to co-ordinate their work. This role is most efficient done by the government, since it has access to the entirety of AES work, the objectives of agricultural development and the role of AES in the realization of these goals, as well as trends in the development of rural areas. Some organizations may be involved in certain issues and providing to agricultural producers part of required information, but it is the task of the competent state authorities to ensure coverage of all areas relevant to the development of agriculture and local communities. Environmental protection, development of border areas and sustainable agriculture are uninteresting topics and private organizations in most cases are not motivated to organize extension services in these areas, so the role of the state in providing these information to rural population is essential. Also, commercialization of AES leads to partial or total exclusion of the poor farmers, who are unable to pay for advisory services provided by private companies. In this sense, the task of the state is to provide coverage for all user groups through public extension or NGOs. Monitoring of the entire AES, especially in institutional pluralism, is a particularly important issue. In most countries, almost anyone can be involved in providing advisory services in agriculture[5] (Alex et. al., 2004: 5), and therefore there is a need for continuous system of control, which can be organised only by the competent state authority. Finally, the role of the state is to enable continuous exchange of information and development of environment for performing advisory work, through its organisations, usually the Ministry of Agriculture. AES can be associated with the university, which is the case in the United States and Portugal, or can form a unique scientific research centre[6] whose information would be available to all active extension staff, with the aim of building an effective advisory system in agriculture.

It can be concluded that the modern extension service is characterized by a pluralistic system of financing and provision of services, in which there

[5] In Paragraph 8 of The Law on providing extension and professional activities in the field of agriculture ("Official Gazette of the Republic of Serbia", No. 30/10) the conditions for doing extension work in agriculture are prescribed. Agricultural extension personnel must have a license to perform advisory services in agriculture, to be entered in the Register of agricultural extension personnel and to be employed in a company, a legal entity or an entrepreneur that are in the Register of economic entities registered to perform other services in agriculture, technical tests and research, or consulting and management.

[6] Institute for applied science in agriculture perform activities as republic extension service in Serbia since 1991.

is a place for private extension organizations, whose role in the construction of high-quality system of agricultural extension service cannot be denied, but under the coordination and supervision of the public sector.

Since the beginning of the transition process in the mid 1980's, the development of agricultural extension services in the world took place in two main tracks: through market and non-market reforms. Market reforms cover four basic strategies, defined according to the organization and financing, as shown in Table 1:

(1) Revision of public extension;
(2) Extension system based on cost recovery;
(3) Pluralism of extension service and
(4) Total privatisation of extension service in agriculture.

Non-market reforms of AES can be conditionally divided into decentralization to lower tiers of government and delegation of responsibilities to other entities providing extension services.

Models of transformation of agricultural extension services

In this section are analyzes different models of transformation of agricultural extension services in the world and it is pointed to their main characteristics, and the possibilities and limits of participation of certain actors in the implementation of extension activities, with examples from selected countries.

Transformation of AES through the revision of public extension (represented in the upper left quadrant in Table 1) is the mildest form of reform. In the pre-transition advisory system, public AES usually had centralistic organization, with the state agency in charge of coordinating the work of smaller organizations in the agricultural extension system, which has resulted in the bureaucracy of the system. This method of organisation assumes provision of predetermined information to farmers, regardless to their needs and therefore is considered as overcome. Modern AES insists on a "bottom-up" approach in organization which is oriented to the needs of producers who, through advisers – as the central link of the extension system, indicate areas of their interest in order to improve agricultural production. Such system is often associated with the active participation of the farmers and processing industry in the management and control structures of extension services. The influence of farmers on

development of agricultural extension services is the greatest when they pay for the part of extension services or in the system of partial commercialization. For that reason, introduction of charges for services that had previously been free is an integral part of this process.[7] An audit of public AES also includes reduction of the extension services performed by government agencies and the transfer of part of these activities (usually) the farmers' organizations.

Institutional pluralism in extension service (lower left quadrant in Table 1) is one of the most widespread forms of transformation AES, especially in developing countries. The prevalence of this model can be explained by the fact that it includes three different strategies of reorganization of extension service, including: providing subsidies to farmers to hire private providers, contracting out to public or private organizations to provide advisory services and most recently, funding for community driven development of AES.

According to the first model, the central authority provides subsidies to farmers in the form of conditional grants for hiring private sector providers for extension. This model was among the first implemented in Chile, Mexico and Uganda. Chile was the first country that experimented with privatization of agricultural extension services. Before the transition of AES began to spread throughout the world, the Chilean government in 1978 significantly reduced the number of extension staff (from 5,000 to 1,000), and began to provide financial support for the establishment of private extension organizations. The newly formed small consulting organizations, in the first phase, mainly engaged staff previously employed in the public service. Farmers were encouraged to engage private providers, and the costs of their contracting were subsidized by 80 percent in 1978. It was planned that the subsidies for this purpose will be reduced to 20 percent in 1982, until the total abolition in 1983, as it was estimated that farmers will be able to bear the whole cost of hiring advisors by then. (Cox and Ortega, 2004: 9) Subsidizing farmers was completed through voucher system, distributed by government services. A similar subsidy system was applied in Colombia, where farmers receive coupons attached to agricultural bank loans, committing a certain

[7] The introduction of fees for certain services is first conducted in countries where farmers are financially able to handle the additional burden. For example, with transformation of AES in the U.S. services such as soil analysis and attending some workshops, which were previously free, began to be charged.

percentage of the loan for extension services. (Rivera and Cary, 2004: 247) Unfavourable economic position of farmers in Chile and slower development of agricultural production than expected have led to the situation that farmers were not able to cover costs of contracting private providers by the planned schedule. After numerous attempts at reorganization of AES, the last of which was realized at the beginning of the XXI century, Chile now has a decentralized agricultural extension service aimed at the needs of small farmers. (Cox and Ortega, 2004: 13)

The second form of institutional pluralism of AES is a modification of the first strategy, in which the central authorities contract directly private entities and organizations to provide specific extension activities. This model of AES exists in Hungary, Venezuela and Honduras.[8] As in other forms of institutional pluralism, this also assumes that private sector is engaged in extension in agriculture and that the state provide financial support. Both models are aimed at strengthening the private sector in agricultural extension service.

The third strategy is relatively recent and involves granting funds to local communities directly for them to undertake project related to development of agricultural extension service. This model corresponds to the non-market forms of transformation of AES. The non-market reforms appear in two basic forms: decentralization to lower tiers of government and the transfer of responsibility for advisory work in agriculture to other entities (the lower part of Table 1). These two methods are partly overlapping.

Decentralization is particularly important for systems that are oriented to the bottom-up approach, since this type of organization greatly appreciates the needs of users/farmers, which are determined with local agro-ecological, socio-economic and other conditions. Therefore, agricultural extension service can be organised differently in each region. In other words, instead of a centralized AES, level of responsibility for advisory work is transferred to a lower level, such as local community. This model of non-market reform is especially popular in Latin America.

[8] A good example for different organisation models of AES is the case of Honduras, where the government contracted private organisation from another country (Costa Rica) to perform extension activities. (Rivera and Kalim, 2003: 10)

Table 1. *Agricultural extension service reform*

<table>
<tr><td colspan="2"></td><td colspan="2">MARKET REFORMS</td></tr>
<tr><td colspan="2"></td><td colspan="2">Funding</td></tr>
<tr><td rowspan="3">Delivery of extension services</td><td></td><td>Public</td><td>Private</td></tr>
<tr><td>Public</td><td>Revision of public sector
Reducing activities
Introduction of partial cost transfer
(USA[9], Canada)</td><td>Cost recovery system of extension
(Partial Commercialization)
(OECD countries)</td></tr>
<tr><td>Private</td><td>Institutional Pluralism
Subsidies to farmers to hire private extension companies
Contracting with public and/or private extension companies -Development of private sector (Chile, Hungary, Estonia)
Funding for community driven development of extension</td><td>Diversified Strategies
Total privatisation
Complete Commercialization
(The Netherlands, New Zealand, England and Wales)</td></tr>
<tr><td rowspan="2">Political, fiscal and admini-strative factors</td><td colspan="3">NON-MARKET REFORMS</td></tr>
<tr><td colspan="2">Decentralisation to lower tiers of government</td><td>Transfer (delegation) of responsibility to other entities</td></tr>
</table>

Source: *Process by authors according to Rivera andi Qamar, 2003: 9 and Rivera, Qamar, Van Crowder, 2001: 24.*

The involvement of local communities in the organization of AES could be a significant step towards the improvement of this service, since doing so rural inhabitants and particularly farmers are motivated to participate to a greater extent in the organization and control of the AES.

However, decentralization does not mean exclusively transferring to lower levels in territorial terms (for example, from state to provincial, district or municipal level), but also includes the transfer of responsibility to other stakeholders, such as farmers' organizations and chambers of

[9] Given examples of countries in which are conducted some form of reorganisation of agricultural extension service serve as a model for better understanding of the transition process of AES. Beside countries listed in Table 1, there are other examples of transformation of extension work in agriculture.

agriculture, such as in Denmark, Finland and France.[10] Also, the responsibility for work of AES can be transferred to non-governmental organizations.

Reform of AES based on cost recovery systems (upper right quadrant in Table 1) is the result of reduced budget for agriculture, and consequently for the extension service. This model involves the transfer of part of costs for providing extension services to its users or agricultural producers. Highly industrialized agriculture and good economic position of farmers resulted in position that farmers are seen as economic entities that are able to pay for advisory services and, consequently, part of burden for financing AES is transmitted to them. This system is present in developed countries in Europe: in more than half of European OECD countries at least 20 percent of funding for AES comes from direct payment for extension services, while in Finland and Norway over 50 percent of the total funds is provided by farmers. (Rivera et. al., 2001: 26)

One of the radical forms of transformation of AES is **total privatization** (lower right quadrant in Table 1). In this case, the financing and provision of the extension services are fully or partially transferred to the private sector. (Rivera et al., 2001: 27) However, as noted earlier, the term *privatisation* refers to the full elimination of state funding or monitoring, which is extremely rare in practice. Participation of the public service (in minimum extent) exists even in the countries cited as examples of total privatization of AES, such as the Netherlands, New Zealand and England and Wales.

Total privatisation of AES PSS is almost nonexistent in the world, and as the closest example of this extreme states AES in New Zealand. Agricultural extension service in this country was initially organized by the state, and its peak was achieved during the 1970's and 1980's. After this period AES, as most of the extension service in the world, entre a phase of restructuring. Until then, AES in New Zealand has been funded by the state, there was good connection with research and scientific organizations, insisted on the continuing education of extension staff and users, and farmers received these services for free. Commercialization process or payment of extension services began in 1987 and ended in 1994, when the funding from the state budget was completely abolished,

[10] In France, beside private companies, chamber of agriculture provide extension services to farmers, but their work is partially finance by public funds.

and since then farmers bear the costs of provided extension services completely. At that time, the efficiency of AES have been significantly reduced, the number of staff has been reduced from 310 to 120, with a number of them withdrew from the extension services completely, and some of them have moved into private consulting companies. There were two times more of these companies at 1994 than at the beginning of this process. (Stantiall and Paine, 2000) Former public extension service has been transformed into a private company *Agriculture New Zealands'*. (Rivera et al., 2001: 27) There are different opinions about the success of privatization of AES in New Zealand. Complete cessation of government funding of AES some authors have rated very negatively, stressing that "When there is no funding, then there is no extension" and that this change have caused the loss of "corporate knowledge", as the state-funded institutions are excluded from the process of research and development of new methods and tools for the implementation of changes in agriculture. (Stantiall and Paine, 2000) Other authors underline that there is reduced interaction between different segments of the system of knowledge and information. There is also limited information distribution, particularly to less well-off and poorer performing farmers, and there is significantly less feedback from farmers to science providers. Generally speaking, there are concerns about the effective transfer of scientific findings to agriculture. (Rivera and Cary, 1997: 253) At the same time, it was noted that a small number of farmers were willing to pay for consulting services that were previously received without financial compensation. On the other hand, the benefits of total commercialization of AES are reflected in the complete orientation to the requirements of farmers and more significant engagement of extension staff, who are now involved in the entire process of production and processing of agricultural products at the farm, proposing solutions to the causes, not the consequences of the problem. It was found that farmers are more willing to implement the knowledge and technological innovation in agricultural production, when they are paying for extension services. (Hall and Kuiper, 1998: 135) With total commercialization of AES, organizations of farmers, such as cooperatives, are starting to offer consulting services for free or at lower prices, thus increasing the competitiveness of extension work.

In the case of total privatization of AES, there is a need for monitoring. In the Netherlands and in England and Wales part of extension services remained under the authority of the state. In the Netherlands, the privatization of AES (broadly speaking) in the initial phase entailed the transfer of extension staff from public service to organizations of farmers

with financial support from the state. At a later stage, the responsibility for the implementation of extension services has been transferred to private companies, with their full commercialization. However, the government continued to finance certain advisory programs of public importance and interest, such as protection of the environment, which has been neglected in the commercialized private extension service. (Petrović and Janković, 2010: 64)

Transformation of extension service in England and Wales[11] began with the process of partial commercialization in 1986 and ended in 1997 with sale of Agricultural Development and Advisory Service – ADAS to a private company. This organisation became one (and largest) of the 60 companies that provide advisory services in agriculture. Although at first glance it was the case of total privatization of AES, the state has maintained a role in providing information to farmers.

Some advisory programs related to issues of public importance, such as animal welfare and environmental protection are reserved under the authority of the state. Part of a public service (ADAS) was transferred to a special agency of the Ministry of Agriculture, Fisheries and Food under the name Farming and Rural Conservating Agency – FRCA. This agency was merged in 2001 with the Rural Development Service and remained under the guardianship of the state. Part of advisers who did not want to work in the privatized extension service moved from ADAS to the Agency for Agriculture and Rural Conservation, remaining so under state wings. In addition, the government continues to occasionally engage ADAS and other consulting companies, in order to realize certain extension activities. Despite everything, the privatization of AES has raised concerns about models of implementation of extension services, and the government organized the following activities (Garforth, 2004: 61-62):

(1) Contracting out specific services to the private sector, as providing information on organic farming and basic agricultural information over the telephone service;
(2) Funding short-term educational programs, which are implemented by private companies, in various fields;
(3) Improve the transfer of knowledge, by development of specific strategies, and
(4) Funding research on knowledge transfer issues.

[11] In Scotland and Northern Ireland different models of extension are implemented.

It can be concluded that, despite the privatization of the former official AES, the state continues to play an active role in the provision of advisory services and is involved in communicating with farmers.

In addition to these forms of transformation of AES, some countries apply several different models simultaneously. This is represented in the central square in Table 1, as example of such organization of AES are listed Germany and Norway. In Germany, there is a territorial division into three areas where exist various models of extension. In Norway, the AES is divided into three categories depending on the level of financial support received from the state.

Advantages and disadvantages of public and privatized agricultural extension

Since the beginning of the transition of agricultural extension service in the world, different models of organizing and financing of AES have been developed. In general, we can say that the AES changed from state funded service that is conducted through public institutions to the activation of private organizations in the implementation of extension activities and commercialization of AES where part of the cost is transferred to farmers. As discussed, the role of the state is important regardless the extent of participation of private organizations in the extension market. Obviously, there are advantages and disadvantages of organizing AES exclusively through private organizations, or solely through public service.

Realization of advisory activities through private organization has the following advantages (Rivera and Cary, 1997: 251-252; Gharibpanah and Zamani, 2011: 92):

(1) Efficient performance of extension services – private organizations easily adapt to the needs of farmers and typically operate with fewer farmers, allowing them to fully meet the needs of users;
(2) Reduction of state spending – including private companies in the implementation of extension activities, they take not only the provision of advisory services, but also their financing, thus reducing government expenditure, which is especially welcome in terms of reducing the agricultural budget, and

(3) High-quality services – increasing competition in the market of extension activities typically results in a higher quality of services and advice.

Disadvantages of privatized extension service are:

(1) Reducing the number of customers – privatization of AES implies also its commercialization, which means that only farmers who can (and want) to pay for the services will get adequate information and advice. Poorer farmers are not able to pay for extension services, so they are completely excluded from the system of extension. Surveys conducted in Chile indicate that the introduction of partial commercialization lead to decreased number of users. (Alex et al., 2004: 9) Meeting the needs of vulnerable rural populations, such as poor farmers, can be entrusted to NGOs, however, they are totally dependent on donors or financial support they receive from the state;
(2) Provision of only market information – private extension organizations are focused on meeting the economic needs of the user. Because there is less accountability to public authorities, private extension organizations are not interested in providing information in areas such as environmental protection, rural development and conservation of natural resources, unless they receive some form of financial compensation for these activities. Modern extension service, however, is not focused exclusively on providing agricultural information. Meeting the needs of non-agricultural users is becoming increasingly important in terms of diversified rural economy, which can be successfully accomplished only through a public advisory service;
(3) Tearing the connections with scientific-research institutions – although they are very important for technology transfer, private organizations have not focused on the financing of scientific-research activities and do not have direct contact with research institutions. In this way the integrity of the system of knowledge and information is undermined and reduce the speed of gaining new knowledge, since there is no feedback from farmers through extension staff to public services and finally to the scientific and research institutions.

Public agricultural extension service began to reform the mid 1980's, for the following reasons:

(1) Political pressure to reduce the role of the state in those areas that can be given by private organizations;
(2) Large number of employees and cumbersome administration, which caused the bureaucratization of public AES;
(3) The high costs of organization and maintenance;
(4) Poor or insufficient effects of public PSS; and
(5) Lack of funding for these services, which is particularly important for developing countries.

Despite the trend of increased participation of private organizations in agricultural extension systems and the delegation of responsibility from public AES to other actors, there are reasons that speak in favour of the organization (at least part) of advisory activities through public service:

(1) The promotion of knowledge and information from non-commercial areas – private extension organizations have an important role in the provision of market information to farmers. However, there are some areas that these organisations are not interested in. In order to fully inform the rural population and distribute knowledge from all fields, it is necessary that public AES exists. According to Rivera and Alex (2004: 44) the role of the state is particularly important in the following four areas: reducing poverty, ensuring food security, rural development and the protection and preservation of the environment;
(2) Information collection and preservation of the system of knowledge and information – information gathering has a dual role. In order for extension staff to adequately meet the needs of users, it is necessary for them to handle with information regarding the state of the market, consumer demand, production potentials, technological innovation, opportunities to improve agricultural production, and so on. The role of public authorities is to collect and make available these information. On the other hand, extension staff is a link that connects farmers and government agencies, and indirectly, scientific research institutions, thus contributing to the preservation and proliferation of knowledge;
(3) Engaging in resolving critical issues – modern extension service has a broader role than solely providing agricultural information. In this sense, public extension represents a channel for improving the knowledge of farmers and its application in the field of sustainable development, environmental consequences of increased agricultural production, promoting fair business,

reduction of rural unemployment, and even improving the health of people in rural areas;

(4) Training of farmers and rural people – in addition to providing information, the AES has an important role in the education of rural population. This is particularly important not only for farmers who are covered by AES, but also in the education of these groups of producers who do not have adequate access to educational institutions. These are usually poorer farmers, with lack the financial means to participate in the costs of extension services, and are therefore excluded from this system. In addition, the AES has a role in providing additional educational programs the entire rural population, and

(5) Monitoring of the implementation and quality of extension services – when extension services are provided by many different actors, which is the case in institutional pluralism, public service has a controlling role in the implementation of the planned extension activities and maintaining their quality.

Conclusion

Transformation of agricultural extension services in the world include changes from publicly organized and funded extension services to the significant participation of the private sector in the implementation and commercialization, which means that final users are included in covering costs of extension work, to total privatization. This paper analyzes the market and non-market reforms of AES and describes some transformation strategy of this service. The intention was not to the analysis all models of organization and financing of agricultural extension that developed around the world, but in their classification and identifying advantages and disadvantages of specific development strategies.

In the reformed modern agricultural extension service there is an adequate place for public service and private profit and non-profit organizations. Through the synergy of their activities, under inevitable monitoring of state authorities, it is possible to meet the needs of farmers in best possible way and to ensure sustainable development of rural areas.

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INTEGRATION OF RETURNEES AFTER READMISSION IN TERMS OF SUSTAINABILITY OF RURAL AREAS IN SREM[1]

Nada Kosanović[2], Snežana Janković[3]

Abstract

Based upon the Readmission Agreement, the Republic of Serbia initiates, integrates and coordinates the contracted activities in order to integrate efficiently returnees and members of other vulnerable social and migrant groups. Key words are readmission[4] and reintegration[5]. The paper focused on returnees (citizens of the Republic of Serbia who do not fulfil or no longer fulfil conditions for obtaining temporary protection of Western European countries), as well as members of other vulnerable social and migrant groups. The paper proposed certain measures and activities for establishing an agricultural educational centre for returnees, helping them to integrate in the legal, social and economic system of the Republic of Serbia, which would contribute to revitalization of rural areas and local agriculture.

Key words: *educational centre, readmission, reintegration, returnees, agriculture*

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[4]Readmission (coming from re-admission – the act of admitting someone again) is a procedure of returning and accepting people who do not fulfil or no longer fulfil conditions for entry or staying at the territory of another country.

[5]Reintegration of returnees, carried out by the state bodies and local self-governements of the Republic of Serbia, international organizations and NGOs, includes activities taken in order to enable returnees to access to all rights and to become a part of the society, preventing in this way secondary migration (re-departure to other countries).

Introduction

The Republic of Serbia rests on the rule of law and social justice, on the principles of civic democracy, human rights and freedoms, and recognition of common European principles and values[6].

According to the International Covenant on Civil and Political Rights, Article 16, "Everyone shall have the right to recognition everywhere as a person before the law", and the Article 13 of the Constitution of the Republic of Serbia (Official Gazette of the Republic of Serbia, No. 1/90) states that Serbian citizens shall be equal in rights and duties and have equal protection before state and other authorities, regardless of their race, gender, place of birth, language, ethnicity, religious, political and other beliefs, education, social background, wealth, or other personal status.

In practice, however, this equality depends on fulfilling administrative requirements. The practice shows that in Serbia lots of migrant groups from Western Europe and other vulnerable migrant and social groups do not exercise this right due to disparities between the current system and their specific situation.

Therefore, socially most vulnerable groups of population are not included in the health care system, not registered in the National Employment Agency and do not have access to education. Those people are invisible to the system.

After putting the Republic of Serbia on the list of the so-called safe countries, the issue of readmission[7] has gained political weight in the last couple of years. At the same time the Republic of Serbia is first on the list of countries of origin for asylum seekers in Western Europe. This situation, based on the Readmission Agreement, opens new opportunities of return for more than 100 000 persons. Accepting these persons demands urgent resolving of the issues concerning provision of efficient and high quality returnees' protection. A great drawback in research and creating recommendations for returnees' reintegration is lack of precise

[6]Constitution of the Republic of Serbia (Official Gazette of the Republic of Serbia, No. 1/90)

[7]"Readmission is a fine euphemism for forcible deportation from a country of immigration to a country of origin", Gredelj Stjepan, *Virtual Return of "the Fourth" and "the Fifth" Generation of Migrants*, Review article, Institute for Philosophy and Social Theory, Belgrade

data on returnees' number and structure. Lack of data is also a problem when it comes to unbiased assessment of returnees' endangerment and evaluation of number and structure of vulnerable groups.

Some organizations, such as the International Organization for Migration (IOM) that conducts the program of one-time financial support for the returnees, have their own, but incomplete data[8]. According to assessments made by the Council of Europe, between 50 000 and 100 000 people are going to be returned from the countries of the European Union, most of them being Roma, mainly from Germany.

The implementation of the Readmission Agreement represents the execution of multilateral and bilateral obligatory agreements between the agreeing countries and comprehends the admission of great number of persons who are the citizens of the Republic of Serbia and the persons who came to member states of the European Union from the territory of the Republic of Serbia.

For a sustainable and permanent return of these persons there has to be collaboration between the country of origin and the country of future residence. The lack of coordination and exchange of information between Serbia and countries returning these persons is the main obstacle for registration of these persons.

Goal of the paper

The goal of this paper is to point out the fact that establishing an agricultural educational centre in the process of readmission would provide returnees with an opportunity to integrate into the society in an efficient, effective, viable and comprehensive way, with full enjoyment of their rights and reducing discrimination against Roma and other socially marginalized groups of returnees.

The development of the primary agricultural production's and light manufacturing's modern sector is one of the priorities of local economic development of Sremska Mitrovica and Šid municipalities. Having in

[8]German Government program GARP, conducted by IOM, started in year 2000 and by the end of 2004 total of 11 131 persons received this kind of support. Regarding their nationality, 63.37 % of them declared as Roma, 19.02 % as Bosnian Muslims and 10.93 % as Serbs.

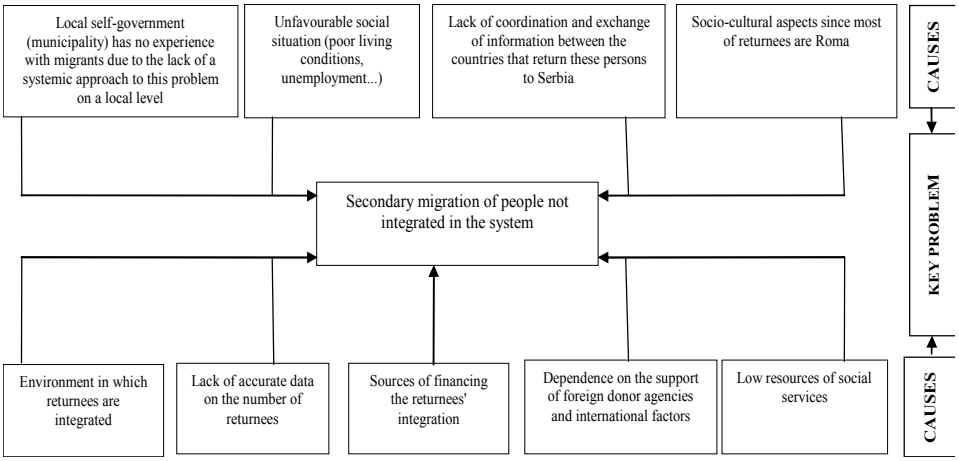
mind its importance for nutritional safety of the population, the revival of agriculture using qualitatively different starting points to revitalize rural development, and the establishment of educational centre for returnees and other vulnerable migrant and social groups, would both contribute to the realization of the above mentioned.

Problem tree

Each well-defined task consists of a certain problem to be solved. One of the methods that help us focus on solving a certain problem is the "problem tree" combined with the "solution tree".

The problem tree represents a graphic design of a main problem together with sub-problems, causes and effects.

Figure 1. *The problem tree*

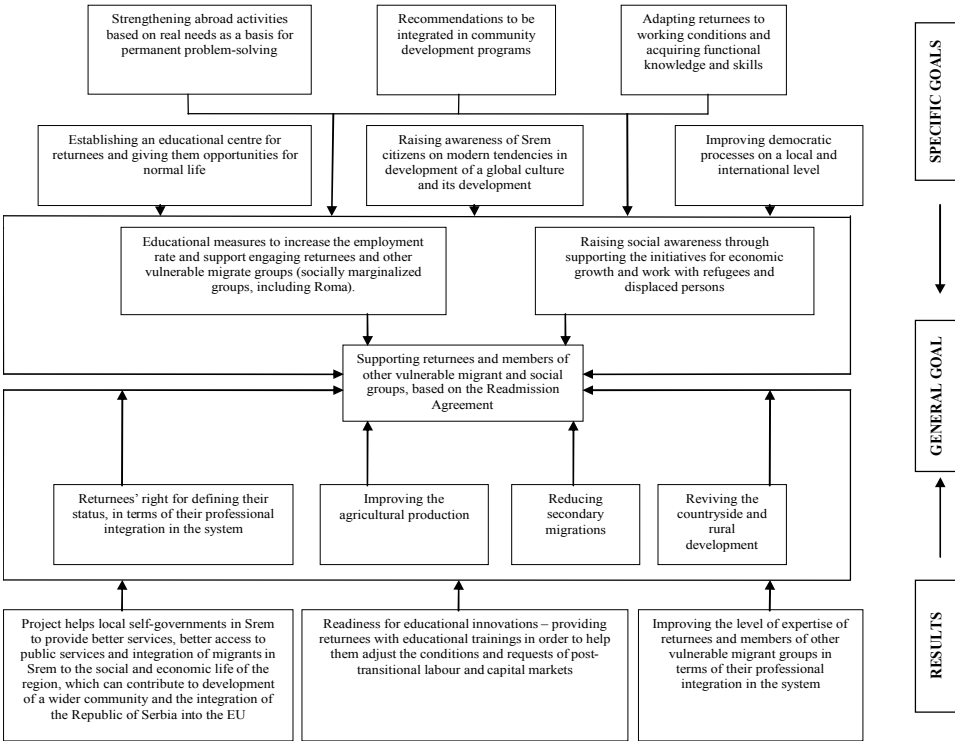


Source: *Based on the author's theoretical and empirical approach.*

Solution tree

The solution tree is "a positive reflection" of the problem tree. Solutions of problems and sub-problems shown in the form of the problem tree have been reformulated into general and specific goals of the solution tree. The solution tree therefore represents a graphic design of goals and gives an image of a future situation, i.e. the situation after solving problems. It also helps understanding the hierarchy and interconnection of goals.

Figure 2. *The solution tree*



Source: *Based on the author's theoretical and empirical approach.*

After making the solution tree and defining the priorities, project goals and desired results are determined.

The solution tree represents an aggregate image of a desired future situation, including indicative methods to achieve this situation. The solution tree and the problem tree are very useful tools for establishing the hierarchy of goals and determining their consistency with upper-level goals, i.e. a general goal of establishing an educational centre for returnees and other vulnerable migrant and social groups.

Background
Current situation and social environment

Socio-economic stabilization and factors in foreign politics, such as approaching to Euro Atlantic integration, led to the decrease in number of asylum seekers from the candidate countries for the EU membership.

Experiences of these countries in the returnees' integration process are relevant for creating the process of returnees' integration in the Republic of Serbia. Although the structure and the history of migrations are different comparing to the Republic of Serbia, some of the problems, like those concerning reintegration of Roma minority in the process of readmission, are very alike. Integration measures these countries define for this category of people can serve as a standard in the process of creating the Strategy of Returnees' Reintegration.

Social atmosphere in the Republic of Serbia, in which the issue of returnees' reintegration is to be solved, is quite unfavourable. Living conditions are difficult and worsened by unemployment, poverty and low resources of social services that are supposed to meet the needs of the citizens. An additional problem is the fact that in the Republic of Serbia lives a great number of socially and economically challenged members of Roma minority and the Republic of Serbia is also a country of admission for refugees from Croatia and Bosnia and Herzegovina and displaced persons from the Autonomous Province of Kosovo and Metohija. On-going and future comeback of a great number of persons in the process of readmission will affect unfavourably the already difficult socio-economic situation in the country.

One of possible consequences of this situation is greater percentage of so-called secondary migration – persons returned based on bilateral agreements on readmission who could not manage to reintegrate in the society and they are leaving the country again. Therefore, the integration process is the most important link in the chain of viable migrations control, and the only way in which the Republic of Serbia can completely fulfil its obligations accepted in the Process of stabilization and joining. Therefore, it is necessary to systematise the legal status of returnees in order to provide resources for exercising their rights, especially in the period while they do not have personal documents that allow them to be a part of existing system of the Republic of Serbia.

Based on unofficial data, it can be said that places of origin those migrants are precisely the municipalities affected by combination of high poverty rate and historical tendency of economic migrations. According the data obtained by NGOs, Raška county, Sandžak that is, and especially the city of Novi Pazar have the greatest percentage of returnees with an unofficial number of about 10 000 registered returnees mainly from Austria and Germany. NGOs also give data on 40 000 registered

returnees, mostly from Sandžak as well as from the municipalities of Vladičin Han and other nearby. Reintegration measures that have been initiated so far in these local self-government units depended primarily on the support of the foreign donation agencies and international factors, and especially of organizations of the countries of admission (governments of Germany and Luxemburg initiated the programs in Novi Pazar[9]). This situation, positive from the point of view of receiving foreign countries support, especially from the countries of admission, if it is not coordinated and monitored can create different socio-economic conditions for integration of returnees from certain countries, that is, returnees in certain municipalities. Emerging differences can create tensions in the returnees' corpus itself, but among municipalities as well, and can have a negative influence on integration opportunities. In order to avoid this kind of situation, and to distribute the support efficiently to the most needed municipalities, the coordination role of the country has to be strengthened.

The paper supports sustainable reintegration through the following actions:

1. Preparations for implementation of supporting activities from the Ministry for Human and Minority Rights and potential donors.
2. A media campaign conducted through trainings – workshops, and collaboration with reintegration centres in the Republic of Serbia, which will help building human capacities. The campaign would be a part of implementation of the Action plan for the project "Establishing an Agricultural Educational Centre for Returnees and Other Vulnerable Migrant and Social Groups"[10] to be carried out with the financial support of state and international institutions.
3. At the same time, the campaign for promoting the project activities defined by this paper would try to gain support of local self-government that recruit and select returnees for the educational centre, and to gain support of electronic and print media as well, for

[9]In Novi Pazar, the governments of Germany and Luxemburg helped a great number of people through donations to the community and programs for employment and professional training of returnees (AGEF – the project of municipality of Berlin). The programs of the Red Cross of Luxemberg and Caritas in the same municipality focused on solving the problems of IDs and accomodation.

[10]The project was presented in the Ministry of Human and Minority Rights of the Republic of Serbia in October 2009

promoting and raising awareness of respecting and protecting returnees' economic and social rights, and the importance of their role in democratic and viable social development.

4. Establishing necessary technical, human and institutional capacities of local communities for returnees' readmission, protection and viable reintegration.
5. Building returnees' capacities through educations on agriculture. This kind of action would lead to improvement of the strategic approach that is in accordance with the Strategy for Diminishing Poverty, the Employment Strategy and the National Agricultural Program 2009-2011.
6. The paper gives recommendations for providing support to returnees in the form of agricultural education, enabling returnees to gain knowledge and acquire skills so that they can take their lives in their own hands and become active, not only when it comes to reintegration but also when it comes to life and their role in the development of a local and a wider community. This community should see returnees as a human resource and not as a burden to a society.
7. The paper defines recommendations for adequate admission of returnees and their professional training for future employment, in order to reduce the number of people living below the poverty line and a burden to the social system and domiciled population. Implementation and realization of those recommendations are precondition for returnees' reintegration and for decreasing secondary migrations, which are the biggest burden Serbia is facing on its way to the EU at the moment.
8. Being a way of active inclusion of returnees and other vulnerable migrant and social groups in socio-economic and business life of the Republic of Serbia, work defines a model for implementation of the above mentioned.
9. It is suggested to form an Educational Centre Council to provide legal, technical, organizational and accounting assistance in establishing an "Agricultural Association of Returnees". This way of organizing would help cooperation development and make returnees' activities more recognizable. This kind of activities would be supported financially and logistically by state institutions, NGOs and international organizations through the Council.

The Council would collaborate with local self-government and relevant state institutions on providing economic independence of returnees by giving them financial support to purchase plots, and set up plastic glasshouses for vegetables, flowers etc. Thus could help returnees include more actively in economic life and become economically independent. Through the Association, and in collaboration with the Council, returnees would be recognized on the market and they would receive financial valorisation of their work. These channels of associating, collaboration and interests could give returnees a competitive advantage as compared to other actors on the market.

The above mentioned goals and activities would be preliminary steps towards a partnership between the Association and a potential agricultural cluster as a model of business linking formed to provide returnees with lots of advantages: above all - aggregate supply, a joint and thus cheaper promotion, joint procurement of inputs, etc.

Location of the educational centre
Why Sremska Mitrovica and Šid municipalities?

Modern agricultural reforms address environmental protection, food safety and development of underdeveloped rural areas[11]. In the period of transition and EU integrations, there is gradual socio-economic collapse in poorer areas with negative demographic structure and in Vojvodina as well. Thus could be seen from the fact that 415 (out of 465) populated areas in 45 municipalities in Vojvodina, are non-urban areas. In these non-urban areas live 43.3% of population, that is 879 697 people out of 2 031 992 registered in Vojvodina in the 2002 Census.

According to these data, an average populated area in Vojvodina has only 2 201 people, 22.94% of which is older than 60. 87% of the above mentioned 415 non-urban areas have negative population growth. Another problem for rural development of the Autonomous Province of Vojvodina is land fragmentation (average plot size is 3.25 ha). Rural development of Vojvodina should be a continual improvement process that helps in engaging local resources and diminishing population outflow from rural areas.

[11]Pejanović, R., Tica, N., Delić, S. (2006): *Organic Agriculture as a New Form of Agribusiness* (based upon a new law on organic agriculture), Economics of Agriculture, No. TB/2006.UDK: 631.95:631.1; p.105

Stopping migrations from rural to urban areas is only possible in the atmosphere where people regard rural areas as socially desirable, in which they can meet all their needs: economic, family, cultural and educational.

Engaging people, local self-government and rural institutions can motivate rural population and enable them to make action plans for improving rural communities and sustainable rural development.

Sremska Mitrovica municipality

Sremska Mitrovica municipality is one of the municipalities in the Republic of Serbia. It is located in the Autonomous Province of Vojvodina, in Srem District. According to 2004 data, the municipality covers the area of 762 km^2 (56 571 ha of agricultural land and 8 705 ha of forest land), 23 cadastral municipalities and 26 populated areas[12].

The administrative centre is the town of Sremska Mitrovica. According to 2002 data, the municipality had 49 609 inhabitants, and negative population growth of -3.8 %. There were 18 186 employed persons in 2004. Today the municipality has 39 elementary and 6 high schools.

Šid municipality

Šid municipality is located in the Autonomous Province of Vojvodina, in Srem District. According to 2004 data, the municipality covers the area of 41 430 ha (19 011 ha of agricultural land and 687 km^2 of forest land).

In 2002, the municipality had 38 973 inhabitants and negative population growth of -6.4 %. In 2004, there were 7 413 employed persons in Šid municipality. The municipality comprises 19 populated areas, and according to 2004 data, its road infrastructure is 185 km long.

[12]Spatial Plan of the Republic of Serbia ("Official Gazette of the Republic of Serbia", No. 13/96), p. 3

Table 1. *Indicators of rural development of Sremska Mitrovica and Šid municipalities*

Criterion / municipality	Sremska Mitrovica	Šid
Population density	**110**	**54**
Index of dependence (non-working / working population)	**46.67**	**48.85**
Population with finished high school, %	**42.3**	**37.3**
Population with finished college or university, %	**8.9**	**6.3**
Average net salary (RSD)	**19 628**	**20 189**
Number of people per hectare of arable land	**161**	**96**
Individual farmers as working population, %	**11.78**	**9.96**
Individual farmers who finished high school, college or university, %	**14.4**	**16.1**
Average agricultural net salary (RSD)	**26 565**	**27 397**
Road length per km^2 (km)	**0.332**	**0.269**
Number of telephone users per 1000 people	**349**	**300**
Number of people per doctor	**418**	**1 028**
Number of hotel beds per 1000 people	**2.7**	**6.6**

Source: *Njegovan, Z., Zarić, V. (1999): Modern Approach for Selecting Rural Development Indicators, Proceedings of the "Regional Development and Demographic Flows in the Balkan Countries", Niš.*

What supports successful establishing of an agricultural educational centre for returnees and other vulnerable migrant and social groups is a favourable geographic position and natural conditions of Sremska Mitrovica and Šid municipalities, along with their biodiversity capacity and road infrastructure that connects nearby local communities and municipalities.

The location of the centre is favourable. It includes direct access to a navigable waterway (the Sava River – a navigable second-class transit way), proximity of a highway, "Nikola Tesla" airport in Surčin and railway traffic (east-west). In addition, it is only 70 km far from Belgrade and 60 km far from Novi Sad. The proximity of these cities and good infrastructure will reduce transportation costs of project partners (educators, stakeholders, etc.).

Moreover, the borders of the Republic of Srpska and Croatia are about 20 km far, which is a big advantage and provides a great opportunity for intensification of cross-border activities. At the same time, this collaboration creates conditions for sustainable economic development not only through encouraging collaboration and exchange of information in the area of solving problems of returnees, but also through active collaboration with project associates and exchange of experiences in the area of agriculture.

The resources these two municipalities have are: natural resources, the immovable cultural property as potential for tourism development, and a major construction fund that includes residential and business facilities and communal infrastructure. Public services and IT sector are very developed.

78.4% population of Srem District lives in rural municipalities, which make it a distinctly rural area. Indicators of rural development give a big picture of rural development of Vojvodina municipalities and basic elements for implementation of the rural development policy. The indicators for Sremska Mitrovica and Šid municipalities represent elements for implementation of the rural development policy in those municipalities.

They have been presented as individual segments to analyse the effect of establishing an agricultural educational centre for returnees on the rural development of these two municipalities. At the same time, these indicators could serve as a basis for developing specific new activities in order to recognize Sremska Mitrovica and Šid municipalities as rural areas with specific features. The indicator of population density defines these municipalities as rural areas, since its value shows less than 150 people per km^2.

The index of dependence[13] shows how much non-working population depends on working population, i.e. how much working population is burdened with non-working population. Rural areas have a high index of dependence due to a large number of elderly people and households.

[13]It is calculated as a ratio of non-working population (younger than 15 and older than 65) and working population (15-65 years old).

The index thus shows that working population in Šid municipality is more burdened with non-working population contingent, due to age of the total population in the municipality of Šid. Inflow of population younger than 40 would positively affect this parameter.

Net salaries are higher in Šid municipality, compared to net salaries of total population and net salaries in agriculture, which is a result of less number of people per hectare of arable land, rather than a level of industrialization.

Percentage of people working in farming is higher in Sremska Mitrovica municipality, which is a result of a larger total number of people, and a larger number of people per hectare of arable land, rather than a significant rural indicator.

The correlation of the above-mentioned indicators of rural development would confirm the thesis that Šid municipality is a rural area with a higher indicator of rural development. This thesis is also confirmed by the indicators of road length per km^2, number of telephone users per 1000 people, and number of people per doctor (Table 1).

A number of hotel beds per 1000 people is three times higher in Šid municipality, which implies the rural character of this municipality and a great potential for tourism development. Therefore, a conclusion can be made that the educational centre should be located on the territory of Šid municipality, which will greatly contribute to local rural development.

Implementation measures

The timeframe for implementation of defined and planned activities is accompanied by certain costs. In order to plan implementation costs of proposed activities, it is necessary to define the cost of individual activities (cost of service, material and labour). Thus, a plan of the total project implementation costs includes all direct and indirect costs.

Table 2. *Implementation measures*

MEASURES	IMPLEMENTERS	EXPECTED RESULTS	DEADLINE	ASSESSMENT OF PERSONELL NEEDS	FINANCIAL RESOURCES NEEDED[14]
Measure 1: Establishing a physical structure of the project and building capacities of project teams	Relevant ministries	Technical implementation of the pilot project	October 2012	As needed, within the existing personnel	**€ 11 800**
Measure 2: Developing and harmonizing project teams for setting up the pilot project	Leading participants and project partners	Adopting methodology for managing the project's target issues	December 2012	As needed, within the existing personnel	**€ 12 600**
Measure 3: Introducing the project to national and international institutions and organizations, and a media campaign	Ministry for Human and Minority Rights	Promotion, raising awareness of importance of returnees' reintegration, recruiting and selecting returnees and creating financial sustainability of the project	February 2013	As needed, within the existing personnel	**€ 10 000**
Measure 4 : Building capacities of local community - Šid and Sremska Mitrovica municipalities	Stakeholders and project managers, local self-government coordinator	Creating a database of returnees' – participants	March 2013	As needed, within the existing personnel	**€ 5 100**
Measure 5 : Creating conditions for admission of participants	Stakeholders and project managers, local self-government coordinator	Defined technical and program details for admission of participants	March 2013	As needed, within the existing personnel	**€ 1 837 921**
Measure 6 : Training according to the defined methodology	Stakeholders and project managers	Acquired necessary know-how and skills – working qualifications	3-month cycles, in groups, continually	As needed, within the existing personnel	**€ 2 000**
Measure 7: Forming an Educational Centre Council	Project managements	Agricultural associations of returnees	December 2013	As needed, within the existing personnel	**€ 56 380**

[14]The PHARE 2000+ Program was meant for the EU candidate countries during the pre-assesion period, as a reformed version of the previous PHARE Program. Apart from it, two new financial instruments ISPA and SAPARD were established. The total annual budget for all three programs amounted to 3 120 milion Euros and it was redistributed according to defined criteria.

Instead of a conclusion – the realisation of a vision....

- To achieve economic growth through an increase in agricultural production by returnees' reintegration;
- To create conditions for rural development;
- To make farmers from returnees;
- To provide returnees with easier access to credits, markets and inputs;
- To increase the employment rate;
- To increase the local budget for returnees;
- To create active, dynamic and motivating work environment;
- To improve communication between local authorities and returnees;
- To use local specifications in order to promote local and rural development;
- To promote those two municipalities on the national level[15].

Developing small agribusiness would contribute to a higher employment rate in the municipality, better supply on the national and international market, substitution of import and bigger export of safe products, which would lead to acquiring competiveness on the national and international market.[16]

Investments in human resources and their education are key factors of economic growth and making new opportunities for employment.[17]

[15]Klikovac-Katanić, V., Kosanović N., (2012): *New Programs in Agri-Food Sector in Function of Sustainability of Rural Regions in Serbia*, Agriculture & Forestry, Vol. 54. (08) (1-88): 5-12, Podgorica

[16]Kosanović, N., (2009): *Food Quality as a Factor of the Republic of Serbia's Competitivenes in Agribusiness*, doctoral thesis, Faculty of Agriculture, University of Novi Sad, Novi Sad, p. 272.

[17]Njegovan, Z., (1987): *Socio-Economic Changes, Basic Production Potentials and Global Directions of Agricultural Development*, *the territory of the Republic of Serbia outside the SAP territory, Border municipalities and municipalities with distinctive migrations,* Institute of Agricultural Economics, Belgrade

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12. Spatial Plan of the Republic of Serbia ("Official Gazette of the Republic of Serbia", No. 13/96).

13. Strategy of Returnees' Reintegration Based on the Readmission Agreement, (2009) ("Official Gazette of the Republic of Serbia", No. 15/09).

SOME CHARACTERISTICS OF RURAL AREAS IN FUNCTION OF RURAL DEVELOPMENT

Sreten Jelić[1], *Tatjana Jovanović*[2]

Abstract

Paper suggests some characteristics of rural areas in function of rural development. Rural areas cover about 85% of Serbian teritory and in their lives 42% of total population. Paper subject is the definition of rural areas, balance of development and programs and measures of rural development. Accordingly in the papar are used the following methods: document analysis, comparative method, observation and statistics. Objective of this paper is to emphasize the govwing role of rural areas in the rural development. Results of the paper suggest on the division of the territory of the Republic of Serbia on the basis of statistical nomenclature of territorial units, the level of rurality and rural classification, but also the need to balance the rural areas with the policies and programs of regional rural development.

Key words: *characteristics of rural areas, rural development, measures, programs, regional development*

Introduction

Rural areas can be defined in many ways depending on the principles and aspects of which are considered rural development. Although the methodology is quite jagged, there are a number of facts that could be considered common and therefore in this concept is used the definition by which rural areas are defined as areas where agriculture is a basic human activity, where the survival of the people is directly conected to it and so-called primary sector in large proportion and to forest exploitation in lesser extent.

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Agriculture and forestry activities are closely related, both due to natural and geographical, but also because of the socio-economic facts. Rural areas cover 85% of the territory of Serbia with a population of 42% of the total population. In the rural areas is represented extensive and largely undeveloped agricultural land reclamation and expressive processes of deagrarization.

Agriculture as a sector of the economy plays a significant role in the development of rural areas especially since it is the most significant part in the creation of income in rural areas and thus ensure the survival of the population in those areas. However, it is necessary to ensure its integration with the secondary and tertiary sectors, more efficient connection between agriculture and the food industry, the development of the service sector in rural areas, and everything else necessary for the survival and prosperity of these areas, rural development and development of rural areas.

Having in mind the resources of rural areas it is necessary to develop other activities for which the conditions exist for faster and more balanced rural development in rural areas.

Defining rural areas and their main characteristics

Although rural areas are studied and analyzed for decades, for them there is still no internationally recognized universal definition. The concept of rurality is variously defined and interpreted by some theoreticians at the level of European countries. In this sense, individual states or association of states set their own criteria defining the rural areas, with emphasis on their own national characteristics and problems of rural development. The main problems for the definition of rural areas are primarily different perceptions of what is and what is not rural and what elements characterize the "rurality", the inherent need to measure and analyze "facility", it is difficult to collect adequate data on the level of basic geographical units, etc.

After harmonization of scientific attitudes, the more complex principles and criteria, which the rural areas treat as local community with a coordinated economic and social structure of various activities, has created real opportunities for the definition and study of rurality.

The most commonly used criteria for defining the rural areas is population number and the relative distribution of non-agricultural population in a given neighborhood.

Based on statistical nomenclature of territorial units which are applied in the European Union territory of the Republic of Serbia can be divided into five statistical units (Table 1)

Table 1. *The division of the territory of the Republic of Serbia on the basis of statistical nomenclature of territorial units*

EU standard	Republic of Serbia
NUTS 1	Republic of Serbia
NUTS 2	Vojvodina, Centralna Srbija, Kosovo i Metohija
NUTS 3	Districts (Severno bački, Južno bački...)
NUTS 4	Municipal (Bač, Ada, Sremska Mitrovica)
NUTS 5	Village

Source*: Bogdanov, N., Small rural households in Serbia and rural non-farm economy, p. 62.*

The methodology of determining the level of rurality is subject to continuous innovation, and now is frequently used classification of regions based on the share of productive in total land. A new concept of classification of areas to rural and urban based on the ever-present demands for more complex evaluation of natural resources and conservation. According to this criterion in the rural areas are included the territories in which productive areas (agricultural and forest) achieve a minimum share of 90%. Developed countries promote this approach as the population density criterion for them is becoming less convenient, it may not be the same rule for our country.[3]

[3] *Zakić Z., Stojanović Ž., 2008.* Ekonomika agrara str. 551-552

Table 2. *Typology of rural Serbia*

EU definition (<100 inhabitants/km^2)				
	Urban		**Rural**	
	Total	*%*	*Total*	*%*
The population density	206.93		53.17	
The total territory	22528	29.08	53911	70.92
Population 2002	4646977	61.98	2866383	38.02
Agricultural land	1565204	30.61	3554896	69.39
Forest land	421077	22.35	1478340	77.65
OECD definition (<150 inhabitants/km^2)				
The population density	299.80		64.59	
The total territory	11072	14.29	66402	85.71
Population 2002	3291310	43.90	4206691	56.10
Agricultural land	771520	15.90	4341787	84.91
Forest land	171965	9.13	1711781	90.87
Productive area (>90% of total territory)				
The population density	140.47		67.40	
The total territory	85.63		93.46	
Population 2002	31150	40.21	46324	59.79
Agricultural land	4375729	58.36	3122272	41.64
Forest land	2118825	41.44	2994482	58.56
Šumsko zemljište	548651	29.13	1335095	70.87

Source: *Zakić Z., Stojanović Ž., 2008. Economics of agriculture, p. 551-552.*

On the basis of the declaration KORK rural areas are defined as areas that have unique social, economic and natural features as well as a distinctive level of economic and social activities.

According to Eurostat approach, which is based on the degree of urbanization we can single out next zones

- Densely populated zones (groups of municipalities, each of which has a population density greater than 500 inhabitants per km^2 and more than 50,000 inhabitants);
- Medium populated areas (where each municipality has a population density greater than 100 inhabitants per km^2, and does not belong to a densely populated area, with a total population of not less than 50000);
- sparsely populated areas (groups of municipalities that can not be classified in densely populated areas nor in the middle populated areas).

European Commission rural areas categorized according to the degree of integration into the national economy and classifies them as: integrated, transitional and distant.

Based on the OECD methodology to define rurality starts from the local and regional hierarchy levels of territorial units.

At the local level, rural areas are defined by population density, and accordingly as rural areas are considered territory with less than 150 inhabitants per km2

At the regional level, the definition of rural areas starts with the percentage share of the population living in rural areas.

OECD methodology is the only internationally recognized, because in addition to density takes into consideration a number of elements that describe the details concerning integration of rural and urban areas.

Although the methodology of defining rural areas is pretty heterogeneous and treat the term of rurality differently, there are a number of facts that could be considered common. In this concept, the rural areas are defined as areas with a population density below 150 inhabitants per square kilometer, which is the main activity is agriculture. Human survival is directly related to the so-called. primary sector.

According to the previously mentioned ways of defining rural areas cover 85% of Serbia's territory, and in them live 42% of the total population of the country.

Serbian rural areas are characterized by extensive agricultural production and land reclamation process, low density, broken type of settlement, high unemployment in other sectors, non-developed infrastructure, low gross domestic product per capita, and so on. Also, depending on geographical location, economic development, the level of integration with the urban areas, the development of the market system of agricultural and food products and specialization in agriculture, except sectors of primary agriculture production, forestry and hunting in rural areas are represented trades and manufacturing, trade, tourism, catering and more.

Rural areas are increasingly directed towards the development of rural tourism, for which Serbia has a genuinely strong natural resources. It

should be noted that these areas are rich in natural resources, clean air, spring water, rich in flora and fauna, large forest and hunting facilities, mineral resources, as well as the rich cultural and historical heritage, which represents the potential for the development of agriculture and tourism.

Balanced development of rural areas, measures and programs for Regional Rural Development

In the past decades in Serbia is present unbalanced regional development, which is particularly reflected in the rural areas which differ according to the natural, economic, social and political. historical and demographic characteristics

Each package of support measures for all branches of the economy means financial support, strategy development and decision support in the form of legislation, which will help the practical implementation and the implementation of policies and plans. Introducing innovations in the economic system requires the development of legislation that should provide monitoring and implementation.

Serbia is a country of potential for the development and promotion of agriculture, but agriculture as an branch has not paid sufficient attention.

Basic funds and programs of agricultural financing were:

- Fund for the development of underdeveloped regions;
- Program for revitalization (revival) of villages;
- Development Fund of the Republic of Serbia.

In conditions of the unstable economy, monetary disturbances and the shadow economy these funds could not give the expected results.

For this reason, in 1995. was adopted the **Law on use of agricultural budget**, which was part of the planned budget intended to help the revitalization of villages and rural areas.

Law on the Serbian underdeveloped areas classified municipalities in underdeveloped, not developed and other.

The division was made according to the degree of development and as the basic parameters were used: the national income, employment (in

agriculture and other sectors), development of infrastructure, the degree of marketability, the structure of the population (gender, age and education), the level of integration with the urban environment, typology of settlements, altitude, distance from the state border and so on.

Law of underdeveloped municipalities in Yugoslavia until 2005. anticipated development of mountainous, border, marginal, coastal, and other undeveloped areas.

Spatial Plan of the Republic of Serbia was intended to mitigate the differences in economic development between regions.

The plan provides for the decentralization of the economy through measures to support underdeveloped regions of small cities or towns. Development of underdeveloped areas would reduce the outflow of population as well as lower concentrations of the same in the big cities and economically developed regions.

Regional Development Strategy for the period 2007-2012 was adopted in January 2007. It represents a detailed analysis of the economic, social and infrastructure indicators in all regions of Serbia.

The strategy was born out of desire to mitigate internal regional and interregional disparities that hinder the development and lead to the migration of the population in developed regions.

Uneven regional development has resulted in the appearance of undeveloped rural areas where the population emigrate to developed centers.

The main objective of the strategy is to point out all the problems that lead to it and propose a series of measures to help mitigate the effects.

National Strategy for Sustainable Development defines support for rural development in the field of agriculture and rural tourism.

From EU pre-accession funds provided for in the period 2009-2013. year about 35 million euros in aid for agriculture and rural tourism development.

Agricultural Development Strategy was adopted in 2005. and the major part of it is relating to rural development.

The main directions of rural development:

- The development of a sustainable, efficient and competitive agricultural sector;
- Improvement of living standard of people living from agriculture;
- Providing social and economic conditions that will contribute to the economic development of the country;
- Creating a rural development policy which recognizes the territorial specificities;
- Environmental protection and the elimination of harmful effects of agricultural production.

Rural development objectives defined in the strategy are not exhaustive and does not cover all the needs of agriculture and rural development.

The strategy does not represent the principle of integrated rural development, and does not cover all aspects of rural development, but its priority areas.

It is very difficult to make a comprehensive rural development strategy because in rural areas there are a number of problems of different nature, and it is impossible to solve simultaneously.

The basic program resources for the implementation of the strategy include:

- Support measures for the creation of a market price;
- Direct payments;
- Subsidies for the purchase of farm inputs;
- Schemes for modernization of agricultural households;
- Subsidies for exports of food products;
- Infrastructure;
- Research, education, extension;
- Short-and long-term loans for agriculture.

Poverty Reduction Strategy was adopted in 2003. and defines poverty as primarily a rural phenomenon.

This strategy defines a series of measures aimed at reducing poverty in rural areas, ranging from the construction of infrastructure and the service sector, through improving processing facilities, and marketing of agricultural products, to raise the level of education.

Tourism Development Strategy of the Republic of Serbia in the period (2005-2010) was adopted in year 2006.. Part of this strategy is related to the development of rural tourism in the Republic of Serbia, which has real potential. Rural tourism, in addition to extra income for rural population, would contribute to building infrastructure, improving marketability, branding of agricultural products, development of additional system services and so on. The European Union and the European Agency for Reconstruction initiated **Project to support rural development programming and payment systems in agriculture** in the period 2006-2008.

The main objectives of the project are: assistance to restructuring of agriculture and food industry, stimulating economic development and poverty reduction, the introduction of the system of control over the implementation of support measures (subsidies and other payments), the introduction of monitoring.

As a result of the project there was a preparation of the **National Rural Development Plan for 2008-2013** which includes the following priority objectives:

- Entrepreneur rural Serbia;
- Competitive Agriculture;
- Organized ecology;
- Advanced and comprehensive community.

Based on the analysis of the current situation (and SWOT analysis) of rural Serbia, interested actors, with their active participation in the process of rural development programming, drafted and approved a vision for rural Serbia by 2013, which represents a triptych composed of three "sub-vision": one for agriculture, one for food and one for marketing and rural economy of Serbia as a whole. [4]

[4] Strategy Plan for Rural Development in Serbia, 2009-2013, Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009, p.21

The structure of the agricultural sector in the future would be altered in favor of market-oriented commercial and family farms that produce high quality products in accordance with the preferences of consumers and the manufacturing process which applying principles of good agricultural practice. Also listed in the Strategy's vision includes elements of stronger linkages with processing complex and preservation of the environment.

Vision for the food industry in front of this sector set the task of manufacturing according to customer preferences and design "aggressive" advertising campaigns, and the implementation of the marketing business concept and development of innovation in various business segments. It also emphasizes the need to improve the quality and safety of products and hygiene improvements in plants. A significant element of the vision for the food industry is establishment of a strong cooperative relationships with farmers and their associations, as well as the development of small and medium enterprises engaged in the production of products with protected designation of origin and protected geographical indication. It is notable, however, that the vision of the food industry does not mention the preservation of the environment, as is the case with the vision of agricultural development, although it is known that the waste products from the food industry plants have a strong pressure on the environment.

The vision for the rural economy and society is the richest in content, but also very vague. Elements of the vision of the rural economy are as follows:

- There are strong and sustainable communities, with the demographic balance, satisfactory income and sufficient employment opportunities, where the inhabitants are easily adapted to the economic, social, political and environmental changes (lively village);
- there are standards of living and quality of life worth modern, developed and democratic Serbia (advanced/successful village);
- the largest possible number of farms and family farms is retained in the countryside (agricultural sector in the rural economy);
- there are equal opportunities for all rural residents, especially women and children, who will have access to education, vocational training and lifelong learning (social justice Village);

- rural communities actively participate in relevant decision-making bodies, in a society based on the principles of equality, mainly gender equality and social justice (Democratic Village);
- cultural identity of rural communities and their principles, customs, traditions and "unity" are preserved and strengthened even further (the village to the cultural identity);
- natural environment, which is the most important value and wealth for the people in rural areas, to the greatest extent possible respects and protects; growth of the rural economy is based on the principles of sustainability (sustainable village);
- strong social cohesion and specific policy measures contribute to reducing poverty and social exclusion (social component of villages).[5]

It is notable that in this study the rural areas and the village used interchangeably, although the generally accepted definition of rural areas include towns and smaller cities. Thus conceived vision of rural areas is more an abstract ideal than realistic attainable goal in the future. Even more elements of the vision of agriculture and the food industry are concrete courses of action for companies in these sectors. Also, a vision that in it own name have a rural economy of economic activities is explicitly mentioned only agriculture, while the development of other economic activities that are important for the development of rural areas is not even mentioned.

Based on these visions are formulated strategies that make the best possible way to achieve the objectives defined by vision:

- Improving the competitiveness of the agricultural, forestry and food sectors;
- The preservation and improvement of the environment and ensuring sustainable use of natural resources;
- Development and promotion of local initiatives to improve the competitiveness and quality of life in rural areas;
- Improving quality of life and promoting diversification of activities in rural areas.

Bearing in mind the vision and the strategy proposed, are formulated appropriate measures to support the development of rural areas. (Table 3)

[5] Strategy Plan for Rural Development in Serbia, 2009-2013, Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009, p.22

Table 3. *Measures to support the development of rural Serbia*

Priority Axis I: Improving market efficiency and implementation of EU standards	
Measure 1	Investments in agricultural households to restructure and meet EU standards
Measure 2	Support for the establishment of producer associations
Measure 3	Investment in processing and marketing of agricultural products to help this industry restructured and meet EU standards
Priority Axis II: Preparations for the implementation of agri-environmental measures and local rural development strategies	
Measure 4	Activities aimed at improving the environment and countryside
Measure 5	Preparation and implementation of local rural development strategies
Priority Axis III: Development of rural economy	
Measure 6	The improvement and development of infrastructure in rural areas
Measure 7	Diversification and development of economic activities in rural areas
Measure 8	Improvement of vocational training

Source: *Strategy Plan for Rural Development in Serbia, 2009-2013, Republic of Serbia, Ministry of Agriculture, Forestry and Water Management, February 2009, p. 30 http://www.minpolj.gov.rs/download/ruralnirazvoj-strategija.pdf*

To 1994. year, the funding of primary agricultural production is mainly carried out from the primary issue and has resulted in the growth of inflation and other distortions in the financial system of the country. To curb inflation and preserve social peace state was responsible for monitoring the prices of agricultural products and foodstuffs. The program of reconstruction of the monetary system was abolished agricultural finance from the primary issue, though not at the same time provided the funding mechanisms of agriculture under favorable conditions. Its financing activities is left to the free market which is characterized in this period extremely high interest rates and the banks' lack of interest due to the higher risk of lending and the characteristics of the production (low turnover coefficient, heavy dependence on agro-ecological conditions and the like). Registered agricultural enterprises have received the necessary working capital from banks with high capital cost if they had adequate guarantee or collateral.

Such a possibility, however, private farms have not had - due to the unresolved status and problems of registration in the cadastre and land registry. The only solution for them were unfavorable trade arrangements with processors and buyers of agricultural products. The state's budget funds that were intended for the promotion of agriculture placed over the processors, which resulted in even worse position of primary producers. All this resulted in a significant reduction in agricultural production and underscored the necessity of finding a new model for stimulating agriculture development.

The decision on the establishment of the agricultural budget was passed in late 1995. Agriculture because of its specificity requires support from the government, even when it comes to developed market economies. In our conditions, cutting funding to the primary issue has left a significant impact on the already devastated the agrarian economy, which is so nearly lost the only or the most important financial support.

The first agricultural budget was formed in 1996. as an integral part of budget of the Republic of Serbia, with a relatively modest total revenues of RSD 1 billion. Budget revenues were formed from the following sources

- part of the revenue from the budget of the Republic of Serbia in the 1995th year;
- special sales tax on tobacco products, alcoholic beverages and primary agricultural raw materials (milk, sugar, oil, flour);
- and other potential sources.

Compared with other countries in transition, budget payments for agriculture in Serbia are the lowest and amounts to only 4% of GDP generated in agriculture. In neighboring countries agricultural budget is between 10% and 14% of this production, which means that he is 3-4 times smaller then ours.

For example, in Serbia subsidies for agriculture amounts 17 € per capita, while in neighboring Hungary amounts 70 €, Slovenia 130 €, while the EU-wide 120 €. Expressed per hectare of arable land in Serbia in 2002. was amounted only 32 €, while in the countries of the European Union in the same year was 360 €.

Table 4. *Height of the agricultural budget in 2001-2009 and its share in the total budget of the Republic of Serbia*

Year	Total budget	Agricultural budget	The share of the agricultural budget in the total budget
2001	129.369.200.000	5.256.000.000	4,06%
2002	219.516.000.000	7.987.435.000	3,64%
2003	296.643.364.499	10.220.256.000	3,45%
2004	419.493.740.673	22.354.902.000	5,33%
2005	473.418.377.000	20.064.957.000	4,24%
2006	448.339.788.000	23.057.256.000	5,14%
2007	595.517.786.100	26.095.751.714	4,38%
2008	654.429.163.862	27.163.978.000	4,15%
2009	698.700.000.000	20.400.000.000	2,92%

Source: *Kardovic D., Agrarian Budget as an Instrument of Agrarian Development Policy of Serbia, MBA Thesis, MBA Course in Agribusiness and Commerce Subsidized by the European Union TEMPUS CD_JEP 40067-2005 at University of Belgrade, p. 32.*

Analysis of the structure of the agricultural budget in this period shows an unequivocal conclusion that the bulk of the budget (about 4/5 in 2003.) were focused on resolving the issue of the current reproduction, mean the current incentives for agriculture, while a much smaller portion (only 1/5 in 2003.) focused on the development incentives and objectives of structural adjustment agribusiness in Serbia. Also in this period, in the structure of the agricultural budget was not any measure (except for rural revitalization) planned for investment development programs in the rural regions, and within that sustainable rural development and environmental objectives. [6]

Starting from 2004. in the agricultural budget were again introduced measures aimed at revitalizing the village, but which were not represented in significant scale. The exception was year 2006. when subsidies for

[6] Vasiljevic Z., M. Ševarlić, Agricultural budget as an economic instrument in the transition of Serbian agro-economy, institutional reforms and transition of agribusiness in Serbia, Volume 2 p. 94-98

rural improvement amounted to 13.4% of the total budget, although this increase is primarily a result of the introduction of measures to support non-commercial farms in the amount of RSD 1,851,872,000. accounting for about 8% of the total agricultural budget for that year. [7]

From the analysis of resource allocation of subsidies in agriculture forestry and water management can be concluded that there are a number of measures which are constantly present while some measures sporadically emerge, which indicates a certain degree of inconsistency to development policy of agriculture and rural areas. Certain applications are declining, such as milk premiums (premiums for industrial plants and wheat are not applied since 2007.), while, on the other hand, there are increase in spending on subsidizing inputs in agricultural production.

National support to agriculture and rural development in the Republic of Serbia is achieved within two courses of action:

1. Market support - includes price support, storage subsidies, direct payments to producers and export subsidies and
2. Support for rural development - includes measures to improve agricultural and forestry sector, measures for sustainable use of natural resources and protection of the environment and measures to diversify the rural economy and improving the quality of rural life.

Support is realized in the form of grants incentives or credit arrangements under favorable conditions in which participate various state funds and agencies and commercial banks. The most significant source of funding for agriculture and rural development are within the budgets of the agricultural budget of the Republic of Serbia. The support is implemented in four directions:

1. Modernization and improvement of market efficiency of the agriculture and food industry;
2. The protection and enhancement of the environment;
3. Development and diversification of the rural economy;
4. Support for local initiatives.

[7] Distribution Program and use of subsidies in agriculture, forestry and water management for the year 2006, the Ministry of Agriculture, Forestry and Water Management, p. 11

In the first course of action are represented the measures aimed at supporting investment projects that are focused on the modernization of farms and companies in the food industry as well as the adoption of appropriate standards to be applied in the European Union to make them more competitive, as on the domestic market and the European Union too. These measures are operationalized through appropriate regulations issued by the Government of the Republic of Serbia.

Conclusion

In rural areas of Serbia there are significant differences in the development of rural regions where trends are depopulation, rural development imbalances, high commitment of workforce, not competitive agriculture, low level of integration of agriculture and food industry pose serious difficulties for agriculture development, rural areas and rural development .

The development support measures for agriculture and rural areas, including international organizations and projects are compatible with the measures that were applied in the SAPARD program and have extremely sectoral character with a very low participation of measures aimed at improving the environment and agricultural diversification and improvement of quality of life in rural areas.

The support system designed for rural development in Serbia is not sufficiently compatible with the system that is designed to be implemented in the European Union for the programming period 2007-2013.

Projects financed by the World Bank represent a significant supplement to rural development policy, which is financed from the budget of the Republic of Serbia and enrich the content-axis Improving environmental protection and projects funded by USAID are supplementary measures under content-axis Diversification of the rural economy. To support the development of rural areas of the Republic of Serbia in the period 2004-2009 was not sufficiently consistent, both in terms of choice of measures and in terms of financial allocations in some years. The adoption of the Operational Support Programme for the period 2009-2013, with a corresponding set of measures and financial allocation, would establish a consistent framework in which to implement the support for the development of rural areas of the Republic of Serbia.

Based on a series of measures and programs of regional and rural development, it is necessary to take action in order to improve the implementation of development of rural areas, rural development and reduce disparities in rural development of regions.

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PRODUCTION AND EXPORT POTENTIAL OF SERBIAN AGRICULTURE IN PROCESS OF EURO-INTEGRATION[*]

Stanislav Zekić, Miloš Tošin[**]

Abstract

Due to the importance it has in the economy and foreign trade of Serbia, agriculture will be one of the most important chapters during the upcoming pre-accession negotiations in the process of European integration. In this context, the problem is the low competitiveness of agriculture in Serbia, which in basic production performance lags significantly behind the EU countries. This is to a large extent caused by unfavorable resource structure and extensive character of Serbian agriculture. Inadequate production characteristics are reflected in the export performance of agriculture in Serbia. Despite the positive foreign trade balance, Serbia has a relatively low volume of agricultural exports in compare to the used labor and agricultural land.

Key words: *Agriculture, Production performances, Agrarian policy, Serbia, European Union.*

Introductory remarks

After the period of socialist establishment, the country's political and economic isolation at the end of the 20th century and the transitional changes at the beginning of this century, Serbia has eventually come to be a candidate country for the European Union (EU) membership and it is expected to be assigned a date for pre-accession negotiations. In that respect, the performances of agricultural production will have a major

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impact on our country's position regarding its agriculture during the negotiations. On the other hand, the significance of Serbian agricultural export performances is mirrored in the forthcoming trade liberalization within the EU countries, which stems from the Stabilization and Association Agreement and possible EU membership.

Production characteristics of Serbian agriculture are examined based on the analysis of movement of agricultural production, as well as dynamics and level of partial agricultural productivity – labor and land productivity. Agricultural productivity is analyzed on the grounds of the structure of agricultural resources, as a crucial determining factor for the productivity level of primary production factors. The analysis encompasses the period from 1970 to 2010, which tentatively equally includes both pre-transitional and transitional periods in Serbia. Comparative analysis has been conducted collectively and individually with the EU countries, using two "old" (Austria and France) and two "new" (Hungary and Poland) European Union's member countries. The agricultural export performances have been depicted based on the scope of agricultural export relative to the engaged workforce and available agricultural land.

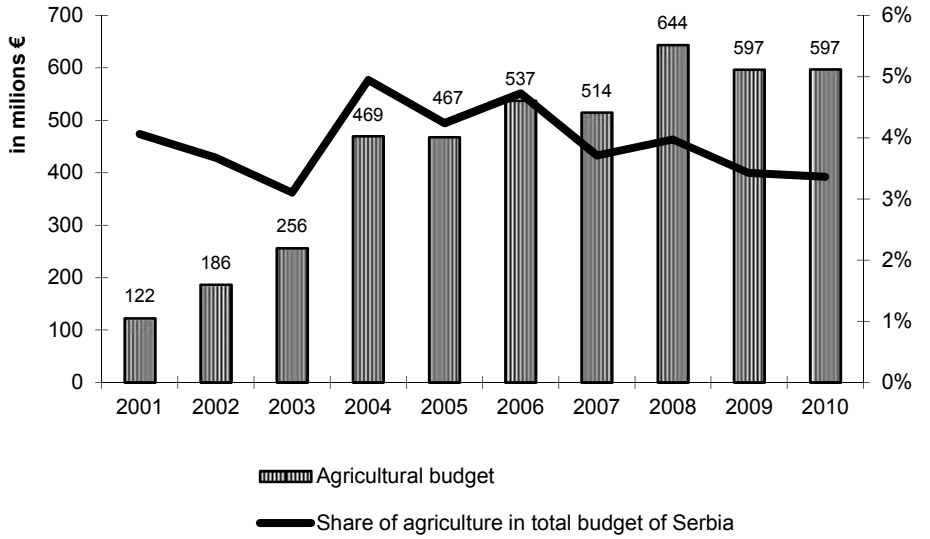
The Main features of Serbian agricultural policy

After abandoning the concept of agricultural collectivization in 1953, the large-scale production organized by social/state combines was being reinforced throughout the entire socialist period in former Yugoslavia. On the other hand, small separate farms were regarded as traditional sector of backward agriculture, and therefore, out of ideological and political reasons, their development was being hindered in many different ways. Input production, processing and trade of agricultural products were in the ownership of social capital, whereas the prices were centrally planned according to the production conditions in the social sector. Such bimodal development strategy, being political-social-economic construct rather than having economic character, conditioned agriculture not to develop as a unique whole, which was inevitably reflected on the overall performances of agricultural production.

The last decade of the 20th century brought the country's political and economic isolation, which, coupled with war in the neighboring countries and NATO bombing, led to the downward trend in Serbian agricultural production. During this period, the closed economy model was implemented forcefully, where the main goal of agricultural policy was

reflected through merely meeting the food needs of the population. Serbian agricultural policy at the beginning of 2000s is characterized by limited agricultural budget funds, while in the first years of the decade market support was the quintessential mode of subsidizing agriculture. In the subsequent years, there was an increase in agricultural budget funds (*Figure 1*), as well as a substantial allocation of the means for structural support. Also, this period is marked by price and trade liberalization, together with the privatization of social capital.

Figure 1. *The agricultural budget in Serbia*



Source: *Popović, Zekić, 2010, p. 108.*

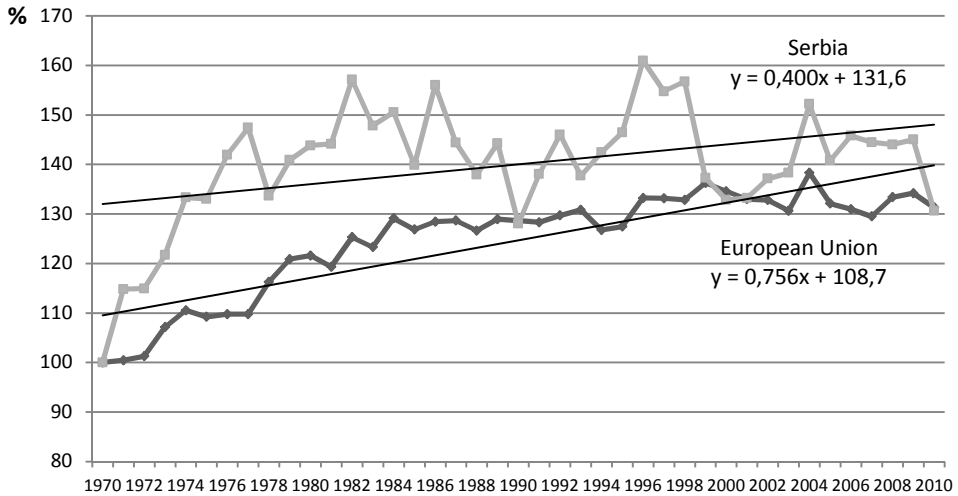
Dynamic of agricultural production

In comparison with EU, the acquired scope of agricultural production in Serbia displays much more fluctuation, as expected. [1] During the analyzed pre-transitional period (1970-1990) the upward trend of agricultural production was relatively notable, that is, about 1.17 % annually. This growth is to a great extent due to the increased investments of conventional production factors – largely into mechanization and, on a smaller scale, into mineral fertilizers, whereas the technological progress

[1] Larger number of countries included in the analysis "softens" the annual fluctuations in the scope of agricultural production for EU.

was substantially lagging behind that of the EU member countries of the time (*Zekić, 2003*). During the period after 1990, the downward trend of agricultural production was mainly conditioned by above mentioned non-economic factors, which caused the Serbian agriculture to operate within the conditions of more or less closed economy during the nineties of the 20th century. The situation was not much better either in the period transitional changes after 2001, when the dynamics of agricultural production had been more or less characterized with stagnation.[2]

Figure 2. *Dynamic of the agricultural production (1970=100)*



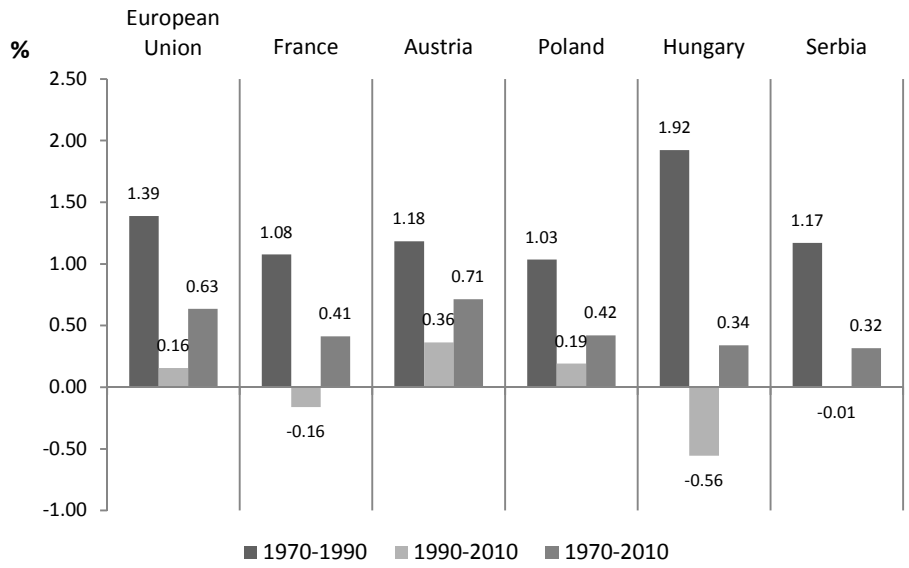
Source: *Own calculations on the basis of FAOSTAT.*

Similar tendencies, reflecting accentuated growth of production in the first analyzed period (1970-1990) and its downward trend during the following twenty years, are characteristic of EU countries, only with the difference that here it has to do with transforming the physiognomy of the Common Agricultural Policy (CAP). In other words, during the 70s and 80s of the twentieth century, CAP powerfully substituted the growth of agricultural production, so that it would, in the following two decades, lead to the transformation of production-dependent support towards the

[2] Still, it should be noted that during the period from 1990-2010, the Serbian agriculture had better production performances with regard to the non-agricultural sector, that is to say, the narrowing the scope of production was much more reflected in the industry. It can be concluded that agricultural sector positively contributed to the improvement of the overall production performances of Serbian economy, however, its contribution is smaller than its potential and needed one (*Zekić S., Gajić M., Kresoja M., 2012*).

direct support to the farmers' income, as well as the promotion of rural development, environmental protection and the like.

Figure 3. *Growth rate of agricultural production*



Source: *Own calculations on the basis of FAOSTAT.*

The structure of agricultural resources

The advantage of agricultural resources, analyzed through the ratio of factors land/labor (Ld/Lr), chooses the dominance in using mechanic or chemical and biological technologies, which further has an impact on the differences in partial productivity level and growth, as well as on the differences in determining the labor and land productivity growth. [3]

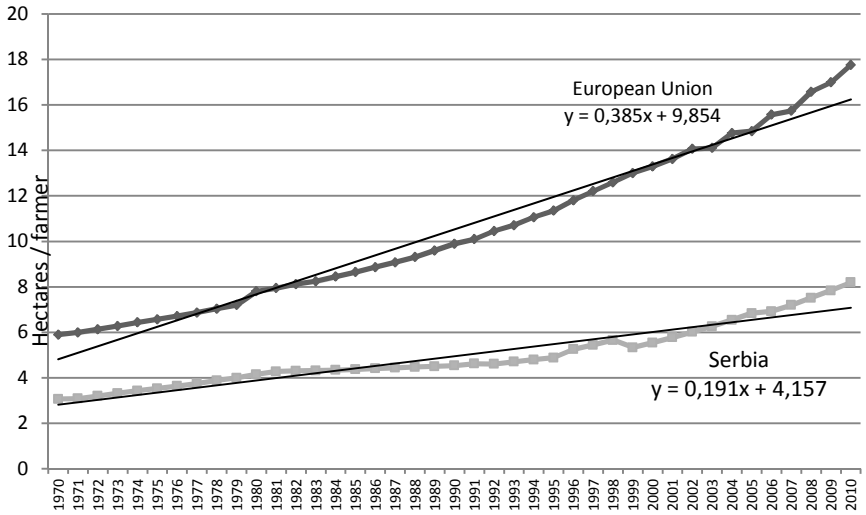
Serbia shows growth in the advantage of resources, although at much slower pace than EU countries, which additionally contributes to Serbia's

[3] Partial labor and land productivity are "linked" through the ratio of factors land/labor, which could be expressed through the following equation: $(Q/Lr)=(Q/Ld)*(Ld/Lr)$, where Q, Lr and Ld represent production, labor and land, respectively. This connection is also visible on the Figures 4 and 6, where the correlation between the level of resource advantage and labor productivity in analyzed countries. Namely, the countries with the largest areas of agricultural land per an active farmer reach the highest level of labor productivity and vice versa.

falling behind EU when it comes to supplying labor with land. In that respect, the average value for the first decade of this century indicates that EU countries have 2.23 times more agricultural land per a farmer in comparison with Serbia. Likewise, Poland has unfavorable structure of resources, as it has not undergone mass collectivization of agriculture, just like Serbia, which resulted in the prevalence of individual agricultural farms.

Relatively unfavorable structure of resources in Serbian agriculture indicates the existence of "redundancies" in agricultural sector. This leads to the conclusion that agricultural production alone cannot be a source of increasing employment, but some of the agriculture-related sectors could possibly be. The relatively slow progress of the structure of agricultural resources is a consequence of non-agricultural sector developing at slower pace, which could help decrease the hidden unemployment in Serbian agriculture.

Figure 4. *Dynamic of the structure of agricultural resources*



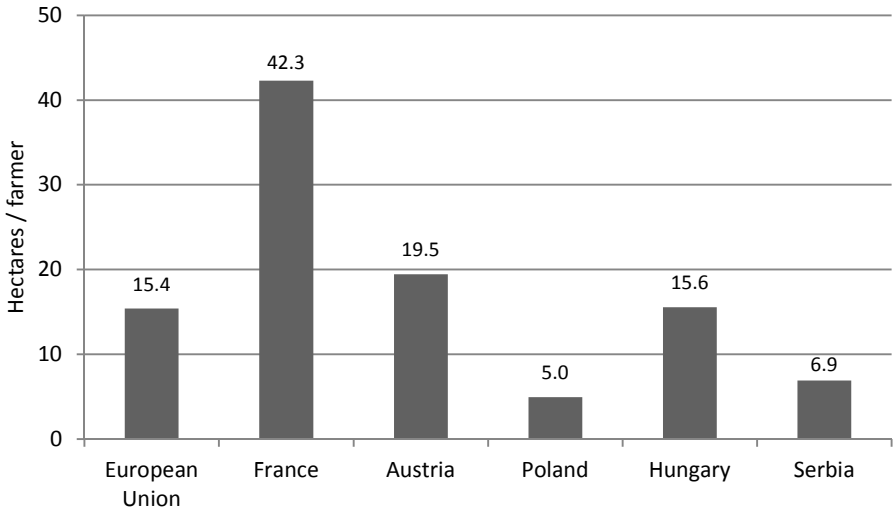
Source: *Own calculations on the basis of FAOSTAT.*

"Over-employment" in Serbian agriculture is especially prominent in the sector of small rural farms, which is still dominant user of the land.[4] On

[4] High rural unemployment, coupled with still existing dual structure of production, represent the main factors of preserving so called over-employment or hidden unemployment in Serbian agriculture.

the one hand, such semi-natural farms represent a problem for increasing agricultural competitiveness. However, on the other hand, they represent a "keeper" of social safety in most rural parts of the country. In other words, small individual farms secure minimum income required to provide for basic daily sustenance for a large part of, otherwise numerous, rural population in Serbia. [5] Other than that, in some important production sectors, the small individual farms have a crucial role in production.[6]

Figure 5. *Level of the structure of agricultural resources (Average for the period 2001-2010)*



Source: *Own calculations on the basis of FAOSTAT.*

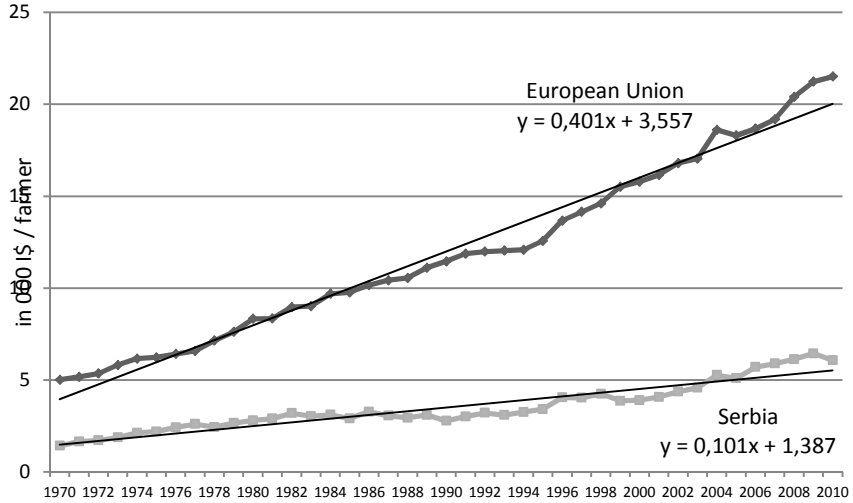
Labor and land productivity in agriculture

Irrespective of the current upward trend of labor productivity in Serbian agriculture, Serbia is still significantly lagging behind the rest of EU countries in this aspect and the existing gap is becoming ever bigger. Similarly as in agricultural production, labor productivity in Serbia up to 1990 was predominantly conditioned by enlarged investments, primarily in agricultural mechanization and mineral fertilizers, whereas essential

[5] It is estimated that about 45% of Serbian population lives in rural areas (*FAOstat*).
[6] For instance, about 60% of milk production comes from farms which possess only a few cows (*World Bank, 2011*).

factor in EU countries was boosting the livestock funds (*Zekić, 2003*). After 1990, the labor productivity grew due to the improved structure of the agricultural resources, that is, diminished number of employees in agricultural sector.

Figure 6. *Dynamic of the labor productivity in agriculture*



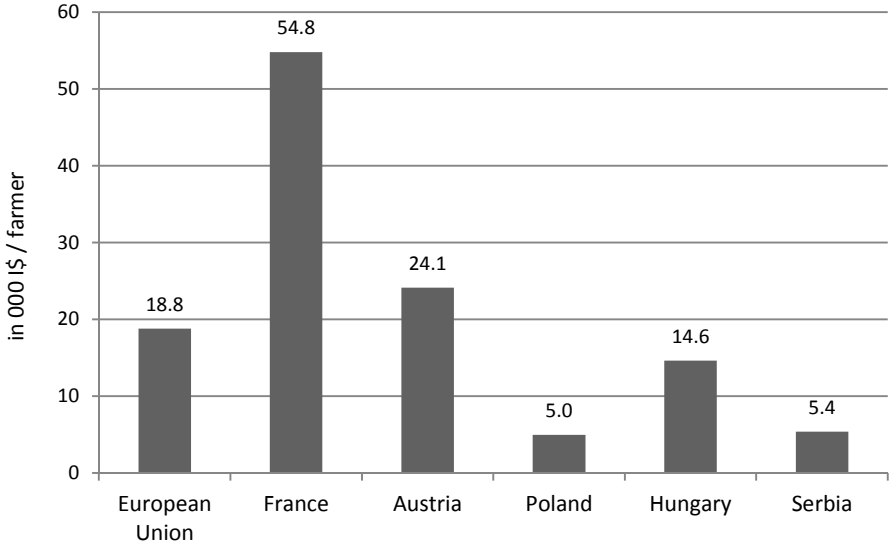
Source: *Own calculations on the basis of FAOSTAT.*

The ratio of labor productivity in agriculture between EU and Serbia approximately amounts to 1:3.48 for the last analyzed decade. The difference in labor productivity between EU and Serbia until 2005 was to a great extent conditioned by the ratio of factors livestock/labor (*Zekić, 2003, and 2008*), which indicates inadequate presence of livestock production in Serbia.

The level of labor productivity largely corresponds to the advantage of the resources, so that Polish agriculture also demonstrates the low labor productivity (*Figure 5*).[7]

[7] By and large, the increase in exploitation of labor factors, that is, the increase in labor productivity should be "looked for" in the development of livestock production, which could have positive impact on the overall level of agriculture's strength. However, the question is to what extent are the individual farms capable of dealing with this aspect of agricultural production in effective and competitive manner.

Figure 7. *Level of the labor productivity in agriculture (Average for the period 2001-2010)*



Source: *Own calculations on the basis of FAOSTAT.*

The tendencies of the land productivity movement "mimic" the movements within the scope of agricultural production, given the fact that changes in agricultural lands are never significantly outstanding. In the entire analyzed period (1970-2010) Serbia demonstrated a growth in production per unit of area, whose dynamics is up to par with EU standard and approximately amounts around 0.8% annually.

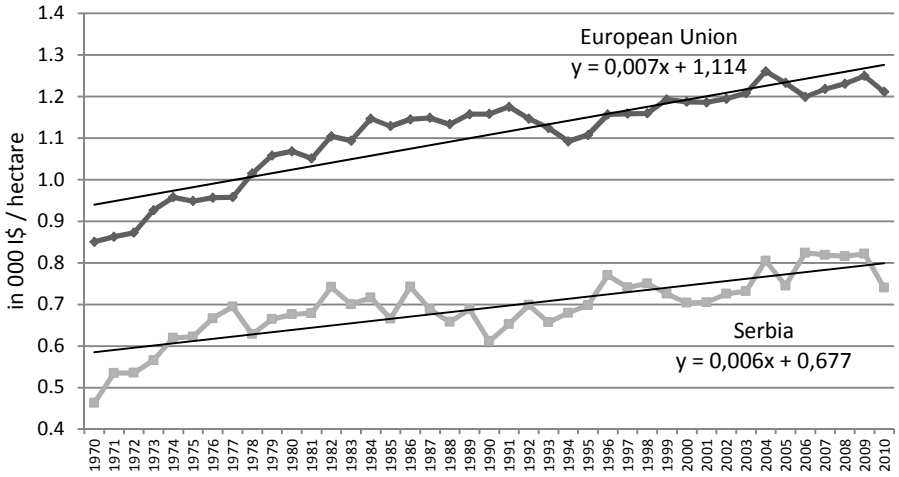
As for the land productivity, Serbia mildly falls behind EU, that is, the EU countries make "only" 50% greater scope of agricultural production per ha of agricultural land at the first decade of 21st century. [8] The reasons of such lagging lie in relatively extensive nature of Serbian agriculture. Namely, in its production structure, the plant production of extensive crops, also known as cereals, and almost according to standards of the dryland farming system. [9]

[8] As in labor productivity, the small number of necessary heads of cattle per unit of area predominantly determines this lag (*Zekić, 2003, and 2008*). This additionally indicates the lagging of livestock sector, which represents the generator of the intensity of agricultural production.

[9] In Serbia, within the structure of plant production corn and wheat take almost 60% of cultivable land (*Statistical Office of the Republic of Serbia*), whereas the percent of irrigated cultivable land is insignificant (*FAOstat*).

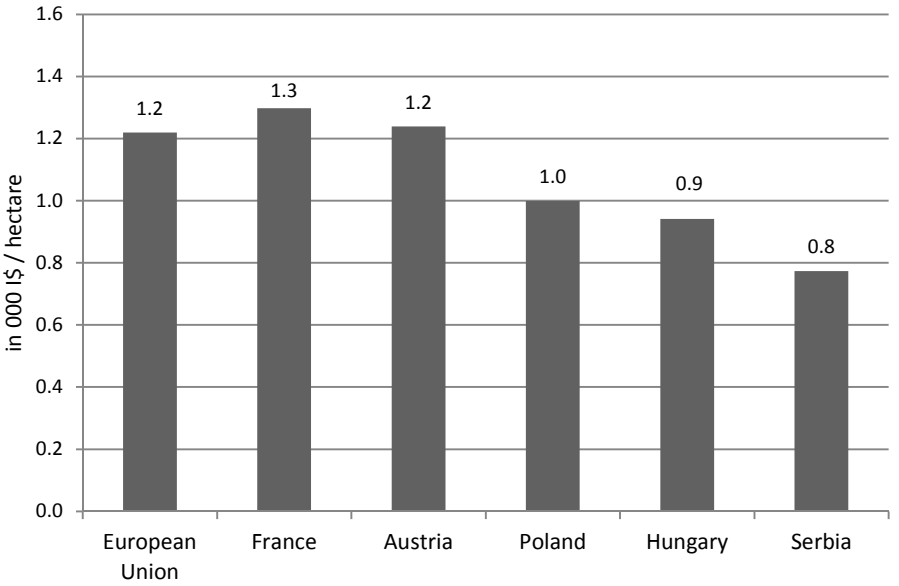
By shifting the focus of agricultural production to the development of livestock production, the inadequately used potential of plant production could be improved.

Figure 8. *Dynamic of the land productivity in agriculture*



Source: *Own calculations on the basis of FAOSTAT.*

Figure 9. *Level of the land productivity in agriculture (Average for the period 2001-2010)*



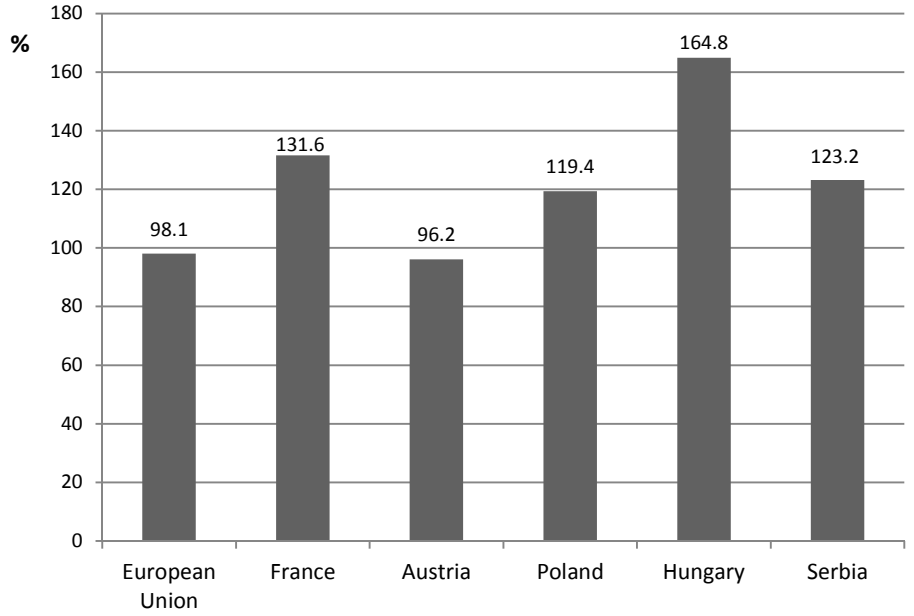
Source: *Own calculations on the basis of FAOSTAT.*

Trade of agricultural and food products

Beginning with 2005, Serbia made a positive balance of foreign trade in agricultural and food products (*Zekić S., Tošin M., Kresoja M., 2010*). These tendencies are reflection of improved trade position of Serbia through bilateral negotiations with countries of the region and trade liberalization with EU in November, 2000, and considerably enlarged export to the market of Russian Federation.

Nevertheless, when these "impressive" export results (*Figure 10*) are balanced with the engaged primary production resources – labor and land, and compared with other countries, it is evident that export capacities are insufficiently exploited. Namely, Serbian agricultural export, analyzed with active farmers taken into consideration, exhibits significant lag behind the EU average, which is even 17.7 times behind it. Hungary exports 10 times more than Serbia per a farmer, so the falling behind is evident even in comparison with Poland (*Figure 11*).

Figure 10. *The export/import coverage of the agricultural and food products (Average for the period 2001-2010)*

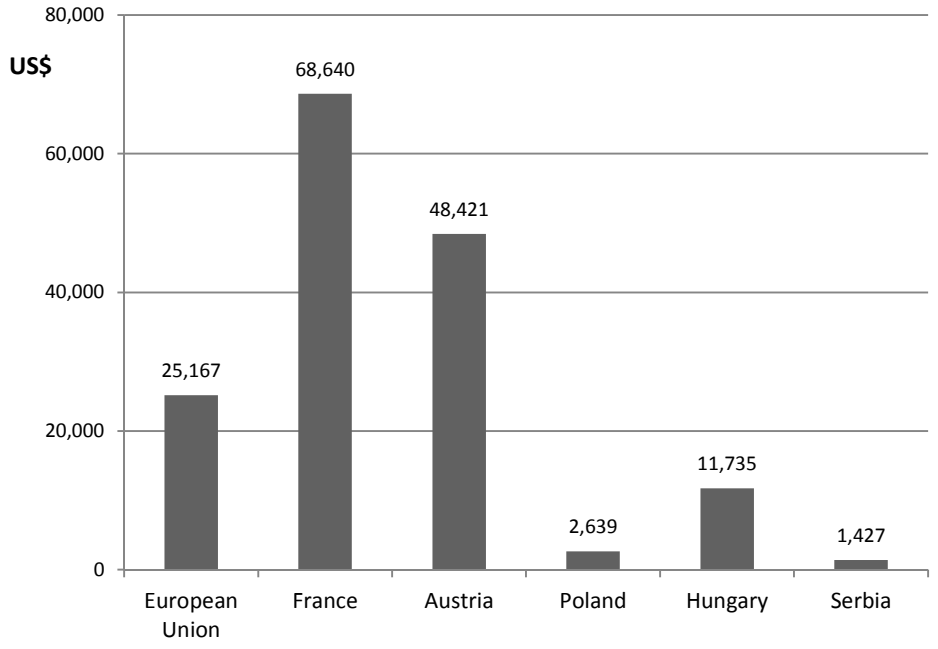


Source: *Own calculations on the basis of FAOSTAT.*

The statistics are slightly improved when agricultural export is analyzed according to the unit of area, but here as well Serbia substantially lags behind, as EU exports per hectare of agricultural land almost 8 times more than Serbia, Hungary 3.6 and Poland 2.5 times (*Figure 12*).

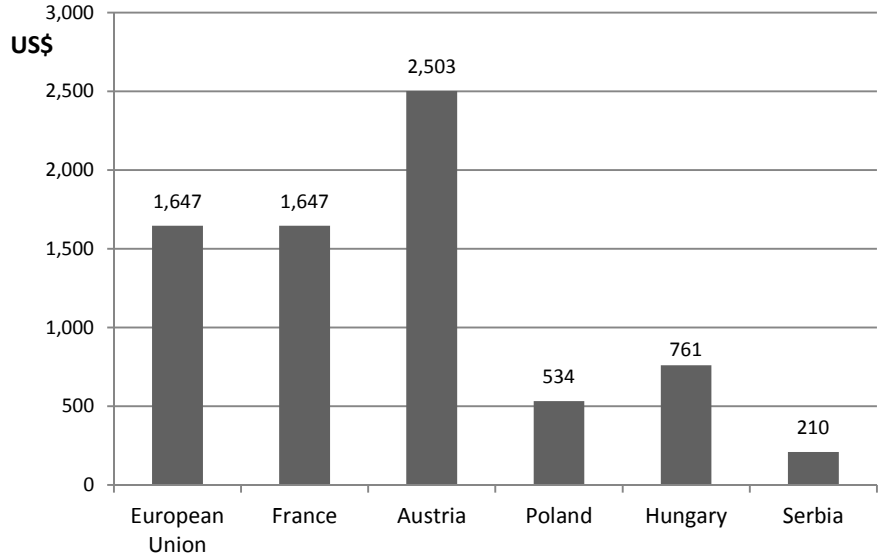
All these facts confirm once more the extensive nature of Serbian agriculture in which structure plant production dominates. Consequently, the export is based on feedstock of pant origin, such as: cereals, fruits, sugar and so on (*Zekić S., Tošin M., Kresoja M., 2010*). The position of Serbian agricultural foreign trade will be additionally complicated from 2013 on its way of trade liberalization with EU, when according to the Stabilization and Association Agreement signed with EU in 2008, Serbia will be obliged to moderate its tariffs for agricultural and food products import from the Union from the starting average of 19% to only 1.7%.

Figure 11. *Export of the agricultural and food products per farmer (Average for the period 2001-2010)*



Source: *Own calculations on the basis of FAOSTAT.*

Figure 12. *Export of the agricultural and food products per hectare (Average for the period 2001-2010)*



Source: *Own calculations on the basis of FAOSTAT.*

Serbian agriculture and Euro-integration

For Serbian agriculture it could be said that it is still in the process of transformation, or more specifically, in the process of overcoming the issues inherited from the former socialist economy, but also from earlier times during which the preconditions were formed for developing a parsed single farms.[10] The structure of agriculture is still unfavorable, with a great number of small farms, coexistence of semi-natural farms and commercial agricultural sector.

Sooner or later, Serbian agricultural manufacturers will be exposed to enormous competitive pressure on the EU common market, which will be soon witnessed following the complete implementation of the Stabilization and Association Agreement. This will pose a problem for relatively non-competitive Serbian sector for agricultural and food products, which is above all, stems from relatively weak production

[10] About the forming of preconditions for developing a parsed single farms on the territory of central Serbia, as early as in 19th century, see: *Čolić, 2004*.

performance. Furthermore, though representing a significant part of Serbian agriculture, the small rural farms are inapt for optimal employment of cutting-edge agro-technical systems, leading to poor production results and hence inability to achieve adequate income. These farms will be the first ones to face "the competitive impact" of Euro-integration, which will influence the sector for livestock production the most, as it is the most problematic area for meeting the EU standards. [11] This situation negatively affects the profitability of agriculture, lessens the scope of investments and hinders the growth of competitiveness.

The advancement is also necessary in the sector for processing agricultural products, as well as the industrial inputs for agriculture, coupled with the building of an infrastructure network. Raising the overall level of services and developing institutions indispensible for efficient functioning of the sector for agricultural and food products – creating consultative services, promoting cooperativeness, efficient functioning of labor and land markets, and the like. In this context, Serbia will be able to use all of the five IPA means (*Instrument for Pre-Accession Assistance*) in the EU forthcoming budget period, among which there are funds for rural development. However, the question is to what extent Serbia has institutional and personnel capacity to "attract" these means. Therefore, significant efforts are to be made in this respect.

Conclusion

Both bimodal development strategy and dual production structure, which stems from the latter, characterized the developmental process in Serbian agriculture during the socialist period; and during the last decade of 20th century, it was political and economic isolation of the country that marked it. All this influenced withholding and also worsening the performance of agricultural production after 1990. According to the achieved scope of production with regard to engaged production factors – labor and land, Serbian agriculture significantly lags behind the EU countries, which is predominantly conditioned by unenviable structure of resources and extensive nature of agricultural production. Namely, with respect to the available land in Serbia, relatively large workforce is engaged in the process, resulting from the parsed individual farms and underdeveloped non-agricultural sector. On the other hand, extensive use

[11] Unlike in livestock breeding, the level of competitiveness in plant production will be determined by high transportation expenses and lack of storage capacities.

of land is present, that is, prominence of plant production in the system, so called, dry-land crop farming. Such production features determine inadequate export performance of Serbian agriculture. Despite the positive balance of foreign trade, the agricultural and food products export demonstrates relatively humble results, given the engaged workforce and available agricultural land. The reason lies in the fact that feedstock and products with lower degree of finalization prevail in export.

Agricultural policy should encourage the change in the structure of production toward the sectors of more intensive production. This primarily refers to the improvement of livestock production, in terms of quantity – increase in number of necessary heads of cattle, and in terms of quality – increase in production potentials of livestock fund, but also refers to the development of fruit and vine production, and also to the enlargement of areas with irrigation system. Augmenting the structure of production would improve production potentials in terms of increasing labor and land productivity. In this way it would be creating production basis for the development of food industry, which would have a substantial impact on the growth of export performances. The measures of agricultural policy should be directed towards the improvement of agricultural farms' structures, that is, building the sustainable family commercial farms. This agricultural model would comply with European model for agricultural development on the one hand; however, these farms would contribute the most to the balanced rural development on the other.

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EVOLUTION OF RURAL DEVELOPMENT POLICY IN BOSNIA AND HERZEGOVINA

Stevo Mirjanić, Gordana Rokvic[1]

Abstract

The objective of this research was to analyze the evolution of the rural development policy in BiH. Due to the different levels of authority over the management of rural development, a comparative analysis of rural development policy was conducted at the national, and subnational levels. The results of the analysis confirm that B & H does not have a common policy for rural development. The process of harmonization of RD policy at all government levels is in progress. By comparing the structure of support for rural development at the entity level in Bosnia and the EU framework for supporting rural development, significant differences are noticed. Given the current prospects of development in BiH, simply copying the model of rural development as it exists at EU level, would not be sufficient or adequate measure to improve conditions in rural areas in BiH.

Key words: *evolution*, *rural development policy, agriculture budget, measures of support*

Introduction

The concept of rural development in the late 20th century becomes equally important in developing countries and countries in transition. Overcoming regional development disparity is no longer in the basic focus of policy development in rural areas. New rural development policy focused on defining 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

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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 significantly among European countries. Therefore, there are significant differences in the objectives, institutional and financial support and general conceptual approach to rural development. Overall trends in post-war Bosnia, including the development of rural areas, passed through the transition period, as well as all other spheres of social and economic milieu of BiH. This period, when it comes to policies and development of rural areas, can be conditionally divided into three phases:

- The first phase, generally indicates a phase of renewal and reconstruction of rural areas;
- The second phase focused on the development of rural areas within the general agricultural policy;
- The third phase marks the beginning of rural development in BiH, which corresponds with the policies and values of the EU rural development.

The time period of individual fazes is difficult to separate, because the reconstruction projects are still ongoing, the rural development policy is still implemented in the context of agricultural policy, and rural development policy, at some levels of government, has not yet experienced the inauguration of a special policy in the agricultural and regional development.

Rural Development Policy in Republika Srpska

In the evolution of rural development policy in the Republic of Srpska three distinct periods can be observed, in which the different importance was given to investment in rural areas, in terms of type and extent of support, strategic targeting of resources, compliance with the policy of agricultural development and harmonization with EU guidelines for rural development.

The first phase of development refers to the period since 2000. year, with the start of allocation of appropriate resources for the development of agriculture and lasted until 2006. year, with the adoption of the Strategy of agricultural development. The overall conclusion is that during this period more than half of the funds for agriculture development was spent in direct support for individual products (milk, seeds, tobacco). Maximum

ten percent of total support was alocated for rural development, primarily rural infrastructure, and this since 2004, Chart No.1.

The second phase of development refers to the period from 2006 til 2009. year, which was marked by the adoption of the Strategy for Agriculture Development of RS. By adoption of the Strategy a shift was made from a purely sectoral approach to integrated development of agriculture and rural areas. This commitment was confirmed with the adoption of a new model of incentives, by which, the support for rural development has become compulsory third axes in total budgetary support:

- support to agriculture via current subsidies and incentives (current development);
- support to investments – via development programs (long-term development); and
- support to rural development and non-commercial farms.

Share of rural development support in total budget in the period 2006-2009 was again low and below 20% of total amount per year, Chart No.1.

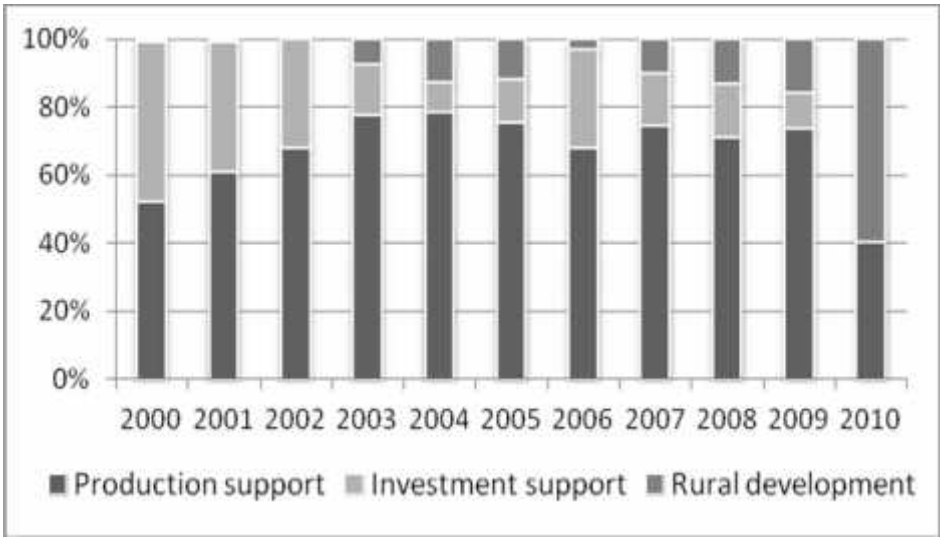
The third phase in the evolution of rural development occurs in 2010 by adoption of the Strategic Plan for Rural Development in the RS, when we start to talk about a separate policy for rural development, with specific goals and measures of support. Basic feature of the new policy is the focus of rural development support to three goals:

- Improvement of competitiveness of the agriculture and forestry;
- Sustainable management of natural resources;
- Improvements in the quality of life and the rural economy diversification.

Allocation of the budget for rural development support in 2010 was grown to 50% of total support.

We can conclude that the amounts of investments as well as the structure of support of the agriculture budget in RS, varied from one year to another. Annual budgets were affected by major shifts in policy development, not only towards supporting rural development but also towards supporting agriculture investments. Chart 1 provides a 10-year budget overview in RS, split into three main types of support: production support, investments support and rural development support.

Chart No.1. *RS agrarian budget support - 2000-2010*



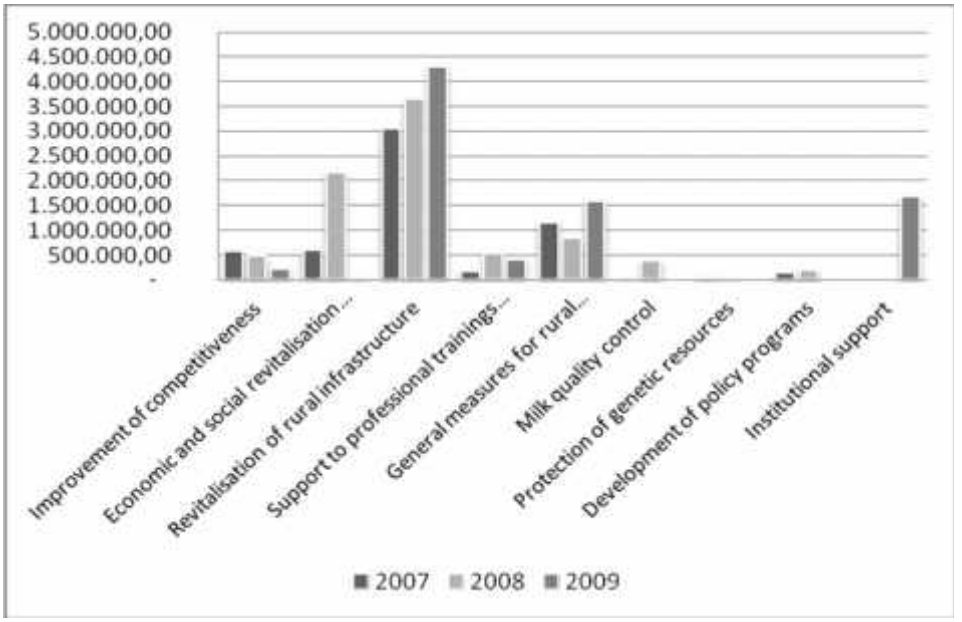
Source: *own calculation.*

During the first couple of years, the Ministry, in addition to supporting production, allocated significant funds for loan based production funding – thus the ratio between these two types of support was almost equal. Starting from 2002, lending was left to commercial banks, and the interest rates premiums for agricultural loans have been introduced.

Starting from 2006, capital investments for support to agriculture and food industry have been introduced while the subsidizing of interest rates has been abolished, thus the long-term investments became continuous and provide the opportunity for targeted subventions to those types of investments that can contribute to achievement of strategic goals.

However, production and income support dominated the overall support structure till 2010. The reform introduced in 2010, by which long-term investments became part of the support to rural development, resulted in lowering production and income support below 50% of the overall agrarian budget.

Chart No.2. *Structure of rural development support measures in a period 2007-2009*

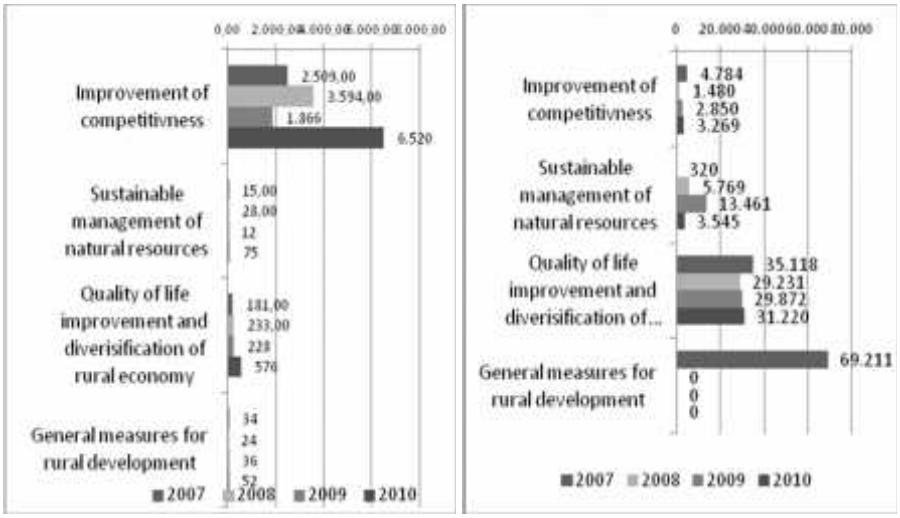


Source: *own calculation.*

Structure of support measures for rural development was also changing from year to year. If observed from 2007, when more diverse and significant rural development support measures have been introduced, it is clear that approximately ten different measures were rotating (Chart 2), although the subsidies model foresaw just three major measures: improvement of competitiveness, economic and social revitalization and the revitalization of rural infrastructure.

Majority of funds within the overall structure of these measures were allocated for rural infrastructure development (Chart 3). If we analyse number of beneficiaries per measure, than the best effect is achieved in supporting competitiveness, primarily investments in agriculture mechanisation (Chart 3).

Chart No.3. *Effects of rural development support measures – per number of beneficiaries and the amount per beneficiary, 2007-2010*



Source: *own calculation.*

As we already stated, in 2010, the support structure changed, based on the adoption of the Strategic Rural Development Plan. The greatest share is being allocated for the support to competitiveness and the life quality improvement, with two rather prominent measures: infrastructure development and the purchase of mechanization (Chart 3).

Rural Development Policy of Federation of Bosnia and Herzegovina

The history of support to the agriculture and rural development sector in the Federation of Bosnia and Herzegovina can be divided into following periods: from the end of the war till 2001, and from 2001 to 2005 and a third period that can be added, from 2006 to date.

Period from 1996 to 2001 was marked by reconstruction of farms, procurement of mechanization, seeds and mineral fertilizers for agricultural production. Subsidies were usually awarded as donations or the projects providing loans with low interest rates and favourable grace periods. A number of post-war projects were designed in order to be lastingly replicated. In addition, starting from 1997, allocation of funds from the FBiH budget started for subsidies to milk and tobacco

production. There was no separate allocation for rural development type of support in this period.

Period from 2001 till 2005 introduced visible changes referring to commercial loans with relatively to very high interest rates, LC development projects and new, somewhat clearer approaches in terms of support to production, stronger, yet insufficient federal subsidies, notable but unbalanced allocations for subsidies from cantons. For the first time some municipalities have stepped in terms of support to their agriculture. This period was also marked by the adoption of new laws and the establishment of relevant institutions at the FBiH and national level. Similarly to RS, certain municipalities were allocating significant amounts with the aim to support the agricultural sector however there are no comprehensive records on these allocations.
Although there was no separate allocation of budget for rural development in this period, the diversification of support measures has led to developing rural development type measures.

Table No.1. *Forms and types of agricultural subsidies in the Federation of BiH, Law on Financial Subsidies, 2004*

Production of crops: mercantile production, seed production, planting material production, establishment of perennial crops of fruit and grapes.
Livestock production: cattle, sheep, pig, horses and poultry husbandry, beekeeping and fishery.
Organic production: organic production advisory services and organic products certification
Capital investments: new orchards and vineyards, crops irrigation and livestock production facilities.
Support to professional institutions: a/ breeding and selection activities, b/ introduction in nursery and seed production, plant protection and advisory functions.
Support to introduction of new technologies.
Participation: organizing of professional/expert gatherings, publishing of specialized publications and support to farmers' associations.

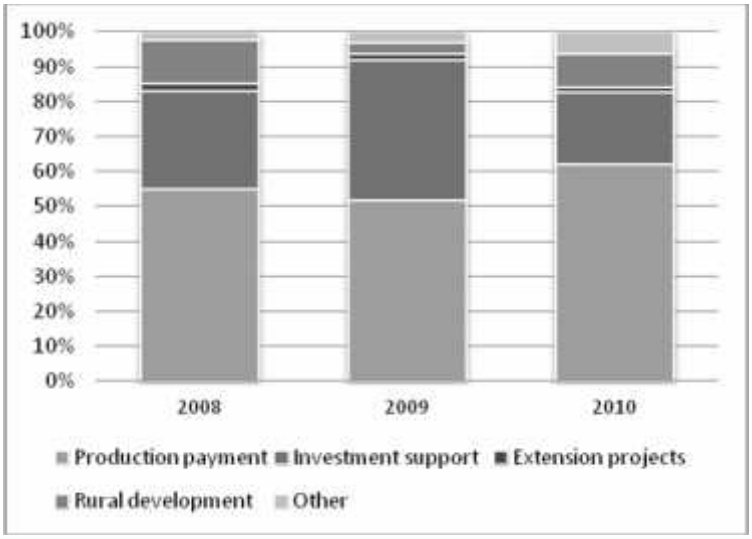
Period from 2006 to 2010 was marked by the adoption of the Mid-term Agricultural Strategy and the disbursement of subsidy funds in line with the model proposed by Strategy:

- Subsidizing of production: direct subsidizing of specific production of 'strategic' importance, capital investments, interest rate premiums;
- Other transfers: activities focusing on strengthening of public professional/specialized institutions, veterinary and plant protection

support to events, improvement of existing and introduction of new technologies, organic production, and assistance to NGOs.

Rural development measures, as one may see from the existing models presented were never an explicit part of agricultural incentives, yet they were present in the previous period. Due to lack of political or strategic commitment, this support is marked by lack of continuity and the low level of investments (Chart 4). There was sporadic support to young farmers, supplementary activities, tourism, less favoured areas, etc.

Chart No.4. *Agrarian budget structure, FBiH, 2008-2010*

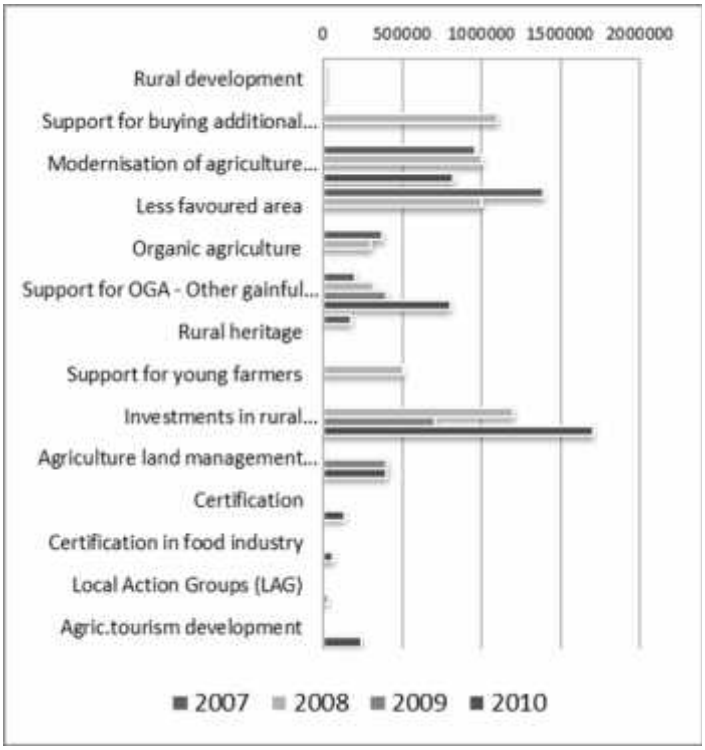


Source: *own calculation.*

As we can see from the chart 5, in a previous period, only the measures focusing on support to infrastructure and supplementary activities development have continued for 3 to 4 years in a row.

Taking into account that the FBiH Government extended the Mid-term Agriculture Strategy to 2012, a new Law on Monetary Subsidies in Agriculture and Rural Development was added to existing strategic commitments. This new model divides the monetary support measures to production incentives and structural policy measures. Disbursements referring to structural policy measures include: capital investments model, rural development model, income support model, model including other types of support.

Chart No.5. *Structure of support to rural development, FBiH, 2007-2010,*



Source: *own calculation.*

As already described, this Law introduced the Rural Development Model for the first time in FBiH. According to the Law, it aims at overall economic, social and cultural progress of population living in rural parts of Federation, taking into account the sustainable development principles. Monetary support focusing on rural development shall be effectuated in the areas of competitiveness improvement, protection and improvement of rural environment and diversification of rural activities (Table 2).

As a result of the new rural development model, the number of rural development measures increased in 2010, however, next year this number was reduced to zero – due to lack of funds and budgetary crisis only 300,000.00 BAM were paid for rural development – as support to organic production. We can conclude that there i attempt to adopt more diversified rural development measures in FBiH, but without real strategic commitment.

Table No.2. *Structure of support to rural development, Law on Monetary Subsidies, 2010*

	Rural development model is primarily focusing to:
	a) competitiveness enhancing
	- investments into farms,
	- rural infrastructure,
	- support to young farmers,
	- professional agricultural training,
	- traditional products;
b)	**protection of rural environment:**
	- areas with difficult economic conditions in agriculture,
	- organic production,
	- preservation of indigenous plant and animal species (varieties and breeds),
	- agro-environmental planning;
c)	**diversifying of rural activities including:**
	- services and supplementary activities,
	- rural heritage preservation.

Rural Development Policy of the Brcko District

Support to development of agriculture at the territory of Brcko District is provided from Brcko District budget, and the amount of this support is increasing each year. Funds from agricultural budget are aiming to encourage agricultural production at the territory of District, and their execution is defined by the Law on Subsidies in Agricultural Production, adopted in 2006.

The 2006 Law did not plan for the use of funds for rural development; however, this category was established in 2008, while from 2011, the Government of Brcko District defined investments into rural development as a regular item in terms of implementation of subsidies in its Rulebook on Modalities and Requirements for Subsidies in Agricultural Production.

According to the new Rulebook, rural development includes investments into agricultural mechanization (self-propelled and trailed), processing capacities and other agricultural investments, organic production and certification by GLOBALGAP standards. Subsidies for capital investments refer to construction of greenhouses and glasshouses, new orchards and rural development.

Table No.3. *Structure of support to agriculture and rural development in BD, 2006-2010*

2006 Law on Subsidies	2010 Changes and Amendments to the Law on Subsidies
a) Plant production: crops, vegetables and fruits production;	1) Plant production: crops, vegetables and fruits production,
b) Livestock production: cattle, pig, poultry, sheep and goat husbandry and other types of animal production,	2) Livestock production: cattle, pig and poultry husbandry, lamb feed, goatling feed and other types of animal production;
c) Organic production;	b) capital investments:
d) Capital investments;	1) construction of greenhouses and glasshouses,
e) Interest rates premiums for agricultural loans;	2) development of new orchards,
f) Development of professional institutions;	3insurance of agricultural production.
g) Introduction of new technologies and cultures in primary agricultural production.	c) rural development

Investments per utilised agriculture area and per beneficiary in Brcko District are higher than in two other entities (Chart 6). When it comes to the amount of funds allocated per beneficiary, the difference is even greater – compared with other two entities if we take into account that the structure of measures within the agricultural budget of BD, contrary to situation in other two entities, does not include investments into infrastructure and the availability of services in rural areas

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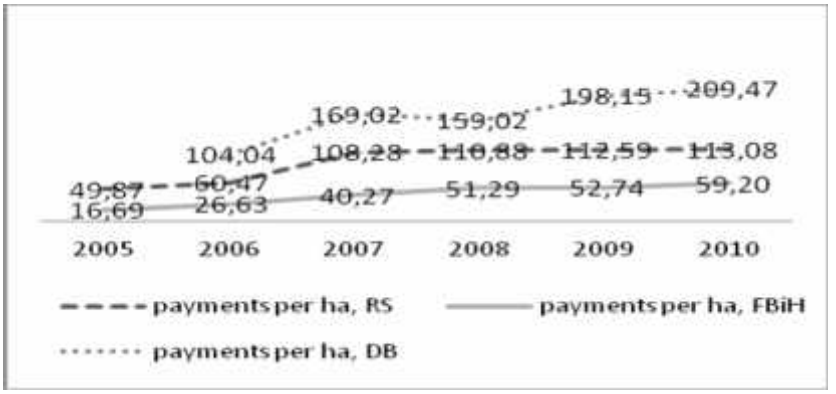
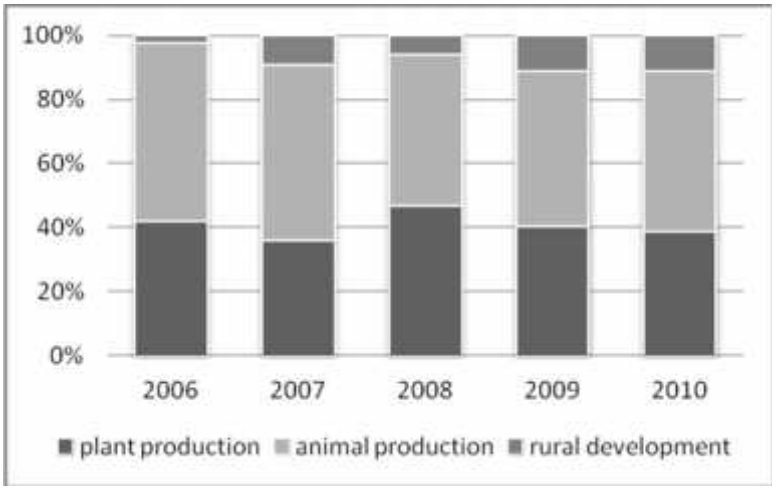
Chart No.6. *Payments per ha UAA, RS, FBiH, BD in KM.*



Source: *own calculation.*

Chart 7 shows that the majority of measures within their overall structure consist of production and income support. Measures within this overview marked as part of funds that were implemented for rural development refer to investments into mechanization, development of new plantations (crops), greenhouses and glasshouses, investments to processing industry, irrigation, introduction of standards and organic production.

Chart No.7. *Structure of measures for agriculture and rural development, Brčko District, 2006-2010*

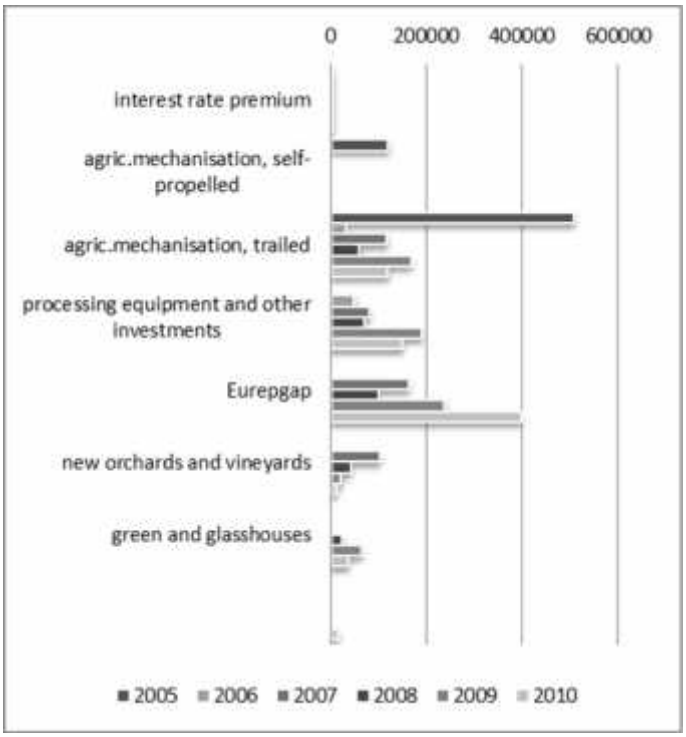


Source: *own calculation.*

Structure of measures for rural development was changing each year. In 2005, these measures included only the support for the mechanization repairs and upgrading and the co-funding of interest rates on investment loans. While the former measure continued in later years, the second one was executed only in 2005, and was not replicated later on.

In addition to support for the procurement of mechanization and other tools and equipment for agricultural production, measures related to development of irrigation systems, procurement of drying and cold storage systems etc. were also introduced.

Chart No.8. *Structure of the rural development support measures, Brcko District, 2005-2010*



Source: *own calculation.*

However, Brcko District Government, besides the subsidies regulated by the Law on subsidies, allocates additional funds for investments into rural development. Thus the allocation of funds for investments in infrastructure is subject to specific directives. The Department of Agriculture, Forestry and Water Management is in charge of investments referring to repairs of gravel roads, clearing and reconstruction of channels used for agricultural production, etc. Amounts of these funds vary each year – the situation in that regard is similar to that in entities – if there are leftover funds, than such projects can be implemented. Funds are approved based on requests submitted by local communities, and priorities are being defined by the Government itself.

Legal and institutional framework for rural development in BiH

An analysis of the legal and institutional framework shows that the rural development support policy measures mainly fall within the mandate of the three Entities and, to a certain degree within the mandate of Cantons -

in the Federation of BiH and municipalities - in RS. Due to a need to align policies with EU standards, a harmonization process was initiated at the state level and the BiH Strategic Plan for Harmonization of Agriculture, Food and Rural Development (2008-2010) was adopted. In addition, operational programs for BiH, FBiH, RS were also adopted and the measures for, among other things, rural development area were defined.

A Strategic Plan for Harmonization of Agriculture, Food and Rural Development 2008-2011 was adopted at the state level. Its purpose is to enhance the competitiveness of agriculture and the food processing industry as well as the harmonization and implementation of rural development measures via state level. This plan should ensure that the all prerequisites for the implementation of the pre-IPARD actions started in 2008 were met and should open a track for the reception of EU rural development funds in 2011. Furthermore, the AFRD Strategic Harmonization Plan provides a framework allowing the sectoral reforms for the strengthening of coordination and management within this sector to take place; it increases the role and the focus of relevant food safety, veterinary and phyto-sanitary issues and provides for gradual alignment with international standards.

General sectoral goals within the agriculture, food and rural development sector were defined by BiH Law on Agriculture, Food and Rural Development (Official Gazette of BiH, 50/08). These goals deal with the use of resources, food safety, alignment with EU policies, income diversification, availability of food, sustainable use of resources, quality of life. It is evident that these go beyond the sectoral goals framework and provide for an extensive approach to development of agriculture and rural areas. The Law defines three sets of measures of support to rural development, aiming to increase the competitiveness, provide for the sustainable use of resources and income diversification and thus they are in line with relevant EU policy.

Other strategic documents complementing this one and defining the policy framework in different Entities include: Republika Srpska Strategic Plan for Rural Development, Mid-term Agricultural Sector Development Strategy (2006-2010) in FBiH. Brcko District never adopted the BD Strategy of Agriculture, Food and Rural Development till 2013. Therefore, only the RS has a specific policy and program for the development of rural areas. As we already described in a chapter dealing

with the support system analysis, this had a positive effect in terms of identifying of particular support measures and the allocation of funds for that purpose that shows a growing trend.

The analysis of the strategic framework at the state and the level of entities in the field of rural development showed that:

- Rural development policy in BiH is implemented by the entity and regulated by the various policy and other supporting documents;
- Law on Agriculture, Food and Rural Development at the state level defines some general goals for BiH in this area;
- Jurisdiction over the implementation of rural development policies is given to the Entity ministries of agriculture, and at the state level, authority is entrusted to the Ministry of Foreign Trade and Economic Relations (Division of agriculture, food, forestry and rural development);
- Decentralized management structure of rural development policy has not been established at any level of government;
- The agricultural support systems at all levels of government have measures supporting rural development and the process of harmonization of policies at all levels has not been reached;
- Compliance with EU directives is only partly achieved, and the highest degree of compliance by the structure of the measures has been made in the RS;

Conclusion

Research on evolution of rural development policy at all government levels in BiH showed some similarities and differences which can be described as:

- Measures of support for rural development in both Entities and the District are part of their programs of support to agriculture and rural development;
- Rural development support policy was, by recent amendments to legislation (FBiH and BD) and the adoption of new strategic plan (RS) aligned with the EU goals and strategic priorities (competitiveness improvement, sustainable management of natural resources, better quality of life and the rural economy diversification);
- Institutions in charge of rural development policies are the Ministries of Agriculture (RS and FBIH), and the Department of Agriculture (BD). Currently there are no initiatives that would provide for the horizontal coordination of rural development policies or programs on

all of the government levels (inclusion of other ministries, departments, institutions);
- Decline in the overall agrarian budget in the period of crisis in both entities and in BD happened at the expense of rural development;
- Modalities of reporting on funds that were disbursed are reduced to indicators used in order to monitor the volume and support measures structure. No efforts are being invested in order to assess the effects (impact) of particular measures;

Main disparities between policies and strategies include:
- RS is the only one having a separate strategic plan on rural development program adopted;
- RS has the most extensive range of measures of support to rural development – the analysis of their utilization however shows that this support comes down to two major measures: investments in farm mechanisation and infrastructure;
- RS and BD have capital investments as part of the support for rural development while the support for capital investments and support to rural development in FBiH were divided into separate parts of the support program;
- In BD, the funding for rural infrastructure is not done according to the program of incentives. Instead the funds are being allocated based on a separate public call and the applications submitted by local communities;
- Unlike RS and FBiH, BD have no measures supporting the development of additional activities, rural tourism and other measures aiming at diversifying of economic activities at farms;

For the purpose of establishing an appropriate model of Rural Development in BiH that would corespond with EU model, it is necessary to define the guidelines at the state level. The aim of the guidelines is to:
- Set up a common policy framework for rural development in BiH;
- Defines the legislative and legal basis for the implementation of rural development policy in BiH;
- Set the framework for coordination of rural development in BiH with the EU rural development policy;
- Set the framework of the management structure of rural development at all levels of government;
- Set the strategic framework of rural development programming at all levels of government;
- Set the stage for the delimitation of less favourable areas in Bosnia;

Assumptions to be met by creating policy framework for rural development in BiH are:

- Adopt a decentralized management model for rural development in the territory of Bosnia and Herzegovina;
- Define the institutional governance structure of rural development in BiH at all levels of government;
- Agree on long-term priorities for rural development in BiH on the basis of the situation assessment and guidelines EU Rural Development Policy;
- On the basis of defined criteria, proceed with the demarcation of areas of BiH according to the degree of rurality, the conditions for working and living in rural areas;

Rural development model of EU implies a level of EU economic and social development such is currently not existing in BiH. Such a model is the one whom the BiH should aspire to achieve in terms of competitiveness, sustainable development and natural resource management, income diversification, and improving quality of life in rural areas. To achieve this, the BiH should, at all levels of government, define strategic priorities, management system, measures and actions to achieve the goals, build vertical and horizontal coordination mechanisms, and along with this process, BiH should apply good practice of EU in all spheres of rural development that can be applied in BiH.

Therefore, This is definitely a new model that will take time to develop in BiH, but is the only effective long-term model that can provide change to the existing situation. At this point it is necessary to emphasize the need for long-term planning of rural development in Bosnia and in this sense, harmonization of donor support in the field of rural development with the national policy is necessary and could result in more efficient utilization of available resources.

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IMPORTANCE OF COMMODITY DERIVATIVES FOR SERBIAN AGRICULTURAL ENTERPRISES RISK MANAGEMENT*

Vladimir Zakić[1], Vlado Kovačević[2]

Abstract

The transition to market economy in the agricultural sector of Serbia reinforces the need for the development of market mechanisms that would allow agricultural producers production planning, marketing, and hedging. The object of this paper is to study and analyze the relevance of commodity derivates for the development of agricultural enterprises in Serbia. Establishment and development of commodity derivatives (futures and options) in Serbia will enable agricultural companies to secure the price of agricultural products prior to harvest / picking. This research is based on two most important methods: historical method in commodity exchange development analyzes and the comparative method which is applied in the analysis of experiences of countries in transition and developed commodity exchange systems. Commodity derivatives market leads to an increase in the overall production and trade volume, but also lower interest rate on loans to the agricultural sector.

Key words: *Commodity exchange, futures, options, commodity derivatives.*

Introduction

One of the main characteristics of modern business is dynamic and increased level of uncertainty. Cash flow of agricultural enterprises continuously is exposed to changes in prices of agricultural products and

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inputs, tax and interest rates, labor costs, exchange rates, adverse effects of natural factors and so on. Result of these phenomena increased need for the development of financial instruments whose implementation could be used as a risk management instruments. For this reason, in the last thirty years there has been a fast development of commodity derivative markets, which allows agricultural enterprises in developed market economies to use various hedging strategies. In this way, farmer's risk of change in prices of agricultural products can be transferred on risk-taking speculators who expect to make a profit.

Based on the experience of other transition countries as well as countries with long tradition in commodity exchange business, it can be concluded that the establishment of commodity exchange activity is an important factor for the successful management of agricultural enterprises. Planned economy, which characterized business in the agricultural sector after the second world war, in the 1990s has changed to the market economy system. In planned economy farmers were protected by guaranteed prices and guaranteed purchases of produced agricultural products. On the other hand, in market economy farmers were left to the market conditions. Farmers are facing with questions: what to *produce*, how to *sale* agricultural products and how to *hedge* price and sales of agricultural products?

Agricultural producers on the futures markets can use hedging strategies to ensure price of agricultural products before the harvest / picking. This way they can protect themselves from adverse price movement and provide stability and certainty in the business of agricultural enterprises. Also, the development of commodity derivatives has other positive effects, including most importantly raising the volume of loans in the agricultural sector.

In the current situation, banks often grant loans that are 50%-70% of the value of agricultural products which are land against warehouse receipts, for the reasons of uncertainty of product prices in the future. Commercial banks are able to secure price of agricultural products in future by using commodity derivative market and as a consequence able to approve agricultural loans in higher amount.

Derivative commodity-market among others has a positive effect on macroeconomic stability because it allows the formation of prices on the free-market basis. Like in other developed systems, development of

Serbian commodity-derivative markets requires two institutional prerequisites:

- Establishment of an effective commodity-exchange activity in Serbia.
- Development of the secured storage of agricultural products, which enables the creation of commodity securities to ensure safe delivery of goods to the spot and futures market.

The development of commodity and stock exchange in Serbia

According to the Law on public stock exchanges from November 3rd 1886 which was signed by King Milan, the first stock exchange founded in Novi Sad was established on March 5th 1921, in order to promote, facilitate and regulate commerce. Its official name was the Novi Sad Commodity and Securities Exchange, and the subject of trade on the stock exchange was a variety of goods, especially agricultural. The first president of the Stock Exchange was one of the most prominent landowners of the time, Gideon Dundjerski. Stock functioned until 1941.

Novi Sad Commodity Exchange was established in December 1958 by the decree of the Government of the Republic of Serbia and had a foothold in the Regulation on Commodity Exchange from 1953. Stock market in Novi Sad was founded in the premises of Matica Srpska. Since its establishment, through the Commodity Exchange in Novi Sad was traded over sixteen million tons of cargo. In the SFRJ the average annual turnover of the stock market was about 350,000 tons of goods, while during the 1990s turnover dropped to just over 100,000 tones[3].

Securities trade (mostly corporate shares and state issued bonds) in Serbia is carried out through the *Belgrade Stock Exchange* (*BSE*), which was founded in the late 19th century. After the Second World War and the change of the political system, the stock market was closed for almost five decades. In 1989 was founded the Yugoslav capital markets. In 1992 it changed its name and becomes the BSE. Annual turnover on the BSE during the 1990s was modest. During the beginning of 21st century there has been a significant increase in trade as a result of political changes and the sale of privatized company's shares. In the following years, some economist expected significant decrease in stock trading after the privatization of the most successful companies. However, the volume of

[3] Data source: www.proberza.co.rs.

trading showed a surprisingly positive trend until the political instability related to the elections and the global economic crisis in 2008. In the next four years, trading volume is significantly lower due to the economic crisis.[4]

Serbia has no established commodity-exchange business, largely due to lack of a proper legal framework. First of all, Serbia lacks the safeguards that guarantee that the seller will be paid, and that the buyer will get the goods. In our practice, participants are left to regular court procedure.

Law on Capital Market (Sl. glasnik RS, no. 31/2011) regulates issues related to the establishment of standardized commodity derivatives, while spot trading and trading with non-standardized derivatives is left to the Law on commodity exchanges that is only in draft phase. The adoption of the Law on commodity exchanges will create the opportunity for a safe trading and establishment of futures market on agricultural products. Currently there are no conditions to allow commodity-exchange business in Serbia, which is primarily reflected in the absence of a body that controls and grant licenses to commodity exchanges and brokers.

Serbian agricultural market has a small size. The draft law relies on existing institutions, which are the carriers of these activities in other developed commodity-exchange systems. This simplifies the commodity-stock system, and it is a more economical (there is no need for establishment of new institutions).

Creation of commodity securities that provide secure delivery of goods

Law on Public Warehouses (Sl. glasnik RS, No. 41/09) created the legal framework for the establishment of a system of public warehouses. Sixteen public warehouses were licensed until 29.08.2012., while the 15 warehouses are in the licensing procedure.

For goods received for safekeeping public warehouse is obligated to issue *warehouse receipts*. There are several main characteristics of public warehouse system in Serbia:

[4] See more: Zakić V. et al (2011) *Tržište hartija od vrednosti kao faktor razvoja korporativnih preduzeća u Srbiji,* Društvo ekonomista Beograda, Ekonomski vidici, vol. 16, br. 4, str. 735-746

• The public warehouses must fulfill the requirements in order to complete licensing procedure, which consists of two parts: (1) must meet the requirements in terms of equipment and facilities for storage of goods, (2) must meet the requirements related to financial performance indicators and to keep certain amount of capital that is not mortgaged.
• A special inspection services within the Ministry of Agriculture, Water and Forestry is responsible for regular and special control of public warehouses which provides additional security to the system.
• Following the example of other successful public storage systems, Indemnity Fund of the Republic of Serbia is established. In the event that a public warehouse can not deliver the stored goods, owner of warehouse receipt will be compensated from Indemnity Fund within quick out-of-court procedure. In this way Indemnity Fund encourages lending and trading because the participants in the system know that warehouse receipt will be compensated out of court in case of loss of goods. In other words, agricultural producers can use warehouse receipts as collateral to obtain short-term loans or for trading.

The importance of commodity derivatives to manage risk in the agri-business sector

Derivative Securities (both financial and commodity derivatives) are financial innovation, which appeared in the financial market during the last thirty years.[5] They were established primarily due to the increase in overall levels of risk in the financial markets. Derivative securities trade volume exceeds the turnover of many classical financial instruments. The introduction and development of these securities in the financial markets has enabled further development of instruments for hedging. Today, the derivative securities are considered to be the most successful financial innovations and the estimates are that the volume of trade will increase in the future.

The concept of financial derivative means a group of derivatives designed for:[6] foreign currencies, interest rates, other securities and market indices.

[5] See more: Vlado Kovačević, „Značaj tržišta robnih finansijskih derivata za poljoprivredna preduzeća“, Magistarski rad, Ekonomski fakultet Beograd, 2002, str. 39-64;
[6] Erić D., *Finansijska tržišta i instrumenti*, Naučna knjiga, Beograd, 1997, str. 209-210;

Commodity derivatives have background in metals, agricultural products, industrial raw materials, crude oil and natural gas, minerals, rubber etc.

In the basis of these securities is some type of assets or indices: commodities, foreign currencies, interest rates, other securities or indices. Basic change in the price of underlying assets will affect the price movements of derivatives. Futures have a number of features that distinguish them from the spot (prompt) trading. Unlike spot transactions, where the transaction ends immediately or not later than 2-5 days, futures transactions suppose a certain period of execution. Also, there is a difference in the physical delivery of the goods - prompt trade transactions must end with delivery of goods, while futures contracts do not necessarily follow the delivery of assets..

The essence of futures trade is to predict future price movements. Sellers are expecting a drop in prices, while buyers rely on reliable forecasts of rising prices. The dynamism and increasing the level of business risk in the world in the past thirty years have caused the need for the development of instruments for hedging. There are several types of instruments that are used to control the business risk, but the most important for commodity derivative markets are:

- Futures contracts.
- Options contracts.

Hedging strategies with futures contracts

Futures are liquid contracts that have a lot of similarities with the forwards so that some authors consider a variant of *forward* contracts[7]. Futures contract means the agreement of forward exchange a certain amount of agricultural products, at a predetermined price, quality and delivery place. The main agricultural products of the highest volume of trade with futures are: wheat, corn, soybeans, rice, coffee, cocoa, cotton, and sugar. There are many fundamental *difference*s between these two types of contracts, such as: [8]

[7] *Futures & Options What You Should Know Before You Trade*, Commodity Futures Trading Commission, januar 1997., http://www.cftc.gov/ opa/ brochures/ futures.htm;
[8] See more: Erić D., *Finansijska tržišta i instrumenti*, Naučna knjiga, Beograd, 1997, str. 206-214;

• Futures contracts can be traded on secondary markets (they are liquid) as opposed to a forward contract;
• In futures contracts, terms are flexible so that the delivery of agricultural products can be made during the month. In a forward contract, the delivery of agricultural products is linked to a particular day or a maximum of a few days.
• The forward contract is not managed by clearing house and does not require margin, so that a forward trade carries a greater risk of default with respect to futures.
• The conclusion of forward contracts ends with the actual delivery of agricultural products to which the contract is concluded, while in futures goods delivery are rare (only few percent of futures contracts implement the actual delivery of goods), and the closing of the contract implies paying the difference in price.
• There is a difference in paying terms. Forward contract payment is made at the maturity date of the contract. In the futures, both parties are obliged to deposit a certain sum immediately upon conclusion of the contract.
• Futures contracts are characterized by high standardization in terms of asset types, quantity, quality and delivery. At the conclusion of futures, meeting of the buyer and the seller is not required because the clearing house appears as the buyer's and seller middleman. Also, the analysis in terms of creditworthiness of the seller by the buyer and vice versa is not required.

Organized trade with futures requires that the following conditions are met[9]:

• Sufficient assets that must be standardized on the basis of quantity, quality, place of delivery and time of delivery. When a client submits an order to buy or sell a contract on any agricultural product, he doesn't need to emphasize the amount of goods that he wants to trade. Futures contracts are standardized in terms of quantity, so if wheat is traded on the CBOT (Chicago Board of Trade) this implies that a contract is concluded in 5000 bushels. Resolving the issue of the size of the contract is a sensitive matter for any commodity derivative, because it hinders trade agreements for small investors and producers. On the other hand, too small contracts increase costs, which are allocated in the name of commissions to brokers. It can be concluded that standardization of certain amounts of assets per futures contract

[9] See more: Erić D., op. cit, str.212-213;

should be determined on the basis of the situation on specific market (experience of other markets should not to be accepted without careful analysis).

• Standardization of quality implies that agricultural products have certain physical and chemical properties. For some products, there could be determined more level of quality, as is the case where the CBOT corn contract at the standard quality is referred as "No. 2 yellow", but there are allowed other quality replacement within established relationships.[10]

• In terms of delivery place standardization there is an alternative: (1) set the delivery at one place (usually a warehouse of commodity exchange), (2) adjustments due to the selected location (in that case futures contract prices may vary). It should be noted that the majority of modern commodity exchanges in the world has its own storage space, while neither Belgrade nor Novi Sad Stock Exchange have own warehouses. This deficiency could be solved simply by renting storage space from public warehouses.

• Standardization of delivery time means that the maturity of the futures contract is predetermined and related to events in a particular month. So, for example, CBOT corn may be traded on March, May, July's, September and December contracts.

• Established norms enable achievements of scale economies effect in transactions and thus reduce transaction costs and makes trade easier and more attractive.

• The existence of competition in the supply and demand is a necessary condition for the efficient trading of futures on agricultural products. There must be a sufficient number of subjects in the futures markets for agricultural products that want to protect themselves from risk, but also enough subjects that are taking that risk in order to make a profit.

By reviewing profit chart (Chart 1 and 2), it can be stated that when the buyer realizes gain, the seller records the loss of the same amount, and vice versa - seller profit is equal to the loss of a buyer.

Futures contracts buyer (taking a *long position*) expects the price of agricultural products in the spot market to *grow*.

[10] "Futures & Options What You Should Know Before You Trade", Commodity Futures Trading Commission, januar 1997., http://www.cftc.gov/ opa/ brochures/ futures.htm;

Futures contract seller (takes a *short position*) on agricultural product expects the opposite, i.e. that the price of agricultural products in the spot market will *fall*.

Chart 1. *Profit graph for buyers of futures on agricultural products*

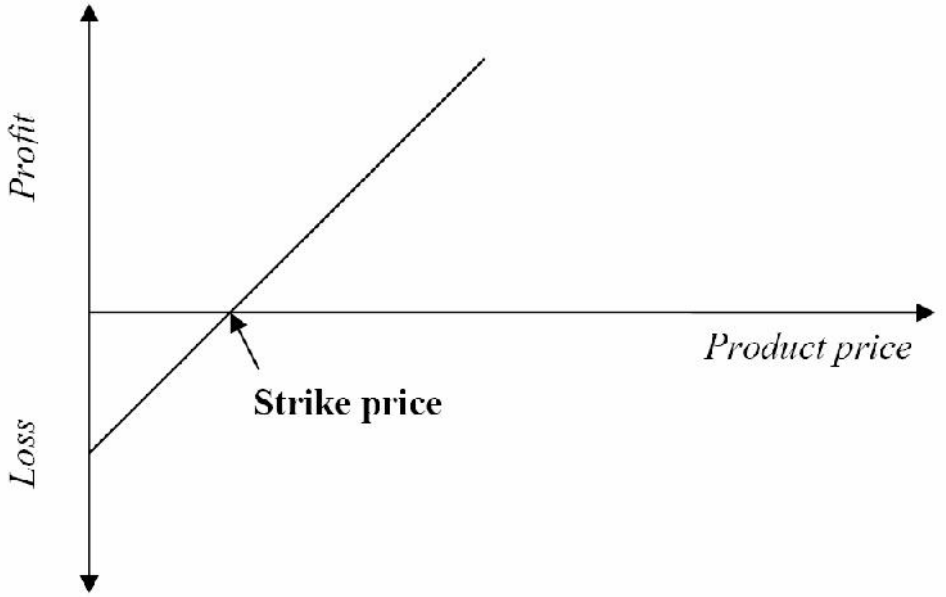
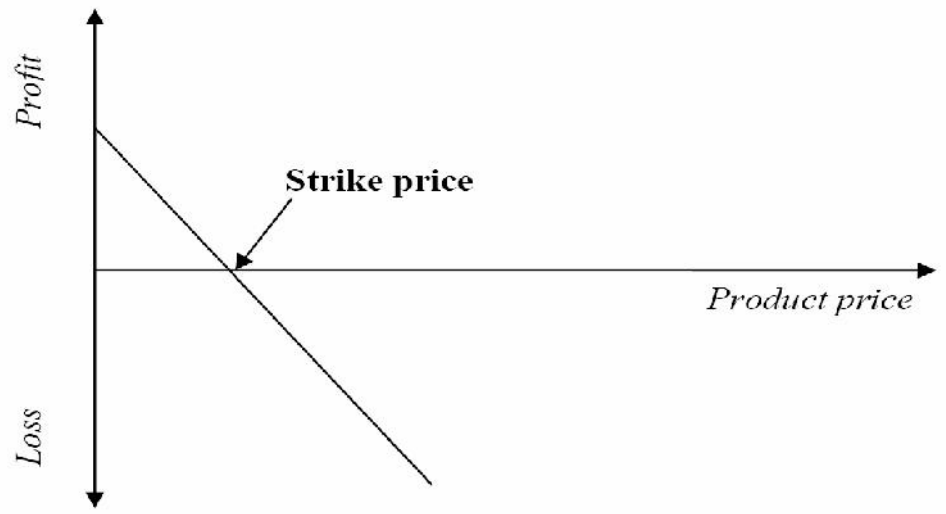


Chart 2. *Profit graph for seller of futures on agricultural products*



It could be concluded that the sum of all the gains in the futures market for agricultural products is equal to the sum of all the losses, so that this is a game with a total score of zero. All of these characteristics are achieved through specific futures trade mechanism, based on a system of *margins* and daily adjustments (market to market). The existence of these mechanisms means that the parties must deposit a certain amount (margin) in order to *secure the payment*. There are two types of margin: initial margin and daily maintenance.

Initial margins are created by opening an account with a broker - dealers and they are initial condition for futures trading. Initial margin amounts to 5-15% of the contract value and must be paid at the time of signing the contract

Margins for maintenance are usually 5-10% of the contract value, and if the amount falls below this limit, the clearing house sends warning to subject to pay an additional fee.

Futures prices are determined at the end of each day and on that basis funds are transferred between the accounts of the parties. Clearing house calculates the position of the parties and makes adjustment depending on the direction of price changes. For example, if the strike price of wheat for delivery in December is 172.51 $, and the next day the price rises to 172.82 $, the clearing house will transfer 0.31 $ from the seller's to the buyer's margin. Otherwise, if the strike price of wheat for delivery in December is 172.51 $, and the next day the price fells to 172.20 $, the clearing house will transfer 0.31 $ from the buyer's to seller's margin. In the same way, the clearing house will perform the transfer between the accounts of the parties. On the maturity date of the contract the buyer and seller close their positions by paying the difference (supply of goods is rare).

The existence of price limits is another characteristic of commodity futures. Maximum and minimum limits for future prices are determined in advance. This establishes the price stability of agricultural products. This could be useful for Serbian market, which during the last years have recorded great price instability.

Hedging strategies with option contracts

Options can be traded at commodity exchanges or OTC (Over the Counter) market. Trading at derivative exchanges implies the high standardization of option contracts, which primarily includes the standardization of quality of agricultural products specified in options (options that have the same underlying assets are called class; options that have the same strike price, the same unit of trade and the same maturity are called series), a given quantity of agricultural products at one contract and options expiration date. As in the case of futures, high standardization of options allows secondary trading of these derivatives.

The technique of trading with option contracts on derivative markets is different from futures contact trading. The buyer of the option pays the full premium amount to the seller at the time of purchase and the margin system is not applied for the buyer. Option seller has to pay the deposit amount to account of the clearing house (OCC - Option Clearing Corporation) on behalf of margins. Clearing house, as in futures trade, performs daily price adjustments and in the case of negative pricing trends call seller to pay additional funds on behalf of margin.

Closing of options is done in a similar way as in the case of futures. At options trading there are also trading limits. The main objective of the limit is to ensure the protection on the price impact, which the owner of a large number of options certainly could have (he could cause disturbance in option price by selling or purchasing large number of options).

Beside the trade at commodity exchange, trading is possible at OTC market. The most important characteristics of OTC options trading are:

- The ability to create non-standardized contracts (whether in terms of type, quantity or quality of the assets underlying the options, options expiration date etc.);
- It is possible to trade with large number of contracts (there are no limits as to commodity exchanges trade);
- OTC trading carries a higher credit risk so the existence of credit information for other party is necessary.

The reasons why volume of commodity options trade is increasing each year widely are:

- Effect of "Leverage" - investment in options has high leverage which gives opportunities to realize large profits by relatively small stake. For example, the premium for the November option on wheat was paid in March 1 $ at strike price of 4 $; in May; the market price of wheat went up to 5 $ (the breakpoint at which neither buyer nor seller have no loss or gain). From this point, each increase in the price of wheat for November delivery will be direct profit for buyer of call option.
- Another important reason that makes commodity option attractive for investment is that the investor may lose only the amount of premium paid.

Charts No.3, No.4, No.5 and No.6 shows possible scenarios in which the buyer and seller have profit or loss.

Chart 3. *Profit graph for buyer of call option on agricultural products*

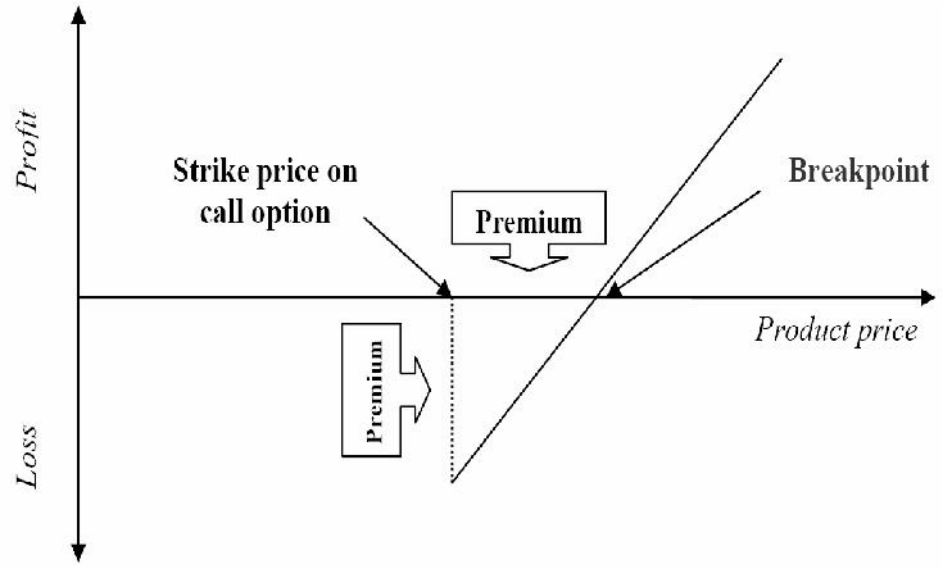


Chart 4. *Profit graph for seller of call option on agricultural products*

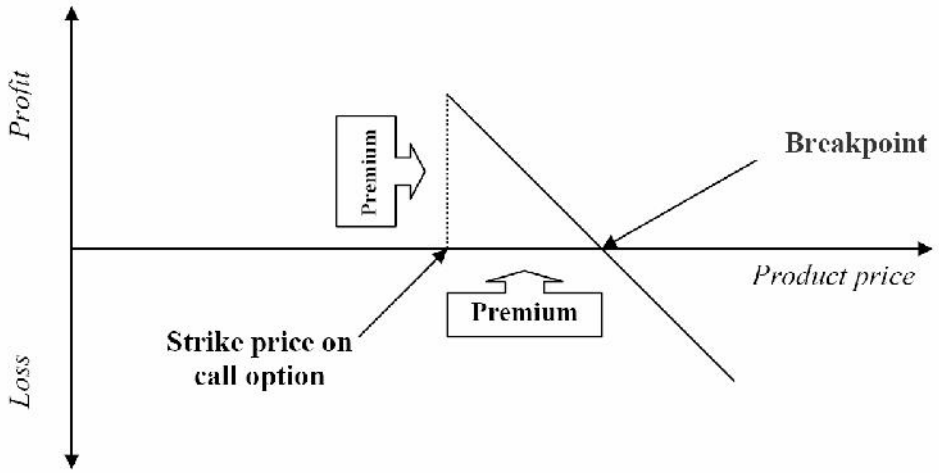


Chart 5. *Profit graph for buyer of put option on agricultural products*

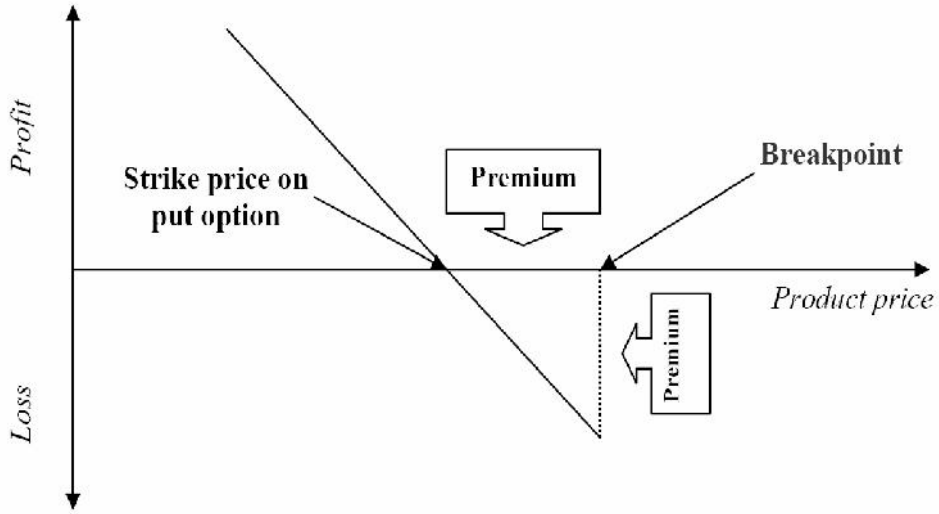
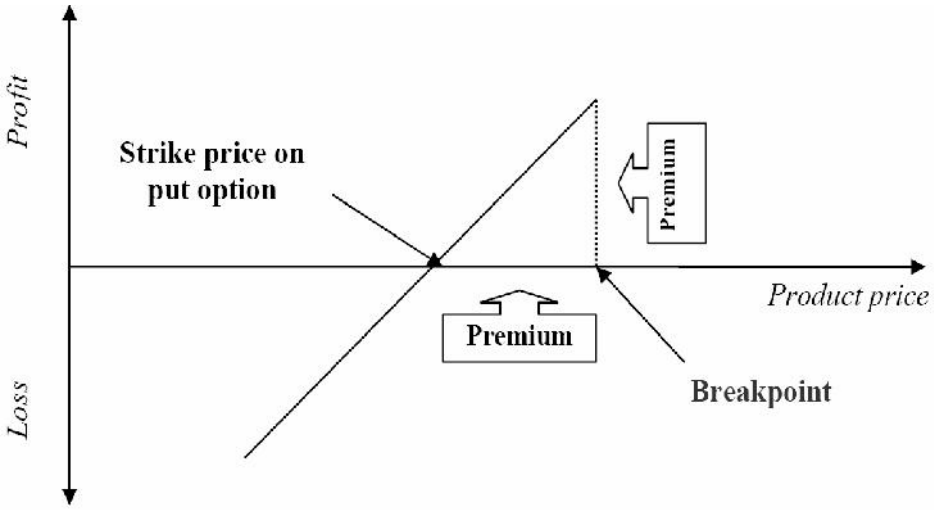


Chart 6. *Profit graph for seller of put option on agricultural products*



Determining the options value and price

In addition to pre-defined elements, option has other elements that determine its value during the period covered by the contract[11]. The time value of an option is the amount that buyers are willing to pay for that option over its present value, expecting that its value will increase until the option maturity period. Unlike the real value time value of an options has speculative character and depends solely on the assessment of market trends.

Factors that influence the creation of the time value of the options are:

- The time length of its validity - the principle is that the longer term means premium is higher (due to higher time value). If option is closer to maturity time it decreases the value, because it is less likely that there will be significant price movements of assets underlying the option.

- Assessment of market opportunities – it expresses on the option price in terms that if the market situation is unstable, the premium will

[11] See more: German C., *Selecting and Using Agricultural Options,* Delaware Cooperative Extension, 1997., http://bluehen.ags.udel.edu/deces/mrkt/mrkt-15.htm;

be higher (in that case price movement in the market is hardly predictable). On the supply side, sellers of options in these situations will require more premiums, while on the other side buyers will be willing to offer a higher premium because they expect significant price changes. In periods of price volatility, even options with short expiration date can have a high premium in the derivative market.

• The ratio of market price and the contract price - this ratio has a significant impact on the amount of the premium, so that if strike price is closer to the market price, premium will be higher. Example: When the price of wheat on futures market is 0.32 $ per kilogram, a call option with a strike price at 0.32 $ will have a higher premium than the same options with a strike price at 0.33 $ per kilogram.

• The actual value could represent the difference between the contract price and the current market asset price. The actual value of the option changes during the duration of options, depending on changes in asset prices, which is its foundation. Therefore, the call option has actual value if the strike price is lower than the current market price for a given agricultural product. For example, call option for a lot of wheat could be contracted at strike price of 3.27 $ per kilogram. If the current price is 4.07 $, option has actual value of 0.80 dinars per kilogram.

Theoretical models relating to the pricing of options and futures have a very practical application in commodity derivatives trading and one of the most commonly used is the Fisher Black and Myron Schultz model.[12] After several months of unsuccessful attempts, they published in 1975 their famous model. The work deals with the determination of pricing options. Today this model is known as the Black-Schultz option pricing model and its parameters are integral parts of most application software intended to run on the options. Black- Schultz model is based on certain assumptions under which the value of the option prices depend solely on the basis that it was created and the time T options, along with other constant variables. Ideal conditions are: the European option; known interest rate over the life of the option; option basis price follows the Monte Carlo method with variance proportional to the square root of the price of the stock exchange; there are no transaction costs etc.

[12] See more: German C., *Selecting and Using Agricultural Options,* Delaware Cooperative Extension, 1997., http://bluehen.ags.udel.edu/deces/mrkt/mrkt-15.htm;

Call option price is given by the formula[13]:

$$C(S,T)=SN(d_1) - Ke^{-rT}N(d_2) \quad (5)$$

where:

$$d1 = (\ln(S/K)) + (r + \sigma^2/2)T)/\sigma T^{1/2} \quad (6)$$

$$d2 = d1 - \sigma T^{1/2} \quad (7)$$

C - Indicates that is call option
S - Price of underlaying assets
N(d) - The cumulative density function that has a normal distribution
K - Strike price
T - Maturity date
r - Interest rate can be acchived with no-risk
σ - Annual variance of the underlaying assets

The main reason for the attractiveness of the Black-Schultz formula is the fact that the option price is a function of "visible" variables and that the model can be used to determine the price of any kind of options. Option price is depending on the expected yield of the underlying assets. Expected return on underlying assets can be determined due to the fact that it correlates with the price of underlying assets at the commodity exchanges.

Conclusion

Based on the developed countries experiences, it can be concluded that the hedging is one of the most common ways to manage the risk of agricultural enterprises. In transition countries, farmers are still not able to use hedging strategies (the exception is Hungary). Positive experiences in developing countries result from the direct use of hedging strategies as well as indirect effects which the developed markets of commodity derivatives have on macroeconomic stability, especially by influencing: balance between supply and demand, lower inflationary pressure, less price volatility, more favorable market situation and so on.

[13] See more: Arditti F. D., *Derivatives (A Comprehesive Resource for Options, Futures, Interest Rate Swaps, and Mortage Securities*), Harvard business school, Boston, 1996., str. 56-59;

For the establishment of commodity derivatives market it is necessary to establish a legal framework, i.e. adoption of the Law on commodity exchanges. In accordance with previous observations, we can distinguish the following recommendations:

1. The licensing and oversight of commodity exchanges should be delegated to the Commission for Securities and Financial Markets (Komisija za HoV) and futures registry should be within Central Registry for Securities (Centralni registar HoV). Given the size of the agricultural products market, relying on a system of existing institutions (which are the carriers of these activities in other developed commodity-stock systems) simplifies the commodity-stock system that is also more economical (there is no need establishment of new institutions).
2. To amend the Law on capital market which prescribes minimum capital of EUR 1,000,000 for commodity futures exchange, which is certainly an obstacle to the establishment of commodity-futures trading.
3. Within the Marketing Information System (STIPS), running for the Ministry of Agriculture, Forestry and Water Management, should be created pricing and other reports, which are essential to allow equal information to all participants of commodity derivative market.
4. To create a long-term transparent mechanism for interventions by Republican and Provincial Directorate for Commodity Reserves. Intervention must be known in advance to all stakeholders. One possible model is the European model of "minimum price", which defines minimum price for main strategic products.

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LOCAL STRATEGIC PLANNING AS A FACTOR OF REGIONAL DEVELOPMENT IN THE REPUBLIC OF SERBIA

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Abstract

The paper deals with the role and importance of local strategic planning as one of the factors ensuring balanced regional development and macro-economy stability. Following the latest international experiences in the area of regional development and planning in market oriented economies, the authors point out that the reform of local government represents one of pre-conditions that have to be fulfilled in order to ensure the efficient functioning of local strategic planning in the Republic of Serbia. The environment encouraging local development has been created by the adoption of relevant laws. Pursuant the above mentioned the paper deals with "good governance" concept as well as with model of local strategic planning in the Republic of Serbia. Strategic planning process, supported by the relevant laws should enable the citizens of Serbia to achieve a high standard of living.

Key words: *regional development, local development, strategic planning, administration, local government.*

Introduction

From the point of view of economy, regional development policy could be seen as a tool for the efficient administration and utilization of comparatives and competitive advantages in space and time. In the last few decades, the experiences in the Republic of Serbia in this field are not of major importance. They have evidenced that the application of a centralised administrative model in the management of social and economic trends is not able to deal efficiently with the cumulated contradictions neither at the national nor at the regional / local level to the least. It is necessary to deal

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with these contradictions as soon as possible by changing the model of social and economic development, since the negative effects of wrongly applied strategies and development policies so far have reached unanticipated boundaries. Such an approach is also required for the fact that Serbia has opted for joining the European Union, which means complying with their standards and models of regional/rural/local development.

Theoretical approaches such as the *theory of anomie*[2] state that development leads towards destabilisation and decentralisation of social consciousness and system structure through differentiation and progression of labour division. In other words, the impact of the existing social consciousness and social norms in a certain point of time becomes an increasing limitation their effects start gradually decreasing so that they become less binding – which all results in the advance of anomie. This gives rise to public confrontations, fresh ideas and new movements, organisations, strikes, etc. which can by no means be brought under the old moulds. If this takes place when there is an economic crisis, as is the case in Serbia, we face what Durkheim calls de-qualification. This process pushes down many individuals and families to a lower level of material status in accordance with which they should tailor their behaviour – self-control, ethics and the way of life. In such a situation the advantages of social impact die out, so the society would have to promote more rigorous forms of ethical behaviour accompanied with attributes such as self-control and solidarity that are compatible with this phenomenon. Of course, this kind of behaviour cannot be attained so soon, and there are efforts to escape the existing hard conditions, which is often done in an inadmissible way. This leads to a weak (if any) integration, tensions and conflicts, which characterise the emerged social changes – namely, a tendency towards involution and regression to the old situation.

This practice often leads to a gradual establishment of fundamental functions and structural processes that make social advancement. One of the starting processes is the differentiation[3] process, which as a rule begins with specialisation caused by disintegration and decentralisation. Thus the old set-ups are abandoned and the surrounding for new ideas and new mutual relations is created. Differentiation enables creation of new production/service centres, new cultural centres, as well as new political

[2] Durkheim's theory recently redeveloped by Neil Smelser (Heideman C., 1992).

[3] The most important differentiation area being isolation of an individual as a citizen with fundamental rights (the right to civil freedom – freedom of consciousness, opinion, speech, freedom of ownership, freedom of political self-organisation, and the like).

centres among which there are both competitive and cooperative relations. This normally refers to a smaller number of totally possible units (leaders), while other time-lag units are followers on the same track. Differentiation as such does not only make space for decentralisation, but also for democratisation of society as a whole. As a functional process on which development is based, it is also called *inclusion*, and it includes a growing part of strata in particular decision-making levels. Thereby adaptation to new situations and new events and enhancement of adaptation capacities are underlined as basic values in the neo-evolutional theory. It is generally achieved through competence, specialisation, professionalism and technological advancement.

Concept of Strategic Planning in Market-Oriented and Sustainable Economy - Problem History and New Proposals

The explication of this topic should begin with the question: *What has happened meanwhile with the planning function in Serbia and in the international surrounding, especially in developed market economies*?

As an answer to this question it is necessary to underline the importance of planning in the light of continual discussions on redefinition of the development concept, existence of a wide range of potential developing areas[4], and finally, its importance in the presence of manifold functions of the state. In addition, it is necessary to depict the level of interrelatedness and complementarity, which is realised in a triangular relation of the *market – planning – economic politics*, while the structure of economy and society, i.e. institutional organisation, undoubtedly represents a special aspect.

In the Republic of Serbia planning has for decades been not only an important part of the system, but perhaps the most prominent determining element and strength of economic, political and ideological practice. It conditioned the character and modalities of the society under development. The effects of such planning system were obvious and in relation to the planning process, whenever recently mentioned it evokes associations that relate planning to the roots of the so called "eastern sin".

[4] The most important developing areas are the following: international exchange, industrialisation process, technological development and dissemination, economic sectors, relation between nationalisation and transnationalisation of development, regional development, local development, rural development, environmental development, sustainable development, cultural development, development of human rights, etc.

The necessity of building a new approach is inevitable and it has to be harmonised with the fundamental identity of the society, i.e. with the future orientation of the country, while being simultaneous with related achievements accomplished in countries with developed market economies. Monitoring of the latest international experiences in the field of regional development and planning (GTZ, Fideco and Associates - Njegovan Z. and Neubauer E., 2004; SIDA - Andreen U., Njegovan Z., 2003) lead us to a conclusion that inherent indicative planning from long ago has been gradually transformed itself into something known as *local strategic structural planning.*

This kind of planning, being the integral part of the so-called "Global"[5] approach to regional development and development in general, is very present in mixed economies and integrating countries. In course of time, these groupings have had to orient themselves towards planning as an important element for the market labelled as "organised market" or "human-oriented market". Such a concept has developed as an answer to the question of the establishment of competitiveness, thus a long-term dynamical economic balance.

Common features of different interpretations of strategic planning and development management can be distinguished as follows:

- Prevailing partial approach, defined with clear specific objectives, i.e. field that is prefixed as – local development, ethno-development or environmental development, which refers to specialised action
- Referring to multidisciplinarity and interdisciplinarity and emphasised necessity to define relations among different developing areas, holders, etc.
- Clearly defined differences, and sometimes underlined controversies as well, between the growth and development that should be ensured through strategic planning
- Growing emphasis on the importance and role of non-economic factors, in the first place information and communication, education, cultural identity, etc.
- Identification of beneficiaries and holders of development as a result of strategic planning without any class, racial and national attributes (man-centred development)

[5] This approach is generally known as hybrid model – a combination of Global and Local approaches to developing tendencies (Todaro, M., 1997).

- Localisation of overall civilizational changes, such as the quality of living (individual human values and the like) that are not directly conditioned with economic power, i.e. property
- Readiness to tolerate different value judgements, different economic orientations and differently identified and defined strategic objectives
- Development, its planning and all relevant value connotations, and
- Growing impact and even realisation of ascendancy of technological development or technological transformation as essential precondition, objective and significance of strategic planning.

What is strategic planning?

The following is one of the adopted and widely used definitions in projects: "*Strategic planning is a systematic process through which the local self-government, jointly with local business subjects and citizens, identify pressing issues and set tangible objectives, tasks and strategies in order to tackle the issues. Strategic planning can be, for instance, applied when planning the economic development or capital investment."*

In the light of this definition, the most important elements of strategic planning are the following:

- Planning is not an *ad hoc* activity, rather a systematic, continual and cyclic process. This means that it has to be carried out in regular intervals, thus becoming a routine activity in the operation of the local self-government (covering the period of three-four years).
- Planning is a complex process that includes all relevant subjects of the local community:
    - Local authorities
    - Citizens and groups of citizens
    - Public companies
    - Enterprises

Planning is a means of administration for the purpose of meeting the current needs and solving the existing problems of the local self-government. As such it can be applied in deciding on capital investments, public services and future economic development.

Taking into account what has been said so far, as well as the character of this paper, it is necessary to highlight the subject of development and development goal as first value elements. Development has to do with the development subject in the first place, which puts in the foreground the question of the subject's own perception. This practically means the following: »I measure what it was like to me« and in what way what I have relate to what I expect, hope for and want. On the other hand, development goal is not mere daydreaming about what I might have, but is essentially related to own capacity and adopted and shaped capabilities to join the development process properly. This brings us to a dilemma how to lay out possible development courses, while avoiding »blindness of excessive closeness«, how to settle the issues like non-existence of social consensus over the role of the state, technological development, etc. but also how to create premises for a true perception of one's own reality. With this as a starting point, local strategic action planning should respect the following factors:

- National objectives which should not be so large in number as clearly designed
- Need to solve acute problems
- Necessity to make sure that scientific/practical possibilities are realised, instead of basing the entire concept on production improvement only
- Necessity to decentralise the society, so as to create strong local research groups.

At the same time, from the point of view of external factors, it is necessary to point out that in the future the decisive factors related to development courses, dynamics and competitiveness at the local level will also be the following:

- strategies of multilateral governmental associations
- strategies of individual countries and groups of countries
- strategies of large business groups, especially trans-national corporations
- technical advancement in general, especially in research-intensive fields
- demand structure in markets of individual countries and regions
- relative ratio of factors in work- and capital-intensive industries, individual countries and regions

Why is strategic planning so important?

Successful and efficient development of local communities is not possible in the absence of an overall process of strategic management including planning, implementation and evaluation of accomplished effects. This is of equal importance for municipalities with abundant funds as for those with insufficient funds. Whatever the case, the optimal funds allocation has to be based on development priorities of the municipality as defined in the strategic planning process. Municipalities that go through strategic planning are as a rule more successful, customer-related, demonstrating increasing responsibility for the needs of the local community. At the same time strategic planning is a highly transparent process which makes sure that all relevant subjects participate in planning the future of the local community.

Consequently, it is necessary to emphasise that appropriate preparation and a dedicated approach to the planning function at the local level guarantee an efficient system of market economy and related long-term macroeconomic stability.

Basic Aspects of Strategic Planning

In its essence, strategic planning rests upon the aspiration and need to make some changes at the local level so as to ensure growth and development in the middle and long run through qualitative and quantitative approaches, to enable evolution and succession, instead of revolution and restart of initial development processes, over long time periods which will cover a range of generations.

Therefore strategic planning entails, as does any other planning practice, two basic preconditions:

a) Adequate institutional grounds that will establish mutual relations among all agents – stakeholders within a community/joint arena, and
b) Corresponding professional know-how to make sure that local participants at different levels do contribute to the creation of efficient action programmes (where failures are eliminated beforehand, mistakes avoided in advance, etc.).

Equally important aspect is the "*Good and Bad Governance*" as the as the basis for realization of efficient local strategic planning.
Institutional arrangements, as do applied professional practices, are activated in accordance with the need to eliminate internal frictions and external tensions, wherefore strategic planning gets attributes that are most often

expressed as: knowledge-based, intention-guided, law-based and reason-controlled process.

Strategic planning as such is based on reliability of findings, possible perspectives and competent estimations, which, as approach, can be expressed with epistemic and pragmatic knowledge. Thereby, episteme and pragmatics in strategic planning are by no means pure derivates of strategic planning science and planning theory, but rather represent the results of ample interrelated strategic planning practices. This goes side by side with experience in the professional implementation of certain scientific postulates which in this process, as a rule, influence recombination in the most varied contexts. The objective is to effectuate an objective approach in the elaboration of relevant proposals on the basis of valid/acceptable rules/propositions.

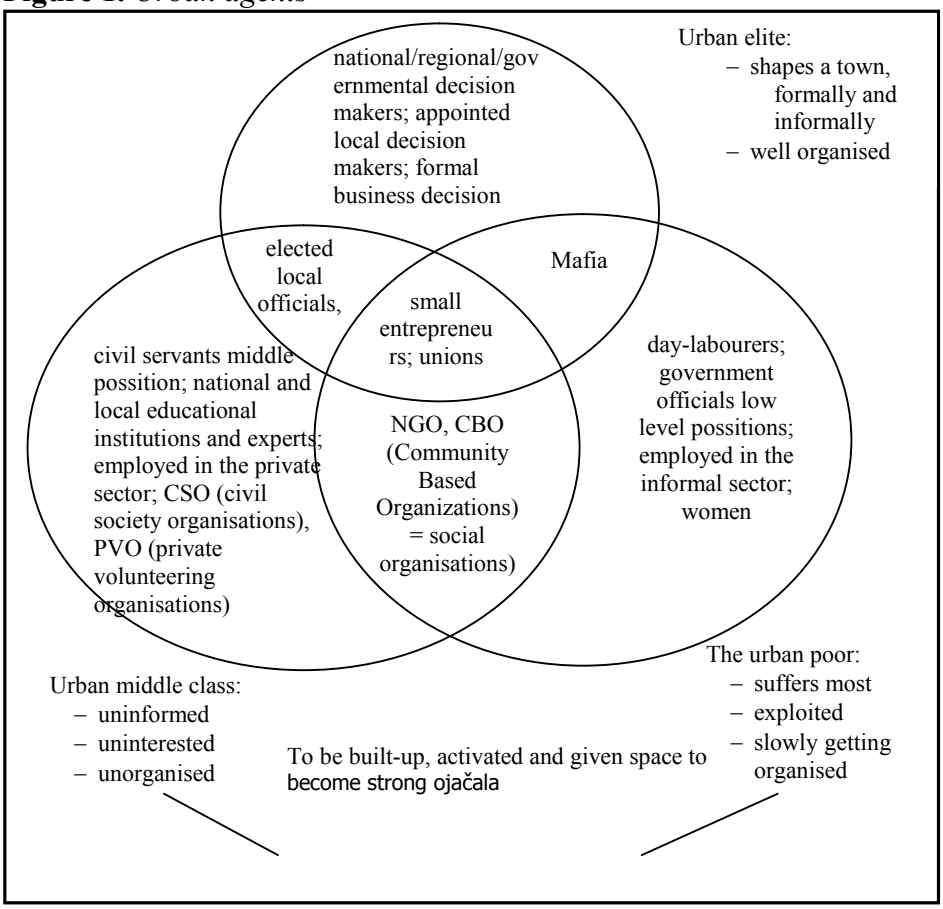
Development must be based upon the so-called "good administration" which, in its essence, presupposes local strategic action planning as a basis for regional development and a factor of competitiveness ("bottom-up" approach). What have to be focused here are all formal and informal agents as well as formal and informal structures so as to be able to make the proposed decisions in an acceptable way and then implement them efficiently.

Recently the words *governance* and *good governance* have been increasingly used in the literature connected with a local sustainable development. For this reason, big donor communities and international financial institutions are binding its policy of financial support to a particular state. Usually the only condition they are asking for are approvements that the reform process is in place or ongoing that will eventually lead to "good governance".

The concept of *good governance* is not new one. It is as old as human civilization. To put it simply, *good governance* as a concept includes decision-making and implementation (or non-implementation) processes. Thereby, the word *good governance* can be used in many different contexts, such as corporate administration, international administration, public administration and local administration.Since *governance* comprises both the decision-making process and its implementation, the analysis of governance is focused on formal and informal agents of decision-making and implementation, as well as on formal and informal structures appointed to make and implement decisions. Local self-government is one of the

administration agents. Other agents participating in administration vary depending on a particular administration level. In rural areas, for instance, other agents can include prosperous farmers, agricultural associations, cooperations, non-governmental organisations (NGOs), research institutes, religious leaders, financial institutions, political parties, the army, etc. The situation in urban areas is far more complex. Figure 1 shows the relation among the agents of the municipal/local administration.

Figure 1. *Urban agents*

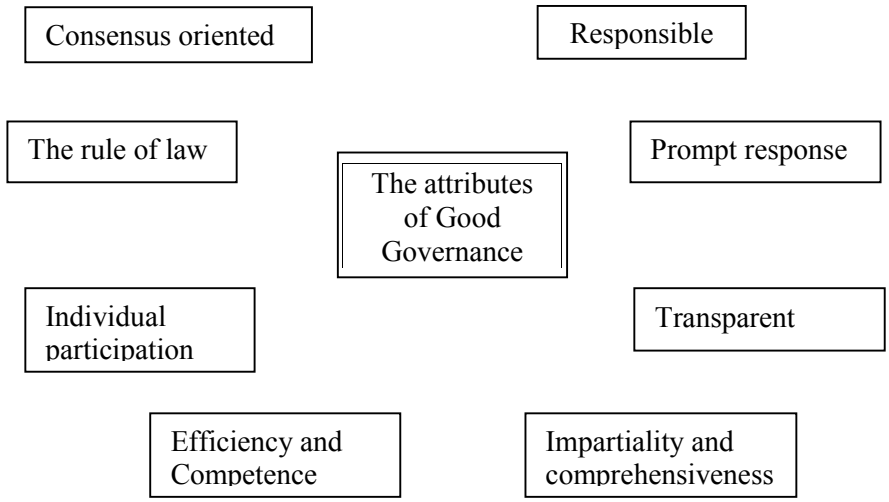


Source: Heideman C. (1992), pg. 17.

In addition to the above mentioned agents, at the state level there are also media, lobbyists, international donor communities, multinational corporations, etc. They can sometimes play an important part in decision-making or affect the decision-making process itself.

All agents, save for the government and the army, are jointly grouped as a part of "civil society". Good administration requires that institutions and processes try and serve all stakeholders within reasonable time periods. There are seven basic attributes: it enables individual participation, rule of law, prompt response, consensus orientation, impartiality and comprehensiveness, efficiency and competence and responsibility. It makes sure that corruption is reduced to the minimum, views of minorities are respected and the voices of the most sensitive parts of the society are spoken out loud in decision-making processes. It reacts quickly to current and future social changes as well.

Figure 2. *Attributes of good administration*



Source: Njegovan, Z., 2005.

Therefore, good government cannot make it without an overall strategic planning process. As a rule, local communities which carry out strategic planning are more successful and efficient, at citizens' disposal, demonstrating more responsibility when it comes to the needs of the local community. If it is to be sustainable, strategic planning at the same time has to be a highly transparent process, thus making sure that all relevant subjects take part in planning the future of the local community. In countries like Serbia, such things do not speak volumes about strategic planning as a sustainable process, so what is going to be presented hereinafter is the history of the problem and an attempt to identify its essence as affirmed in market-oriented economies.

Model of Local Strategic Planning in Serbia

The strategic planning model, as described here, can be considered applicable in Serbia because it represents one of many successfully standardised models that have been developed and implemented in the cities and municipalities of the Western Europe. A representative model contains several components that have to be considered when formulating the strategic planning process in the local self-government, with special emphasis on the following:

- Environment – Each process planning, especially if it is a strategic planning process, has to be based on an objective estimation of the environment conditions within the community. This includes the assessment of external and internal factors. External environment can be such that the local self-government is not in a position to change certain conditions which are prescribed by the higher-level authorities. However, the local authorities can and have to be ready to affect the local conditions having a bad impact on the process.
- Vision and values – in the nature of the assessment of the local community's working environment, it is of vital importance to develop a system of local values and a vision which are reasonable for the majority of representatives of the local authorities and wider community, i.e. citizens and economic agents. The vision of a community represents a wider perspective for the future and should serve as a guideline for all participants in the strategic planning process. Its role is also to ensure that all participants in the process, even when they do not act identically, stay on the same track during the process. Values are common knowledge, opinions and attitudes of all participants which are related to the purpose, internal (organisational) culture and general behaviour in an organisation and the society. Both the community's vision and its values are usually long-term and change only over a long time intervals. The main role of values is to ensure that the community's vision and its future are not disturbed by future political or non-political changes.
- Mission and leadership – In so far as the vision of the community reflects a wider perspective, the mission of the community is a clearly defined wide system of objectives which serves to explain this wider picture in a more detailed way. It is typically a short description of the future of the Municipality

(with or without an explanation). Mission can be essentially defined as a standalone, widest objective of the community.

- Objectives – Objectives are management tools aiming at precise explanation of the ways for best materialisation of both vision and mission. While mission gives a wider course and meaning, multiple objectives are there to make a concrete orientation in the everyday work of municipal authorities and of other agents involved in the process. Such objectives are often defined during the budget development process in order to achieve the defined vision and mission of the community considering the available resources.
- Strategy, structure and systems – are "tools" by means of which vision, mission and objectives are realised. *Strategy* refers to the general action plan aiming at the achievement of certain objectives. It defines activities (fields of operation) that the community sets to develop, capacities, abilities and knowledge that are necessary for the realisation of these activities and, of course, the tendencies and courses required for the growth/progress of the municipality. *Structure* refers to the way the organisational structure of the municipal authorities is established in order to realise vision and mission. Finally, *systems* refer to management tools by means of which strategy is accomplished within the defined structure. Systems, such as annual budget (management tool, in the first place) are developed in order to distribute resources and responsibilities for public spending during the realisation of the community's vision and mission.
- Implementation – In this phase all process components are activated. Depending on the quality of work in earlier phases, implementation should be efficient (lowest expenses) and effective (with as good results as possible). This ought to result in high level services, increased performance and excellent financial results.
- Evaluation – Self-evaluation is the final phase in the strategic planning process. Therewith a completely new process is started to be carried out in the following year. It serves to compare the strategic plan with the performance of local authorities. Here levels of success, possible set-backs and difficulties are identified as well. In line with the evaluation results, corrective measures are proposed aiming at improvement of the overall performance of strategic planning for the next year.

What are requisite preconditions for the initiation of a strategic planning process?

The Republic of Serbia has recently passed the Law on Local Self-Government, which gives larger autonomy to local authorities and exacts organisational restructuring of the whole system of local authorities in Serbia; the Law on Budget System, which calls for the adoption of a new functional system for classification and schedule of accounts, as well as the Law on Turnover and Income Tax which provides resources to the local authorities. It is of great importance that these local self-government reform accelerators are accompanied with a law on restitution of centralised property to local self-governments, thus ensuring the substantial grounds for local development.

In addition to the appropriate legislative milieu, it is necessary to provide other prerequisites for the initiation of a strategic planning process:

- Adequate surrounding – political, legal and economic, with special emphasis on:
    - Sufficiently wide and clear authorisation over local resources for successful strategic planning at the local level
    - Understanding of the framework within which strategic planning should be carried out, especially readiness to accept or realise the necessary changes in the local setting for the purpose of correct realisation of the process
    - Compliance in defining the objectives – the final objective and the most important parts of the process has to be completely clear to all participants and presented to the public.
    - Readiness of officials/decision-makers for cooperation and team work in the local self-government and the community in general.
    - Officials have to have vision, belief and political courage to react on other people's collective proposals
    - There has to be willingness to allow for opinions of economic and political subjects, authorities and the public, as well as to establish cooperation among the aforementioned
- Understanding of the strategic planning process management, especially by those who manage the process.
    - Local staff and lecturers who know how to conduct strategic planning and possess the know-how of the matter: planning of

capital development, i.e. of economic development and budgeting.
    - Access to information necessary for the strategic planning process – people who work on the realisation of the process are the ones who present the information
    - Identification of the need for external assistance.

How strategic planning is realised at the local level?

The elected municipal management staff, with the assistance of the appointed staff, should develop the strategic planning process and define what will become a part of strategic planning and what will not. Considering this, it has to be taken care of the process should be adjusted to the local level in all important aspects - technical, political and cultural.

This particularly refers to:

    - The process should be adjusted to local conditions and special attention paid to the fact that there is poor knowledge about the concept of strategic planning; the terminology related to strategic planning should also be clarified.
    - The process should be structured in such a way that expected results are realistic and feasible, which means that the realisation of objectives, tasks and results has to be within the financial capacities of the Municipality
- Reliance and understanding of all participants, including the community as a whole, can be achieved only if strategic planning contributes to the realisation of immediate and visible results.
- The Process should be realised in phases, meaning that all phases are included in planned activities, namely:

    - Development of mission and vision
    - Definition of objectives and tasks
    - Training and presentation of the process (if necessary)
    - Provision of appropriate (neutral, accepted by all team members) premises for the work of the strategic planning team
    - Collection of information, including the analysis of project advantages, weaknesses, possibilities and challenges, as well as the estimation of available funds (internal and external)
    - Identification of available alternatives

- Definition of priorities and decision-making process with public participation
- Regular informing the public on the results and implementation phases.

How to make a sustainable process?

It is essential to avoid situations where strategic planning starts being a theoretical exercise with no reference to the real life, or just a "single-shot attempt" which is not going to be realised in the future. Some of key elements and/or characteristics of the process that deserve special attention in order to avoid the "single-shot attempt" concept are the following:

- All local participants have to be involved in the process from the very beginning
- The process has to be transparent and the public has to be informed
- The process must not be realised *ad hoc*; it must be recorded and described in full detail for the needs of future preparation
- Strategic planning structure and procedures have to be realised on regular basis
- It is of vital importance that participants make special efforts in order to be successful in the first attempt of process implementation
- During the implementation and towards the end of the process, the local self-government should evaluate the process and foresee any necessary changes for future implementations
- The process should be internationally supported, as well as locally (local experts) so as to promote ideas and experiences acquired during process realisation to other subjects and local-self-governments
- Time and resources must be foreseen in such a way as to enable planning in the long run

Conclusion

The above described model illustrates how the local authorities can restructure/reformulate their practices and procedures so as to make a positive impact on a far-reaching future of local communities in Serbia. Efficient restructuring of the municipal organisation, application of strategic planning and development of a long-term strategic management plan based on the local

community's vision and mission should be conducted simultaneously despite the fact that each of them will have varied success. The environment encouraging local development has been created by the adoption of relevant laws. The advantages originating from the realisation of such a concept related to the reform of local authorities should result in tangible and measurable results with direct impact on the everyday life of the citizens of Serbia and their aspiration to achieve a high standard of living.

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AGRARIAN DEVELOPMENT, ORGANIC FARMING AND PROBLEMS IN ENVIRONMENTAL PROTECTION[1]

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Abstract

The authors discuss the development of the agricultural, ecological agriculture and environmental problems. They point out that the development of agricultural environmental programs are an integral part of the EU accession process, which is defined within the IPT and as such is mandatory for all EU member states. In the times that followed contemporary agriculture in Serbia must comply fully with all regulations on the protection of the environment, as well as to harmonize all programs and bringing them into compliance with the National Environmental Protection Programmed. When viewed from the ecological point of view, the performance of agricultural production can have positive and negative impact on the maintenance and protection of land as environmental factors. In this paper, the authors describe the application of environment-friendly farming and give the main features of supply of organic agricultural products in Serbia. At the end, the authors point out that in Serbia there are no specifically defined policies for the conservation of ecosystems, to prevent the destruction of natural habitats and species loss prevention and reduction of the value of natural landscapes, which are related to agricultural production.

Keywords: *agricultural development, organic agriculture, organic agriculture.*

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Introduction

Agricultural Development in Serbia in recent years has undergone a profound and comprehensive crisis at all levels. The causes of the crisis are many and one of them is inadequate and agricultural policy. Our agricultural policy throughout the past decade has gone through many dilemmas, challenges and temptations of wandering. This situation is very much influenced by the state of our ecological agriculture and the problems related to environmental protection.

Under modern conditions agricultural output was mostly at the expense of the environment. Traditional agriculture (natural farms and the farmers how to use plants and animals), but he left a legacy of a time disturbed nature and the environment (erosion, barren land, etc.). Modern agriculture, which on technical - technological developments could cause even more serious damages. It must not be allowed to climb the development of agricultural production and threaten the environment and lead to ecological problems with unforeseeable consequences.

In the race to produce more food, modern farming and food processing industries produce low quality products that can be sold at lower prices. In this way the food industry through their work contributes to the destruction of the environment and regression. Production so healthy food just means the application of environmentally sound technologies. The main task of modern agriculture and the food industry is not only to produce more food at lower prices but to their work contribute to the protection and enhancement of the environment. Production so healthy food just means the application of environmentally sound technologies. Under current conditions, agricultural policy should takes into account the development of ecological agriculture.

Agricultural resources and protection of the natural environment

In times to come, modern agriculture must comply fully with all regulations on the protection of the environment, as well as to harmonize all programs and bringing them into compliance with the National Environmental Protection Programmed.[4] Some of the main problems of

[4] http://www.ekoplan.gov.rs/src/upload-centar/dokumenti/razno/npzzs.pdf, 99-100.

the negative impacts of agricultural production on the environment include:

- soil pollution due to uncontrolled use of pesticides and fertilizers, and the use of contaminated water for irrigation;
- problems of chemical and bacteriological water pollution;
- processes of erosion (in the central and mountainous regions dominated water erosion, while in Vojvodina dominant wind erosion[5]);
- air quality (uncontrolled burning of waste dumps and agricultural areas);
- Low level of environmental awareness of farmers about the need to protect the environment and the use of so-called "good agricultural practices"
- Sustainable agriculture and environment-friendly. [6]

Commonly, the agro-environmental payments applied in the so-called National Agro-Environmental Programmed (NAEP). Clearly defined and logical hierarchy of goals, to be achieved through the implementation of a wide range of specific sub-measures in this manner, organize and promote farmers as national, regional and local programs.

Serbia still does NAEP, but some agro-environmental measures implemented in the framework of measures to encourage the development of agriculture and the Ministry of Agriculture, Forestry and Water Management in the period from 2005 to 2007. and was included in the recently prepared a draft National Rural Development Programmed (NPRR) for the period 2010-2013. year. [7]

However, so far in the field of agro-ecological paying very little has been done. Some forms of agro-environmental payments are available from the national budget to support organic farming,[8] the preservation of

[5] Wind erosion occurs wind activity, respectively, because of their ability to shape the surface of the Earth.

[6] Стратегија пољопривреде и руралног развоја за период од 2010 до 2020, 30.

[7] Група аутора, (2011): „Развој националног агроеколошког програма за Србију“, ICUN Gland, Швајцарска и Београд Србија у сарадњи са Avalon-ом, I IEEP-ом, Naturom Balkanikom, Београд, 12.

[8] Уредба о коришћењу подстицајних средстава за подршку развоју органске производње за 2010. годину, Службени гласник Републике Србије бр. 33/10.

indigenous breeds of domestic animals,[9] the process of introducing good agricultural practices. These measures can be used as a stimulus for further development of existing support schemes in EU programs (support to biodiversity, landscape diversity and other agro-ecological activities).

Agricultural development and ecological agriculture

When viewed from the ecological point of view, the performance of agricultural production can have positive and negative impact on the maintenance and protection of land as environmental factors. The positive impact would be reflected in the provision of necessary nutrients the soil, maintaining and improving the structure of the soil, preventing erosion is suitable for growing crops and the application of appropriate treatments. Negative consequences that may arise due to the intensification of agricultural production would lead to the fact that agriculture is increasingly manifested as one of the important factors of destruction and pollution of the environment. [10]

Agricultural production in the past fifty years, significantly modernized. That was caused by the following factors: rural people move to cities, increased mechanization, improved transportation, improve seed quality, protection of species, breeding new species of domestic animals, international trade and competition in the manufacture of food products. As a result of this progress, there is over-exploitation and degradation of natural resources, primarily agricultural land, water and air. The continued use of pesticides and herbicides has led to increased resistance of parasites. This automatically led to the need for more frequent use of them. Frequent use, on the other hand, caused additional problems due to the increasing cost and the additional pollution of soil and water.[11]

We can conclude that agriculture in its efficiency can be very vulnerable stronger deterioration of the environment and rural communities. Such as air pollution, poor production of organic matter in the process of

[9] Уредба за очување и одрживо коришћење генетичких ресурса домаћих животиња за 2010. годину, Службени гласник Републике Србије бр. 15/10.

[10] Средојевић З. (2002): „Економски проблеми еколошке пољопривреде“, Пољопривредни факултет, Београд, 78.

[11] Симоновић З. (2006): „О агроеколошким проблемима агробизниса“,Економика пољопривреде, Београд, 453-454.

photosynthesis, this means the conversion of solar energy. Water pollution by nitrates and nitrites which may be due not only to a weakening of the production of organic matter in the water and food but also their exclusion. Through water for irrigation may be unfit for human consumption due to process contaminants. And fish can be inconvenient hygiene, if they come from contaminated water.[12]

Negative effects of modern agricultural techniques and technologies to the maintenance and protection of the environment is growing. In the last three decades, the problem is in the world devotes special attention. The goal is to create agricultural production dominated economic principles put in the best possible compliance with environmental requirements. The concept of alternative agriculture would in principle be represented essentially correcting manufacturing processes that are used in industrial production organized with the goal of preventing the destruction and pollution of the environment. Such a pure agricultural production system that avoids or substantially excludes applied synthetic fertilizers, pesticides, growth regulators and livestock feed additives. Organic agriculture would depend on crop rotation, crop residues, manure, legumes, green fertilizers and biological control of pests, diseases and weeds, etc.

Briefly defined alternative and organic farming are included plus the agronomy of Applied Ecology, plus actively preserved environment. Does the acceptance of organic farming can be depends largely on the application or withdrawal of artificial elements used in the current agricultural production. The advantage of organic agriculture is reflected in the fact that its production is based on material circulation. Roundabout matter should be closed as much as possible. [13]

We are free to point out that our country is in some aspects of food production ahead. Our existing legislation does not allow the use of genetically modified foods. For example, when we are not allowed to import or irradiation of food irradiated food. Irradiation of food can cause mutations in the genetic basis of plant radiation by gamma rays from

[12] Симоновић З. (2005): „ Неки еколошки проблеми пољопривредне производње и руралног развоја“, ИЕП, Међународни научни скуп Мултифункционалан пољопривреда и рурални развој, Београд 2005, 62.
[13] Средојевић З, исто, 105 – 106.

cobalt or neutrons from a reactor in order to obtain higher yields accelerate ripening of fruit, providing plant resistance, as well as preservation and conservation of agricultural products, as well as an effective pest control.

The use of gamma-ray radiation in the food boxes in use in the United States and may be used only for wheat, flour, potatoes, vegetables and fruits. European Union countries are not officially allowed irradiation of foodstuffs. Some member states still use this technology irradiation foodstuff. Irradiation of milk and dairy products are not allowed because it would affect the destruction of vitamins in these products. [14]

For ecological, organic or biological agriculture, mainly referring to the so-called. production of "health food", i.e. agricultural production without the use of fertilizers, pesticides, hormones and the like. Organic farming is agricultural production concept that is much more complex and whose essence is not only in the omission of agricultural chemicals, but in the overall economy with which it is possible to achieve.

Environmentally sound agricultural production covers all agricultural production technologies which are not harmful to the environment, and social and economic considerations are acceptable for cultivation of plants and animals. Allows operation and help of powerful laws of nature to increase productivity and resistance of plants and animals. Organic production aims to establish a mixed farm, which consists of several basic parts: arable land, pastures, orchards, vegetable gardens, vineyards and livestock. In this way, a balance and harmony of the whole, and also stability and resistance to external influences (natural, economic, etc.).

Organic farming is actually a kind of farming in which instead of inorganic, non-living materials (fertilizers and pesticides) use what nature produces vivid (manure and plant extracts). Environmentally sound agricultural production is mainly related to agricultural production and rational skillfully uses pesticides, fertilizers, etc. It cannot be called organic farming, but it may be the first step toward reorienting. Organic farming seeks to completely prevent the entry of agricultural chemicals in agricultural and ecological systems, and do not use them.

[14] Ђекић С.(2005): „*Аграрни менаџмент*“, Економски факултет, Ниш, 238.

Organic agriculture in recent years experienced an increasing flourishing around the world. Ecological, social and economic crisis that has fallen conventional farming, creating a growing need in the market for environmentally friendly products. In the final this situation leads to an increasing growth of biological production.

The current ecological agriculture in many countries has been clearly defined laws, which are joined by a Serbian, adopting a package of laws and regulations in the field of agriculture. Food products in organic farming are controlled and carry a special character, which gives consumers the safety and inspire confidence in the product and composition.

However, despite the adoption of new regulations on the Serbian food market still reins element of the product bearing the label "healthy food" or some other indication that the wrong way to the customer that this is a product that is manufactured according to the standards of organic production. This is a sure sign that prevails among our citizens aware of the use of organic food. Manufacturers in turn abusing this situation for their financial gain because it is known that organic agriculture products to market more expensive by 20% to 80% of the products of conventional agriculture. [15]

We hope that this will change the status of implementation of the Law on organic production[16] which came into force on 1st January 2011. year. This law is regulated in detail the production of agricultural products obtained by organic production methods, objectives and principles of organic production, organic production methods, inspection and certification of organic production, processing, labeling, storage, transport, trade, import and export of organic products, supervision of Authorized affairs and other issues of importance to organic production.

State of development of the sector of organic agriculture in Serbia

State of development of the sector of organic agriculture can be traced through three periods.

[15] Средојевић З. исто, 130.
[16] Службени гласник РС", бр. 30/10.

The first period begins with the development of the former SFRY in 1991. The formation and activity of non-governmental organizations “Terra's” from Subotica. Along with that starts the process of educating consumers about the benefits of a diet that includes organic agricultural products which caused the initial demand for this product category. Despite the difficult economic conditions of operations in the period 1991 - 2000 years (international sanctions, hyperinflation, war events, etc.). Viability of organic agriculture sector has proven to be very strong so it is difficult to survive in such conditions represented a real success.

The second period of development begins to 2000. and lasts until 2010. year. Serbia's return to the international community as a full-scale, organic farming sector has been recognized as an interesting development, not only in Serbia but also in neighboring countries. Thus, in the framework of the EU assistance programs called Stability Pact for South Eastern Europe funded project entitled "Implementation and development of organic agriculture in Southeast Europe", where he participated in Serbian. The project, in the period 2001 - 2006 years, funded a large number of activities, from training of farmers, consumers, advisers, inspectors in the formation of experimental plots on which the modern methods of production demonstrated in organic agriculture.

The third period of development, characterized by a resolution of the institutional framework for the development, and starts since 2010. year. The adoption of the Law on organic production which is compliant with EU regulations have been met the initial requirements for a more efficient and effective development of this field. In addition, only a year before he founded the National Association for organic production under the name Serbia Organica[17] as the first organization that brings together the entire sector of organic agriculture in the territory of the Republic of Serbia. Ministry of Agriculture, Water and Forestry established four centers for the development of organic agriculture and farming in Selenca for field and vegetable crops, fruit of Valjevo, Svilajnac of Animal Husbandry and Leskovac for the collection of products from nature. Subsidies that farmers received in 2010. amounted to 10 million, which is definitely not enough, but the sum is a clear signal that the manufacturing sector and the importance attached by the state. Crop and vegetable production is supported in the amount of 25,000 dinars per hectare, 15,000 dinars was

[17] http://serbiaorganica.org

the amount of subsidy per head of cattle, 5,000 dinars for small livestock, 500 dinars for small livestock and 2,000 dinars per hive of bees.[18]

Basic features of the supply of organic agricultural products in Serbia are relatively modest in relation to the total area of the total agricultural land, i.e. only 8500 acres and a modest number of crops that crops are produced. In addition it is necessary to be enumerated, and the total area of about 230,000 hectares of forest within which systematically collecting medicinal herbs, berries and mushrooms. Correlate the data on total agricultural area and in the broadest sense of the Organic Agriculture in Serbia, we get the information of only 0.04% of the area of organic agriculture in relation to the total agricultural area which puts us, generally speaking, the group of countries with the lowest percentage in this regard.

Table 1. *Surface in the system of organic farming in Serbia by culture (2009).*

Product category	*Agricultural crops (crop)*	*Organic production (hectares)*	*Transition period (ha)*	*Total (ha)*
Growing crops	*apples*	*650*	*550*	*1200*
	raspberries	*360*	*20*	*380*
	strawberries	*80*	*10*	*90*
	plums	*420*	*170*	*590*
	cherries	*100*	*50*	*150*
	Other			*2560*
Subtotal				*4970*
The one-plant	*corn*	*20*	*210*	*230*
	wheat	*40*	*130*	*170*
	soybean	*10*	*400*	*410*
	Vegetables and Others			*427*
Subtotal				*1240*
grasslands		*50*	*2240*	*2290*

Source: Organic Agriculture in Serbia, 2011, стр. 8.

The main manufacturing zones are southern and western part of Serbia, as well as the entire territory of Vojvodina. Growing crops are dominant with about 60% of the total organic farmland, with 15% engaged in the

[18] www.mojafarma.rs/index

production of perennial crops and 25% in the form of pasture. A general characteristic of the agricultural production in Serbia, which is reflected in the fragmentation of holdings and a large number of farmers, is also present in the organic agriculture sector. Sometime around 3000 manufacturer engaged in the production of this type of 2009th the expert estimates the total value of the products leaving the farm in the range between 20 - 25 million Euros.

Problems related to environmental protection

The main and primary goal of environmental protection is to protect it from the adverse effects of agricultural production. What I want to point out is that in Serbia there is no specifically defined policies for the conservation of ecosystems, preventing the destruction of natural habitats or the disappearance of species and preventing impairment of natural landscapes, which are related to agricultural production. Throughout this period, agriculture as a source of potential adverse effects on the environment, not specifically analyzed, nor legally, nor are factors involved in agricultural policy of protecting the natural environment. The formulated general policy of environmental protection, with no special emphasis on agriculture in rural areas does not provide sufficient protection, especially knowing that the EU policy in this area is extremely demanding.

Almost all the countries in transition have focused their economic policy measures to stabilize income and price cuts. Irrespective of the form of these measures have, whether it comes to guarantees, subsidies and the like., Ignores the fact that the reduction in the risk of price variation directly increase agricultural production with resultant negative effects in terms of environmental situation. Subsidies to agricultural inputs have two effects on the ecological position of national economies. On the one hand, subsidies inevitably lead to increased use of subsidized inputs, while the other side subsidies oriented agricultural production. [19]

[19] Гајић М., Ловре К., Тркуља Ђ., Зекић С. (2003): „Еколошки ефекти пољопривредне политике земаља у транзицији“, Институционалне реформе и транзиција агропривреде у Републици Србији“, Економски факултет Београд, 221-222.

EU environmental policy is primarily a function of:
1) achieving long-term stable economic development and equitable distribution of natural resources through the development of new technologies that contribute to an increased use of resources, on the one hand and
2) reduce the destructive effects of industrial and human waste through reduction and cessation of production of the leading polluters on the other side.

In other words, the goal of environmental policy as a component of economic development policy is to define the positive and negative external effects to accurately emphasize the most important species from both types of effects and to propose a way that can reduce the negative and increase the positive external effects. [20]

Agricultural production in addition to its primary function has the opportunity to contribute to environmental protection, restoration of natural resources and protection of biodiversity. Production that is based on these principles has enabled the creation of conditions for the formation of the basic version of the European model of multifunctional agriculture. The common agricultural and rural policy (CARPE) includes four elements:

1. with respect to the transition adjustment,
2. market stabilization
3. subsidy related to the environmental component as well as for the preservation of the landscape,
4. factors stimulating rural development. [21]

In the process of harmonization of our legislation with the EU policy framework established benchmarks of environmental protection systems which are designed following documents: National Strategy of Serbia's EU Feasibility Study and priorities of the European Partnership, Poverty Reduction Strategy, Management Strategy, Sustainable Development

[20] Цветановић С, Јовановић Д. (2006): „*Економска политика Европске Уније – нова европска економија*“, Економски факултет, Ниш, 190 – 191.
[21] Тркуља Ђ, Ловре К, Гајић М. (2005): „*Мултифункционалност пољопривреде Европске уније – суштинска реформа и реалне могућности нових чланица*“, Мултифункционална пољопривреда и рурални развој, Тематски зборник, Институт за економику пољопривреде, Београд, 109.

Strategy, Water resource base Serbia, Draft National Environmental protection Plan, the Government of the Republic of Serbia to implement the priorities of the European Partnership and others.

The legal framework for environmental protection, which is in accordance with EU Directives, began to be adopted in Serbia in 2004. year. Strategic efforts of our country are contained in the desire to join the European Union in a near future. For this reason, there is a requirement for monitoring and implementation of legislation in the field of environmental protection. The European Union has prepared a White Paper containing the method of preparing the countries of Eastern Europe for integration into the internal market. This book regulating guidelines in the area of legislation that member countries must harmonize.

In accordance with new European Union standards drafted the Law on Environmental Protection was adopted in late 2004. The sitting of the National Assembly of the Republic of Serbia. [22] The law provides for protection to include management of natural values, measures and requirements for environmental protection, environmental monitoring, information systems and public participation, economic instruments, liability for environmental pollution, monitoring, penalties. This Law in a comprehensive manner prescribed measures to protect air, water, land, biodiversity, forests and natural resources of pollution and degradation.

Significant progress in the development of legislation was made in 2009. and 2010. year. Adoption of modern legislation in the field of environment would be a continuous process of improvement that the environmental sector was and is one of the priorities of development. After 2003rd the environment sector was not a priority, the laws in this area were from 2001. until today (2010.) only three times on the agenda of the Assembly (so that there are examples of laws that were adopted in 2009., or 2010., and were prepared in 2002. was).

The phase for Serbia to join the EU should pay particular attention to environmental policy, which is implemented through ecological agriculture programs. Interest in the application of these programs in Serbia is very low. If Serbia wants to join the EU, it is necessary to adopt new and existing standards comply with current EU policy. It is also

[22]Службени Гласник Републике Србије број 135/04.

necessary to define the basic directions in environmental policy, specifically related to agriculture.

So, therefore, the priority objectives to keep in the direction of:

- Defining the environmental policy of the negative effects of agricultural production
- Starting preparations for the introduction of the Nitrates Directive
- Enhancing cooperation with the Ministry of Environment and Physical Planning, the establishment of permanent working groups
- The introduction of Investment Support on farms to reduce pollution and adaptation to EU standards.
- Support the process of certification and support the development of organic farming and the introduction of good agricultural practices.
- Introduction of the register of producers of organic products.
- Provide a legal basis for the introduction of good agricultural practices and support the introduction of the budget.
- Development of strategic, legal, administrative and technical instruments for the control of genetically modified organisms (GMOs) and reducing the risks of GMOs to a minimum.
- Conducting an inventory sheet and previous support of genetic resources, the adoption of the National Programme for the conservation of genetic resources and providing support for the implementation of the program.

Conclusions

The problems we deal with in this paper, and the point which the resolution are as follows:

In the coming period of time waiting for Serbian agriculture obligation to harmonize its legislation fully with all regulations on the protection of the environment, as well as to harmonize all programs and bringing them into compliance with the National Environmental Protection Programmed.

Agricultural Development in Serbia should be directed towards the creation of agricultural production, which will be dominated by economic principles, which were brought into the best possible compliance with

environmental requirements. Serbia on the field waiting for a job in establishing new and in agreeing with the existing standards. The new standards should be in line with EU policy. At this stage it is necessary to define the basic directions of environmental policy and so what better way to minimize the negative effects of agricultural production. In some aspects of food production positive legislation of Serbia has made a positive step because it prohibits the use of genetically modified foods.

The interest in organic agriculture programs in Serbia is very low, except in areas that are protected by law because of its natural resources. We believe that increasing and expanding subsidies to those who are interested in these programs is the right way for the popularization of this production. Until now, the reality in the field of agro-environmental payments very little has been done. We believe that it is necessary to increase the payments for this purpose from the national budget. Policy implementation of these programs is in line with the policy that applies to the EU, because this is the development of agro-environmental programs an integral part of the EU accession process, which has been perceived very accurately within the Common Agricultural Policy of the European Union (CAP).

The goal of food production would have to be based on the production of environmentally oriented products. These products should be different from traditional products that they create smaller amounts of waste materials and caused lower consumption of raw materials and energy. To maintain environmentally sound products should be taken in all stages of the technological cycle of production of obtaining primary raw materials, through production of the product, its packaging distributing, selling used product delays.

Organic food production today is unpopular because it is reflected in the production cost of this type of food. Price of food produced by conventional farming is far lower than the price of healthy foods. Low profits in the production of healthy food are a barrier to higher production. For this reason, farmers are opting to produce food economically cost effective.

Our analysis shows that the problems of the organization of ecological production complex and are related to the problems of lack of interest in

this kind of production and the need to pursue a consistent agricultural policy should contribute to better success of this production.

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INTEREST CONNECTIONS AMONG AGRICULTURAL ENTERPRISES[1]

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Abstract

Trends of globalization, high dynamics of changes in the business environment, modified customer preferences, the effects of the economic and financial crisis initiate the need for a change in the existing business model of an enterprise. Namely, the burden of described circumstances makes individual enterprises to be very vulnerable. Instead of focusing their efforts towards achieving more efficient level of business, improving the quality of existing products and the development and introduction of new products, they are forced to struggle for a mere survival. The trend described above has not bypassed even the enterprises in the field of agriculture whose activity was by their nature expressed as risky, which emphasized the total exposure to adverse circumstances even more. Hence, the solution could be identified in mutual connecting of enterprises based on different grounds – connection by agreement or by the investment of capital. The main motives of interest connections among enterprises are contained in strengthening the potential to capitalize opportunities in an environment, to minimize adverse effects on the basis of numerous risks and improve the competitive position of an enterprise. The goal of this paper is to point out to the different forms of connections among the agricultural enterprises with a special emphasis on solutions that have been successfully implemented in developed countries. The significance of such an approach is recognized in providing the guidelines to domicile producers about the fact how they can improve their current position not only at domestic market, but to become competitive in the global market as well. It is conquering new markets and foreign currency income on the basis of the sales what represent a sure path to economic development and the improvement of business conditions in the Republic of Serbia.

Keywords: *interest connections, agricultural producers, competitive advantage, value creation, strategic alliances.*

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Introduction

Numerous changes have affected the world economy, from globalization, supplying chain development, accelerated technological changes, through unfavorable economic tendencies in the form of recession and economic-financial crisis. The above factors have been monitored by changing habits and preferences, as well as by the emergence of the customers' demands that have become increasingly pickier, by shortening a product life cycle and by the expressively fierce struggle between competing enterprises. The change of a business environment requires a change of how the enterprises will perform in the market, more precise review of existing strategies as well as defining new strategies that will achieve and maintain competitive advantage.

The researches suggest that as the key drivers of agricultural activities in the Republic of Serbia occur family farms in the first line, usually as producers of primary inputs, small and medium enterprises in the field of agricultural and food processing industry, as well as several large agricultural corporations (in the food industry). Low productivity and utilization of available capacities very often results in unprofitable production, particularly in the area of family farms.

From the above mentioned facts it results the need for radical shift in current practice and in this regard experiences of certain developed countries might prove useful. Namely, the solutions that were implemented in those countries have contributed in a way that agriculture recorded economic parameters that have been far above the level of Serbian agriculture. It is undeniable that there are numerous strategies and ideas on possible directions in which the agriculture of the Republic of Serbia should develop. This paper will focus on the micro aspect, more precisely on the change of the model of agricultural enterprises operation and finding the suitable partners that the enterprise will rely on until they are strong enough and become sufficiently competitive for the global market needs.

In order to successfully face a number of challenges, enterprises are often forced to enter into various alliances and business combinations. Research suggests that such strategies have numerous advantages which are reflected in easier access to important resources and technologies, reducing costs, conquering new markets, increasing sales, improving competitive position. In fact, combining the strengths of two or more enterprises contribute to a faster adaptation to the market changes, the growth of productivity, generating the effect of the scale economy, which all together ultimately leads to reducing costs and finally to profitable business.

The way to connect the enterprises can be horizontal, vertical and conglomerate. **Horizontal connecting** takes place between enterprises operating in the same branch or industry and which are at the same stage of production and distribution cycle that is between the enterprises that are competing with each other. The goals of such an approach are focused on winning control over the most part of the market (market dominance) as well as on the entry into new markets. The problem of horizontal combination of the enterprises may be a potential conflict with the antimonopoly regulations.

Vertical connecting refers to enterprises that operate in various stages of production and distribution process and that, as such, find itself in actual or potential buyer-seller relationships. Typical representatives of such connections are agro-industrial complexes. The advantages of vertical connecting are reflected in completing the control of the chain of production and trade as well as raising the entry barriers for potential competitors.

Conglomerate mergers represent a strategy of linking enterprises that belong to different industries and whose business is in no way related to each other. The goal is to make a business diversification, reduce risk, and provide an easier access to funding sources and more efficient allocation of resources.

As mentioned above, enterprises can be linked to each other in a number of ways, whereby a more general categorization of available strategies can go on criteria – whether the connection was realized on the basis of the contract between firms (as well as between firms and farms) or on the basis of investing the capital. Enterprises develop strategic plans by which they want to achieve growth, to gain an entry into new business areas or undertake another substantial transformation. In addition, there are a number of strategies that can help them to achieve intentions: internal growth through retaining and reinvesting the profit, establishment of strategic alliances and merging with another enterprise(s). Implications of each of these alternatives in terms of control, risk and sufficient internal resources are different. In addition to the mentioned ones, there are other ways of interest enterprises' connecting such as cooperatives, joint ventures and acquisitions.

Strategic Alliances

The strategic alliances are agreements between independent firms on mutual cooperation in order to get realized certain strategic goals. Enterprises can achieve their intentions by recognizing the fact that they need each other, with implementation of joint control over the process of decision making and management, risk sharing and realizing benefits. It is an agreement that

allows the partners to jointly achieve the goals that could not be realized independently (Martin, Stiefelmeyer, 2001). In doing so, it is vital that enterprises retain their legal and economic independence. The aforementioned elements represent the basis for distinction of strategic alliances from other forms of association.

Alliances as a form of an interest connection between enterprises may arise as a result of conclusion of the agreement between the partners (e.g. supply contracts, licenses, franchising, etc.). Alliances also may arise on the basis of capital investments into existing enterprises and through joint ventures or consortia by forming new enterprises. From the above follows one more classification of the alliances and that is according to the resources that are the subject of association – the financial capital, market access, intellectual property, equipment and plant, technology etc. The above mentioned intangible assets are also important for achieving competitive advantage of an enterprise. In other words, knowledge is an important factor of production in the modern economy in general, so in agriculture as well.

For an alliance, as a kind of association of agricultural enterprises, to have a strategic character, it is necessary to contain the following characteristics (Popovic, Jasko, Prokic; 2010):

- Participation in the alliance is based on capital or skills (competencies) of the participants;
- The alliance is formed for a period of at least ten years;
- Establishment of an alliance generates additional pressures on existing competitive enterprises, or changes the existing order in the market;
- The parties involved in the alliance have the will and the ability to maximize the usage of available resources and opportunities.

When looking at the way the company could penetrate the foreign market, the decision to enter into strategic partnership can be a good solution. In the case of small, family-owned agricultural enterprises, alliances offer many advantages that are recognized through the ability to export and direct investments. In fact the lack of access to foreign markets very often represents a limiting factor for development of small enterprises, since the absorption capacity of the domestic market, in terms of certain goods, is rather limited. On the other hand, there is a significant international market demand for certain products with geographical origin and strategic alliances can help that such potential gets realized.

Before entering into a partnership, an enterprise should establish a basis for gaining competitive advantage. If some of the activities in the value chain (procurement of raw materials and intermediates – activities of production – marketing - distribution) are not efficient enough when the enterprise acts on its own, then it is necessary to decide for finding a strategic partner (Porter, 1998).

Forming strategic alliances is a multistage process that begins with a strategic planning, selection of partners, negotiation and implementation. Strategic planning assumes that the management of the enterprise has a vision of the direction the enterprise should go and to understand how it could reach there (Holmlund, Fulton, 1999). Then, it is necessary to recognize the strengths and limitations of the enterprises participants in a given process, along with the threats and opportunities in the region. Finally it is necessary to put together a plan of action which has to be followed.

The next crucial step is to choose a partner(s) who is (are) complementary, appropriate and compatible (Kale, Singh, 2009). C**omplementarity** of the partners represents the degree to which the partners contribute to the competitive advantage of their alliance with their resources (e.g. one partner brings skills and resources that the other side does not possess). That can be equipment, technology or experienced staff. For example, in the case of alliances between domestic and foreign enterprises, domestic enterprise could provide certain inputs for food products, while foreign partner could take care of their distribution in foreign markets, marketing and sales. Of course, other combinations of inputs are possible as well. Through this process, it is being directly contributed to the creation of value-added products. Greater complementarity means both, a higher probability of success of the alliance and its long-term survival.

However, complementarity by itself is not sufficient for the success of the alliance, but it requires the partners to be mutually compatible. **Compatibility** indicates the degree of compliance between partners, then the harmonization of their business style and organizational culture.

Finally, **mutual commitment** (agreement) indicates not only the will of the partners to contribute in terms of resources, but also a short-term waiver (sacrifice) in order to jointly achieve the desired long-term benefits.

All the three attributes of the partners are vital for the success of a particular alliance and the management of an enterprise should understand in which circumstances the mentioned factors are crucial. For example, the

complementarity is especially important when one partner has little bit of experience in a particular market. On the other hand, the agreement between partners is particularly important in identifying the specific benefits that need to be carried out together. Reaching the agreement requires considerable amount of resources as well as the efforts that the partners work together, which also assumes certain adjustments and compromises. Additionally, it should not be forgotten that the partners in strategic alliances retain their independence, which requires the need for finding a balance between their independence and total obedience to the requirements of the other party.

In the process of negotiation on formation of the alliance it is necessary to assess the common needs of partners, with mutual respect and development of a trustful relationship. In fact, the alliances do not represent a mere agreement as much as they represent relationships between participants. The subject of negotiation, among other things, should be mutual objectives, responsibilities, assessed risks (Holmlund, Fulton, 1999).

After the formation of the alliance, the key factor is a management of the alliance and the implementation of the agreement in order to be avoid and minimized the risks that may endanger survival of the alliance and successful realization of defined goals. In this regard, the ownership of capital represents an effective mechanism for managing an alliance. Within the alliance, the enterprise may be exposed to an opportunistic behavior by the partners if, for example, one partner maximizes benefits at the expense of the other partner or negotiates an establishment of a new alliance with other enterprises without knowledge of his partner.

The risks described above are especially frequent in conditions when one partner brings specific resources into the alliance, or if there is uncertainty regarding the market conditions. In such circumstances, the establishment of an alliance on the basis of capital in which one partner has a share in the capital of other partners, or when both partners form a new entity in which they participate, is essential for success. This means that shared capital aligns different interests of partners by making the ownership of capital as a factor that limits their opportunistic behavior in the future. Then, capital facilitates hierarchical supervision in day to day operations and a final share of capital creates a basis for each partner to receive a pro rata share of the alliance earnings. In this manner, partners are encouraged to work together.

Another management mechanism of an alliance is based on regulations of the contract. The contract contributes to the efficient risk management in many ways. First of all, the contract clearly defines the mutual rights and

obligations of the partners, it specifies the roles that each party brings to the alliance, the process of obtained results' allocation, the way of resolving the possible disputes, as well as the expected effects of the connection. The contract also defines the way of communication between strategic partners and a third party and the way in which the alliance will be terminated (Holmlund, Fulton, 1999).

Finally, achieving the desired benefits requires proactive management of the alliance upon its establishment as well as its initial operation. For that purpose, it is especially important the coordination of partners and development of trust between them. Coordination supposes substantial understanding of the interdependence between the partners, i.e. how the decisions and actions of one partner may affect the other partners in the alliance – e.g. decisions made about allocating resources. Strong alliances are those that provide the partner companies by the increased amount of financial resources and enable them to overcome the obstacles in the business cycle for the benefit of employees and customers.

Among the most important benefits of strategic alliances is certainly an increase of the cost efficiency, followed by the growth of profit. In this regard, it is possible to reduce costs in a number of ways (Martin, Stiefelmeyer, 2001):

- The costs of research and negotiation that incurred in the process of finding buyers or establishing the price, have been reduced as a result of an improved communication between enterprises in the alliance;
- The costs can also be reduced if any member of the alliance is a permanent buyer or supplier of the other party, due to which the search for a buyer or negotiation over the price is eliminated ;
- It derives from the previous the reduction of costs on the basis of improving the efficiency of materials usage in the production process;
- A price risk, especially in terms of agricultural products, will be reduced, similarly to the price hedges.

In addition to the cost reduction, the key benefits of the alliance include:

- An improved product image as well as its utility value due to the better control, which contributes to the differentiation of producers and to the strengthening of the brand value;
- The creation of new products may be accompanied by development of market niches (e.g. in the case of food products with geographical origin);
- If the product is sold locally, the benefits of reducing transport costs have both a producer and a buyer;

- Entering into the strategic alliance can encourage enterprises to develop differentiated products that they would never produce independently due to the high risk;
- The enterprise in the alliance has an access to the expertise it has not had before, and it also exchanges a certain expertise with its partners;
- The enterprise may enter into an alliance in order to strengthen its position in the branch in which it is know from earlier. Instead of going into a new industry where it has no experience, through an alliance with an enterprise that already has a developed brand, the speed with which the product will become known in the market is increased.

Despite numerous cases of failed strategic alliances, in the world practice there have been recorded numerous examples of successful strategic alliances in the field of agriculture and food industry. Below are some of the examples. Canadian manufacturer of bread *Warburton's Bakery* has formed an alliance with the wheat producer *Canadian Wheat Board* which represented a vertical integration, allowing the farmers a production of specific products for a new market niche. On the territory of the United States, it is well known the alliance in the field of sugar production between *United Sugar Corp.* (the sugar producer) and the *Pillsbury Best* company which holds a license for sugar packing. Thanks to the alliance, there has been created a product that has quickly become a national brand. In practice, there have also been recorded the alliances in the field of seed potatoes production *(Riverhurst Agricultural Products* and *Northern Vigour),* in poultry and egg production *(Co-Op Ltd. and the Global Egg Corporation of Ontario),* in the tobacco industry etc.

Joint Ventures

In addition to the strategic alliances, agricultural enterprises have the opportunity to improve production and market performance through joint ventures. It is a business endeavor between partners from different countries by which a new entity is being formed, the one that is, in addition to joint venture of the funds, followed by shared entrepreneurship, the sharing of risks and returns as well. Joint ventures represent one of the key strategic decision in addition to the one on entry and exit from the business, expanding the capacity or diversification of production. Hence, such an investment has a more permanent character and the rights and obligations of related parties are governed by the contract (Jovanovic-Gavrilovic, 2000).

Joint ventures may include the manufacturing arrangement, as well as the distributive and research and development one. The operating joint venture is

an entity which is the holder of productive activity and it plays an active role in the decision-making process. Each partner provides a contribution through capital or technology, marketing, personal work or physical assets. What is important, however, is that partners allow to the entity an access to the distribution network and to the local market – factors that are critical for success.

In addition to joint ventures between local and foreign partners, there are also possibilities for joint ventures between domestic enterprises and enterprises and farms. When we talk about connection of the local enterprises, it is particularly interesting a model of joint venture called "spider's web", whose essence is consisted of connecting a number of enterprises with a main partner. The objective is to hold the competence at the arm's length until enterprises-partners become strong enough. For example, a small enterprise can establish a joint venture with a medium or large enterprise in order to strengthen its position in the market. That means that a partner is selected from the ranks of future champions in the industry (e.g. food industry) much earlier and, accordingly, all of the resources are invested in order to achieve an outstanding joint venture. Enterprises can create a spider's web – a joint venture, while having an exclusive partnership with a particular firm. For these reasons, the joint ventures timing is critical as in the case of strategic alliances, in order to be ensured the cooperation with leading enterprises and thereby to be achieved a higher competitive advantage (Harrigan, 2003).

Joint ventures can be even established between the enterprises from the processing industry and certain farm which will appear in the role of deliverer of the necessary inputs for the production process. In this regard, there are possible numerous modalities of the joint venture agreement (ADAS, 2007):

1. *Contract farming* – The contractor conducts operations on the land for a fixed fee, and any surplus above the costs is subject of distribution according to the terms of the contract. For example, a land owner and a farmer who, under the contract, performs mechanical and labor operations on the land, may enter the joint venture. The property owner provides workers who are paid by himself. The contractor is responsible for farm management and crop cultivation.
2. *Contract rearing* provides that the farmer grows the owner's cattle for a fee for each animal head. For example, in the case of dairy, a contract may provide that the part of animals (heifers) is temporarily sent to other farms, so that the dairy plant is able to focus on milk production.

3. *Labor & machinery sharing* implies that two or more parties join their workers and equipment together in order to be performed operations at cooperative farms. Joint ventures are formed with the aim to be reduced the equipment costs, to be rationalized the work of employees and to be maintained the control over the land.
4. *Machinery sharing* involves association of the equipment and services through execution of the operations for a fee. In such case, all parties dispose a significant amount of land, while on the basis of the contract they associate the equipment that allows them to increase their investments (which would not be possible without available equipment).

When choosing a partner with whom the joint venture will be carried out, it is important to be perceived availability of necessary resources, and potential foreign partner will be interested in the factors such as the economic climate, the size and structure of the economy, the level of development, the balance of payments situation and other indicators as well. The decision on the selection is made on the basis of criteria – whether specific joint ventures provide the achievement of synergetic effects?

The benefits of joint ventures in agriculture are primarily reflected in the scale economy, which allows participants to reduce unit costs and under other unchanged conditions increases the profit. In some countries there are significant tax relieves for establishment of the joint venture. That means the owner of land enjoys relieves on the basis of inheritance, for capital gains tax and income tax, if he has a status of farmer. The joint venture allows older farmers to retire without completely losing a contact with agriculture, as well as to use their experience in helping the young people to successfully enter the world of agriculture.

Through joint ventures it is possible to achieve a number of advantages, beside the capital inflows the transfer of technology is often provided, which is particularly important for domestic producers in order to be modernized the traditional system of agricultural production and to be provided the staff training as well as the penetration into the foreign markets. This increases the efficiency of machinery utilization in agricultural production, contributes to the preservation of local biodiversity (assuming the standards of the environmental protection are being respected) and improves the profitability of production.

The main limitations of joint ventures are reflected in the efforts of international partners to possess a greater freedom in prices' determination

and in the transfer of profit. Foreign partners also tend to overestimate the value of their equity stakes in order to ensure the greater participation in the policy of the profit managing and distribution. This is particularly the case for the equity stakes in the form of intangible assets such as licenses, patents and know-how. In addition, the investors put in the foreground their interests that may not always be compatible with the national interests.

Mergers and Acquisitions

Some firms are not able to collaborate with others in development of the new products, skills or achievement of other goals. Hence, they opt to purchase the resources and knowledge they need for further growth and development. This purchase of the other enterprises can take two forms:

1. Merger (fusion) which is realized by merging two or more enterprises whereby only one of them carries on with the business, i.e.

$$\text{Enterprise A} + \text{Enterprise B} = \text{Enterprise A}$$

The enterprise that has survived merging has not necessarily had to be a large company. Reasons for that should be looked for in a fact that the merging operation can be motivated by the tax reasons, but also by the other circumstances which imply that the number of employees should be respected, as well as the value of net assets and other factors.

2. Acquisition (annexation) is the activity of gaining a control package of another company shares through the operation on the financial market. Besides, acquisition can be realized by buying another enterprise's property where it is required for the entire property to be taken over. In other words, an acquisition essentially reflects the transfer of ownership. And while the merging of enterprises has been typically carried out on the basis of agreement between participating enterprises, an acquisition of other enterprises has an expressed hostile tone.

$$\text{Enterprise A} + \text{Enterprise B} = \text{Enterprise A}'$$

In order to be fully understood the motives of the abovementioned operations' implementation, that simultaneously represent a business restructuring of an enterprise, it is necessary to look back at the evolution of the mergers and acquisitions forms from the moment of the first appearance up to the present days. Namely, there were five waves of mergers that have

significantly contributed to the USA economy, but also to the rest of world one (Weston, Mithcell, Mulherin, 2004):

- Horizontal mergers represent a starting form of the external enterprise growth strategy. This strategy is being realized between the enterprises that belong to the same branch. In the terms of time, the horizontal mergers were characteristic for the last years of 19th and beginning of the 20th century. The goal of the merger is to eliminate the competition, to materialize the benefits of the monopoly position, as well as to achieve the scale economy;
- A wave of vertical mergers took place during the 1920ies. It was a strategy that included enterprises that had different positions in the value chain (integration with suppliers and distributors) in order to be achieved the oligopoly position;
- The mergers of the conglomerate type represent a strategy of linking the enterprises that belong to different industries and whose businesses are not connected in any way. The goal is to be made a business diversification. This strategy was dominant in the 1960ies;
- The 1980ies were known as the decade of big contracts in the sense that each of the ten largest contracts weighed several billion dollars. This period was also characterized by a significant number of hostile acquisitions;
- Strategic mergers were initiated during the last decade of the previous century, but they have been continued up to the present days. The impulses to the mergers of that period have been given by the processes of globalization, deregulation as well as development of new technologies. Important feature also makes the values of contracts whose amounts represent the historical maximums. Unlike the first four waves of mergers that were largely characteristic for the USA economy, the fifth wave of restructuring has plashed Europe, Asia and the rest of the world as well, along with USA. The reasons for the significant business combinations in Europe should be looked for in significantly altered structure of the economy, then in development of the financial market, as well as in an increased number of small shareholders.

When it comes to goals that can be realized by implementing an external growth strategy, it is necessary to point out that the management of an enterprise is trying in this way to realize an entire set of benefits. Restructuring of an enterprise is aimed at increasing the capacity, acquiring new knowledge and technologies, entering new markets, capitalization of synergetic effects, placement of capital surplus, achieving the tax savings, more effective overcoming the barriers to enter the certain markets through

fusion or acquisition of the enterprise that has acquired a certain reputation in a given market, winning the potentials which in short term provide a profit since the product which has been taken over was already well developed, accessing the sales network and establishing the control over certain rare sources of supply, strengthening of bargaining power in relation to the customers and suppliers, improving the position in the financial market etc (Savić, Vasiljević, 2011).

Mergers and acquisitions of agricultural enterprises are somewhat different from the business combinations of the enterprises in other branches. Specific features certainly derive from the characteristics of agricultural activity, whose knowing is necessary for better structuring of the transactions, as well as for selection of appropriate negotiation strategies and collateral instruments.

First of all, agricultural activity has exceptionally cyclical and seasonal character. The annual cycle begins in the autumn with land cultivation, in the spring and early summer the crops' growth phase takes place, while the late summer is the time for harvest. The described cycle is particularly noticeable in the farmers' sector, but inevitably it has an impact on the processing industry as well.

From the aspect of conducting the enterprises' acquisition and merging transactions, it is unlikely that transactions will be carried out during the production cycle. This is because in this case, it is necessary to estimate the value of the upcoming harvest, i.e. unfinished production, but it is also necessary to regulate numerous issues of compensation to the enterprise-candidate for merging or acquisition on the basis of the work done. If the transactions should not be implemented within a short inactive period of time, i.e. between the harvest and land preparation for the next sowing, it is necessary to introduce additional mechanisms in order to be solved many complex issues. The right of the target enterprise to be settled on the basis of collecting of crops can be regulated by a special agreement, according to which it claims the right onto the yields together with the payment rights. The price of such harvest and the relevant services of equipment utilization could be considered within the transaction price for the acquisition or merger.

If the transaction is delayed, acquirer should consider the option to begin with operations before the transaction is concluded. Namely, the negotiations could take months while in the meantime the weather conditions may become unfavorable due to which the buyer will not be able to adequately prepare the land. The possibility of a potential buyer to begin the operations before the

conclusion of the transaction assumes defining and applying the specific agreements on land cultivation, as well as the contract on the joint carrying out of operations on the plots as well as on other agricultural services (Borodkin, 2012).

The parties should also agree on mutual compensations in the case if the buying-selling transaction would not be concluded – such as the compensation for would-be buyer for performed operation, used seed, fuel, chemicals. However, the compensation could be predicted even for the target enterprise on the basis of the agricultural machinery utilization as well as possible damage to equipment. Finally, the contract may provide that the buyer-enterprise should complete the started cycle of agricultural production, with providing the appropriate compensation to the seller.

An evaluation is certainly the most important issue in the transactions of mergers and acquisitions both for the buyer-enterprise and the seller-enterprise**,** in order to be determined whether the transaction is economically justified and whether it makes sense to start with the complex procedure of restructuring. There is several evaluation methods used for assessment of the enterprise-target value. The answer to the question of how much the enterprise is worth is not easy one, especially in the case of agricultural enterprises. Especially if one takes into account that each party involved in the transaction of acquisition has its own point of view. For example, an evaluation would be conducted by both the buyer-enterprise and the seller-enterprise, as well as by the investment banker and other intermediaries. However, the amount by which the transfer is going to be made is possible to be decided only through negotiation. It surely does not mean that certain methods of evaluation are irrelevant. On the contrary, there are at least three methods available: discounting of the future cash flow, evaluation of the assets and comparison to similar enterprises (the market or fair value). It is also essential to be established so-called strategic value of an enterprise. The starting basis is consisted of the current result and free cash flow. Then it is followed by an analysis of "what if", which considers alternative scenarios and trends of the key enterprises performances, including the effects of synergy as well. In determination of value it is necessary to include many aspects of future business operations, such as the quality of management, structure and value of intangible assets, contracted jobs and others.

The cases of mergers and acquisitions in agriculture and food processing industry are numerous, and some of them are listed here. By the merger of Brazilian enterprises Sadia S.A. (the leader in the food processing industry) with a major competitor Perdigao in 2009, it was established one of the

world's largest producer of poultry meat. The Canadian company Viterra (formerly Saskatchewan Wheat Pool) acquired the Australian ABB Grain (Pelletier, 2009). In the Republic of Serbia the merger of four agricultural enterprises has been announced, Agricultural company "Beograd" (PKB), AD "Dragan Marković", Agro-industrial company "Zemun" and "Voćarske plantaže", which should be all merged into one enterprise by the year of 2013.

Conclusion

Entire economy and agriculture as a separate branch are subject to continuous changes such as globalization, supply chain development, accelerated technological changes, but also to adverse economic trends in the forms of economic recession and financial crisis. New standards in the world have already required from the farmers to give their contribution to the struggle against climate changes – through the rational use of energy, reduced gases' emissions that contribute to the greenhouse gas, an efficient use of water, humane conditions of animal husbandry and many other restrictions. Increasingly demanding consumers, uncertain products' life cycle, an intense competition along with other risks make need for changes in the existing business model as an imperative. The fact that farmers and enterprises are often unable to handle the avalanche of requests makes a strategy of enterprise merging as the rational choice.

For the farmers and enterprises in the agri-food sector it is important not only to survive, but also to continuously develop and improve their business operations. That means for them to be quicker and more efficient than the competition. In this regard it is important to choose in time the strategy of connection as well as the right partner with whom they could build a superior market position.

The modalities of connections that are available are numerous and could be basically classified on the connections on the contract basis and connections on the capital investment basis. In this paper, the review of both categories has been made, indicating the specificities and importance of the strategic alliances, joint ventures, mergers and acquisitions in the context of agricultural enterprises.

When we talk about small and medium-sized enterprises, which are the primary carriers of the food processing industry in the Republic of Serbia, along with the family farms, the fact that enterprises often do not possess their own land, or they possess it but in size that is not sufficient to be fully

provided the necessary inputs, it provides a significant potential for small farmers to establish cooperation with the related enterprises, on the basis of the contract on connections and a specific form of joint ventures.

The fact that in modern agriculture knowledge is a factor of production (which is equal to the land, equipment and financial resources) suggests that on the basis of the connections with the enterprises that possess a specific know-how and advanced technology, the competitive position of an enterprise could be significantly improved as well as it could be ensured the long-term survival.

The benefits of connecting among other things are recognized in the following: reducing of the business operations' costs, the strengthening of negotiation position, obtaining the capital for new investments, protection from the price risk, an introduction of new products, development and differentiation of the brand, penetration of the new markets and finally the long-term survival of an enterprise. All of the above/mentioned should result in the synergetic effects and thus enable the development of not only the agricultural enterprises, but also the entire agri-food sector.

Literature

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LABOUR SUPPLY AND DEMAND MISMATCHES IN THE RURAL SERBIA - THE CURRENT STATE AND CONSEQUENCES

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Abstract

The paper analyses characteristics of the labour market in Serbia. The overall objective is to identify if the significant differences regarding the labour market current state and perspectives between rural and non-rural regions in Serbia exist. The analysis was conducted using descriptive statistics. Differences between rural and non-rural regions were tested by ANOVA in SPSS. We found no differences at 1% level of significance, both regarding labour supply and demand. Regarding labour supply, differences at 5% significance level are found in dependant ratio and share of lower/higher educated in the total district population. Differences regarding working contingent, and high school educated are identified at 10% significance level. Regarding the economic sector structure differences are found to be significant at 5% level. A higher investment in the non-rural than in the rural areas influences spatial dimension of the labour demand. Consequently, the non-rural areas are characterized with significantly less inhabitants per firm.

Key words: *labour market, indicators, regions, rural, urban, disparities*.

Introduction

The Serbian labour market is characterized by low employment. According to the Labour Force Survey 2011, employment rate is 45.4% (LFS, 2011). It is still far from the policy objectives set in *The National Employment Strategy of Serbia 2011-2020* (NESS, 2011). The reasons for the low employment are mainly found in redundancies of the

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public/social enterprises, while the number of private entrepreneurs and their employees grew by significantly lower rates than it was expected (Jovanović Gavrilović, 2010). In such situation, the unemployment becomes a main characteristic of the labour market. It is often seen as the biggest socio-economic issue in Serbia.

Significant disparities exist at the regional level: the Central Serbia has been hardest hit by unemployment and Belgrade as the capital city is the best positioned regarding this issue (Gligorov et al., 2011). The regional perspective of the labour market in Serbia is fully recognized by the public policy (NESS, 2011). In the frame of the current public policy process, the regional disparities are seen as a challenge with high priority. For example, the NESS covers initiatives not only at the national, but also at the regional i.e. district levels (the administrative division of Serbia equivalent to the NUTS III level). This analysis allows a distinction between high, medium-, and low-risk labour markets in Serbia and directs the employment policy measures tailored to the specific needs of regions (Arandarenko and Nojković, 2007). Unfortunately, at the public policy level in Serbia the rural-urban labour market characteristics were not fully investigated yet.

From the theoretical point of view, regional and interregional differences, including rural-urban dichotomy are widely recognized in the literature (Terluin, 2001). Rural areas are generally characterized by wide-open space and small, dispersed populations. Demographic and economic changes both pose challenges and create new opportunities for rural areas. Generally, rural areas relay on labour availability and quality. In *The Proposal on Agro-Environmental Indicators* (PAIS) almost 50% of all indicators are based on population and labour (*Population and migrations* – demographic and changes; *Social well-being* – employment and quality of employment; *Economic structure and performance* – enterprises, human capital and structure). Parallel, the list of internationally adopted OECD themes, applied in rural development monitoring of *Economic structure and rural regions performance*, consists of following indicators: labour, employment, enterprises and sector structure, productivity, and investment. Labour market performances indicate perspectives for rural economy diversification. The key rural economy indicators can be derived from relatively simplified and easily accessible labour market statistics.

The literature review in Serbia shows extremely low scientific interest in exploring the rural-urban differences in the labour market. However, a few studies aiming to explain the regional differences based on the administrative division of Serbia are available. Six out of twenty five districts (Belgrade, Juzno-backi, Severno-backi, Branicevski, Nisavski, and Pomoravski district) were selected by the labour market mapping as the most perspective regions in Serbia (Arandarenko, 2006). Based on the same methodology, another study was conducted in 2007 (Stojanović, 2007). According to this study, most regions in Serbia are described using the labour market attributes such as good situation and bad perspectives, or bad situation and bad perspective. The study argues that the rural areas in Serbia generally belong to the lagging behind or poverty stricken-regions.

However, the characteristics of labor market in Serbia are not unique; similar problems (or structure) exist in other Eastern, post-socialist countries. Buchta and Štulrajter analyzed divergence of the socio-economic indicators between the rural and the urban areas in the Slovakia (Buchta and Štulrajter, 2007). As the result of dual approach in the economy development, there is high divergence between developed and undeveloped regions. The developed regions (urban districts of the two biggest cities - Bratislava and Košice) are characterized by mostly urban structure, and with strongly developed production and service activities. The underdeveloped regions have unfavorable location potential; they are predominantly with rural structure, with the underdeveloped and weakly diversified economic activities, and population with lower educational level. The authors argue that development strategy in the country continuously generates the danger of conservation of dual economies - thus exposing total society to the increased regional disparities. Having in mind all facts mentioned above, the paper aims to provide an assessment of the labour market in the rural areas in Serbia. Particular attention is paid to the labour supply and demand mismatches in the identified areas. Overall objective is to find out significant differences between rural and non-rural regions in Serbia regarding the labour market current state and perspectives. Based on the obtained results, the policy recommendations are emphasized.

The Research Methodology

The rural areas in Serbia are officially considered as the non-urban. However, the international organizations recognize a wide range of criteria for the designation of “rural”. The most commonly used criteria

are following: (1) size of population; (2) population density; (3) commuting intensity; (4) share of agriculture in employment or in value added (Way, 2003). In this paper we employed widely used OECD criterion for the definition of rural areas. It defines "rural areas" as local communities with a population density below 150 inhabitants per square kilometer (OECD, 1994). Giving the particular attention to the rural areas, the communities are divided into rural and non-rural depending on their population (Table 1). However, on NUTS III level regions are qualified as predominantly rural, significantly rural and predominantly urban. Predominantly rural areas cover districts with more than 50% of the population in the rural communities. For the purpose of this analysis, the non-rural areas include both significantly rural (with 15-50% inhabitants in the rural communities) and predominantly urban regions (below 15% of the population in the rural communities). Data are available for Serbia without Kosovo and Metohija.

Table 1. *The classification of regions in Serbia (NUTS III)*

Regions	Characteristic	Population	Area	Districts
Rural regions	50% or more of population live in rural communities	55 %	75%	18
Non-rural regions	Less than 50% of the population live in rural areas	45%	25%	7

Source: *Recalculated based on Bogdanov and Stojanović, 2006.*

Different labour market indicators are interpreted in this study. Quality of the labour supply is analyzed by demographic indicators such as share of 65+ and 18+ population in the total population, vital statistics (average age and aging index), and level of education. The indicators of employment (number of employed per 1000 inhabitants, activity rate, employment by sectors, and share of agricultural in total population) and unemployment (number of unemployed per 1000 inhabitants, participation of people looking for their first job in the labor market and participation of unqualified persons in this structure) are equally included. Dependent population ratio, coefficient of importance of young population, rejuvenation rate, substitution rate, and labor market demographic index are used as the key indicators of the labour market current state and perspectives in the rural Serbia. Given the available data, several indicators of labour demand are chosen: share of persons employed in agriculture in given district in total district employment,

number of firms per 1000 inhabitants, share of investment in agriculture in total investment of the district and in total investment in agriculture in Serbia, share of a district in the total Gross Value Added (GVA), and average earnings in districts.

The research data were driven from *The Statistical yearbook of the Republic of Serbia, 2012*, *The Labour Force Survey, 2011* (LFS) and *The Municipalities in numbers, 2011*, published by the Republic of Serbia Statistical Office. The analysis was conducted using descriptive statistics. Differences between rural and non-rural regions were tested by ANOVA in SPSS.

The Research Results and Discussion

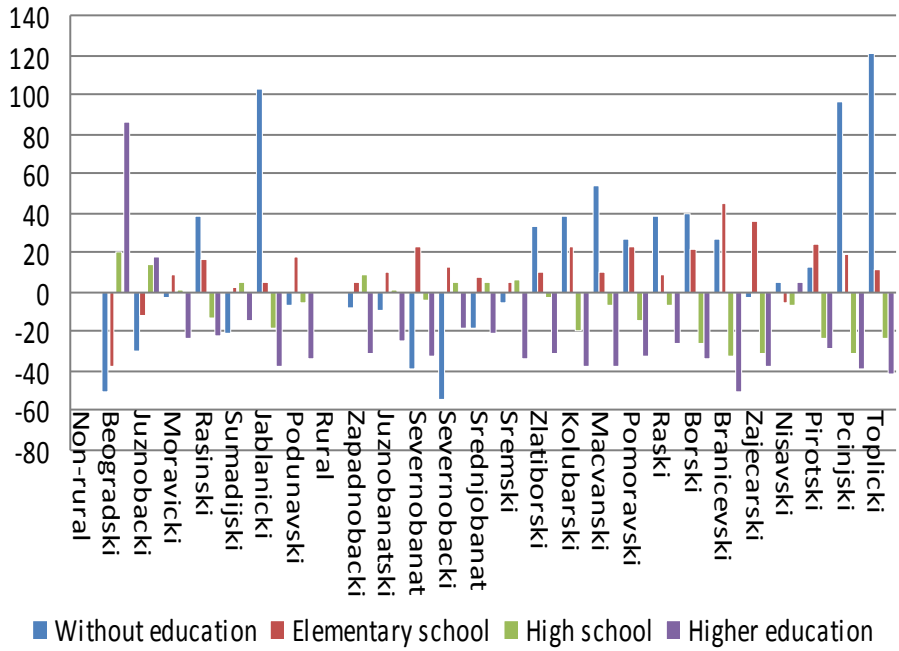
This section is organized in three parts. The first part gives an overview of the labour supply (demographic indicators). The second part deals with the labour demand in the rural areas. Finally, the research results are used to explain significant differences between the rural and other (the non-rural) regions in Serbia.

The average age of population in Serbia, according to *the Census 2002* data, is 41.4 years. In the rural areas this indicator is slightly higher – 41.91 years. Share of population 65+ in the total population is dramatically high in the Eastern Serbia (Zajecarski district – 23.43%, Pirotski district – 21.81%, and Branicevski district – 21.66%). Ageing index appears to be better only in two regions in the South of Serbia – Raski - 72.68, and Pcinjski district - 64.59. Consequently, an outstanding unfavorable relation between pre-productive and post-productive component of population (ageing index is higher than 100) exists in almost 90% of the rural regions (16 out of 18 rural districts).

The quality of labour force is analyzed by the educational level of population in the rural areas in Serbia. Given data are compared with average for Serbia (Graph 1). The Northern part of Serbia (the Region of Vojvodina) is generally better positioned than other parts of the country. However, the lower share of unqualified population (without any education), as well as higher share of population with elementary or secondary school in comparison with the national average do not seem to be good indicators of regional advantage.
As far as educational structure is concerned, the highest potential in the rural Serbia is discovered in the Nisavski district with the highest

involvement of higher educated population compared with the average for Serbia. Unfortunately, it is an isolated case. The educational level can not be considered as the strategic potential for development for most of regions located in the West and the Central part, as well as in the Eastern and the Southern Serbia.

Graph 1. *The educational structure in Serbia - substraction from average in %, 2002*



Source: *Municipalities in numbers 2011, RZS, own calculation.*

The analysis of active population is important as this segment supports economic activity, and influences total production. The analysis preformed for 18 selected areas in the Serbia do not show any significant differences between regions in share of economically active population in the total population. Minimal level is recorded in the Toplicki district – 40.95%, while the maximal value of this indicator appeared in the Kolubarski district - 50.93%.

Table 2. *The rural labour market indicators in Serbia, 2002.*

District	Dependant ratio	Coeff. of young popul. imprt.	Rejuve-nation rate	Substi-tution rate	Labour market demogr. index
Non-rural					
Beogradski	0,44	0,21	0,93	1,20	0,90
Juznobacki	0,44	0,23	1,13	1,29	1,03
Moravicki	0,48	0,22	0,86	1,21	0,98
Rasinski	0,51	0,23	0,80	1,16	0,95
Sumadijski	0,46	0,22	0,93	1,32	1,03
Jablanicki	0,44	0,25	0,67	1,13	0,58
Podunavski	0,49	0,25	1,02	1,33	1,15
Rural					
Zapadnobacki	0,47	0,22	0,90	1,18	0,94
Juznobanatski	0,47	0,23	1,01	1,24	1,03
Severnobanatski	0,48	0,23	0,95	1,12	0,94
Severnobacki	0,46	0,23	0,98	1,16	0,93
Srednjobanatski	0,48	0,23	0,96	1,15	0,99
Sremski	0,46	0,24	1,05	1,29	1,08
Zlatiborski	0,47	0,25	1,10	1,30	1,10
Kolubarski	0,51	0,23	0,84	1,17	1,01
Macvanski	0,48	0,24	1,00	1,34	1,11
Pomoravski	0,56	0,24	0,73	1,10	0,95
Raski	0,50	0,29	1,41	1,51	1,35
Borski	0,50	0,23	0,82	1,05	0,91
Branicevski	0,61	0,26	0,73	1,08	1,02
Zajecarski	0,57	0,20	0,54	0,85	0,70
Nisavski	0,49	0,22	0,82	1,07	0,89
Pirotski	0,56	0,21	0,63	0,96	0,81
Pcinjski	0,53	0,33	1,67	1,54	1,60
Toplicki	0,56	0,26	0,85	1,01	0,95

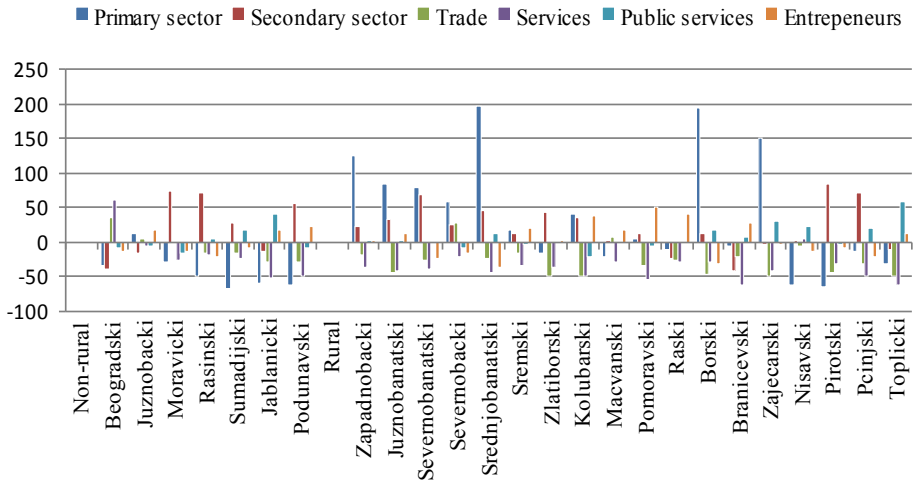
Source: *Municipalities in numbers 2011, RZS, own calculation.*

However, some differences between working contingent and active population are noticed. According to number of employed per 1000 inhabitants Severnobacki, Pomoravski and Kolubarski districts are the best positioned. The worst situation in this area is recorded in the South-East Serbia – Branicevski, Toplicki and Pcinjski district. It is important to emphasize that in the Kolubarski district, with the highest share of employed in the rural areas, more than 25% of population declares as agricultural. The basic cohort groups are usually used in the context of the rural regions development analysis. The current state and perspectives in the labour market can be viewed by different

indicators – dependant ratio, young population importance coefficient, rate, rejuvenation rate substitution rate, and labour market demographic index (Table 2). The labour market demographic index gives the first insights in the future needs of new employments in the next ten years. The requested job creation is important in prevention of the out-migration and decrease of the rural population. The analysis indicates particularly stricken regions – the highly unfavorable rejuvenation and substitution rates are recorded in the South-East of Serbia – Zajecarski and Pirotski district. Due to future possibilities for employment, the hardest economic situation is recorded in Pcinjski and Raski district. The demographic index shows requested job creation in the next 10 years for 60% more in the first district, while the same indicator in the second region ultimately demonstrates the need of 35% working places more than it is now. Having in mind the socio-demographic and economic indicators of the labour supply, the rural Serbia obviously seeks urgent definition of a new development approach.

Beside the socio-economic structure of rural population, it is necessary to analyze also the demand side - determinants of rural labour allocation. It is well known that the growth and decline of a region depends on their ability to attract and retain business and people (Bristow, 2005). Therefore sectoral structure of employment, investments in the region, number of firms, GVA per employee and level of salary are included in this analysis.

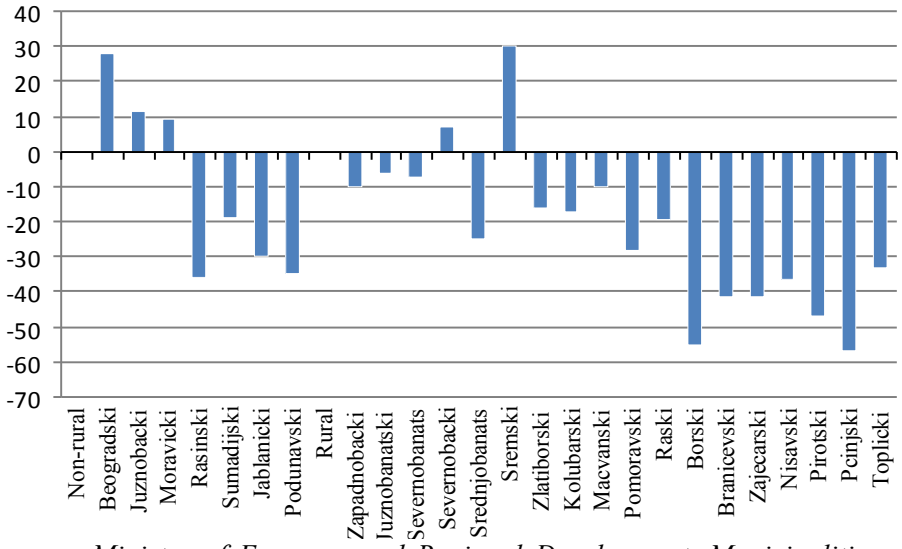
Graph 2. *The sectoral structure of employment – deviation from the average in %, 2002*



Source: *Municipalities in numbers 2011, RZS, own calculation.*

The economic structure of the region influences the regional employment. Thus, the additional information is given by the sectorial analysis (Graph 2). The rural areas are characterized by higher share of the primary sector (agriculture, forestry, water management, and mining). In this context the northern part of Serbia – the Region of Vojvodina, as well as two districts in the Eastern Serbia – Borski and Zajecarski district, hold particular position. As it was expected, due to their characteristics, the rural districts are marked with higher share of employed in agriculture in the total employment. It is on the average 4,51%, in the contrast to the other regions where the value of the same indicator is 2,26%. The lowest share of employed in agriculture is in the Sumadijski district, and the largest proportion of employed in agriculture is in the Zapadno-backi district. The secondary sector (the food industry, primarily) is more developed in the Region of Vojvodina. In the capital city of Belgrade higher share of the trade and services sector is noticed. On the other hand, the regions with structural problems record higher share of the following sectors: (1) the share of entrepreneurs in the total employment in Macvanski, Pomoravski, Raski and Branicevski district is higher than average for Serbia; (2) in four regions in the South-East Serbia – Zajecarski, Niski, Toplicki, and Pcinjski district, share of the public services sector (such as education, health sector, communal services etc.) in the total employment is higher than average for Serbia.

Graph 3. *GVA per employee of districts compared to the Serbian average, deviation in %, 2010*

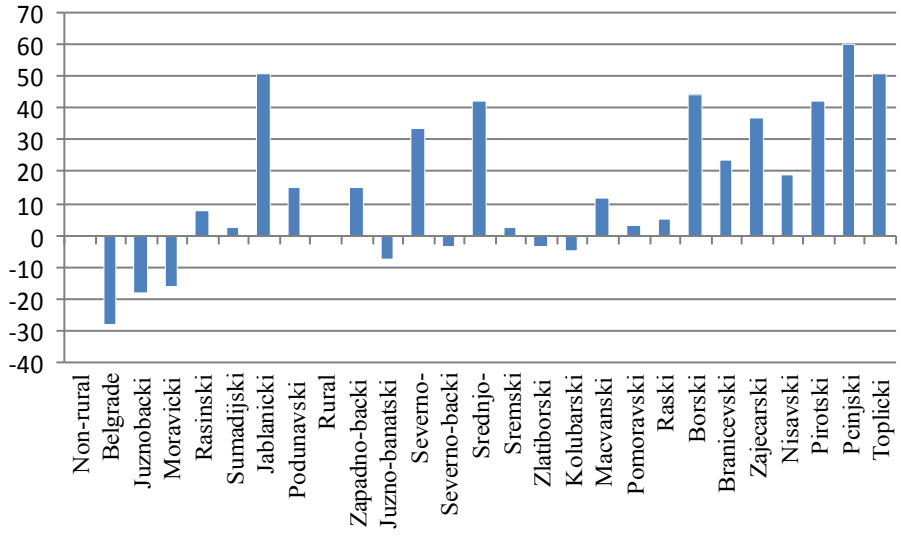


Source: *Ministry of Economy and Regional Development, Municipalities and Regions in Serbia 2011, RZS, own analysis.*

GVA per employee in districts compared to the Serbian average could be used to observe relative productivity of employed persons. Compared to the average of Serbia, large number of districts has low productivity of labour force (Graph 3). The highest productivity of labour is noticed in the Sremski district and Belgrade, and the lowest in two districts in the South-east of Serbia - Borski and Pcinjski. Employees in Belgrade, on average, earn more than 25% higher salary compared to the Serbian average. Employees in only two additional districts – Juzno-backi and Juzno-banatski have salary above the Serbian average. The lowest salary is earned in Toplicki and Pirotski district.

According to the unemployment rate, the worst situation is noticed in Raski, Toplicki, and Nisavski district. The Raski district is characterised with the highest share of persons who are looking for a first employment at the labour market. On the other hand, the qualification structure of the unemployed is highly unfavorable in this region – the share of the unqualified persons in the corpus of unemployed people is almost 45%.

Graph 4. *Number of inhabitants per firm on NUTS III level compared to the Serbian average, deviation in %, 2010*



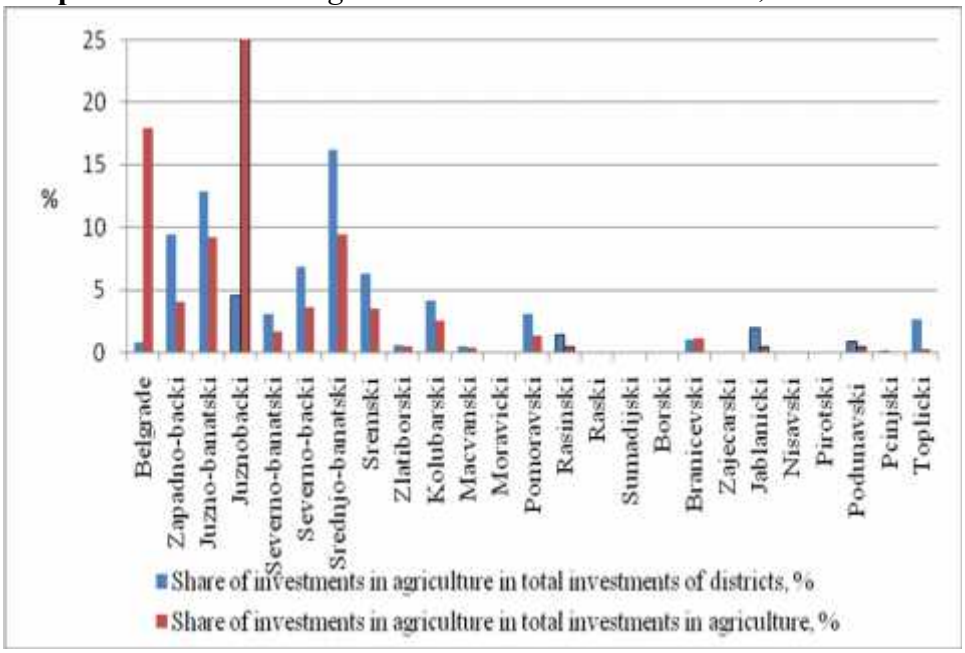
Source: *Ministry of Economy and Regional Development, own analysis.*

Regarding the number of firms, the best situation is in the capital city (Graph 4). In comparison with the average for Serbia, almost 30% less

inhabitants per one firm are registered in Belgrade. The worst situation is recorded in Pcinjski, Jablanicki, and Toplicki districts with 40 up to 50 percents more inhabitants per firm than the country average.

As far as investment are concerned (Graph 5), the rural areas have on average invested more in agriculture: almost 4% of total investments in the districts are directed toward farming. In the non-rural districts the share of agriculture investment in the total investment is 1,46%. In Belgrade, only 0,8% of total investment have been made in agriculture. When analysing investment in agriculture in a given district as a proportion of total investment in agriculture in Serbia, the results are opposite: the non-rural regions acquired on average larger percentage of agricultural investment made in Serbia (approximately 5% per each region). Each rural area attracted on average only 2% of total investment in the Serbian agricultural sector. For example, in Juznobacki district, classified as non-rural district, investment in agriculture were slightly above a quarter of total agriculture investment in Serbia. On the other hand, the extremely low agricultural investment are recorded in eight out of eighteen rural districts – sum of their share in total investment is lower than 1%.

Graph 5. *Investment in agriculture on NUTS III level in %, 2010*



Source: *Municipalities and Regions in Serbia 2011, own analysis.*

Differences between rural and other (non-rural) areas in Serbia are found to be significant only in a few cases. It is interesting to point out that any differences at 1% significant level both regarding labour supply and demand are not found. Regarding labour supply, differences at 5% significance level are found in dependant ratio and share of lower and higher educated in the total district population. Differences regarding working contingent, and high school educated are identified at 10% significance level (Table 3).

Table 3. *The labour supply, differences identified by ANOVA*

Indicator	Mean	St_dev	F stat
Dependant ratio			
Rural	0.5094	(0.0450)	
Non-rural	0.4670	(0.0292)	5.262**
Working contingent			
Rural	65.81	(2.0395)	
Non-rural	67.31	(1.4940)	3.104*
Elementary educated in the total district population			
Rural	46.48	(4.7965)	
Non-rural	40.05	(7.6806)	6.424**
High school educated in the total district population			
Rural	36.48	(5.8651)	
Non-rural	41.40	(5.7341)	3.593*
Higher educated in the total district population			
Rural	7.66	(1.2990)	
Non-rural	10.58	(4.8237)	5.870**

* *Significant at 10% significant level. ** Significant at 5% significant level. *** Significant at 1% significant level.*

The labour demand in the rural and other areas heavily depend on the economy structure (Table 4). The primary sector is significantly more important in the rural districts, while in the non-rural districts employment more relay on the tertiary sector - trade and services. Regarding the economic sector structure all differences are found to be significant at 5% level. Better employment possibilities and overall quality of the labour demand in the non-rural than in the rural areas are heavily influenced by higher investment (level of significance <0.05).

Consequently, the non-rural areas are characterized with significantly less inhabitants per active firm ($p<0.10$).

Identified differences between rural and other regions in Serbia are interrelated. For example, lower educational level of population in the rural areas significantly influences their orientation toward the primary sector activities which require lower educated labour. However, as a result of lower labour quality, investments are more often directed toward other regions (urban and significantly rural regions). On the other hand, it is surprising that even agricultural investment are higher in the Serbian non-rural regions. However, huge regional disparities are evident both due to the labour market supply and demand.

Table 4. *The labour demand, differences identified by ANOVA*

Indicator	Mean	St_dev	F stat
Primary sector share in the total district economy			
Rural	5.34	(3.1037)	6.467**
Non-rural	2.26	(1.0390)	
Trade sector share in the total district economy			
Rural	7.59	(2.2455)	4.596**
Non-rural	9.77	(2.3956)	
Services sector share in the total district economy			
Rural	8.49	(2.1173)	4.327**
Non-rural	11.46	(2.4509)	
Number of inhabitants per firm			
Rural			
Non-rural	28566	(5132)	3.341*
	24125	(6279)	
GVA per capita			
Rural	70.39	(24.2126)	3.459*
Non-rural	102.71	(64.6109)	
Investments			
Rural	5164201	(2528640)	4.283**
Non-rural	41317012	(76669249)	

** Significant at 10% significant level. ** Significant at 5% significant level. *** Significant at 1% significant level.*

Finally, the obtained results might be different if other regional aspects of analysis were included (for example, the spatial analysis regarding north and south of the country; urban *versus* other regions). The analysis at the NUTS IV level might give significantly more insights in the rural labour

market as well. This paper presented an analysis of the current situation on the labor market. Testing changes over time might indicate the presence of certain trends. However, the important regional disparities in Serbia are identified. The study emphasizes urgent need for a new economic dynamism based on the framework of wider context of regional and rural development strategy.

Conclusion

Strategic planning and definition of institutional framework for agricultural and rural development, among others, strongly relay on the labour market characteristics. Spatial inequality of chances for employment of rural and urban population is evident in our labour market. Therefore the paper refers to neglected issues of the rural – non-rural labour market disparities in Serbia.

Regarding labour supply, the accompanying sign of the rural regions is a low level of education. It limits possibility for investment in development of tertiary sector in these regions. However, analysis showed that investment in agricultural projects were not directed toward these regions more significantly as well. Huge urban market and suburban agricultural areas are more attractive even for agricultural investment in Serbia. The labour supply and demand generally mismatches as a result of the continuously governed dual policy. The economic policy based on the dual economy structure is justified only during the limited period of time (the initial phase). Any further delay in the transition to the single-sector growth model can lead to the opposite effects. The similar results were obtained in the study of Buchta and Štulrajter in 2007. For example, in our analysis no significant differences are found due to unemployment. The Serbian rural and non-rural areas are equally exposed to limited labour demand. Additionally, regarding demographics, no statistically significant differences are noticed as well. Population in Serbia is generally ageing no matter if it is rural or urban.

Our study shows that most of the rural districts in Serbia are still facing with initial problems in developing even agrarian rurality. Based on the level of education some rural regions have better potential for development. Arandarenko argued that some rural districts in Serbia had a potential to generate economic growth (Arandarenko et al., 2006). However, even with more favorable educational structure of the population, they still fail to take a chance. The public policy should be

obviously focused on the relevant issues of strategic development without any dualities.

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_____III SECTION_____

AGRIBUSINESS OF RURAL AREAS, DIVERSIFICATION AND COMPARATIVE ADVANTAGES OF RURAL ECONOMY

AGRICULTURAL STRUCTURE IN THE SOUTH OF ROMANIA AND AGRICULTURE DEVELOPMENT OPPORTUNITIES[1]

Adrian Turek Rahoveanu[2,3] *Magdalena Turek Rahoveanu,*[4,5]

Abstract

Economic zoning is an indispensable step in the establishment of sector development strategies and policies that respond to the particular needs and allowing preservation of individuality of each area. The configuration of these areas is not static in time and space, modifying it according to the needs and level of economic development at a time. To substantiate rural policies depending on the specific area, studies are needed to define the typology of rural communities, to highlight the socio-economic disparities. This research is aimed at selecting a limited number of diagnostic features, accomplishing conditions for stability in time, representation and accessibility of data. This approach is an important tool in diagnosing the countryside and a base for rural policy substantiation.

Keywords: *agrarian structures, agricultural economics, competitiveness, agricultural policies*

[1]The paper is a part of the research on the PNDII Project 1762/2008 "Improving management of production structures in developing South Muntenia Region in order to increase the competitiveness of farms", financed by the Ministry of Education and Research of Romania

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Introduction

An important role in the national economy development is to relaunch agriculture, as a key sector of Romania. Creating a functioning market in Romania to be able to cope with the market forces within the EU, implies reducing the existing disparities in Romanian agriculture, including those related to physical and value production are in the foreground.

The agricultural potential of the area is high, but the fragmentation of agricultural land, plus inappropriate technical equipment, poor infrastructure and an aging workforce and / or unqualified for agriculture, make this potential to be poorly capitalized.

In this context, in this paper we intend to analyze the state of development of agriculture in the lowlands of the south, the method adopted quantifies the state of economic processes according to its real parameters that are expressed by specific technical and economic indicators, plus data and qualitative information.

Material and method

For this work we have done documentation and processing data obtained from the Romanian Statistical Yearbook, 1995-2010 editions and the General Agricultural Census, year 2010.

Using the analysis and comparison method is presented the agrarian structures situation in southern Romania and based on existing strengths and opportunities we could formulate some solutions to increase competitiveness and development possibilities of agriculture in the south of Romania.

The issues pursued in this work are: presentation of the development regions in the south of Romania, analyze the agricultural economy of the South of Romania, SWOT analysis of the study area and opportunities for development of agriculture in the south of Romania.

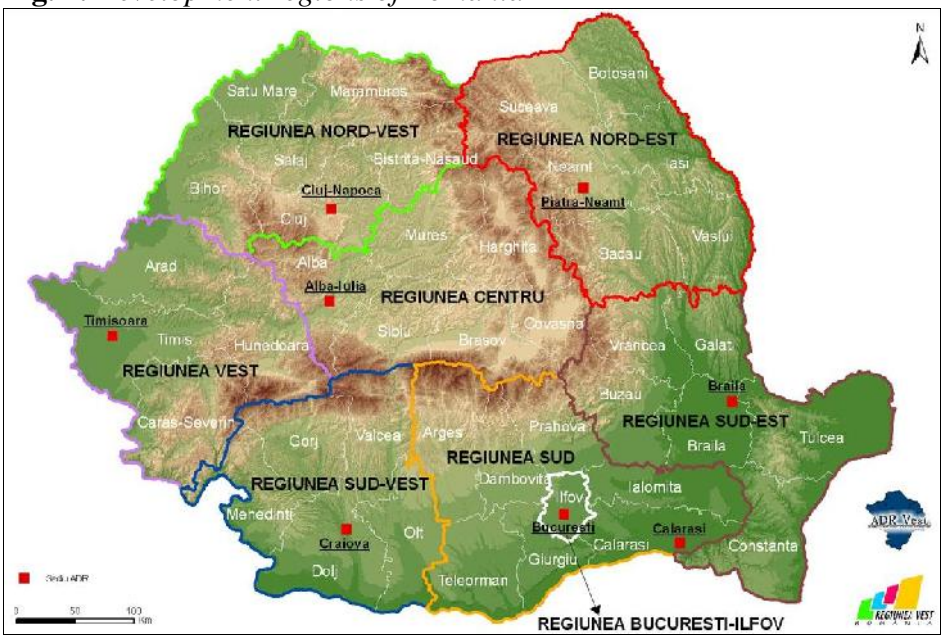
Results and discussion

Presentation of the development regions in the south of Romania

South Muntenia region has an area of 34,453 km^2, representing 14.45% of Romania's surface and has 7 counties: Arges, Calarasi, Dambovita, Ialomita, Giurgiu, Prahova and Teleorman, topography of the area is characterized by variety and includes three major forms of relief: mountain 9.5%, 19.8% hills, plains and meadows 70.7%.

South West Oltenia has an area of 29,212 km^2, representing 12.25% of Romania's surface and has 5 counties: Dolj, Gorj, Mehedinti, Olt and Valcea, the relief is characterized by three major forms of relief: mountains, hills and plain (Figure 1).

Fig. 1. *Development regions of Romania*



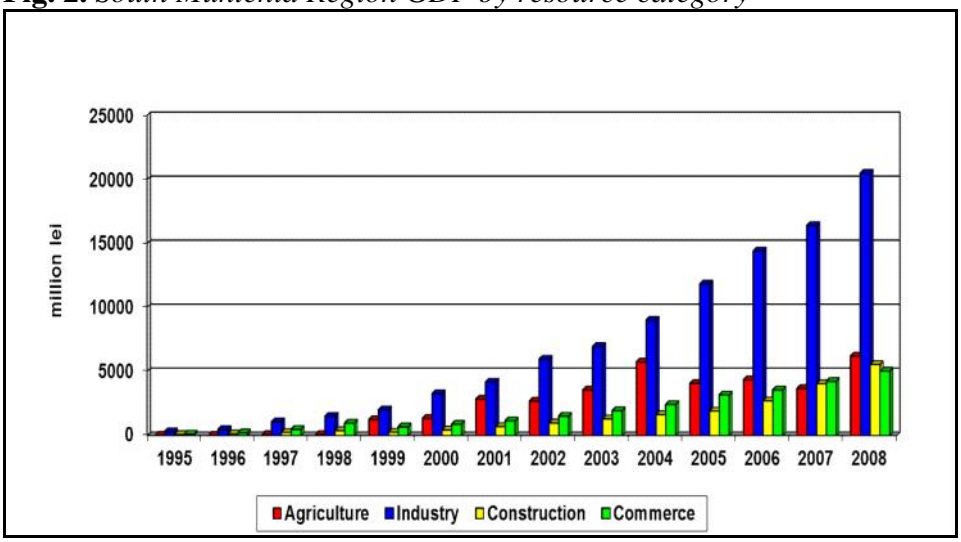
Source: *www.strategvest.ro*

Declining share of agriculture in GDP in Romania is a normal and expected trend in the economic development, but is usually accompanied by a decline of employment in agriculture, as labour migrates to other sectors.

Data presented for the analyzed region shows that agriculture has not contributed significantly to the economic growth, fluctuations in agricultural production being influenced by the climatic conditions.

The South Muntenia Region in the period under review, regional GDP had an increasing trend from 1162.7 millions lei in 1995 to 64,535.4 lei in 2008. During the same period, the contribution of agriculture to the achievement of regional GDP was 1.84% in 1995, compared to 9.63% in 2008, in the conditions of increasing of 290 times of agriculture share to South Muntenia region GDP (Figure 2).

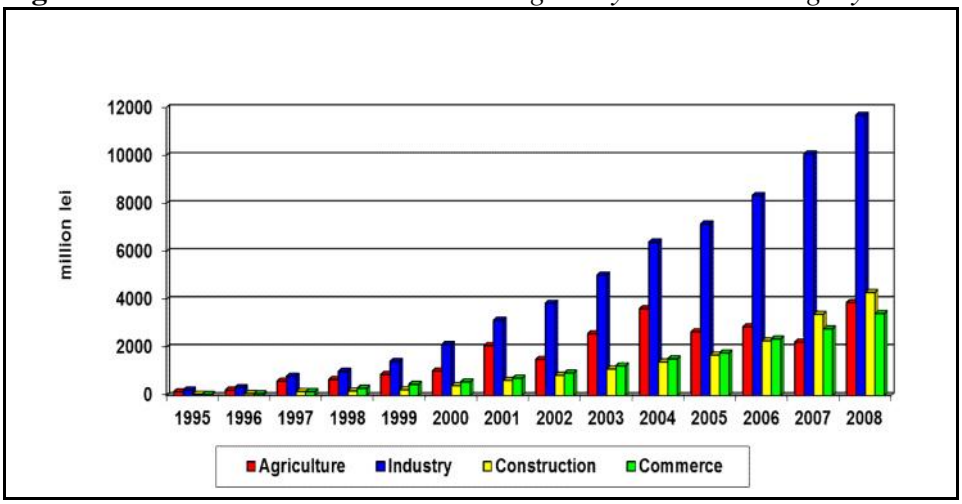
Fig. 2. *South Muntenia Region GDP by resource category*



Source: *General Agricultural Census, 2010.*

In SW Oltenia region, regional GDP had an increasing trend, from 699.8 million lei in 1995 to 40,340.2 in 2008. During the same period, the contribution of agriculture to the achievement of regional GDP was 22.2% in 1995, compared to 9.59% in 2008, in the conditions of increasing of about 25 times of agriculture share to South West Oltenia region GDP (Figure 3).

Fig. 3. *GDP in the South West Oltenia region by resource category*



Source: *General Agricultural Census, 2010.*

In 2009 there was a decline in GDP of 7.1% in Romania, which is part of the global recessionary trends and not by accession, except to the extent that by the accession Romania became more integrated into the international circuit and thus more exposed to external disturbances.

In 2009, agriculture (including forestry and fisheries) contributed to total gross value added (GDP) by 6.7%[6]. According to NIS, agriculture contributed the least to lower GDP. This favourable inertia is a consequence of agricultural support and the fact that demand for agricultural products is inelastic in relation to price and income.

After the economic crisis, agriculture had a stabilizing effect on the economy, especially by contribution from 2010 and decisive in 2011, due to good crops.

Agricultural economy of the South of Romania

Important sector of the regional economy, agriculture is present in both development regions studied, the largest share being held by counties from plain area (Ialomita, Calarasi, Giurgiu, Teleorman, Olt and Dolj).

According to statistics, in 2010 the agricultural area of the two regions was 4,238,065 hectares, representing 28.9% of total agricultural area of

[6] Monthly Statistical Bulletin no.12/2009, National Institute of Statistics

the country, causing agricultural character and high agricultural potential of the area. The structure of agricultural area, that is arable land 75.99%, 20.39% meadows and pastures, vineyards and orchards 3.61% and favourable natural conditions have led to the development in these regions of all branches of agriculture.

The Romanian agriculture is heterogeneous in terms of exploitation structures, and their dual nature is emphasized to the vast majority of Member States of the European Union. Although some progresses were done, is maintained an excessively high number of individual farms, small and very small, inefficient, as well as a few large and very large units whose activity was not restructured to become compatible with the requirements of the community market, and to receive financial support, while applying the mechanism to reduce subsidies for large farms. Missing a medium farm sector, family and associative, which characterizes "European agricultural model" that was formed long time under the impact of the Common Agricultural Policy[7].

In Romania, the small subsistence farms proved very durable. Structural changes should lead to the development of these households multifunctional in their association marketing, supply inputs, pooling of investments and agricultural works, storage products, processing of raw materials, etc. Gradually, the number of subsistence farms will decrease in favor of forming a viable commercial sector and rural economic diversification in Romanian.

Existence of diversified farming structures, connected by various forms of cooperation and agro-industrial integration that are competitive single market and the world market, fundamental option for Romania[8].

General Agricultural Census of 2010 provides an image of agriculture on agricultural structures operating both nationally and in the studied area. Reflects also the dual structure of agriculture nationwide, where about 56% of agricultural area is used by the individual sector, agricultural

[7] Letitia Zahiu (eds.) - "Agriculture in the Romanian economy - between expectations and realities", Ceres Publishing, 2010

[8] Turek Rahoveanu Adrian (coordinator), Turek Rahoveanu Magdalena, Ion Raluca, Voicu Radu - “Optimizing production structures - necessity to ensure the competitiveness of farms”, Terra Nostra Publishing, Iasi 2011

holdings without legal personality, remaining 44% being used by different types of legal entities with legal personality (table 1).

Table 1. *Utilised agricultural area by legal status of farms, year 2010*

Development Regions	Total agricultural holdings		Agricultural holdings without legal status		Agricultural holdings with legal status	
	ha	%	ha	%	ha	%
Romania	**13298**	*100*	**7,445**	*100*	**5,853**	*100*
Southeast Muntenia	**2,333**	*17.54*	**1,069**	*14.36*	**1,264**	*21.60*
South West Oltenia	**1,608**	*12.09*	**1,105**	*14.84*	**503**	*8.59*

Source: *General Agricultural Census, 2010.*

Regarding the sector analyzed, the individual sector or agricultural husbandries sector comprise 1.36 million farms with an average size of 2.92 ha in Muntenia South East and 2.79 ha in South West Oltenia, which operates nearly 51, 4% of the utilized agricultural area in the southern area of the country, which is the main component of private agricultural sector (Table 2).

Table 2. *Agricultural holdings and utilized agricultural area average per farm, year 2010*

Development Region	Total agricultural holdings	Agricultural holdings using agricultural area	UAA average	
			on a farm	on an agricultural holding using agricultural area
	number	number	hectares	hectares
Romania	**3,856,245**	3,721,885	**3.45**	3.57
Southeast Muntenia	**800,269**	760,432	**2.92**	3.07
South West Oltenia	**576,590**	554,660	**2.79**	2.90

Source: *General Agricultural Census, 2010.*

Another major component of agriculture is represented by farms classified as having legal personality. According to the census of 2010, there were 5297 units (with an average size of 255 ha per holding), whose legal status can be classified into several categories (Table 3 and Table 4):

- companies / agricultural associations totalling 215 units in South East Muntenia and 79 units in the South West Oltenia, with an average size of 660 ha and 379 ha respectively;

– units totalling 3898 companies in South East Muntenia and 1105 units in South West Oltenia with an average size of 232 ha and 248 ha respectively;

Table 3. *Agricultural holdings, by legal status, year 2010*

Development Region	MU	Total	Of which:		
			Agricultural individual holdings	Societies / agricultural associations	Companies
Romania	No	**3,856,245**	**3,820,393**	**1,390**	**16,410**
	%	*100.0*	*99.07*	*0.03*	*0.42*
Southeast Muntenia	No	**800,269**	**793,718**	**215**	**3,898**
	%	*100.0*	*99.18*	*0.02*	*0.48*
South West Oltenia	No	**576,590**	**573,768**	**79**	**1,105**
	%	*100.0*	*99.51*	*0.01*	*0.19*

Source: *General Agricultural Census, 2010.*

Table 4. *UAA, by legal status, year 2010*

Development Region	MU	Total	Of which:		
			Individual holdings	Societies / agricultural associations	Companies
Romania	ha	**13298**	**7,154**	**556**	**3,169**
	%	*100.0*	*53.8*	*4.1*	*23.8*
Southeast Muntenia	ha	**2,333**	**948**	**142**	**906**
	%	*100.0*	*40.6*	*6.1*	*38.8*
South West Oltenia	ha	**1,608**	**1,083**	**30**	**274**
	%	*100.0*	*67.3*	*1.8*	*17.0*

Source: *General Agricultural Census, 2010.*

Romania is characteristic structural dualism, namely the existence of a small number of large and very large farms at one pole and a large number of small individual farms and very small at the other pole. Are almost completely lacking exactly what characterizes the agriculture in developed countries, namely commercial family or medium size farms, that may generate economic, social and ecological benefits to both forms of farms located in extreme. Among individual farms can hardly find commercial holdings, expressed in at least one European economic unit. As a result, the current situation of Romanian agriculture is the result of large and small farms, both still running efficiency crisis[9].

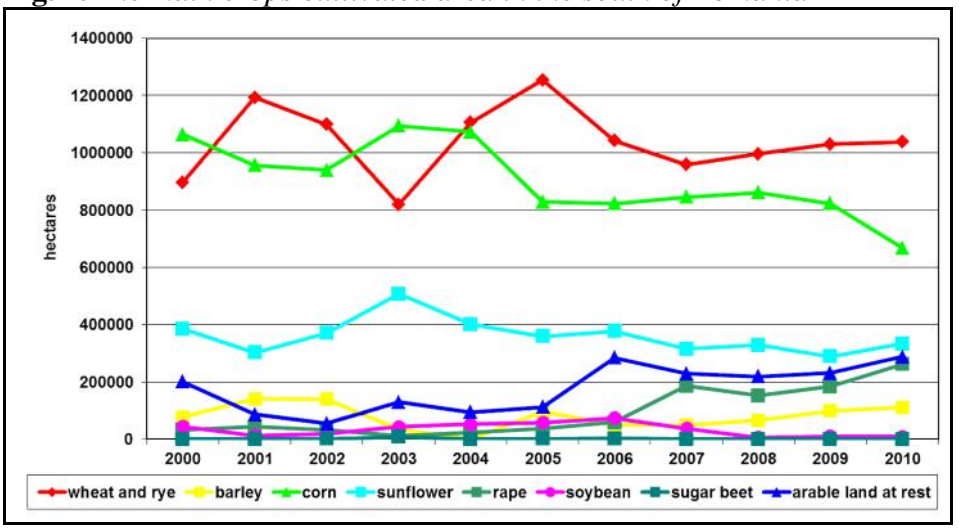
[9] Marin Popescu – „Economic, social and environmental efficiency, in the context of sustainability of agriculture and European integration", 2004

Romanian agriculture has the comparative advantage of the existence of natural resources, favorable to high yields and has cheap labor in rural areas, but get a low agricultural productivity and has no sufficient financial resources to modernize agriculture and rural activities. To this goal, we really need a long-term strategy, as in agriculture the investment results requires long-term approach[10].

Overall analysis south of the area reveals underutilized natural resources and a low production due to limiting factors related to the management, existing agricultural structures, lack of productive capital and investment.

Regarding areas under cultivation in the south of Romania we find that wheat and maize occupy the most important areas, with annual average between 800,000 and 1.2 million ha, followed by sunflower with average approx. 400,000 ha. The remaining crops: rapeseed, barley, soybean or sugar beet areas totalling less than 200,000 ha annually (Figure 4).

Fig. 4. *The main crops cultivated area in the south of Romania*

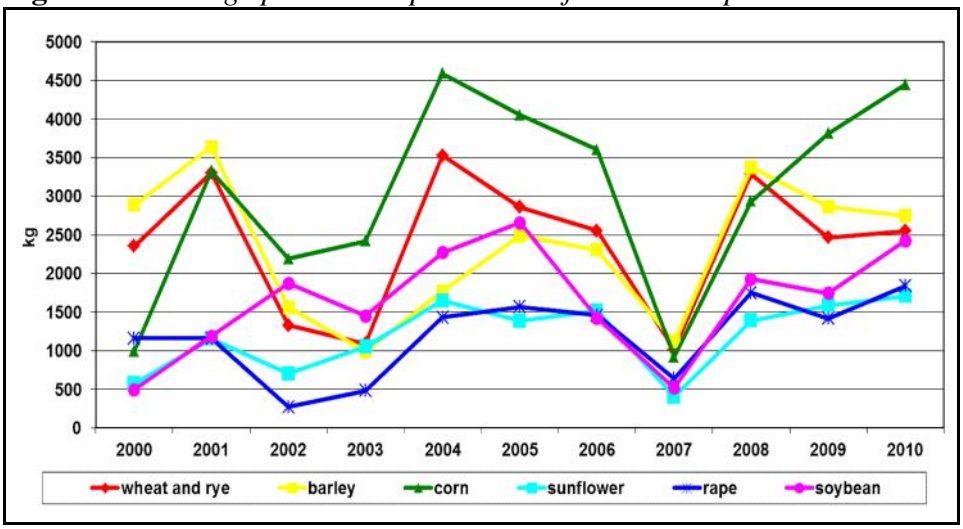


Source: *General Agricultural Census, 2010.*

The average yields had very large developments from year to year that shows totally dependence of agricultural productions on natural and climatic conditions of the area, which leads to instability of production (Figure 5).

[10] Letitia Zahiu Traian Lazăr – "Romania's Agriculture in the European Agricultural Integration Process" Ex Ponto Publishing, Constanta, 2000

Fig. 5. *The average production per hectare for main crops*



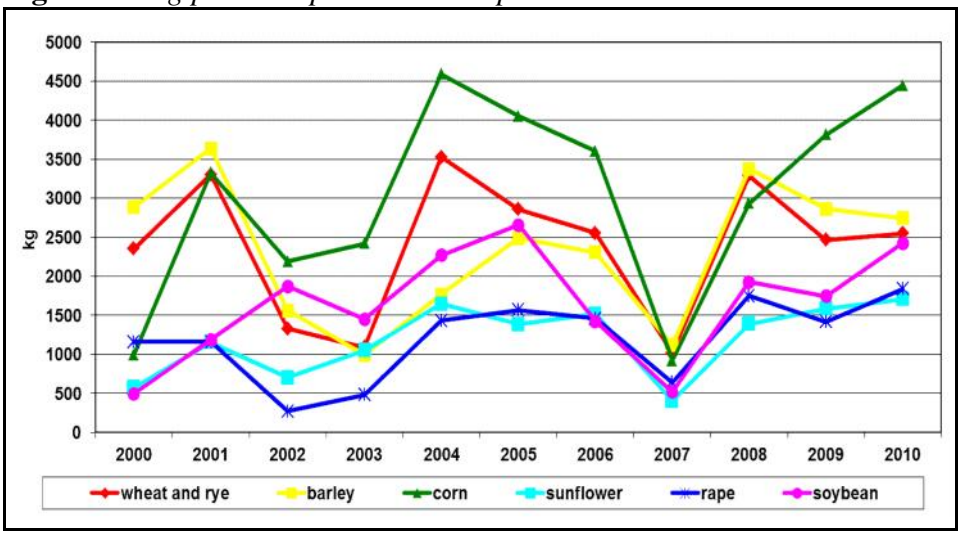
Source: *General Agricultural Census, 2010.*

The causes of this reduction of yields per hectare are numerous. These include:

- decrease the productive capacity of agricultural land, due to lack of land improvement works, especially irrigations which are particularly desirable because of the drought that affected Romania in recent years;
- excessive land fragmentation, which makes almost impossible to use performing culture technologies;
- absence of a coherent policy for land fusion;
- lower use of industrial inputs within individual farms because the prices have become higher compared to prices of agricultural products.

Such large variations cause distortions in the market, the offer acting directly on sales prices and on farmers' income. In years with better harvests the prices collapsing often below the cost of production, and in years of poor harvests farmers have nothing to sell (Figure 6).

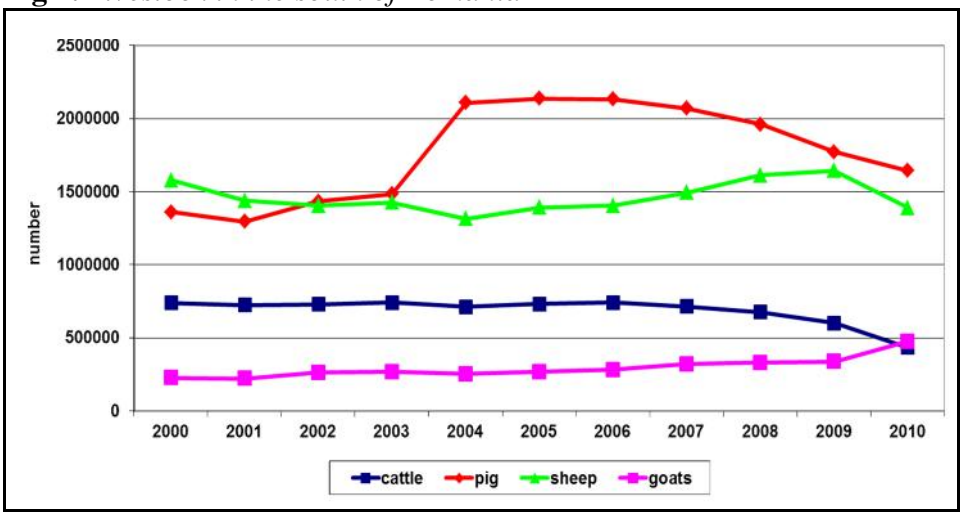
Fig. 6. *Selling prices to producer - crop sector*



Source: *General Agricultural Census, 2010.*

The livestock sector suffered the heaviest shock of reforms. Currently, almost all livestock and poultry is private, especially individual households. In the south of Romania, it can be seen that during the analyzed period, cattle, sheep and goats had a relatively stable trend, the only fluctuations occurring in pig herds, ranging between 1.5 and 2.1 million heads (Figure 7).

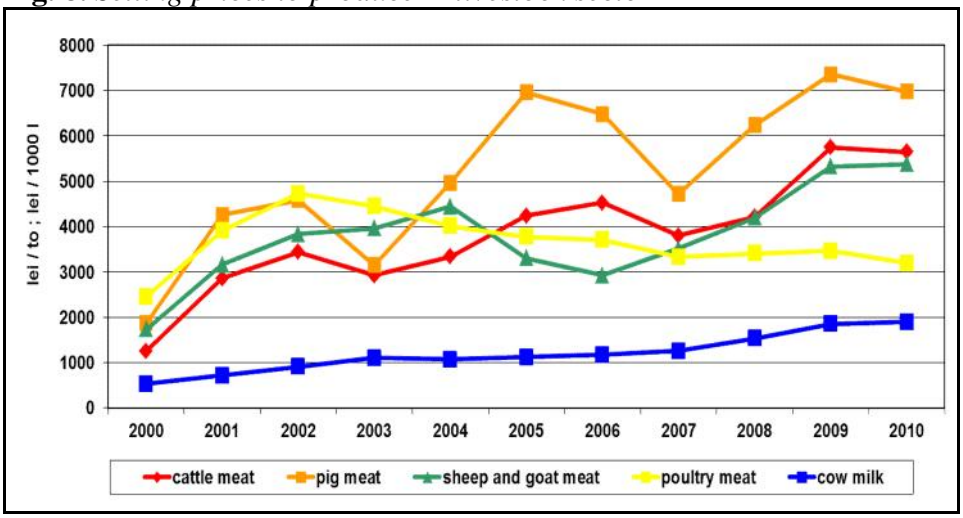
Fig 7. *Livestock in the south of Romania*



Source: *General Agricultural Census, 2010.*

Most households are not specialized in animal breeding and raise animals solely for consumption. For this reason, the degree of marketing of animal products is extremely low and the quality is heterogeneous. To these is added the lack of financial resources to purchase large productivity livestock jelly, the lack of collection channels and ultimately lower prices received by farmers from the processors (Figure 8).

Fig. 8. *Selling prices to producer - livestock sector*



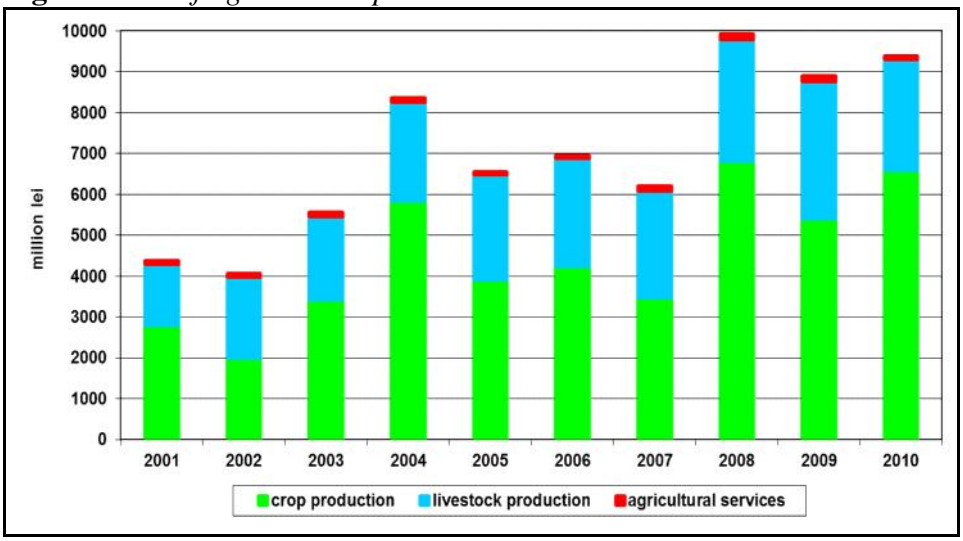
Source: *General Agricultural Census, 2010.*

Creating a functional market to be able to compete within the European Union markets, involves reducing disparities between Romania and European agriculture, among that those related to physical and value production are in the foreground.

The total agricultural production of the analyzed area ranged between 4000 and 10,000 millions lei, of which crop production value ranged between 50% - 70%, the value of livestock production ranged between 29% - 49%, and agricultural services only recorded percent 1% - 2% (Figure 9).

To reduce these gaps on agricultural production value measures are required such as equipment with tractors and farm machinery, irrigation use, performance biological material, modern means of information and extension of research results in the field.

Fig. 9. *Value of agricultural production branch*



Source: *General Agricultural Census, 2010.*

The lack of agricultural competitive offer in the context of climate change and economic crisis requires a new approach to the role of agriculture as a balancing factor for Romania's economic growth model.

SWOT Analysis of the South Region of Romania

Strengths:

- High agricultural and livestock potential mainly in the southern part of the region (over 50% of the area is located in the plains);
- High fertility of the soil;
- Majority private sector ownership of agricultural land (over 99%);
- High tourism potential that create favourable conditions to agro-tourism activities in the northern part of the area;

Weaknesses:

- Low profitability of agricultural activities due to land fragmentation and large number of individual farms practicing a subsistence agriculture;
- Low diversification of agricultural production - high concentration of cultivation cereals;
- Insufficient irrigation of agricultural land – dependence of production on natural and climatic conditions of the area, which leads to instability of production;

- Inputs costs are high, resulting in high prices of agricultural products far beyond imported;
- Insufficient financial resources that determine the practice of nonperforming technologies, the use of obsolete agricultural machinery and therefore obtaining low production at high costs;
- Inability of small farmers to improve their market competitiveness results in loss of attractiveness to agricultural activity, resulting in their migration to urban areas;
- Farmers do not know what and how much to produce for the market;
- Lack of collection systems for agricultural products;
- Low level of processing agricultural products leading to added value;
- High share of elderly population occupied in agriculture;
- Lack of specialized labour;
- Non-correlation of education and training with labour market needs - no professional or vocational schools;
- Low level of development of infrastructure;
- Reduced capital investment in agriculture;

Opportunities:

- Access to European funds for the development of agricultural activities;
- Promoting local initiatives of "Leader";
- SME development in productive and service areas specific to rural areas;
- Association between farmers to share production costs and to increase profitability in agriculture;
- Development of organic farming;
- Processing of agricultural products to increase their added value;
- Access to the EU internal market;
- Development of infrastructure to support economic activities;
- More efficient use of tourism potential and improve the quality of tourism services, agro-tourism development and protection of historical and cultural traditions of the south area of the country;
- Educational and training programs for specializations in non-agricultural areas, financed through the Sector Operational Programme Human Resources Development;
- Applying scientific research results obtained in agriculture;

Risks:

- EU accession in 2007 has resulted in increased competition for agricultural products;
- Widening imbalance between rural communities and depopulation of them - young people migrating to urban areas or abroad;
- Excessive aging of the population employed in agriculture;
- Reduced capital investment in agriculture;
- Low quality of agricultural management;
- Lack of entrepreneurial culture in rural areas.

Conclusions

Opportunities for development of agriculture in the south of Romania

The main measures to reduce and gradual elimination of structural gaps from south area agriculture of Romania to the EU Member States and to increase competitiveness and economic efficiency, address the following:

- the best use of the natural conditions of soil and climate, human, material and financial resources of farms;
- increasing mechanization of agricultural operations, increase productivity and yields while reducing production costs;
- concentration of agricultural production in larger units to produce for the market in terms of economic, social and environmental efficiency;
- quantitative and qualitative stabilizing of supply of agricultural products by improving the quality of inputs and technologies;
- initiating and supporting the establishment of associations of individual farmers for supplying inputs, executing mechanical works, storage products produced and efficient marketing of products obtained;
- accelerate the restructuring of farms by increasing territorial and economic dimensions to form medium farm sector, concentrate the supply for sale, along with organizing small farmers in various forms of association and cooperation on product chains to ensure market competitiveness and income for the rural residents;
- improvement of production structures to meet domestic consumption demand and exports by stimulating intensive

development of production and economic diversification in rural areas;

- promoting sustainable production and consumption model by increasing food production on sustainable ways and product quality, thus it is possible efficient use of agricultural resources and increasing competitiveness on the European market and the world market;
- increase added value and labour productivity in farms by economic organization of farmers, improving the use of agricultural resources and using financial support from the Community and from the national budget for restructuring farm activities and investments;
- agro-food chains organization (production, storage, processing, distribution) resulting in increased competitiveness in agriculture;

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ROMANIAN TOURISM IN THE CONTEXT OF SERVICES GLOBALIZATION

Adrian Ungureanu [1], *Lana Nastić*[2]

Abstract

This paper makes a short and descriptive analysis regarding the globalization effects on Romanian tourism. In obtaining results, the author used the tourist flow analysis which is analyzed by its components namely internal or external number of tourists, their origin and synthesis method is realized reconstruction phenomenon separate component. The main objective of this analysis is to provide some answers, especially in terms of increasing interest for Romanian tourism in the context of globalization of tourism.

Key words: *tourism, globalization, competitiveness*

Tourism contribution to the development of services

Globally, there is a tendency of the tourism to develop at an accelerated rate as compared to other industries. This process caused, on the one hand, the reduction of the amount of people employed in agriculture and even in industry and, on the other hand, it increased the share of services in respect of gross domestic product. While the development of industry and agriculture is clearly linked to the existence of the highways, without which raw materials and finished products can not be moved, this interdependence is not proved enough yet for the development of the services. However, services can not develop without a quality transport infrastructure. Because services have emerged as the main economic engine of the last decades, the analysis of the

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[2] The paper represents a part of the research at the project III - 46006 – Sustainable agriculture and rural development in terms of the Republic of Serbia strategic goals' realization within the Danube region, funded by the Ministry of Education and Science.

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relationship between the economic sector and infrastructure illustrates the pressing need to allocate funds for upgrading priority roads, railways, airports and harbors. (Ioncică, 2006,p. 41-56)

Regarding travel services, Romania has a real basis for developing its home market and for exporting such services. As it has a great natural potential, Romania could become an exporter of tourism services. The export of services in these sectors should positively contribute not only to the equilibration of the balance of trade, but also to the GDP growth and hence it could contribute to increase of the income. It is difficult to quantify the total, public statistics referring in particular to the export of such services, that caused consumption of foreign tourists arrival in Romania. In 2008 Romania's GDP reached its maximum of 137 billion. In 2009 and 2010, the economy fell to 116.3 and respectively to 119.8 billion euros. In 2011, Romania's GDP reached 122.7 billion euros. The growth of international tourism is based, on the one hand, on the increase of incomes of population and, on the other hand, on facilitating the tourists access in areas with attractions (equally when they are coming to Romania and when returning to the country of origin).The sense of security, the hospitality and the quality of the services, such as the quality of accommodations and the politeness of employees. Of the equal importance is to acknowledge the right price, including the additional costs, from the very beginning. An Eurostat report shows that Romania ranks last among the 27 Member States of the European Union with 2.5 million overnight stays and revenues of $ 1.3 billion, respectively $ 61/ resident.

Ahead of Romania are ranked Bulgaria, with 2.6 billion dollars, or $ 345 / resident, Cyprus with 2.2 billion dollars and Slovenia with $ 1.8 billion. (www.ecc.eurostat.ep.europa.eu; accesat la data de 17.09.2012). Compared to neighboring countries, Romania has less impressive results: the export of services accounts for only a percentage of GDP and it values less than imports (expenses of Romanian tourists in other countries are lower than those of foreign tourists arrived in Romania). The situation is unusual if we take into consideration natural resources existing in Romania: natural potential for summertime and wintertime vacations, spa and climatic resorts, ecological and cultural tourism offers. Exceeding this state of fact depends only to a certain degree on the efforts of tourism services providers and to a far greater extent to the authorities that are responsible for pointing out areas with great potential in attracting tourists and for modernization of the

infrastructure. Only when tourists will be able to move easily among different resorts and attractions, the promotion of Romania in countries which are highly interested in tourism (Germany, Austria, Hungary, Slovakia, Poland, and Russia) will be truly effective. There are some Central and Eastern European countries where the benefits from tourism activities has a high share in GDP: in Croatia, these types of services generates 25.6% of GDP, 17.3% of GDP in Turkey and in Slovenia 15 7% of GDP. It follows, therefore, that the volume of transport services and tourism in Romania is well below its potential granted by its geographical position and its status as EU member. In order to capitalize on this potential, there is a high need of improvements of the infrastructure and of granting tax incentives without which Romania cannot hope for a future in exporting tourism services. (Neagu, 2005, p.102).

Romania's rich and varied tourism potential has placed it among the most famous and appreciated holiday destinations in the world, as one of the countries with a rich tradition and experience in tourism. Romania's position on the international tourism market, the tourism place in household expenditure and in the economic structure were largely influenced by the socio-economic situation. As a result, Romania has known a different evolution for each of the components of the domestic and international tourism due to major changes in the world and domestic economy and as well to its ability to understand and react to these events. (Ioncică, 2006; p.41-56) Romania ranks 77 out of 142 countries according to the "Global Competitiveness Report 2011-2012". This places our country behind Bulgaria and Croatia, but in front of Albania, Ukraine, Georgia, Greece or Serbia. The countries placed on the first 10 positions in this top are:

Table 1. *Top 10 countries in the world in the Global Competitiveness Report*

Rank/Year	2009	2011	Score (2011)
1	Switzerland	Switzerland	5.68
2	Austria	Germany	5.50
3	Germany	France	5.41
4	France	Austria	5.41
5	Canada	Sweden	5.34
6	Spain	United States	5.30
7	Sweden	United Kingdom	5.30
8	United States	Spain	5.29
9	Australia	Canada	5.29
10	Singapore	Singapore	5.23

Source: *http://www.manager.ro/articole/analize/analiza:-raportul-global-al-competitivitatii-unde-se-situeaza-romania-12137.html*

As it can be seen in Table 1, the top 10 countries worldwide in the Global Competitiveness Report are the same in 2010 and in 2011, some of them switching their position. But we can observe that Switzerland continues to maintain unchanged its position in these two considered years. In the context of European tourism, Romania ranks 34th out of 42 positions.

Table 2. *Romania's position relative to regional competitors*

Rank	Country	Regional rank	Overall rank	Score
1	Czech Republic	22	31	4.77
2	Slovenia	23	33	4.64
3	Montenegro	25	36	4.56
4	Hungary	26	38	4.54
5	Bulgaria	27	48	4.39
6	Polond	28	49	4.38
7	Slovak Republic	31	54	4.35
8	Romania	34	63	4.17
9	Serbia	38	82	3.85
10	Ukaine	39	85	3.83
11	Moldova	42	99	3.60

Source: *http://store.ectap.ro/articole/644_ro.pdf*

In terms of its direct competitors, namely its neighboring countries or those which are in the same geographical region, we can see that Romania has a quite disadvantageous position, being surpassed bothly by its western neighbor, Hungary, and by its direct competitor on all tourism markets, Bulgaria.

The result is even more interesting as it can be noted that some of the countries placed ahead of Romania (Czech Republic, Hungary, Poland, Slovakia) do not benefit, for example, of seaside opportunities that can be exploited for tourism.

Tourist flows to Romania

In terms of spatial distribution, the tourist flow has a well defined focus. Thus, in 2011, 94.34% of arrivals of foreign tourists were of European origin, the remaining 5.66% were from other continents.

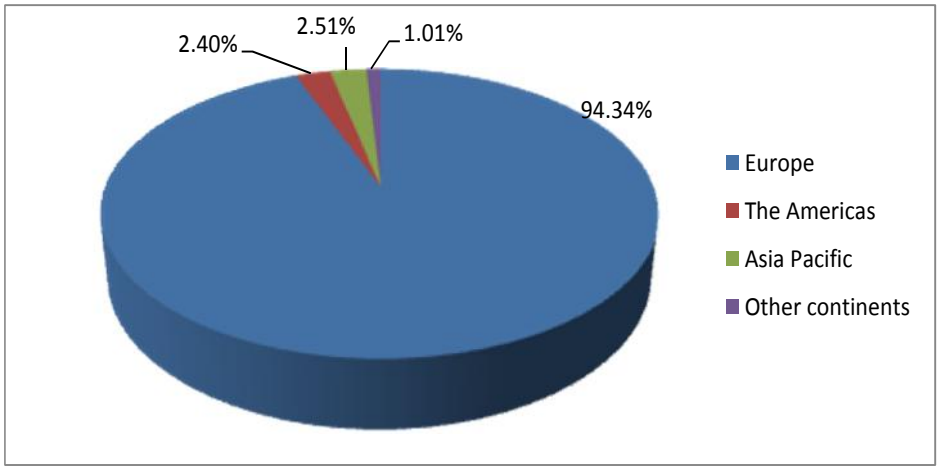
Table 3. *Distribution of foreign tourist arrivals in Romania by Continent*

Continent	Share
Europe	94,34%
Africa	0,29%
The Americas	2,40%
Asia Pacific	2,71%
Ţări nespecificate	0,26%

Source: *author's own processing based on National Institute of Statistics.*

The distribution of foreign tourist arrivals in Romania, considering the continent of origin can be seen in Graph 1.

Graph 1. *Distribution of foreign tourist arrivals in Romania by continent*

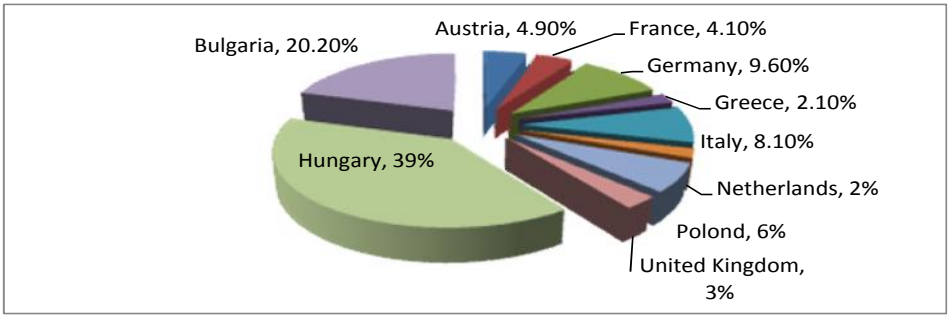


Source: *author's own processing based on National Institute of Statistics.*

A few countries - Austria, France, Germany, Greece, Italy, Netherlands, Poland, United Kingdom, Hungary, Bulgaria - focus a great amount of the touristic emission to Romania. (Table 2).

This is explained by the relative small distances among tourists' countries of origin, by the similarities in language, culture and history; traditionally, for a long time were promoted only spaces belonging to Eastern European destinations.

Graph 2. *Distribution of foreign tourist arrivals by country of origin Romania*



Source: *author's own processing based on National Institute of Statistics.*

Talking about domestic destinations, Danube Delta and spa and climatic destinations has an ascending trend, but the top Romanian destination still is the Black Sea seaside. However, counterbalancing the summer season, there is an increased preference for spa and climatic offers (containing courses of treatment or spa services), rather than a seaside package less attractive in terms of services offered. According to the analyzed data, it can be stated that the majority of foreign tourists uses the highroads to visit our country (74.6%) and only 19.80% prefer air transport. Railways and boats are used to a smaller weight.

Tourist flows in Romania

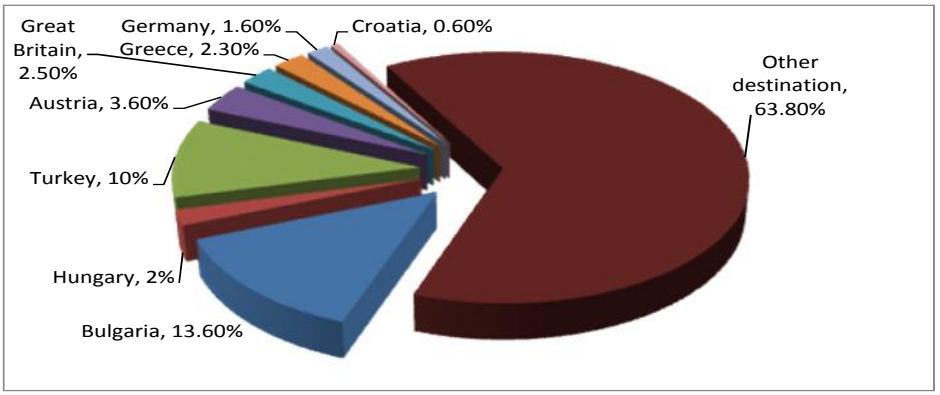
Going abroad, Romanians preferences go mostly to European countries, especially the neighboring ones.

Table 4. *Destinations preferred by Romanian tourists in 2011*

Destinations that have attracted most Romanian tourists	Number of Romanian tourists in these countries in 2011 (thousands)
Bulgaria	1.490
Hungary	1.100
Turkey	390
Austria	276
Great Britain	257
Greece	224
Germany	170
Croatia	63

Source: *http://www.incomemagazine.ro/articol_77134/care-sunt-tarile-in-care-calatoresc-cel-mai-mult-turistii-romani.html*

Graph 3. *Favorite destinations of Romanian tourists in 2011*



Source: *author's own processing based on National Institute of Statistics.*

Bulgaria (with approximately 13.6%) has become a favorite destination of the Romanian tourists, attracted mainly by the Black Sea seaside, but also by the affordability of Bulgarian mountain resorts and last, but not least, by the quality of services. Another destination preferred by Romanian tourists is Hungary (10%). Turkey is loved by Romanians because of the quality and complexity of services for all inclusive packages. Related to the price, the quality of the offered services is excellent. The target group consists in families with children, groups of friends and young honeymooners. Austria is, along Hungary, one of the few countries in the region that do not benefit of a seashore, but which stays among Romanians preferences. Romanians go to Austria for skiing in wintertime and in the rest of the year in almost all other regions. It should not be overlooked the weekend tourism, when Romanians go shopping in Vienna.

Among Romanians favorite British place of destination, London dominates both as a tourist destination and as a shopping stop. Some Romanians travel for visiting relatives or friends, or to meet their children settled there to study. Excepting England, many Romanians travel also to Ireland, but less to Scotland. Another country preferred for its coastline by Romanians for is Greece. Germany is preferred by Romanians for economical and business reasons. (Alexandru Corina, http://www.incomemagazine.ro/articol_77134/care-sunt-tarile-in-care-calatoresc-cel-mai-mult-turistii-romani.html; accessed 5.08.2012) .

Alike foreign tourists who visit our country, 72.4% of the Romanian prefer to use the highroads to go on holidays, 25.4% opting for traveling by. A very small percentage of 0.2% of Romanian visitors prefer to travel by sea and 2% by train. Nowadays only four countries are represented in Romanian national tourism offices: Austria, Greece, Hungary and Thailand. The Bureau of Romanian National Tourist Organization of Greece states that "Romanians are among the most extravagant spenders as foreign tourists in Greece, exceeding Germans, British and Dutch. An Englishman spends daily 5-10 Euros, while a Romanian takes out of his pocket 80-100 Euros day, besides the traveling expenses. Members of the Austrian National Tourist Office states that" Romanians spend in Austria during wintertime 145 Euros per day and in summertime 116 Euros ". (Voiculescu Loredana, http://www.gandul.info/financiar/de-ce-se-bat-strainii-pe-turistii-romani-sunt-cei-mai-cheltuitori-iar-o-treime-dintre-ei-aleg-sa-stea-la-hoteluri-de-4-5-stele-9400103; accessed 17.06.2012).

A third part of Romanian choose 4 or 5 stars hotels when they travel to Austria, while only 21.7% of Hungarian tourists choose to stay at a 4-5 stars hotel, according to Austrian Statistics. Only 19.6% of Polish tourists spend the night in a luxury hotel, 19.3% are recorded for the Czech tourists.

The portrait of the Romanian tourists abroad is eloquent if we take in account their average age. Romanians are different from other tourists because they are younger. During the summertime, the average age of Romanians that travel to Austria is 44 years, compared to an average of 43.5 of the other tourists, and those who spend their winter holidays skiing in Austria are on average 40 years old, compared to 43.5 years as the average age of other tourists. (Voiculescu Loredana, http://www.gandul.info/financiar/de-ce-se-bat-strainii-pe-turistii-romani-sunt-cei-mai-cheltuitori-iar-o-treime-dintre-ei-aleg-sa-stea-la-hoteluri-de-4-5-stele-9400103; accessed: 17.06.2012)

Analysis of the accommodation capacity in operation in 2007-2011

The existing accommodation capacity available in Romania has had a relatively continuous upward trend from year to year, with few exceptions.

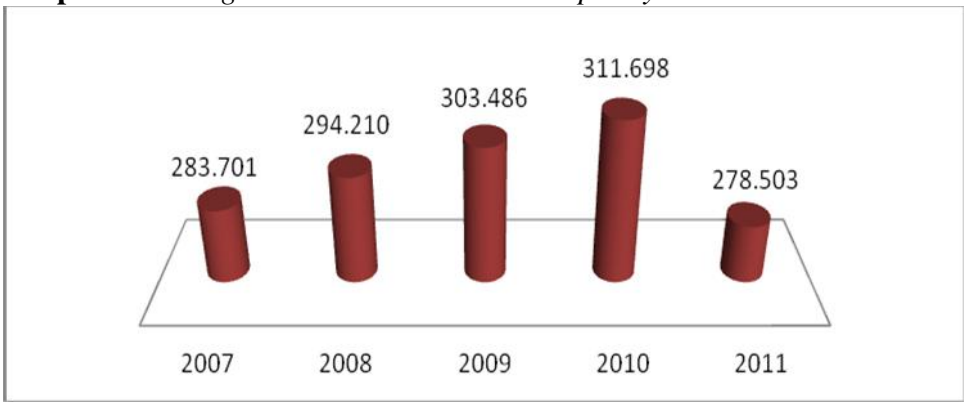
Table 5. *The existing tourist accommodation capacity in 2007-2011*

Years	Accommodation capacity in operation in 2007-2011
2007	283.701
2008	294.210
2009	303.486
2010	311.698
2011	278.503

Source: *author's own processing based on National Institute of Statistics.*

So in 2007 the capacity of existing tourist accommodation was of 283,701beds, in 2011 reaching a total of 278,503 beds, representing a decrease of 5,198 beds, that is a relative decrease of 0.4%.

Graph 4. *Existing tourist accommodation capacity in 2007-2011*



Source: author's own processing based on *National Institute of Statistics.*

Analyzing the chart results that in 2011 the existing tourist accommodation capacity decreased by 2% compared with 2010.

Tourist accommodation capacity in operation in 2007-2011

Tourist accommodation capacity in operation is represented by the number of beds offered by the tourist accommodation establishments, taking into account the number of days the units are opened in the period of time considered. There are not included the beds in the rooms or units temporarily closed due to lack of tourists, running repairs or other reasons. Tourist accommodation capacity in operation after 2007 showed an upward trend.

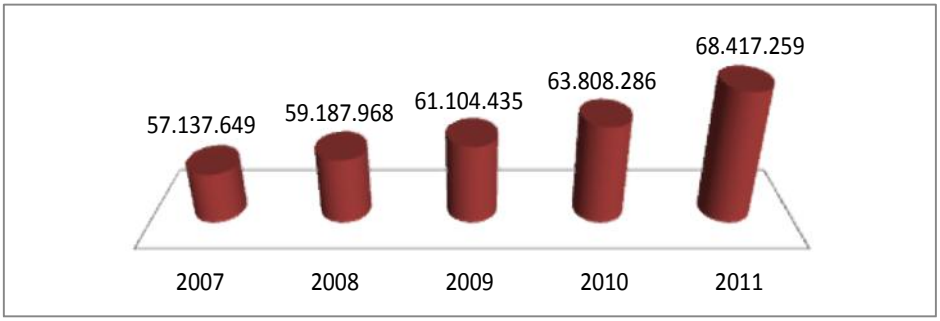
Table 6. *Tourist accommodation capacity in operation in 2007-2011*

Years	Accommodation capacity in operation
2007	57.137.649
2008	59.187.968
2009	61.104.435
2010	63.808.286
2011	68.417.259

Source: *author's own processing based on National Institute of Statistics.*

If in 2007 the tourist accommodation capacity in operation was of 57,137,649 beds, by 2011 it has steadily increased by 68,417,259 beds. (Relative increase of 4%).

Graph 5. *Tourist accommodation capacity in operation in 2007-2011*



Source: author's own processing based on *National Institute of Statistics.*

Tourist arrivals in 2007-2011

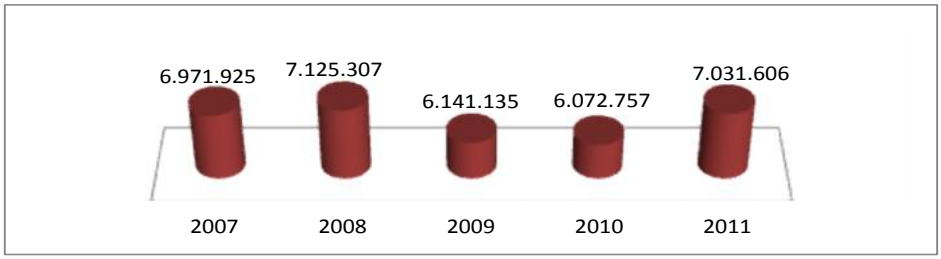
Tourist arrivals, in terms of lodging, in Romania, had increased in 2011 compared to 2007 by 0.2%: from a total of 6,971,925 people in 2007 to 7,031,606 people in 2011.

Table 7. *Arrivals of tourists in the establishments of tourists with tourists' accommodation functions 2007-2011*

Years	Tourist arrivals
2007	6.971.925
2008	7.125.307
2009	6.141.135
2010	6.072.757
2011	7.031.606

Source: *author's own processing based on National Institute of Statistics*

Graph 6. *Tourist arrivals in tourist accommodation with tourist accommodation function 2007-2011*



Analyzing the number of tourists accommodated in the given period of time, it is obvious that the trend was not continuous, achieving increases and decreases.

Romanian tourists' arrivals in reception with tourists' accommodation function during 2007 – 2011

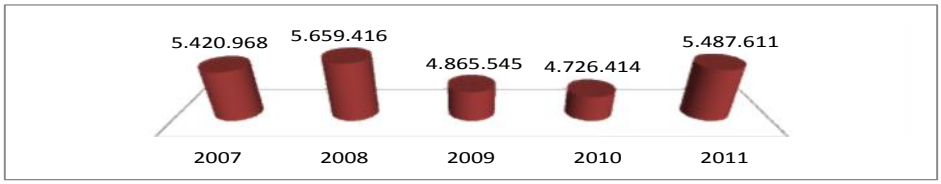
Table 8. *Romanian tourists' arrivals in lodgings with tourists' accommodation function during 2007 - 2011*

Years	Tourists
2007	5.420.968
2008	5.659.416
2009	4.865.545
2010	4.726.414
2011	5.487.611

Source: *author's own processing based on National Institute of Statistics.*

The number of arrivals of Romanian tourists in the establishments with tourists' accommodation function was ascending in the discussed period, with few exceptions.

Graph 7. *Romanian tourists' arrivals in reception with tourists' accommodation function during 2007 - 2011*



Source*: author's own processing based on National Institute of Statistics.*

In table 8 it can be seen that in 2008 there was the maximum number of arrivals of Romanian tourists, equivalent to 5,659,416 tourists that will fall by 0.6% to a total of 5,487,611 tourists, in 2011.

Arrivals of foreign tourists in the establishments with tourists' accommodation function in 2007-2011

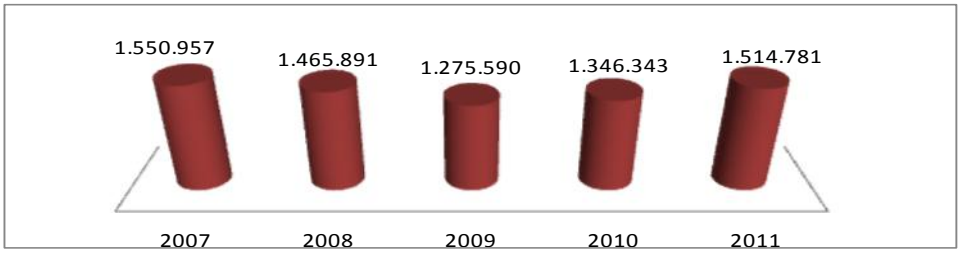
Table 9. *Arrivals of foreign tourists in the establishments with tourists' accommodation function in 2007-2011*

Years	Tourists
2007	1.550.957
2008	1.465.891
2009	1.275.590
2010	1.346.343
2011	1.514.781

Source: *author's own processing based on National Institute of Statistics.*

The number of foreign tourist arrivals in the establishments with tourists' accommodation function during 2007 - 2011 had a downward trend, with few exceptions.

Graph 8. Arrivals of foreign tourists in the establishments with tourists' accommodation function in 2007-2011



Source: *author's own processing based on National Institute of Statistics.*

In the analyzed period of time, the number of foreign tourist arrivals in the establishments with tourists' accommodation function was directly influenced by the economic crisis. Only in 2011 there was an amount of 1,514,781 arrivals, figure that equates to a decrease of 0.5% compared to 2007, when there was a number of 1,550,957 tourists. Compared to the previous year, it can be noticed a slightly raise, registering an increase of 12% in the number of foreign tourist arrivals in the establishments with tourists' accommodation function.

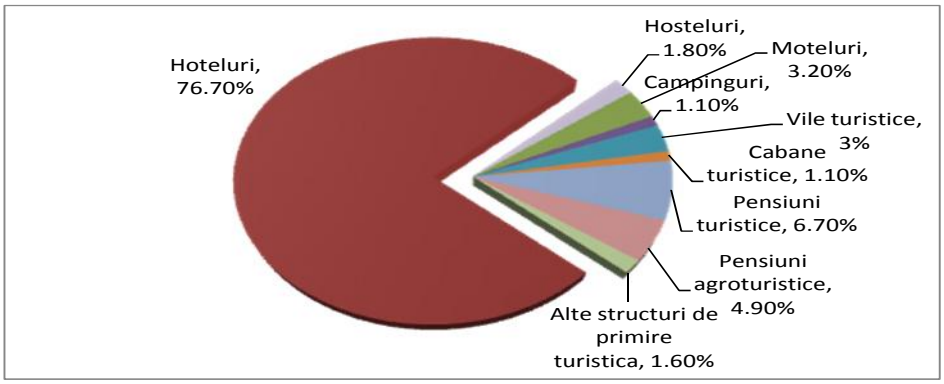
Arrivals in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011

Table 10. *Arrivals in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011*

Type of tourist accommodation	Tourists
Hotels	5.367.723
Hostels	126.588
Motels	221.039
Tourist inns	611
Tourist villas	221.470
Tourist chalets	80.195
Tourist boarding houses	469.693
Agro-tourist boarding houses	344.186
School and pre-school camps	65.995
Camping sites	73.558
Tourist halting places	11.118
Bungalows	14.464
Houselet-type units	4.976
Ship accommodation places	8.705

Source: *author's own processing based on National Institute of Statistics.*

Graph 9. *Arrivals in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011*



Source: *author's own processing based on National Institute of Statistics.*

In 2011, 76.70% out of the total number of tourists chose hotels preference followed by the boarding houses, that together with rural tourism ranks next with a total of 11.60%.

Arrivals in major tourist accommodation with tourist accommodation function in tourist areas in 2011

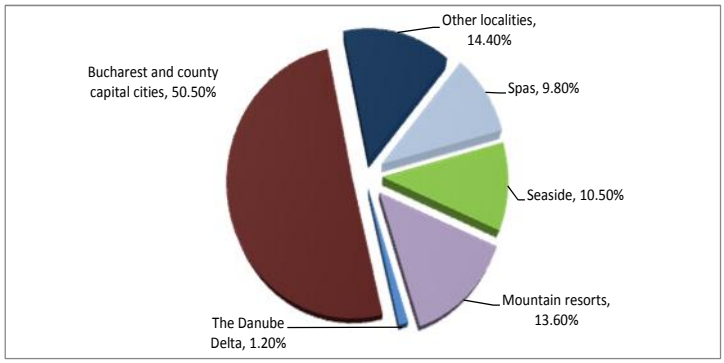
Table 11. *Arrivals in major tourist accommodation with accommodation in tourist areas in 2011*

Touristic areas	Tourists
Spas	686.550
Seaside	735.881
Mountain resorts	953.332
The Danube Delta	81.567
Bucharest and county capital cities	3.537.932
Other localities	1.007.130

Source: *author's own processing based on National Institute of Statistics.*

As shown in table 10, Bucharest and county capitals are representative regarding the number of tourist arrivals in the establishments of tourists' reception with functions of accommodation, with a share of 50.5%, followed by other cities and tourist routes (14, 4%) and mountain resorts (13.6%).

Graph 10. *Arrivals in major tourist accommodation with tourist accommodation function in tourist areas in 2011*



Source: *author's own processing based on National Institute of Statistics.*

Overnight stays in the establishments of tourists 'reception with tourists' accommodation function during 2010 - 2011

An overnight stay means each night spent by a person that is registered in a tourist accommodation, whether or not he/she is physically present in the room.

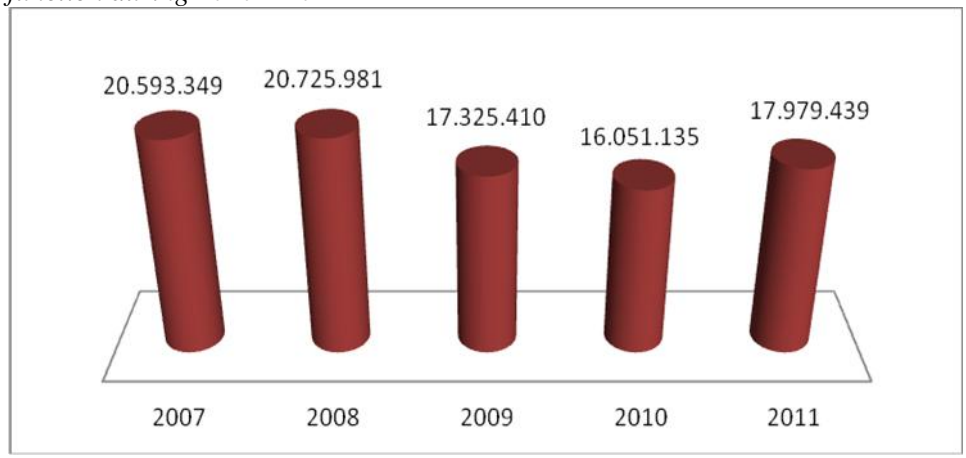
Table 12. *Overnight stays in the establishments of tourists 'reception with tourists' accommodation function from 2010 to 2011*

Years	Overnight stays
2007	20.593.349
2008	20.725.981
2009	17.325.410
2010	16.051.135
2011	17.979.439

Source: *author's own processing based on National Institute of Statistics.*

In terms of overnight stays in the establishments with tourists' accommodation function in 2007- 2011, it was observed a decrease in 2011 compared to 2007, from a total of 20,593,349 overnight stays in 2007, to a total of 17,979,439 overnight stays in 2011. In 2011 overnight stays decreased by 13.7%. (Table 11)

Graph 11. *Overnight stays in the establishments with tourists' accommodation function during 2010 – 2011*



Source: *author's own processing based on National Institute of Statistics.*

Overnight stays in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011

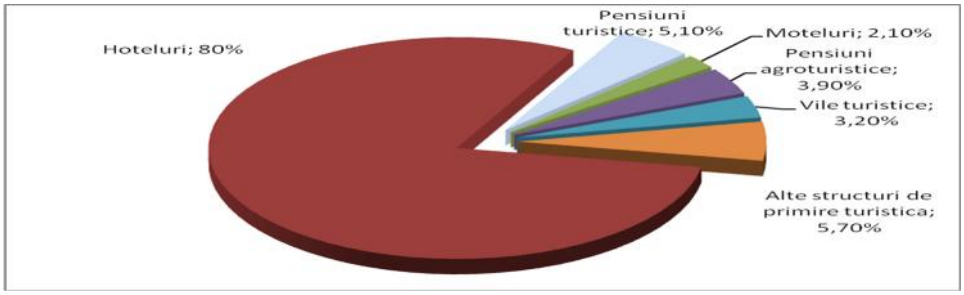
Table 13. *Overnight stays in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011*

Type of tourist accommodation	Tourists
Hotels	14.330.000
Hostels	275.662
Motels	375.320
Tourist inns	1.586
Tourist villas	564.338
Tourist chalets	142.167
Tourist boarding houses	910.498
Agro-tourist boarding houses	700.997
School and pre-school camps	276.029
Camping sites	188.110
Tourist halting places	25.614
Bungalows	42.109
Houselet-type units	17.299
Ship accommodation places	61.054

Source: *National Institute of Statistics.*

As shown in table 12, the greatest amount of tourists prefer to stay overnight in hotels (14,330,000), followed by boarding houses (910,498) and Agro-tourism boarding houses (700,997). Tourist accommodation service is calculated by taking in account the total number of overnight stays.

Graph 12. *Overnight stays in major tourist accommodation with tourist accommodation function by the type of tourist accommodation in 2011*



Source: *author's own processing based on National Institute of Statistics.*

Overnight stays in major tourist accommodation with tourist accommodation function in tourist areas in 2011

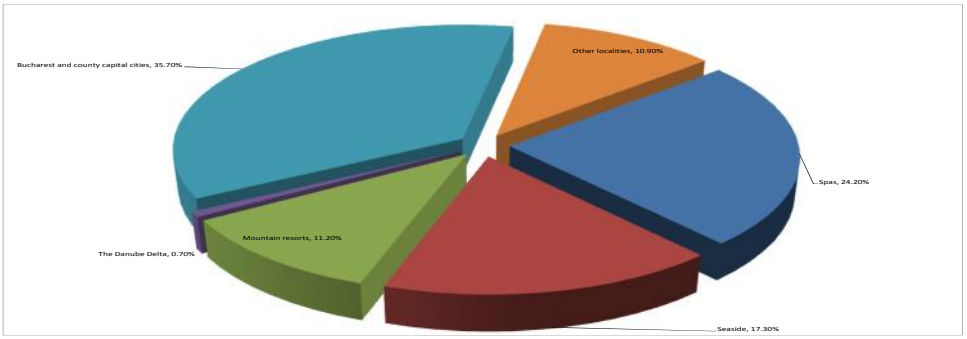
Table 14. *Overnight stays in major tourist accommodation with tourist accommodation function in tourist areas in 2011*

Tourist areas	Number of tourists
Spas	4.335.327
Seaside	3.103.617
Mountain resorts	1.997.323
The Danube Delta	130.519
Bucharest and county capital cities	6.402.199
Other localities	1.945.117

Source: *National Institute of Statistics.*

As shown in table 13, Bucharest and county capitals are representative in terms of overnight stays (35.7%), 24.20% of the tourists prefer to sleep in spa accommodations and 17.3% in seaside hotels.

Graph 13. Overnight stays in major tourist accommodation with tourist accommodation function in tourist areas in 2011

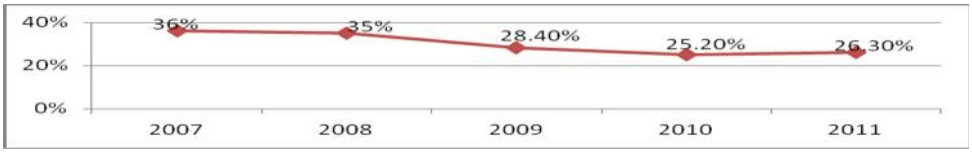


Source: *author's own processing based on National Institute of Statistics.*

Indices of the capacity in operation in 2007-2011

During 2007 - 2011, evidence of use of accommodation capacity in operation has ranged between 36% in 2007 and 26.3% in 2011.

Graph. 14. *Indices of the capacity in operation in 2007-2011*



Source: *author's own processing based on National Institute of Statistics.*

Graphic 14 shows that the highest value of net use index of accommodation capacity in operation was registered in 2007 (36%) and the lowest value was recorded in 2010 (25.2%).

Evolution of tourist accommodation structures during 2007 – 2011

According to the review, tourist reception with tourists' accommodation function registered an increasing trend from year to year with few exceptions; in 2007 there was a total of 4694 structures that reached in 2011 a total of 4992 structures with functions of accommodation, which represents an increase of 298 structures in 2011 compared to 2007, the relative increase being of 1.4%.

Table 15. *Structure of tourists 'reception with tourists' accommodation function in 2007-2011*

	2007	2008	2009	2010	2011
Total	**4.694**	**4.840**	**4.986**	**5.222**	**4.992**
Hotels	1.059	1.075	1.104	1.159	1.233
Hostels	44	46	60	79	145
Motels	450	153	146	151	184
Tourist inns	6	5	5	4	4
Tourist villas	708	718	747	768	548
Tourist chalets	104	110	117	128	147
Bungalows	266	264	265	267	205
Holliday villages	3	3	4	4	5
Camping sites	62	59	55	51	44
Tourist halting places	30	31	30	32	41
Houselet-type units	49	50	46	49	27
School and pre-school camps	115	111	111	92	69
Tourist boarding houses	736	783	878	949	1.050
Agro-tourist boarding houses	1.292	1.348	1.412	1.354	1.210
Ship accommodation places	9	7	6	7	5

Source: *National Institute of Statistics.*

In 2011 hotels achieved the highest growth of the amount of all accommodation listed with a slight increase compared to 2010 when it was registered a total of 1,233 hotels.

Conclusions

Romania's domestic tourism is represented by the holidays spent by the indigenous people within the country's borders. In terms of destination, vacation options of Romanian tourists in 2011 were directed mostly to cities, mainly for cultural tourism and business. Romania's international tourist flow is represented mostly by the tourists of European origin; in 2011 they visited our country in proportion of 95%. Most foreign tourists are from Hungary and Bulgaria. And a great amount of the Romanian tourists prefer as vacation destinations Bulgaria, Hungary, Turkey and Austria.

The existing tourist accommodation capacity in 2007-2011 decreased in 2011 compared to 2007 by 0.4%, from a total of 283,701 beds to a number of 278,503 beds. Instead, tourist accommodation capacity in operation, considered in the same period of time, had an upward trend, increasing by 4% in 2011 compared to 2007, from a total of 57,137,649 beds to a number of 68,417,259 beds. Tourist arrivals in establishments with tourists accommodation function in Romania increased in 2011 compared to 2007 by 0.2%, from a total of 6,971,925 people in 2007 to 7,031,606 people in 2011.

As for the overnight stays in the establishments of tourists 'reception with tourists' accommodation function in 2007-2011,it was observed a decrease in 2011 compared to 2007 from a total of 20,593,349 overnight stays in 2007, to a total of 17,979,439 overnight stays in 2011. In 2011 overnight stays had a relative decrease of 2.8%.

During 2007 - 2011, the evidence of use of the accommodation capacity in operation has ranged between 36% in 2007 and 26.3% in 2011. Analyzing the development of tourist reception with tourists' accommodation function during the period 2007-2011, we can see that in 2011 the hotels reached the highest growth of all accommodation listed. By analyzing these indicators, I can say that the development of domestic and international tourism of Romania was weak in 2011, taking into account the previous years.

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AGRICULTURE IN SERBIA

Andra-Valentina Tudorica[1], Velibor Potrebić[2]

Abstract

Only agriculture remains as the main economic activity in the rural areas, the primary source of income and improvement in the standard of living of the rural population. In that sense, reducing poverty, eliminating hunger, raising productivity, and protecting the environment in rural areas – all in a sustainable manner - represent a number of complex objectives which has to be efficiently governed toward development of a market oriented agriculture and is one of the most fundamental challenges the country is facing today.

Key words: *agriculture, fruit production, organic agriculture, regional development.*

Introduction

Agriculture is one of the most important economic activities in Serbia. The total area of agricultural land is 5,097,000 hectares with around 80% arable land. Primary production from agriculture, hunting, forestry and fisheries accounted for over 10% of GDP in 2011. Already a major component of the economy of the Republic of Serbia (RoS), agriculture has considerable goal for increased production and efficiency. With appropriate policies and support it could become a powerful engine of economic growth.

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Agricultural exports continue to expand and contributed about 24% of total Serbian exports in 2011. Agriculture's contribution to the economy is as broad as it is deep. Approximately 44 percent of the population live in rural areas, of whom one-third rely wholly or in part on agriculture for their livelihoods. Large tracts of fertile land, particularly in the Vojvodina region, allow the production of most food commodities and assured an adequate food supply throughout the economic and political turmoil of the 1990s. Some 200,000 people (10 percent of the work force) are employed in agro-processing and agricultural service industries.

Table 1. *Main Country Indicators*

	Total area (in km²)	Population (excl Kosovo) (thousands)	Population density (per km²)	GDP (EUR mio)	GDP growth (% change from previous year)
Serbia	77 474	7335	95.3	29 963	-10.4
All West Balkan countries[1]	264 462	23 658	89.2	109 669.30	-3.42
EU 27	4 308 406.6	501 103	116.0	11788711.1	-4.2

Characterised by rich land resources and favourable climate, agriculture represents a vital sector of the Serbian economy. Two thirds of the population in rural areas are involved in agriculture. The importance of agriculture in the Serbian economy is derived from natural conditions and the traditionally important role of the primary agricultural and food processing industry.

A variety of different favourable natural conditions result in a high diversity of agricultural production. There are three broad agricultural regions that can be distinguished in Serbia on the basis of geography and climate, land quality, farm production systems, socio-economic development and political and administrative boundaries, namely: Vojvodina, Central Serbia and Southern Serbia.

Serbian terrain ranges from the flat and rich lowlands of Vojvodina in the north for crop farming and vegetable production, to hilly terrain in central Serbia and high mountains on the eastern, western and southern borders of the country, suitable for sheep and cattle breeding, and fruit and wine production.

Agriculture is one of the most important industries of the Serbian economy. In 2011, primary production from agriculture, hunting, forestry and fisheries accounted for over 15% of GDP1 .

Agricultural production is based on privately-owned farms, thus farm structure is dominated by small private households. Private farms cultivate approximately 89% of agricultural land, or 80% of arable land. However, the most important producers are large farms, also representing the bedrock for large processing capacities.

Cereal exports are also significant, particularly maize. While not fully competitive with major Central European exporters such as Hungary, Serbian cereals are nevertheless competitive in neighboring Macedonia, Bosnia-Herzegovina, Montenegro and Kosovo – all of which have large structural cereal deficits. An increase in on-farm productivity (higher yields, lower production costs etc) would further improve the competitiveness of wheat and maize, and is readily attainable.

Oilseed crops also have considerable potential for export, although the ability to realise this potential will depend on the extent to which processing efficiency can be improved.

Over 700,000 farmers in Serbia with average of 3,4 ha of land and 2 cows, present disadvantage for development of conventional agricultural industry, but great potential for organic production. Because of its competitive nature, production and processing of organic food is a great opportunity for further development of Serbia. For several years now, Serbia has been undertaking enormous efforts to modernize its economy and join the WTO and EU. Various support measures are giving positive effects and the appointment of Serbia as a candidate country is expected in the nearest future. In this context, one of the areas which require considerable adjustments is Serbia's agricultural sector. Europe's Common Agricultural Policy (CAP) regulates markets and mechanisms for many agricultural products and the integration of Serbia's agriculture into the CAP is a manifold challenge.

Worldwide, organic food markets are governed and driven by the same eco-nomic principles as all other industries. The turnover from organic products in Europe has reached several billion euros and annual growth rates are typically close to 10%. Demand is growing much faster than domestic production. It is this trend which propels economies to translate organic food manufacturing potentials into export opportunities. With its abundant agricultural land and its long agroindustrial tradition, Serbia can look forward to transforming these advantageous factors into export opportunities and invigorating its domestic market.

The Serbian National Action Plan for Organic Agriculture shows that Serbian political decision-makers have realised the country's potential for organic farming and started preparing the necessary framework to turn these opportunities into real business. The GIZ has supported the development of the National Action Plan and is assisting Serbia in reducing constraints in the development of the agricultural sector in general, and of the organic subsector in particular. The organic sector in Serbia has attained a respectable base:

- Several associations promote the organic sector and develop it systematically as lobby organisations.
- Governmental institutions and miNistries, spearheaded by the Ministry of Agriculture, Trade, Forestry and Water Management monitor and take care of the sector's needs.
- About 20 academic institutes, faculties, R&D facilities and affiliated bodies help to design and propagate most appropriate farming and cropping systems
- More than eight certification bodies make sure that international rules for organic practices are respected and that the resulting product, manufactured by almost 4,000 farmers and partially processed in about 30 special companies, complies with all international standards and requirements.

On more than 8,000 hectares of agricultural land, a product portfolio mostly consisting of fruits, berries, vegetables, some cereals and some oil crops, generates a farmgate value of some €25 million. Most of this product is exported, particularly to the EU, as domestic market development is hampered by the insufficiently increasing purchasing power of consumers. Demand for the organically grown product exists in many countries and Serbia has excellent ecoclimatic and technical

conditions to cultivate, in addition to the traditional berries and fruits, organic cereals and oil crops that are in high demand. So far, however, farms engaged in organic farming need assistance to procure the appropriate machinery, other technical devices and capital, in order to raise production efficiency to levels that ensure their competitivenes son the national, regional, and EU market.

Until early 2009, the Law on Associations restricted the formation of strong interest groups or associations, not only in organic agriculture but in general, as it did not allow associations to conduct business and accumulate capital.

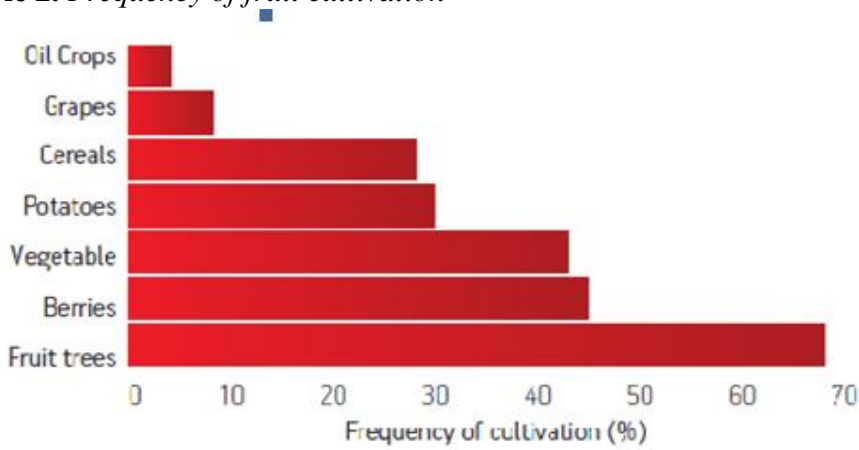
Arable land under organic farming accounts for about 8,500-9,000 ha or 1-1,1% of the surveyed land total. The survey results suggest that organic farming is mostly practiced in southern and western Serbia, followed by Vojvodina. Out of total agricultural land under organic cultivation, perennial crops are planted on almost 40% and annual crops on 16%. The balance (44%) 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. Although berries are the main export crop, it appears that farmers are diversifying to other crops, opting mostly for apples and plums. There is also a significant increase of land under annual crops.

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. In the absence of clear empirical data, a first approximation comes to the conclusion that the farm-gate value of all organic crops grown in 2009 ranges from €20 to €25 million.

Fruit trees and berries are still cultivated, but growing of vegetables has almost been discontinued. However, small farms with less than five hectarescultivate 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 pasture or simply left fallow.

In the category of berries raspberries dominate, while plums and apples are most important crops among the fruits. Raspberries, plums and apples are grown on more than 70% of all certified acreage.

Table 2. *Frequency of fruit cultivation*



Capacities of most of these companies are small and the number of registered fruit and vegetable processors with more than 200 is still very high. All of them are obliged by the law to implement HACCP standards. Refrigeration companies dominate that sector, presumably because it takes less effort to certify a refrigeration plant under HACCP, than to invest in a full processing line for juices or jams. About 30 food processing companies manufacture organic products, virtually all of them processing conventional produce while operating an organic line additionally.

Generating value with agricultural products within the framework of small scale agriculture, and particularly with products destined for food consumption, is as difficult in Serbia as elsewhere in the world:

- Small farming finds it hard to take advantage of the economy of scale effects and thus its per rata production costs are usually high.
- Farmers are typically not well integrated into markets, do not have sufficient marketing power, and even if value is generated it occurs at higher levels of the value chain, but not on the primary level.
- Famers usually produce commodities, for most of which prices are formed on an international basis, with little allowance for local peculiarities.

- Processors are also squeezed between having to operate on a scale which causes high per unit costs and the demands of international marketing. For most products, margins thus generated at processor level are small, albeit higher than at the farmer level.

The national rural development program

In 2010, in accord with its responsibility for rural and agricultural development, the Ministry of Agriculture, Trade, Forestry and Water Management (MATFWM) drafted The National Rural Development Program 2011 – 2013, setting the objectives and visions of future agricultural and rural development, particularly within the envisaged WTO accession, and EU integration. National Rural Development Program 2011 - 2013 was adopted in February 2011.

The program focuses on improving the competitiveness of farms and integrating primary production with processing and marketing, so that value accrues along the entire chain and increases competiveness, since with joining the WTO and the EU the pressure on small farms to compete internationally is expected to rise. Goals and Objectives of the National Rural Development Program 2011 – 2013:

- Development of a profitable processing industry, capable of manufacturing products of high demand for domestic and international markets.
- Development of rural areas attractive for rural populations to live and work in, and evolve their own identity.

Financial support for the organic sector

Financial support to the organic sector started in 2005/06. In that year, the MAFWM for the first time planned incentives for organic production in the form of reimbursements for certification costs. A separate law concerning subsidies for organic production and organic prod-ucts earmarked an amount of €19,000. In 2007 and 2008 funds were planned to cover the costs of the period of conver-sion into organic. In 2008 incentives for organic agriculture and organic cattle production in the conversion period were set aside, and €11,000 disbursed. In 2009 the MAFWM authorized 27 operators' subsidies totalling €46,000. In 2010 the MATFWM received 98 applications for subsidies, 53 were approved with total amount of €200,000.

By adopting Council No 2092/91, the EU was one of the first global institutions to formulate a policy on organic farming. With this regulation the Council created a community framework detailing the requirements for agricultural products and foodstuffs, referring to production methods used in organic farming and the food industry. The Council Regulations recognize organic farming in their strategy on environmental integration and sustainable development within the Common Agricultural Policy. The integral principle is that farmers providing services to the environment beyond the reference level of Good Agricultural Practices should be adequately remunerated. Certain methods of agricultural production e.g. organic farming, integrated production, traditional lowinput farming, and typical local production provide a combination of positive environmental, social and economic effects.

SWOT of the organic sector in Serbia

Strengths:

- Trained assessors in the field of organic agriculture in Accreditation Board of Serbia
- Awareness of need for quality high in many industries
- Large areas of agricultural land not polluted
- Positive opinion on organic farming among academia, many farmers, and consumers
- Road to EU accession
- Systematic education
- International cooperation of local academia with University of Kassel started
- Close relations already existing with organic markets in Germany, Austria, Switzerland, and The Netherlands

Weaknesses:

- International (EU) markets insufficiently exploited
- Insufficient cooperation of actors in value chain
- Education in both general and organic agriculture insufficient
- Makeup of farms (many small farms, not cooperating) inappropriate
- Sector at all levels severely underfinanced, only marginal subsidies are marked
- Financial engagement of international donors marginal
- Financial scheme and technical support for creating and running an accreditation body not yet clarified
- Certification systems still non-transparent

- Data base on organic agriculture processing and marketing weak and not transparent

Threats:
- Farms cannot develop to the level of interna-tional competiveness
- Sector fails to be acknowledged at the politi-cal level as the driving force in agricultural development
- Politics does not sufficiently recognize or-ganic farming in restructuring the agricultural sector in the process of EU accession
- Sector cannot build up international relations and cannot penetrate suit able markets
- Sector is marginalized by developments in other countries, offering similar range of products
- Actors do not respect accepted EU business systems and are excluded from major international trading.

Rural poverty

Poverty increased dramatically during the Milosevic era. More than one third of the total population (2.8 million people) were below a relative poverty line of $US2/day in 2000, compared to 14.1 percent of the population (1.2 million) in 1990. Eighteen percent of the population (1.4 million people) live below an absolute poverty line of $US1/day. Households with large, dependent families; those in which the head is either unemployed or employed in the industrial sector; and refugees and internally displaced people are the most vulnerable. The poverty gap widened, from 1.0 percent of GDP in 1990 to 3.1 percent of GDP in 2000 (Table 14, Annex 3), although poverty remains shallow.

Most of the increase in poverty is attributable to a severe drop in income, from a GDP of $US 2500/capita in 1990 to $840-$990/capita in 2000. However low, stable gini coefficients indicate that all income groups have suffered in equal measure, with no widening of the income distribution.

Rural areas have a much lower incidence of poverty and extreme poverty, relative to urban areas .Rural poverty has also increased more slowly since 1990. Nevertheless, 29% of the rural population, approximately one million rural people, are currently below the poverty line of $US2/day. Of these, 430,000 rural people live in extreme poverty. The average income deficit gap is similar between rural and urban areas, with many rural

households close to the poverty line. There are no empirical data on the characteristics of the rural poor. But they are likely to include the socio-economic groups identified above given that both urban and rural poor are vulnerable to deteriorating access to social services, falling wages, and/or loss of unemployment.

Reform of Direct Support for Agriculture

Public support for agriculture in Serbia has evolved on an *ad hoc* basis, rather than as a coherent response to sector issues. Direct producer support has been inappropriately targeted, has been transferred in inappropriate forms, and has yielded little tangible production response. Producer subsidies do not remedy the underlying causes of low output and productivity. Moreover, subsidies have received a higher priority than support for the institutions and roles for which a Ministry of Agriculture should be responsible in a market economy. Future public expenditure should be allocated on the basis of well-defined sector objectives and priorities that are consistent with broad economic policy, including the need for fiscal rigor, and that support the proper role of government in a market-oriented economy. Direct support should also be transparent, predictable and wellarticulated to ensure that it does not become a source of instability in agricultural markets. It should also be more poverty oriented. Preparation of a realistic, forward-looking agricultural sector strategy is the starting point for this process. This strategy should then be linked to the MAFWM budget as the basis for future direct support for agriculture.

Agricultural Extension

Agricultural extension in Serbia is delivered through the semi-autonomous Institute for Science Application in Agriculture (ISAA). The ISAA employs about 750 staff in 34 agricultural stations across Serbia, and is partly financed by an annual budget from MAFWM (107 million dinars, or US$1.75 million, in 2002). Additional income derives from agricultural activities and fees for services to private farmers and AKs. Except in its animal-selection tasks, the ISAA works mostly with medium- to large-scale private and socially-owned farms, its activities being centrally planned and primarily commercial in nature. As such, the ISAA is a potential candidate for privatization following restructuring.

Better access to knowledge and information through agriculture research, extension and education is an important strategy for improving

agricultural productivity; however government should proceed carefully with the provision of technical services to farmers. Public institutions should first work with industry stakeholders to develop an agricultural knowledge and information system (AKIS) strategy. This strategy should differentiate information requirements by client type, from subsistence farmers to large scale commercial agricultural firms. Development priorities, public and private roles, social and commercial outcomes, mass media and information technology functions and cost recovery criteria and mechanisms would be integral components of the AKIS strategy. The development of an agricultural research master plan is a necessary component of an AKIS strategy. Once finalized, the strategy should lead to a logical pattern of institutional reform consistent with the desired outcomes.

In Serbia, the Ministry of Science Technology and Development (MSTD) funds all research including that in agriculture, primarily focused on plant and animal selection. However, the six leading agricultural research institutes typically earn in excess of 80 percent of their income from royalties, product sales and regulatory and consulting services, with the result that little time is spent on their primary research and development mission. Each institute's Management Committee includes MSTD and institute nominees, while its Scientific Council is institute appointed. There is little farmer representation, if any, in institute management. The capacity of Serbian universities to support research is limited by funding and resource constraints.

Regional Classification

Three distinct regions were identified on the basis of geography and climate, farm production systems, socio-economic development, and political and administrative boundaries: Vojvodina, central Serbia, and the mountain region of southern Serbia. While the precise delineation of these regions is somewhat arbitrary and can be debated, the broad characteristics of each region are quite distinct and provide an adequate basis for a regional differentiation of policy.

Region 1: Vojvodina

The Vojvodina is a distinct political and administrative entity, comprising 28 percent of the total land area of Serbia and 26 percent of the total population. It is the wealthiest region, and experienced a net inward

migration from 1995-1999. Fewer than 10 percent of municipalities are classified as underdeveloped according to the UN Human Development Index (HDI). There are fewer villages in the Vojvodina than in other regions, and there is a relatively low population density (94 people/km2), but villages are linked by a reasonable transport and communications network.

Agriculture is a major component of the Vojvodina economy, with 32 percent of Gross Social Product in 1999. Crop production predominates because of the region's fertile soils, good growing conditions, and high proportion of arable land (76 percent of land area). In 1999, the Vojvodina accounted for 56 percent of Serbia's wheat production, 62 percent of maize production, 91 percent of sugarbeet production and 92 percent of sunflower production. Commercial vegetable production is also important. Fruit and wine have a limited role. Intensive pig and poultry production are more important sources of diversification, with 39 percent and 34 percent of total livestock numbers.

Producers in this region are more strongly market-oriented than in the other two regions. Vojvodina farmers account for most of the marketed surplus of grains, oilseed, sugarbeet, pigs and poultry. Milk production is also strongly market-oriented. The Vojvodina also accounts for most of Serbia's agro-processing capacity for these commodities. Its strong commercial orientation is attributable to the high proportion of agricultural land farmed by socially-owned Aks (36 percent), and to a core of relatively large (50 hectare-500 hectare) private farms. Socially-owned agro-processors are a major element of agro-processing and marketing.

Region 2: Central Serbia

Central Serbia accounts for 29 percent of the total land area of Serbia and 44 percent of the total population. It is the most diverse and densely populated of the three regions, due in part to the influence of Belgrade. The capital city is an important source of markets and employment, and also accounts for this region's higher levels of infrastructure. GDP/capita is slightly lower than in the Vojvodina, and there is a higher proportion (21 percent) of municipalities classified as underdeveloped according to the Human Development Index. But severe rural poverty is not widely observed.

Rural areas are characterized by the region's hilly topography, small farms and diverse farm production systems. Such topography limits both the area of land suitable for agriculture (66 percent) and the proportion of agricultural land suited for arable use (67 percent). Farms are small. In line with the region's higher population, per capita availability of arable land is 0.29 hectare/capita. The agricultural potential of this arable land is good nevertheless, with fertile soils and favorable climatic conditions. Production systems are fairly intensive as a result, and the region accounts for a large proportion of high-value fruit and vegetable crops. Ninety percent of berry fruits, which are a major export commodity, are produced in this region. There is also a high concentration of livestock, particularly cattle for milk production. Processing and marketing activities are dominated by fruit, vegetables, milk and meat, much of which is sold in Belgrade.

Private-sector activity is strong in this region, with almost 95 percent of agricultural land privately owned. A high proportion of agro-processing remains socially-owned, but most of these enterprises are now independent of their former AK parent companies and are likely to attract strong interest for privatization. Privatization is only the start of enterprise rejuvenation however. The enterprises involved in the marketing and processing of fruit and vegetables need to increase their operating efficiency, improve their links with producers in order to increase supply and improve product quality, and improve their access to both domestic and export markets.

Region 3: Southern Serbia

With 44 percent of the total land area of Serbia, Southern Serbia is the largest of the three regions, and also the poorest, least developed region. Much of the area is mountainous, with 37 percent of the total area classified as forest and only 54.9 percent classified as agricultural land. As only 55 percent of the agricultural land is arable, per capita land availability is not high (0.28 hectare/capita). The scarcity of arable land and the harsh climatic conditions in many areas limit the potential for agriculture. Communities in this region are the most isolated in Serbia. Rural communities tend to be located around pockets of arable land, and are small and highly dispersed; there are many small villages and a low overall population density. Together with the mountainous terrain these characteristics also render the provision of infrastructure very expensive, and so increase the isolation of villages from markets and each other. GDP/capita is 35 percent lower than in Vojvodina, and 58 percent of

municipalities are underdeveloped according to the Human Development Index. A substantial proportion (19 percent) of all municipalities are classified as severely underdeveloped. The low level of socio-economic development is further illustrated by the fact that southern Serbia has the largest number of villages, but the weakest level of infrastructure. Widespread rural poverty has been a major determinant of the net out-migration recorded for Central Serbia and Southern Serbia during the period 1995-1999 of which much is from Southern Serbia.

Household incomes are very low, particularly in isolated areas, a consequence of the low potential for agriculture, poor access, and lack of opportunities for non-farm employment. The resulting poverty levels have been exacerbated by the out-migration of the last 50 years, which has left a predominance of older people in rural areas. Many villages have been abandoned entirely, and others face the same prospect.

Agriculture is dominated by livestock production, particularly cattle and sheep. Orchards and vineyards are also important. The region has over 50 percent of Serbia's area planted to grapes and over 40 percent of its orchards. But production is largely subsistence, and the region accounts for a very small proportion of marketed surplus. Agro-processing capacity is relatively small as a consequence and is directed to wine, tobacco, sheep, fruit and vegetables. Given the limited potential for agriculture, low levels of socio-economic development, and poor infrastructure and access to markets, aggregate agricultural production will probably contract further in the medium term. The more marginal and isolated rural areas will continue to be abandoned, and farming in this region will increasingly concentrate in the areas of more fertile land, closer to major urban centers.

Not all rural communities face abandonment, however. The perimeter of mountains, national parks, historical sites and national monuments that rings southern Serbia offers considerable potential for agro and eco-tourism. This potential is enhanced by the preservation of local traditions and the diversity of minority ethnic groups in many of these areas. There is also potential to develop niche products such as mountain fruits and herbs, many of which could be exported to neighboring countries. For many producers in this region, Sofia is much closer than Belgrade. Not all rural people have access to these opportunities, however, and a concerted effort is needed to help those who do.

A number of traditional agricultural activities that were economically important in the past have now declined, but may still have considerable commercial potential. Production of spring lamb was once important in the area, though today, a large-scale socially-owned sheep farm has virtually closed because of a shortage of funds and lost markets, and lamb production is now a fraction of earlier volumes. Cheese production was also important, as were fruit and vegetables. Wild boar is native to the area, and hunting and fishing is popular. The difficulty of getting consistent quality from numerous small producers is a problem common to the region. The food industry needs produce that is cooled, sorted, graded, packed and targeted at specific markets. The need to improve logistical infrastructure in the region with assembly sheds, grading and packing equipment, transport facilities and cold stores is obvious. A relatively low investment in packing sheds in the production areas, each about 800m2, would revitalize the traditional porcini industry and support development of a quality product that could compete internationally throughout the season. Sales should be to Sofia (about 63 km distant), Skopje (120 km) and to the port of Bar on the Adriatic coast for export to Bari and Ancona in Italy.

These opportunities cannot be exploited without investment and technical assistance, and the local community does not have the economic base to secure such investment. A community assistance program with some grant funding is needed to catalyze such developments.

Conclusions

Private sector agents should be the target of these measures, as they are most likely to respond quickly, and so catalyse sector recovery and growth. Hence, the immediate priorities for action are as follows:

Reform trade and incentive policies;
Strengthen commodity and farm input marketing systems;
Rejuvenate the food marketing chain;
Improve access to rural finance.
Complete the privatization and restructuring of agrok-ombinats and agro-processors;
Strengthen land markets;
Initiate reform of public institutions for agricultural support;
Rehabilitate drainage canals.
Complete the reform of public institutions for agricultural support and land administration;

Promote regional development;

Restore the physical and institutional infrastructure for irrigation, drainage and flood control.

Immediate attention should be given to the allocation of resources between subsidies and public institutions. Public responsibilities such as border control, plant and animal health, research, training and education should receive a higher priority for support, particularly given the need to align many of these functions with EU standards. The focus, level and form of subsidy should also be reviewed: first, to assess its economic impact; second, to ensure that it is consistent with requirements for WTO membership; and, finally, to consider the rationale for aligning these policies with the CAP.

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MODERN FEATURES OF AGRICULTURAL TRADE IN THE CONDITIONS OF MARKET INTEGRATION

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Abstract

International trade with agricultural products is still rather far from full liberalization despite of the progress achieved in international trade by agricultural production after carrying out within the framework of the WTO of many negotiations rounds. Some new rules in the organizations of international trade and the new obligations which were taken up by the participant countries of WTO have opened the new questions to discuss and settle within the framework of the following negotiation rounds. The basic themes of such negotiations at the Russian introduction into WTO should become the questions of the state trade regulation, the further perfection of sanitary control rules, the further decrease of the custom duties and administrative character of tariff quotas establishment on imported agricultural production.

Key words: *agricultural products, sustainable development, agribusiness, subsidies*

Introduction

The fundamental thrust of GATT/WTO rules is to move the international trade system toward a "tariff-only" regime, eliminating trade distorting subsidies and non-tariff trade barriers by bringing further discipline on regulations to ensure they are necessary and based on objective criteria (e.g., sound science and appropriate risk assessment). Tariffs remain the principle legitimate type of government intervention, but are subject to negotiations and progressive reduction or elimination. Once a tariff level has been negotiated, it becomes "bound" under the rules — i.e., the

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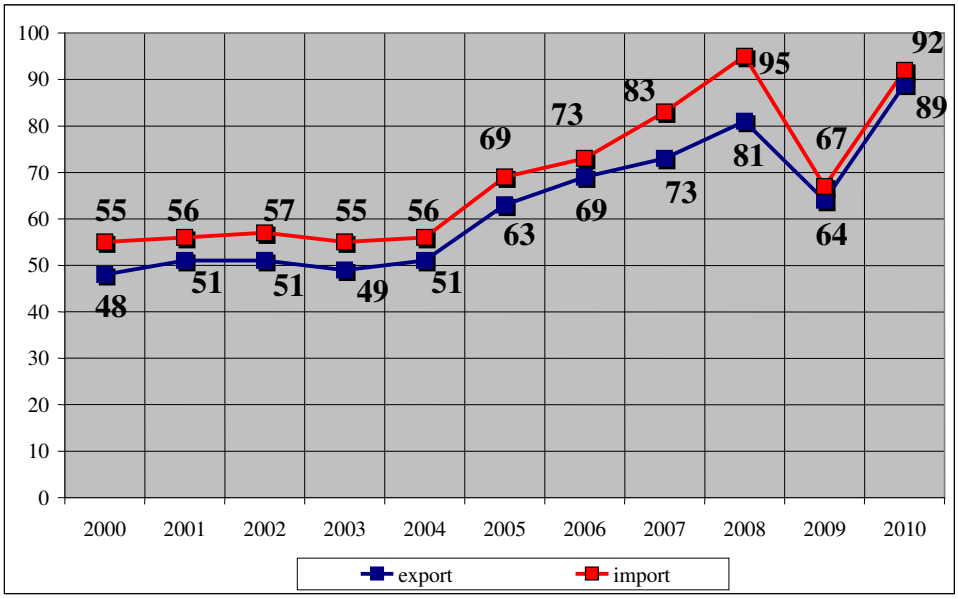
country commits to apply that tariff level or lower, and not to raise that tariff again except in limited and unusual circumstances.

Totally free and unencumbered markets do not, however, exist. Governments have historically intervened, and continue today to intervene, in various ways. Some examples of this are levying border taxes on imports; subsidizing particular groups by providing government funds or by requiring economic transfers from other sectors; imposing non-tariff restrictions such as quotas, licensing schemes or technical requirements; or regulating imports for health or safety purposes.

World trade in agricultural products in 2010 increased 12% compared to 2008 and reached record highs. The European Union (EU) stood as the largest importer of agricultural products in the world. Increased trade in agriculture was due increased product demand from major emerging economies compared to previous years. World agricultural trade reached an all-time high, at least 12% (expressed in Euros) above the previous record set in 2008. The impact of the economic crisis led to a contraction of 6% in global agricultural exports in 2009 but they rebounded by nearly 20% last year (See Picture 1).

Picture 1. *Dynamics of agricultural exports and imports by EU-27, bln. €*

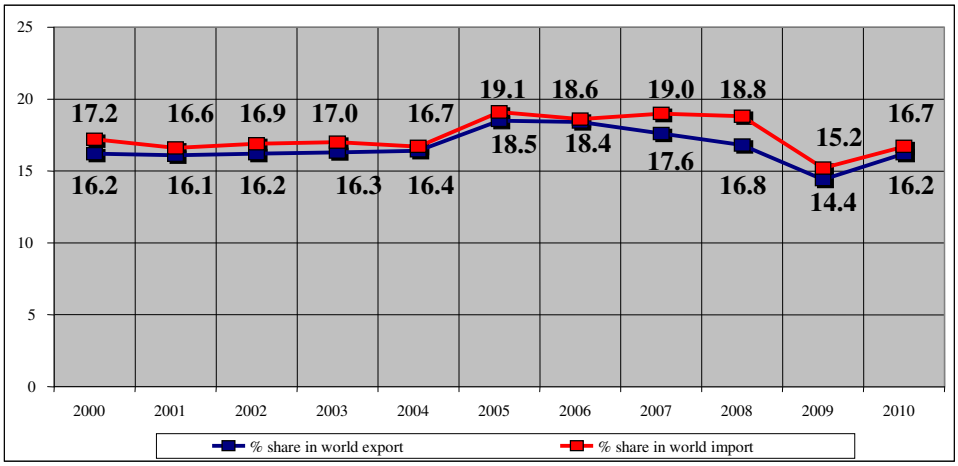


Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

The EU as well as the other top exporters all benefited from buoyant markets. Following the slump in 2009, the EU, the US and Brazil bounced back with over 20% growth in exports, to reach record levels in 2010. The EU's trade balance improved to the extent that it emerged from recession as a net exporter in 2010, for the first time since 2006. The €6 billion agricultural trade surplus is largely due to expansion in the value of exports, driven by stronger demand for final products, as the EU's key trading partners come out of recession and higher prices for commodities and intermediate goods.

The EU remains by far the world's biggest importer with imports worth €83 billion in 2008-10, well ahead of the US. EU imports grew by 9% in 2010 though they remain 5% below the peak of 2008, when they reached €88 billion. This is a result of the sharp drop of over 12% in 2009 after two years of very strong growth of over 13% per year. The EU's share of global imports was over 19% in 2009. US imports grew strongly by 17% in 2010, having suffered a less severe decline (just 5%) than the EU in 2009. China's meteoric growth in imports, surging by 47% after a 6% drop in 2009, means that it surpasses Japan as the third largest importer. The latter's imports grew by a "mere" 10%. Russia's imports also rebounded strongly by 25% in 2010, having suffered a decline in value of 13% in 2009.

Picture 2. *Dynamics of share of EU-27 in world agricultural trade, %*



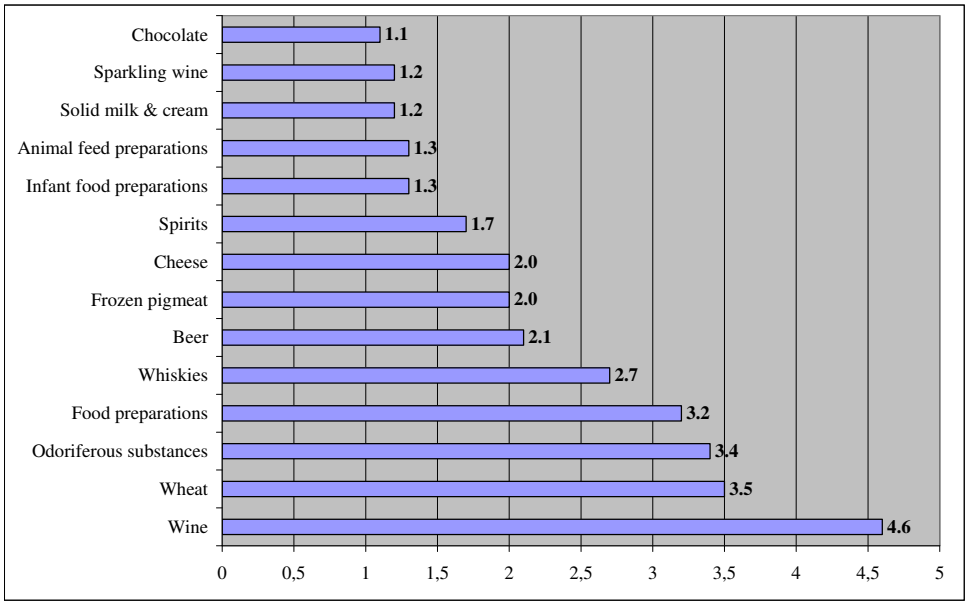
Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

The EU's trade balance continued to improve in 2010 to the extent that it switched from being a net importer with a trade deficit of €2.5 billion in 2009 to a net exporter, for the first time since 2006, with an agricultural trade surplus of over €6 billion. The surplus is largely due to growth in the value of exports after the contraction of trade in 2009 linked to economic crisis and the drop in commodity prices.

The EU and the other top exporters all benefited from buoyant export sales. Following the slump in the value of agricultural exports in 2009, (8% for the EU and 10% for the US), last year they both bounced back with spectacular growth of 21% and 24% respectively. For the past 3 years, the EU and the US have been roughly neck and neck as the world's leading agri-food exporters.

The EU's export profile has changed little in recent years. Final products and other products together account for 69% of the value of EU exports in 2008-10, while intermediate products and commodities represent 20% and 9% respectively. Picture 3 shows that 12 of the top 14 exports were final products, the exceptions being wheat (a commodity), milk and cream and odoriferous substances (other products).

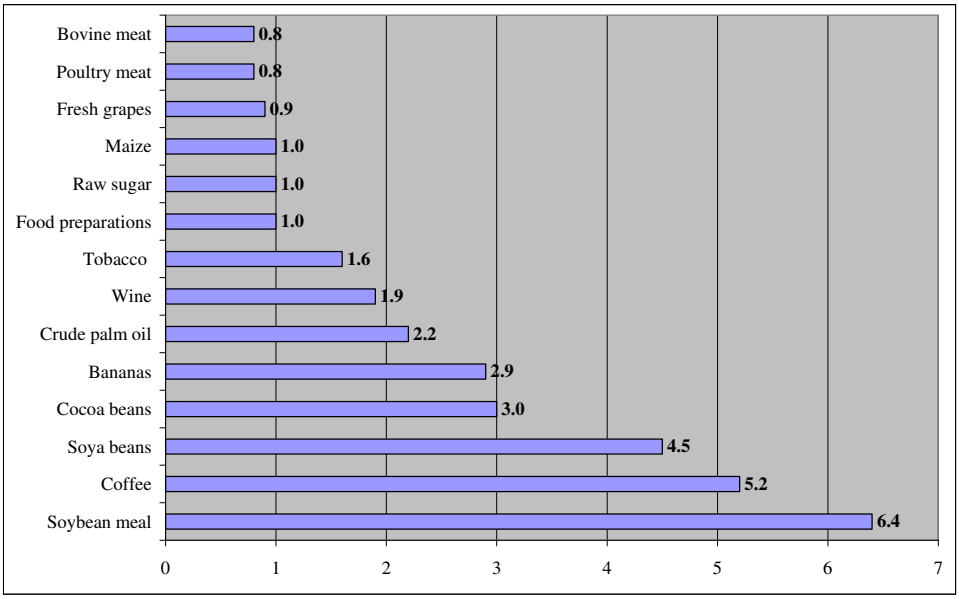
Picture 3. *Main EU-27 agricultural export products in 2010, bln. €*



Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

There is also very little change in the profile of imports in 2010 compared to last year. Final products and other products still account for some 54% of the value of imports, while intermediate products and commodities have a share of 27% and 19% respectively. The top 14 imports for 2010 are shown in Picture 4.

Picture 4. *Main EU-27 agricultural import products in 2010, bln. €*



Source: *International Trade and International Transportation (2011). VLANT Consulting. www.vlant-consult.ru*

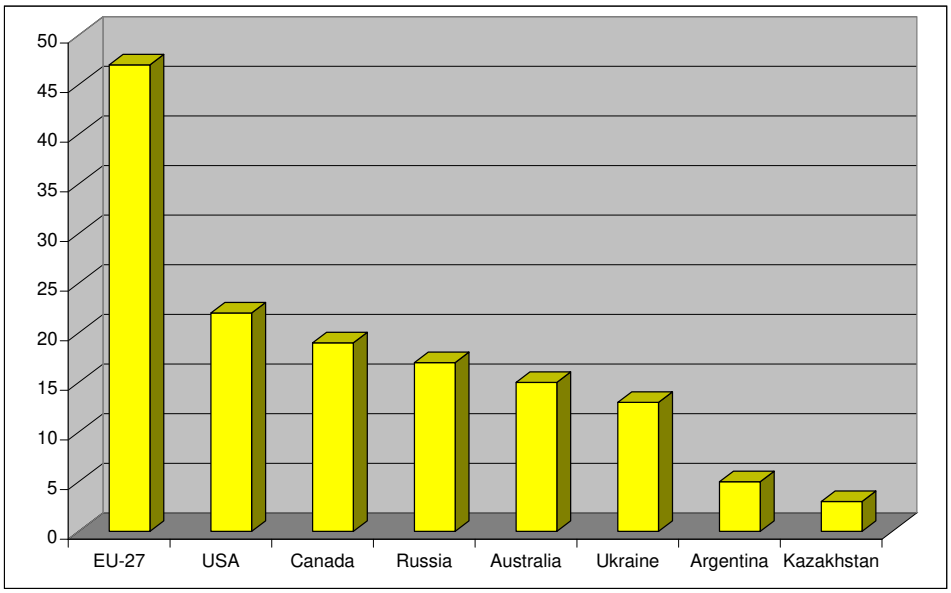
After reviewing the trade turnover of EU-27 it is necessary to give a picture of global trade with respect to the main agricultural products.

World trade of wheat in 2010 grew up on 11% (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 was promoted by wheat big crops in leading exporters, first of all in the CIS countries (in Russia and the Ukraine long-term maxima of wheat gathering were fixed) in 2008-2010.

The list of the leading countries-exporters of wheat is stable enough, however their sequence has been changing frequently during the last years. The USA continue to remain the leader though in 2010 their separation from Canada which has taken the second place was minimum

current decade (indicators of the countries have made 22 and 19.5 million ton correspondingly). The third place in 2010 was divided by France and Russia (17 million ton both), Australia (15 million ton) closed the first five.

Picture 5. *Main wheat exporters in 2010, million ton.*



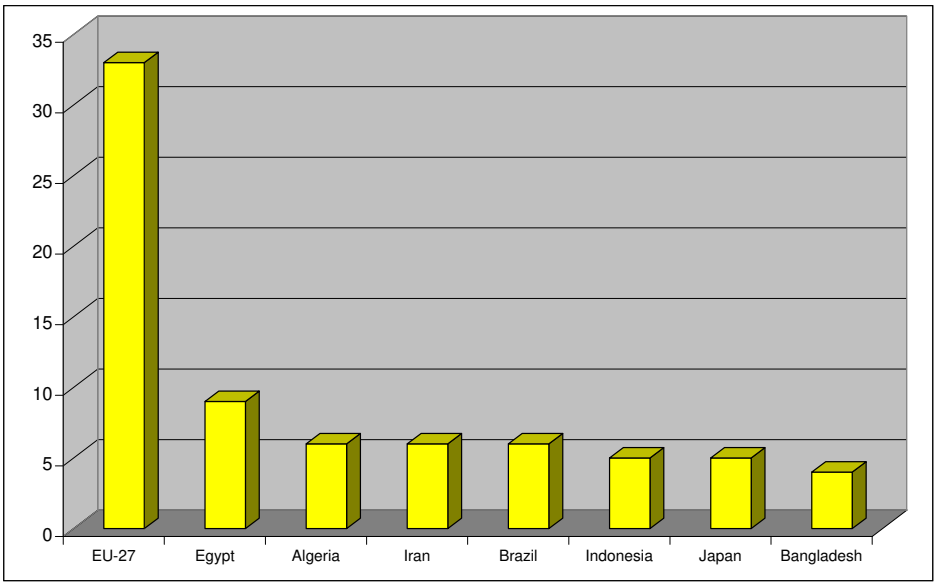
Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

Australia (+7 million ton), EU (+6.5 million ton), the Ukraine (+5.5 million ton) and Russia (+5 million) showed the most considerable growth of export in 2010. Strong decrease was fixed in the USA (-8 million ton) and Argentina (-3.5 million ton).

Egypt which in 2010 reached a new maximum in purchases (9 million ton) has been the leader in wheat import for several years. Besides it, the list of first five of the countries-importers in 2010 included Italy, Spain (6.5 million ton), Algeria and Iran (5.5 million ton). The most considerable growth of import among leading buyers was noted in the EU (+5 million ton), Bangladesh (+2.5 million ton) and Philippines (+1.5 million ton). Essential decrease in import was fixed at Morocco (-1.5 million ton) and Japan (-1 million ton).

World trade of corn in 2010 decreased by 5.5%, and in absolute expression decrease amounts to 5.5 million ton. Increase of use of corn for biofuel in the USA, the leading world exporter, the smallest in the last several years crop yield Argentina, the second key exporter, and also the amplified competition to cheap fodder grain from the CIS countries promoted trade decrease.

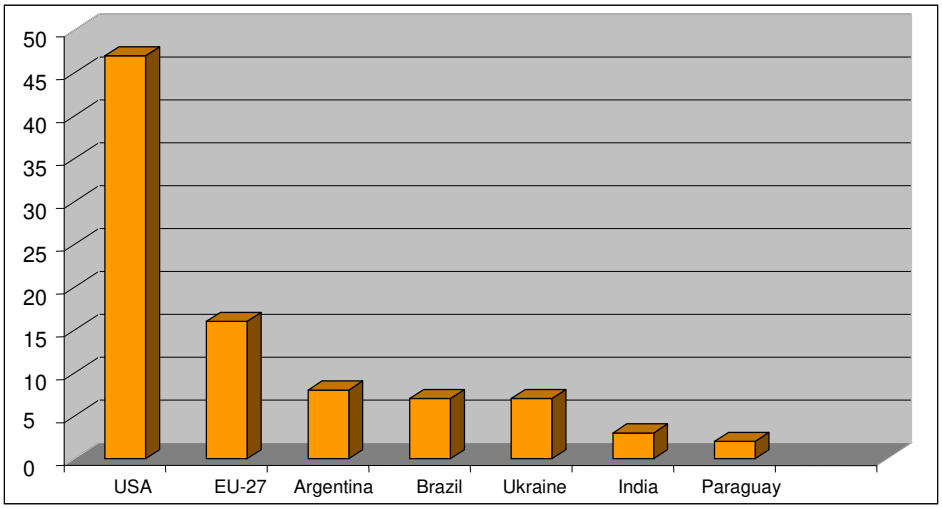
Picture 6. *Main wheat importers in 2010, million ton*



Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

The largest exporter of corn historically is the USA, providing about half of global trade (48 million ton in 2010). The second place last years confidently is occupied by Argentina (8.5 million ton in 2010), in 2010 also Brazil (8 million ton), Ukraine (7 million ton) and France (6.5 million ton) were included into the first five of the countries.

Picture 7. *Main corn exporters in 2010, million ton*



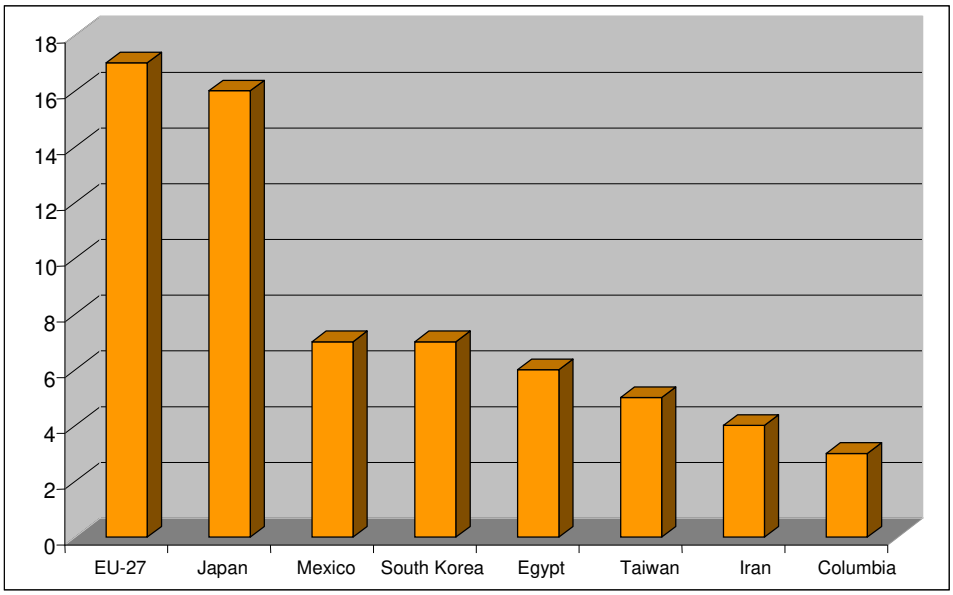
Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

The greatest increase in export in 2010 was shown by the Ukraine (+4.5 million ton) and the EU (+2.5 million), Argentina (-7 million ton) and the USA (-6 million ton) strongly reduced shipments.

Japan is traditionally the leader in corn import at countries level. Import in this country throughout 2000s is stable and is within 16-17 million ton limits in a year. In 2010 purchases in the world market Mexico, Republic Korea (7.5 million ton both), Egypt (5.5 million ton) and Taiwan (4.5 million ton) were marked according to their purchases amount.

Iran (+0.7 million ton), Syria (+0.6 million ton) and Egypt (+1.5 million ton) have shown considerable growth of import from leading buyers in 2010. Big reduction is fixed at the EU (-4.5 million ton), Mexico (-1.8 million ton) and Republic of Korea (-1.7 million ton).

Picture 8. *Main corn importers in 2010, million ton*



Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

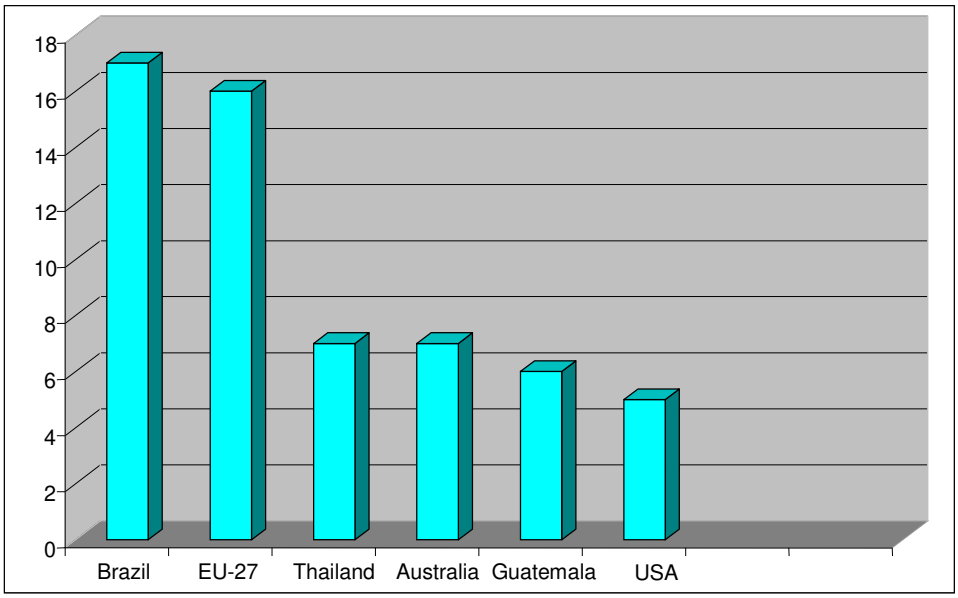
World trade of sugar in 2010 grew up to 1.5 %, and in absolute expression — to 1 million ton. The global result has reached a new historical maximum. Trade expansion was promoted by sugar cane huge crop in Brazil while there was reduction of volumes of its processing in ethanol and growing demand for sugar from the developing countries.

Brazil, last years providing 30–35 % of global trade (24 million ton in 2010) and having the repeated superiority over any other country acts as the leading exporter of sugar from the middle of 1990s. Also the first five in 2010 included Thailand (5.5 million ton), Australia, France (3.5 million ton both) and Guatemala and the USA (2 million ton both) divided the fifth place. Brazil (+5 million ton) has shown substantial growth of export in 2010, from other it is possible to mark the EU and Colombia (+0.6 million ton). Deliveries from India (-5 million ton) have practically stopped.

The leading sugar importer at countries level in 2000s usually were the USA or Russia, however in 2010 they were outstripped by India (4.5 million ton), among irregular importers where owing to a poor harvest

there was a strong deficiency of sugar. The USA have taken the second place (4 million ton), and Russia thanks to a good harvest of sugar beet has sharply lowered purchases of sugar and according to its amount moved to the end of first ten countries. The first five in 2010 was added by Republic of Korea (2.5 million ton), Great Britain (2.5 million ton) and the United Arab Emirates (2 million ton).

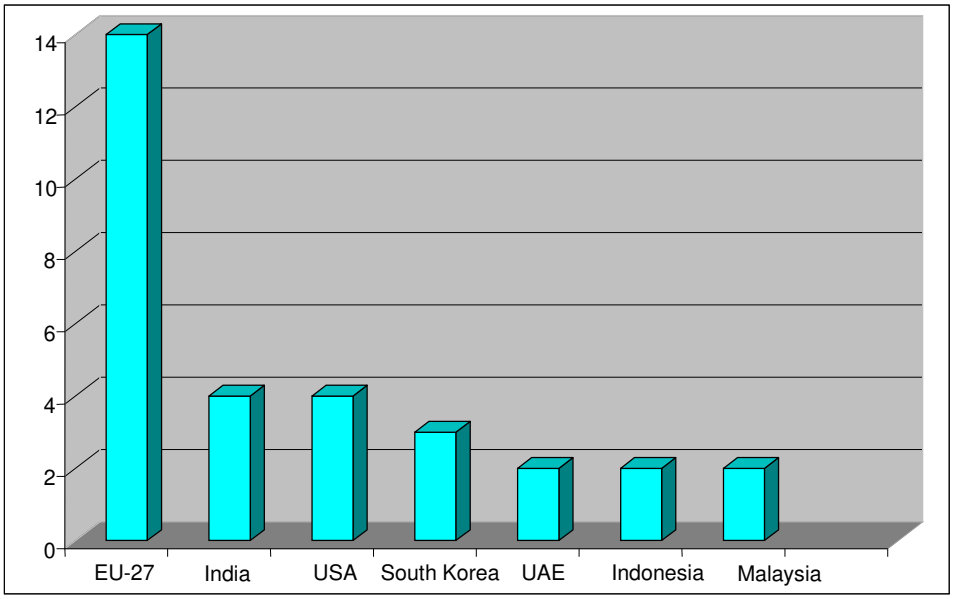
Picture 9. *Main sugar exporters in 2010, million ton*



Source: *International Trade and International Transportation (2011). VLANT Consulting. www.vlant-consult.ru*

The most considerable growth of import from leading buyers was shown by Indonesia and Mexico (+0,5 million ton both). Huge decrease in purchases is fixed in Russia (-1.5 million ton) and EU (-1 million ton). Summarizing the carried out analysis, it is necessary to notice that within 2007 – first half of 2008 in the world market the sharp rise in prices for the majority of kinds of agricultural production was observed. This growth was defined by a combination of both structural, and short-term factors. They included increase of demand pushed by economic lifting in developing countries, increased manufacture of biofuel that has reduced presence of foodstuff, and occurrence of adverse weather conditions in a number of the main manufacturers of agricultural crops. All it has negatively affected world deliveries of the foodstuffs.

Picture 10. *Main sugar importers in 2010, million ton*



Source: *International Trade and International Transportation (2011). VLANT Consulting.* www.vlant-consult.ru

The key structural factors which caused increase of prices on foodstuff, is a result of a long-term increase of demand from outside quickly economically rising developing countries, especially such giants as China and India where besides the general increase in the population the middle class during the last years has essentially grown, and which qualitative needs have strongly increased. World financial and economic crisis has a little bit slowed down the given growth, however the analysis of results of 2010 shows renewal of growth of demand for agricultural production in the world. In addition to increase of demand for foodstuffs from developing countries climatic changes and aspiration to saving of energy carriers have induced the governments to use more scale of ethanol (ethyl spirit) and biodiesel fuel; both of them are almost entirely taken from foodstuff and a forage for cattle (corn, a sugar cane, palm and soya oil).

The main concerns of developing countries in the sphere of international trade with agricultural products and effective development of domestic agricultural production are related to the modern tendencies of globalization and trade integration. Nowadays most of the regulating 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. Until recently only one of the main global producers of agricultural products – Russia – was not among the WTO members. The Russian accession into WTO had been approved in December 2011 after the long period of multilateral negotiations. The ratification of the accession documents by the State Parliament of the Russian Federation (Duma) is expected in the middle of 2012. After that, Russia will become the full member of the single global trade system. In the respect of optimization of the domestic agricultural production in the conditions of trade integration research of the Russian accession experience, main problems and challenges may be of a great importance for the neighboring countries, CIS states and Eastern Europe and all other new-joining countries.

Along with a wide range of advantages given by the WTO system to the Russian economy, many experts reasonably observe series of problems and challenges related mainly to the alleviation of access to the Russian internal market for foreign goods, decreasing competitiveness of Russian producers, wave of bankruptcies, increase of unemployment and decrease of living standard.

Membership in WTO will obviously limit the opportunities in independent regulation of the external economic activity. Particularly, the binding of the import custom tariffs will limit the maneuverability and flexibility of the state regulation of the custom and tariff measures. The economic conditions of the majority of plant and animal production branches will get worsened because of the low competitiveness of Russian production based on the low level of provision with qualitative production factors, as well as on the weak interaction between agriculture and the rest of industries and services. It will become harder and more difficult for the state to protect national producers, the access for the foreign food products to the internal market will become easier because of the lower import custom tariffs. This may lead to the decrease in the national production.

The above-mentioned problems are especially actual for the Russian agri-industrial complex and development of rural territories. Russian experts anticipate the decrease of the share of the local agricultural producers on the internal market which, in turn, will effect on the employment in the related industries. Food processing industries, especially meat and dairy, are expected to be the most attackable. After the WTO accession the

problems may arise in the sphere of application of veterinary, sanitary and phytosanitary measures, treated as protective ones. Once entering WTO the country has to implement the sanitary and phytosanitary measures or restrictions in accordance with the WTO Agreement on Sanitary and Phytosanitary Measures – and only based on the scientifically proven principles of phytosanitary risk. The growing flow of cheap import products may bring new quarantine objects and diseases to the country.

Even today, 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 find their customer neither on foreign nor even on local Russian markets.

However, the "secret" of success of foreign farmers on the Russian market is not only in the unique high quality of their production. Agriculture in global economics is one of the most protected and "closed" branches. The main method of protection is to give a huge volume of subsidies to the agricultural producers. Annual expenses of WTO member countries for agriculture reach dozens of millions US dollars. Half of "agricultural" expenses of WTO member countries are the measures distorting trade and production which has a negative influence on the global agricultural market, leading to the excess production and fall of prices for agricultural and food products.

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. Herewith USA and a range of other developed countries remain the net exporters of food products and save the high level of food sovereignty. USA and France are fully independent and provide themselves with agricultural and food products on 100%, Germany – on 93%, Italy – on 78%, Japan (which almost has no land resources) – on 40%.

Foreign experience of state support of agriculture, applied tools and methodological base of WTO in this sphere are obviously the necessary objects to be studied in purpose to smooth the expectative negative effects for Russian agriculture in view of WTO accession and to use all existing competitive advantages.

According to the results of agricultural negotiations, completed by Russia in autumn 2011, our country had agreed with the position when the total volume of agricultural support, preventing fair trade, could not exceed $9 bln. in 2012 and had to be gradually decreased to $4.4 bln. by 2018. Starting from the accession moment to December 31st, 2017, for the avoidance of excessive support of individual products, annual agricultural support of the specific products should not exceed 30% of agricultural support spent on the non-specific products.

Summarizing the main problems to solve by the Government of the Russian Federation and scientific community on the evidence of the WTO accession, it is necessary to mention the following:

1. Lowering competitiveness of Russian agriculture on the international and domestic markets (at least during first years after WTO accession).
2. Integration of agrarian markets of CIS countries and establishment of the common agrarian market.
3. Scientific provision of accession processes and further membership in WTO.

Undoubtedly, development of theory and practice of integration of agrarian markets in the conditions of economic globalization will let to assess objectively the nearest and long-term circumstances of Russian accession to WTO. At once, this organization can not be recognized as an ideal tool for international trade regulation. WTO is naturally influenced by both separate countries and powerful transnational corporations lobbing their interests. Developing countries and economics in transition are not in the center but on the circumference of this organization. Many of its procedures are too formal and bureaucratic. Sometimes there are even the cases of discrimination of applying countries.

We assume that the system of state support of agriculture in Russia, according to the study of foreign experience, should be established particularly on the basis of the Green Box. We consider the following measures of support of Russian farmers and food processing companies as the most perspective tools of support and defense:

1. Direct payment to the producers unrelated to the price or production volumes. For example, farmers in the USA get support calculated on the certain formula without any relation to the current production volume. Payment mechanisms are specified in the separate

law once per six years. Thus, the land plot of 100 ha with the fixed productivity of corn 7 t/ha in the basis period gives the right to get $6.5 thousand as an annual subsidy.

2. Implementation of sanitary and phytosanitary measures as the limiting barriers to protect the domestic market. This is officially forbidden, however EU countries use “high” sanitary standards to limit the access of import products. For example, to limit the pork import EU countries implement the total prohibition of the growth factor ractopamine – the drug that is used as a feed additive to promote leanness in pigs raised for their meat. Obligations on sanitary, veterinary and phytosanitary regulation are interconnected with agricultural obligations undertaken by the accessing country. They are directed on provision of correspondence between the systems of sanitary, veterinary and phytosanitary regulations and WTO rules of technical regulations. Implemented sanitary, veterinary and phytosanitary measures have to be based on the international standards, supported by the sufficient scientific ground and risk assessment. Russia will save its right to introduce more strict requirements comparing to the recommended by the international organizations when it is required by the level of protection set in Russia. Herewith Russia will actively participate in the activities of the related international organizations during the development of standards and recommendations. The transparence of the procedure should be provided when the importer can appeal the stoppage, annulment or refusal of import permission for his goods and to get the letter of reply explaining the reasons of the certain decision and measures that should be undertaken by him in order to get the permission. The Federal Service for Veterinary and Phytosanitary Surveillance committed to provide the possibility for the exporting country to undertake the certain correction measures before the final decision on import stoppage. The given obligation is not spread on the cases associated with the severe risks for health of people and animals.

3. Combination of tariff quotas, sanitary and phytosanitary measures. In the USA and EU such practice results in the not complete fulfillment of the set quotas. In that case tariff quotas act as the extra control element as also serve as a tool of redistribution of exclusive import volumes.

Conclusions

Trade in last decades becomes more and more internationalized and globalized. A global trading system is now both freer and fairer than ever before and this will boost global prosperity and can make a significant contribution to the global economic development.

High speed of technical progress in the communication and transportation lets to save time and money to transfer of information, cargo transportation and mobility of people. These technical achievements also let to control every international operation more effectively. Faster exchange with information lets to adjust prices and increase the sales volumes on international markets. Due to the technical innovations, there is a possibility to move production from one country to another, to distribute production of final products and their components between countries and regions to optimize costs.

Favorable conditions for development of international trade are developed because of the evolution of international trade and social institutes and business infrastructure. This is especially related to the trade liberalization, development of trade unions and free trade areas all over the world. International trade can bring significant benefits to countries. It provides scope for enormous and sustainable gains in economic growth and poverty reduction that is especially important for developing countries.

Because of the growing competition on the global market, elimination of trade barriers, development of communication systems, information and transport, national economics feel the increasing influence of international markets. They consider internationalization as the imminence to face with eventually. Today there is no necessity to go abroad to feel international competition. National producers should adapt their business to the new conditions. Even the companies with the predominantly local national orientation have to provide their competitiveness internationally for the further sustainable business success. International orientation becomes vital for the national companies (and even national economies) for their long-term development. In other words, trade internationalization and integration drive the global economics and provide benefits and welfare for national producers.

The present rise of prices for agricultural production in world economy is rather essential and testifies about possible increasing shift in dynamics of the long-term average prices in the historical bearish tendency proceeding the whole century. The high prices favor big exporters of agricultural production, such as Australia. However possibility to benefit by higher prices in practice was limited till now by drought. The increase in global manufacture should facilitate an intense situation with supply by the agricultural goods, and foreign experts consider that possibility of some decrease in the world prices in the long term isn't excluded. However restoration of global stocks of the foodstuffs and agricultural production as a whole will be obviously slow and world demand, predictably, remains rather considerable. It means that the global prices in the foreseeable future remain high.

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THE SIGNIFICANCE OF CREATING A NETWORK DIAGRAM (CPM METHOD) IN THE PRODUCTION OF WHEAT[1]

Biljana Grujić, Nataša Kljajić[2]

Abstract

This work primarily describes organisational and economic conditions in the production of wheat, emphasizing, at the same time, the necessity to procure with farm machinery. Also, the development of methods in network planning techniques (CPM and PERT method) is analyzed and the concept, factors and methodology of network planning, as well as the rules for drawing a network diagram are defined. If we include mathematical model into the network model, we get detailed information on terms for carrying out an operation and how long the production will last. The aim of the analysis is to explain the significance of creating a network diagram (CPM METHOD) for the production of wheat on 20 ha. Defining technology interdependence charts and lists of activities completes the process of creating a network diagram. Finally, the work contains tabular presentation of an analysis of costs of machinery services in the production of wheat. However, because of frequent price oscillations of oil derivatives, the costs of diesel fuel were singled out from the costs of machinery service.

Key words: *wheat, technological chart, network diagram, CPM method.*

Introduction

In the conditions when there is a growing labour division and specialization, planning in agricultural companies has become more complex. Agricultural companies begin to create plans with various aims. In the case of wheat production technological chart is being created which

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includes working operations during vegetation for the period from planting to harvest and which defines how long each individual activity lasts. In plans of this kind there is the highest possible level of predictibility because it is exactly ordered who should do what and when in order to accomplish scheduled task.

Network diagram is created in order to make graphical representation of working operations (based on a scheduled order of operations in technological chart). The most simple technique of creating a network diagram is a *technique of network planning. Network planning technique enables planning, coordination and control of complex processes where it is necessary to coordinate large number of jobs in order to accomplish the whole working task in a certain time limit, with minimum burdening of those that take part in realization.*Two network planning techniques are significant - CPM method *(Critical Path Method)* and PERT method *(Program Evaluation and Review Technique)*.

This work presents CPM method and practical application during wheat production on the surface area of 20 ha. Working operations are presented by technological chart and the duration of operations is determined in days. To determine the number of days required for the performance of activities per hectare, used norms are shown in the price list of mechanical services *(ZSV, 2011)*.

Then, the list of interdependance among activities is created which shows which operations must be carried out after the previous are finished and which can be carried out simultaneously. Also, creating is network diagram using CPM method, which shows critical path (determines the duration of a project) and time reserves (activities that are not on critical path and their duration is less than maximum allowed duration). Tables follow network diagram where are detailed analysis of time and time reserves. Finally, there is also a tabular presentation of costs of machinery services (without diesel fuel costs) for the entire surface area *(Price list, 2011)*.

Organisational and economic conditions in the production of wheat

Crop production requires the use of self-propelled, and driving the tractor trailers and vehicles. Since the machines are essential tractors, while for transport, except unit that makes the tractor and trailer, can be used truck, van, etc. Implements also not be a constraint in the production process, so

that depending on the needs of use: ploughs (two-furrow and three-furrow), mounted disc harrow, draw seedbed tiller, mounted atomizer, seeders (narrow-row and wide-row drill), trailers (capacity per 7 hectares), etc. For the purposes of the harvesting in using are harvesters *(Ristić, 2010.)*.

Rational organisation in the production of wheat requires an excellent knowledge of organisational and economic conditions and an excellent knowledge of natural resources. These conditions restrict final result in production by affecting income and the costs of production.

Procurement with farm machinery represents one of significant organisational and economic conditions which help in achievement of higher incomes, higher productivity, to reduce the costs of production and increase competitiveness of this type of production. Beside soil working machines, machines for fertilization and plant protection, it is impossible to imagine wheat production without special sowing machines, combines - harvesting machines and straw packing machines. The range and structure in using machinery in the production depend on the type of production and the system for growing plants; they also depend on crops, weather and soil conditions, on the level of production organisation and organisation of work and on the level of production intensity. Average return from wheat depends on various factors, for example on the quality of the applied agrotechnique, additional plant nutrition, crop protection, the choice of plant type, weather conditions during vegetation. In average, return from wheat is 5,5-6,5 t/ha. An average return from ground biomass (straw and chaff) is 35-45% of an average return, in other words an average return is 2-3 t/ha, depending on the sort *(Munćan, Živković, 2006)*.

Development of basic methods in network planning techniques

There are two important methods that appeared in the world:

1. *Critical Path Method - CPM*
2. *Program Evaluation and Review Technique - PERT method*

Critical Path Method was created in 1956 because of the need to develop planning system for chemical industry, but it was meant to serve especially for revision planning and work on automatic plant maintenance. At the beginning, research pointed to the fact that the problem could be solved only by applying mathematical methods and using electronic adding machines. At the beginning of 1957 first written

studies were published related to planning by critical path method and at the end of the same year it was started with method application. Satisfactory results were achieved and therefore the method was expanded by new tasks (remont and chemical plant maintenance). Since 1959 many scientific works about critical path method were published by various authors ad especially by James E. Kelley Jr. and Morgan R. Walker Jr. Both mentioned authors actively participated in the research, and the result was that the method was expanded. Critical Path Method also appears under the name CPS (Critical Path Scheduling) and CPPS (Critical Path Planning and Scheduling) in practice, but among these methods there is no essential difference *(Ceranić, 2007)*. Analysis of time in application of CPM method has only one estimation of time and it is indicated as estimated or standardized time *(Jelisavčić, 2010)*.

PERT method appeared as an result of a task aiming to develop system of planning, informing and managing very complex projects with numerous uncertainties. In an earlier phase of development (1956) on a rocket programme POLARIS (ballistic missiles and nuclear submarines) the conclusion was made that all conventional leading systems represent an inefficient system for programme observation. Newly created method was named PERT method and first published studies appeared in 1958. Success achieved by the navy became interesting for other branches of the american army, so they intensively started with network planning, especially in the air force. At the beginning, PERT method was used only by bureaus or institutions that were dealing with military orders. In time, instructions for an application of PERT method in companies were created, so this method started to be used in other social activities, too. This method was completed by including an analysis related to project costs. The Ministry of Navy organized PERT method training courses in order to be available to citizens and movies were also made about coordinated planning. Soon the application of network planning was spread to Europe, since the american institutions started to use this method in their branch offices in Europe and further *(Ceranić, 2007)*. An analysis of time includes three activities duration estimates in an application of this method *(Jelisavčić, 2010):*

- *optimistic* - minimum activity duration;
- *possible* - period in which would activities finish under normal conditions;
- *pesimistic* - the longest duration of activities under unfavorable conditions.

The concept, factors and methodology of network planning technique

At the same time with the development of science, technique and technology, scientific methods of planning were developed. Technification revealed that rational project planning cannot give precise solutions. In order to avoid mistakes in planning scientific methods started to be developed and the most significant was *network planning technique (Jelisavčić, 2010)*. Network planning technique enables sufficiently precise review of the whole work realization, logical development review and the review of mutual dependance between the parts of the process and the process itself. *In a word*, **network planning technique enables** *planning, coordination and control in complex processes where it is necessary to coordinate large number of partial activities in order to carry out a full business plan in a certain time limit, with minimum burdening of those that take part in realization.* Network diagram is created using activities (arrows) and events (circles) and represents graphical presentation of the observed project realization. It is a mathematical model of a project by which bussiness plan results could be analized and explained. Network diagram (model) of a project represents the sequence of activities. Every event is marked by a number. The first event is marked by number one and the last one with *n*. If we mark the first one with *i* and the last one with *j*, then the activity can be marked with the symbol A_{ij}. The mark explains with which event the activity starts and with which ends.

Basic **factors** of network planning technique are: project, activity and event *(Jelisavčić, 2010*). *Project* is a set of measures (economic, organizational and technical) whose aim is to realize certain aim. Project requires engagement, organisation and resource management, and the essence of resource management includes organisation, planning, projecting, realization and control of assigned processes. *Therefore, it is necessary to determine the sequence of operations and undertakings which will achieve final results, or in other words realize the project, followed by constant striving toward final aim.* So, for example, the project is: presentation of a new product, scientific research topic, growing perennial plant nurseries, an investment in the construction of agricultural buildings, an investment in the introduction of amelioration systems and other. *Activity* is an integral part of a project which is a complex whole. Activities are individual technological tasks or jobs whose logical connection makes the observed project and whose realization requires certain measures and certain time. Every activity must

be limited by the earliest beginning and the latest end. Activities are represented by arrows whose length is not determined by action duration. Except activities that require certain time and measures there are also so-called *fictitious activities* that don't require time and measures and which enable realistic review of connection among certain activities within the project and are represented by broken arrows. *Event* is an observed time interval at which certain activity starts or ends (one, several or the whole project) and it doesn't have time dimension. Events are graphically represented by a circle in which necessary data are written. Event is, for example: the beginning of preparation for sowing, harvest, gathering, the end of sowing, harvest, gathering and other.

The special advantage of network planning is the possibility to separate **methodological wholes** completely *(Jelisavčić, 2010):*

1. *structure analysis* - analizes the sequence in technology, relations in activities within the project and creation of network diagram (graphical representation of project realization).
2. *time analysis* - includes determination of time needed for the realization of certain activities and for the whole project; it is essential to determine "critical path" of the project;
3. *costs analysis* - determination of costs for certain activities and for the whole project, as well as finding optimum relation between time and costs in realization (of activities and of project);
4. *resources analysis* - includes material, equipment and working labour planning (*Glišović*).

Beside mentioned network planning advantages, there are also *(Glišović)*:

- *the creation of network plan requires previous detailed project analysis, which results in better understanding of an undertaking;*
- *the saving of time and resources;*
- *realization control;*
- *calculation of time reserves for analysis and levelling of resources;*
- *personnel and resources can be distributed in advance.*

Practical application of CPM method in the construction of network diagram in the production of wheat

The starting point for the development of a network diagram work processes are presented in the form of maps and lists of technological activities. The obtained values allow for the creation of network

diagrams. Formed a network diagram following two tables - analysis time and analysis time reserves. Tabular view indicators of time analysis provides information about whether it can be and how much time units to delay the start or the end of a work activity. After analyzing the access time to the analysis time reserves, and indicators are used to determine the specific activities that must begin at their earliest beginnings that have been completed in their latest endings. Activities whose time reserves equal to zero indicating that there is no freedom in a time of their execution, ie. must be made at fixed times. Activity with such properties is a critical activity.

Simultaneous creating of techological charts compiled and technological documentations which accompanying the technological process. Technological documentations has a basic task to determine the order and the way of technological operations in the technological process. Technological documentations establishing procedures, and the types and quantities of materials used, types of tools, the tools and how to work with them, work operations, etc. As technology documentations used by different types and forms of documentation and the most commonly used is technological map *(Lajović, Vulić, 2010)*.

Technological chart, as seen in columns, include: the working process, activity tags (alphabetical order), time of the execution, planning number of working days to perform, the composition of the working group (workers and machines), unit of issue, daily output, the total workload and the total number of days in a given activity. In order to determine the required number of days in wheat production, technological chart must contain the above-mentioned technical - technological and organizational elements. According *Dimitrijević, Ceranić (2011)* technological chart represents a plan under which existing organizational - economic criteria define the level of intensity of production, the rational behavior of all actors in the coordination of production and implementation of a production process. Depending on the type of soil, the previous culture and technology selection, the choice of certain cultural practices and daily performance and machine work during the performing certain operations. Implementation of the planned work processes in optimal agro-technical terms helps to reduce the actual cost of production compared to the planned.

The following table *(table 1)* contains a sequence of technological operations and cropping periods in the production of wheat on an area of 20 ha.

Table 1. *Technological chart of wheat production*

No.	The working process	Activity tags	During the execution	Number of working days for the execution	Composition of the working group		Unit of issue	Daily output	Overall work	For all the work to date
					Workers	Machine				
1.	Subsoiling	A	VII	2	1	1	ha	4,8	20	4
2.	Shallow ploughing to 15 cm (fallowing)	B	VIII	4	1	1	ha	3	20	7
3.	Fertilization (NPK, 0.4 t / ha)	C	IX	2	1	1	ha	5,4	20	4
4.	Ploughing (40 cm)	D	IX	13	1	1	ha	0,9	20	22
5.	Preparation Sowing (up to 4 m)	E	X	3	1	1	ha	4,2	20	5
6.	Sowing (0.3 t / ha)	F	X	5	1	1	ha	2,4	20	8
7.	Top dressing I	G	II	2	1	1	ha	5	20	4
8.	Top dressing II	H	III	2	1	1	ha	5	20	4
9.	Weed contrtol	I	IV	2	1	1	ha	8,4	20	3
10.	Harvesting	J	VII	4	1	1	ha	3	20	7

Source: *The author's view sequence of technological operations.*

The number of working days intended for the realization of operations is calculated using standard indexes which are published (*ZSV, 2011)*. In the original document daily standards for the performance of all individual operations are presented (in ha), which are in accordance with the needs of sowing wheat on 20 ha. Therefore, for example, for shallow plowing up to 15 cm of depth daily standard is 5 ha, which means that for 20 ha of surface area planted with wheat 4 days are needed. The choice of certain agrotechnical measures, as well as the daily output of human and machinery work during certain operations differ depending on the land type, what was previosly planted on it and the technology. Realized daily output per hectare is 30 - 40% less than the standardized one. The losses include: machinary maintenance, rest, time for preparing and finishing,

travelling to the place of work and back, time for turn and supplying per hectare (Milić *et al, 2001*). Therefore, the number of days necessary for the realization of whole work is larger than standardized.

Base on the technological chart the list of activities is being created which determines the sequence of operations and the possibility to perfrm them at the same time. Accordingly, the list of activities shows the correlation between activities ie. relationship observed and the previous activity. A list of activities in the production of wheat is shown in the following table *(table 2)*.

Table 2. *List of activities in the production of wheat*

Mutual relations activities		**Considered activity**									
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Previous activities	A		+								
	B			+	+	+					
	C						+	+			
	D							+			
	E								+		
	F										+
	G									+	
	H									+	
	I										+
	J										

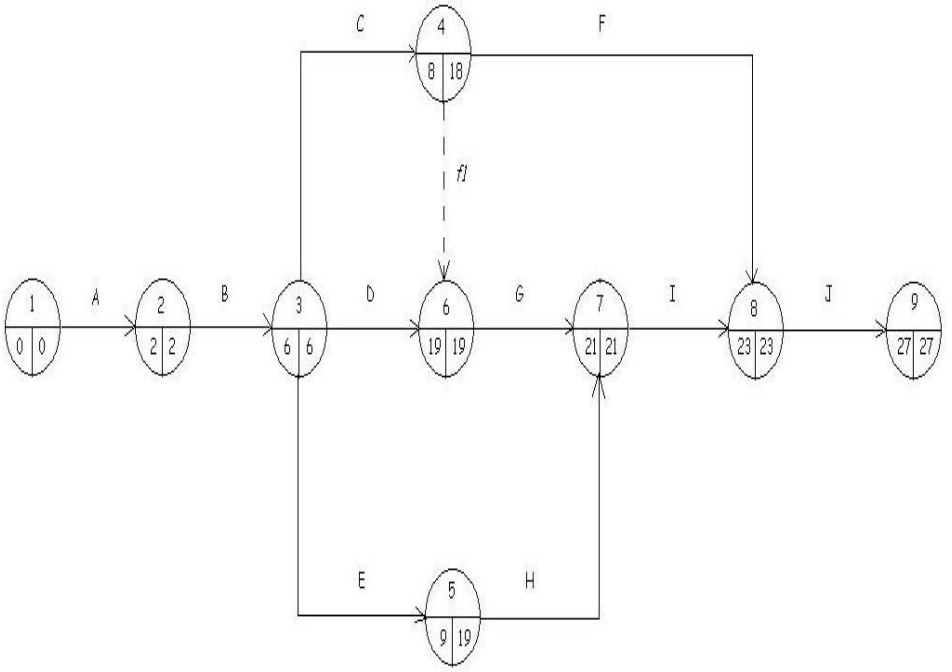
Source: *Table 1.*

Activities marked alphabetically (A - J) symbolize the interdependence of work processes. For example. work activity B (shallow ploughing to 15 cm - fallowing) begins after the activity A (subsoiling) and so on.

When interdependant activities are determined, we created a network diagram using CPM method. On network diagram we are drawn knots and activities. Marks of activity are taken from technological chart, activities are marked in alphabetical order (A-J), positioned above the arrow in the diagram with one fictitious activity (f1), which is indicated by dashed lines represent the number of days to perform specific work process. Numbering used is growing event (1 - 9), which shall be entered in circles of diagram. On the diagram we can see the critical path and determine the total duration of all activities in the production of wheat.

The following graph (*graph. 1*) is a network diagram (CPM method) in wheat production.

Graph. 1. *Network diagram (using CPM method) in production of wheat*



Source: *Table 1 and 2.*

Critical path includes those activities which don't have free time reserves and which contain critical activities (time reserves are equal zero), so therefore must be performed in the latest time limit. Duration of some activities determines the duration of the whole project. In case when it comes to changes in duration of any activity on a critical path, it immediately affects the duration of the whole project.

In this example, *27 days* are needed for the implementation process in production of wheat on an area of 20 ha. *Critical path includes activities:* 1-2-3-6-7-8-9. Other activities (4 – ploughing, 5 - preparation sowing) are the activities with *time reserve.* Their dislocation of critical activities affect the shortening of the duration of critical activities, and that means a potential cost savings in the production of wheat.

Prepared network diagram accompanying two tables - analysis time and time reserves *(table 3 and 4).*

Basic parameters within time analysis are *(Ceranić, 2007):*

- *the earliest beginning of an activity* E_{ij}^{p}
- *the earliest end of an activity* E_{ij}^{z}, which is calculated: $E_{ij}^{z} = E_{ij}^{p} + t_{ij}$
- *the latest beginning of an activity* L_{ij}^{p}, which is calculated: $L_{ij}^{p} = L_{ij}^{z} - t_{ij}$
- *the latest end of an activity* L_{ij}^{z}.

Between the earliest beginning and the latest end of an activity there is an available time period within which the observed activity must be finished. Therefore, the following relation must be realized: $t_j^1 - t_i^0 \geq t_{ij}$.

Table 3 presents the analysis time in the production of wheat.

Table 3. *Analysis time in the production of wheat*

Connection between events i - j	Duration of activity t_{ij}	Earliest time		Latest time		Maximum time to perform activities $L_{ij}^{z} - E_{ij}^{p}$
		Begining E_{ij}^{p}	Ending E_{ij}^{z}	Begining L_{ij}^{p}	Ending L_{ij}^{z}	
1-2	2	0	2	0	2	2
2-3	4	2	6	2	6	4
3-4	2	6	8	16	18	12
3-5	3	6	9	16	19	13
3-6	13	6	19	6	19	13
4-6	0	8	8	19	19	11
4-8	5	8	13	18	23	15
5-7	2	9	11	19	21	12
6-7	2	19	21	19	21	2
7-8	2	21	23	21	23	2
8-9	4	23	27	23	27	4

Source: *Graph. 1.*

Each activity whose duration is less than its maximum allowed duration has certain time reserve and time reserves are present only at those activities which are not on the critical path (4-5). In the example of wheat production activity duration is shorter than the maximum time in activities with the marks C (fertilization, the connection between the events 3-4), E (preparation sowing - the connection between the events 3-5), F (sowing - the connection between the events 4-8) and H (top dressing II - the connection between the events 5-7). Consequently, the

number of days to remaining in the operations of these can be compensated for the remaining operations (which are on the critical path) if it is needed due to a possible excess of the standard time.

After tabulation time analysis approaches to the analysis of time reserves. It is primarily necessary to analize five types of time reserves, where four are related to activities and the fifth to knots *(Ceranić, 2007):*

1. *total time reserve* (T_{ij}), which is calculated: $T_{ij} = t_j^1 - t_i^0 - t_{ij} \geq 0$;
2. *free time reserve* (F_{ij}), which is calculated: $F_{ij} = t_j^0 - t_i^0 - t_{ij} \geq 0$;
3. *independent time reserve* (N_{ij}), which is calculated:

$$N_{ij} = t_j^0 - t_i^1 - t_{ij} \gtrless 0; \quad N_{ij} \leq T_{ij};$$

4. *dependent time reserve* (Z_{ij}), which is calculated: $Z_{ij} = t_j^1 - t_i^1 - t_{ij} \geq 0$;
5. *critical time reserve* (K_{ij}), which is calculated: $K_{ij} = t_i^1 - t_j^0$.

Accordingly defined patterns, approach to calculating time reserves, wich values are given in *table 4.*

Table 4. *Analysis of time reserves in wheat production*

Connection between events	Duration of activity	t_i^0	t_j^0	t_i^1	t_j^1	T_{ij}	F_{ij}	N_{ij}	Z_{ij}	K_{ij}
1-2	2	0	2	0	2	0	0	0	0	0
2-3	4	2	6	2	6	0	0	0	0	0
3-4	2	6	8	6	18	10	0	0	10	0
3-5	3	6	9	6	19	10	0	0	10	0
3-6	13	6	19	6	19	0	0	0	0	0
4-6	0	8	19	18	19	11	11	1	1	10
4-8	5	8	23	18	23	10	10	0	0	0
5-7	2	9	21	19	21	10	10	0	0	10
6-7	2	19	21	19	21	0	0	0	0	0
7-8	2	21	23	21	23	0	0	0	0	0
8-9	4	23	27	23	27	0	0	0	0	0

Source: *Graph. 1.*

Calculated time the event occurred, and based on them, defined time reserves are used to determine the activities that must begin at earliest beginnings to be completed in his the latest endings.

These are activities whose time reserves are equal to zero, meaning that there is no freedom in a time of their implementation, must be carried out in clearly defined times. Mentioned parameters are explained in the example of subsoiling operation (connections between events 1-2):

- total time reserve with a value of 0 indicates that it can not move the deadline of the earliest possible beginning of the activity and can not be extended time duration;
- free time reserve with a value of 0 indicates that it can not move the deadline of the earliest possible beginning of the activity and can not be extended time duration, because it endangers the earliest possible beginning of all following activities;
- independent time reserve with a value of 0 indicates that it can not move the deadline of the earliest possible beginning of the activity and can not be extended time duration; can be used positive and negative values, but the only positive are used to extend the duration or shift the earliest possible date that beginning activities;
- dependent time reserve with a value of 0 indicates that it can not move the deadline of the earliest possible beginning of the activity, if any previous activities are completed no later than time allowed;
- critical time reserve with a value of 0 indicates that the appropriate knot is on the critical path.

Time analysis and time reserves analysis represent the second phase in network planning – time analysis. The third phase is the most complicated - the analysis of costs. This phase determines the factors upon which the realization of the whole project depends, and at the same time the relation between resources and time is being researched.

This phase in network planning is performed separately. This phase determines daily costs of machinery work (per hectare) in relation to certain operations in the production of wheat and based on the price list for 2011 *(table 5)*. Because of frequent oscillations in the price of fuel derivatives, the costs of diesel fuel were singled out from the costs of machinery service.

Table 5. *Costs of mechanical services (2011)*

No.	The working process	Unit of issue	Price (RSD/ha)	Costs for the 20 ha (RSD)
1.	Subsoiling	ha	4.450	89.000
2.	Shallow ploughing to 15 cm (fallowing)	ha	3.040	60.800
3.	Fertilization (NPK, 0.4 t / ha)	ha	960	19.200
4.	Ploughing (40 cm)	ha	4.820	96.400
5.	Preparation Sowing (up to 4 m)	ha	1.200	24.000
6.	Sowing (0.3 t / ha)	ha	1.300	26.000
7.	Top dressing I	ha	1.900	38.000
8.	Top dressing II	ha	1.900	38.000
9.	Weed contrtol	ha	2.440	48.800
10	Harvesting	ha	7.100	142.000
Total			29.110	582.200

Source: *Zadružni savez Vojvodine (2011): Cenovnik mašinskih usluga u poljoprivredi, Novi Sad.*

Generally, total costs of machinery service for the production of wheat on the surface area of 20 ha are 582.200 RSD, but the costs of diesel fuel are not included *(table 5)*. Total costs of machinery services are calculated by multiplying the quantity of fuel used in each operation with retail price of fuel actual at the moment of calculation. For calculating the costs of machinery services per cadastre acre the price from the price list (din/unit of issue) should be multiplied by coefficient 0,5754.

Conclusion

The significance of creating a technological chart is complex, through which it is emphasized: determination of the numbers of days needed for the realization of each operation, facilitated coordination of participants'

activity, prevention from greater mistakes in management, determines the level of management successfulness and similar. The list of activities additionally facilitates the creation of network diagram and points out an interdependance among activities and possibilities to perform several activities at the same time, which results in shortened costs in the production of wheat. The significance of network diagram application is increasing considering the fact that it saves time and material resources and enables control under the realization of the whole process. Based on the network diagram facilitated the define the disposition human and material resources necessary to carry out the project.

Generally, the significance of network diagram application in the production of wheat enables rational use of all available resources because the sequence of activities makes it impossible to double time and costs, in other words project leader can successfully change the duration of individual working process realization, but limited by time reserves, which results in less uncertainty regarding the realization of the project. Network diagram defined *27 days* for the implementation process in production of wheat on an area of 20 ha. Dislocation time, at the activities with time reserve (4 – ploughing, 5 - preparation sowing), on critical activities affect the shortening of the duration of, and that means a potential cost savings in the production of wheat.

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MACEDONIAN CONSUMERS AND FOOD SAFETY ISSUES

Blagica Sekovska[1], Predrag Jovićević[2]

Abstract

Consumers' attitudes to trust and risk are key issues in food safety research and attention needs to be focused on clearly defining a framework for analysing consumer behaviour in these terms. This paper aims to collate the current social sciences literature in the fields of food safety, trust and risk. The relationship between food safety and quality is addressed, and is discussed in the context of research on consumer risk perception. Quality and safety perception is linked to food choice and consumer demand. Consumers' preferences for food safety characteristics are investigated with a particular focus on the consumer subjective perception of food safety issues.

Keywords: *Quality, trust, risk, food safety, consumer behaviour*

Introduction

Food quality and safety have been highly topical for the past 10 year the public debate, in food policy, in industry, and, last but not least, in research. Several factors have driven this debate. First, a variety of food scares has directed public attention to food safety issues. As a result, safety issues have for some years figured prominently on the political agenda, with the EU white paper on food safety (Commission of the European Communities,1999) and the foundation of the European Food Safety Agency as visible outcomes. Second, segments of the general public have become interested and often critical with regard to certain ways of producing foo, both at the farm level and at the processing level. As a result, we have had discussions on organic production, animal welfare, and the use of genetically modified organisms (GMOs) in food

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production, to mention only the most prominent debates. Third, and partly related to the previous factor,consumers in developed countries have become more demanding, more critical, and more fragmented in their food choices, leading to situations where quality differentiation of food products, both vertical and horizontal, has become necessary in order to satisfy consumers. These developments occurred concurrently with an increasing realisation in the food processing industry that competing on price alone is not necessarily the most attractive business strategy. The prominence of the concepts of quality and safety in agribusiness is thus driven by all actors in the marketplace. And it is not surprising that research has followed. Whenever issues of quality and safety cannot be addressed at the final processing level, but have to pervade the whole value chain, relationships among value chain members may have to change. Food safety, for example, is closely linked to the traceability issue and often leads to closer links among value chain members.

Consumer preferences are thus not only regarded as being revealed in their demand, but their formation in interaction with the supply of goods becomes a separate area of inquiry. Thus,this stream of research can be seen as mediating between supply and demand, as it is the perception of the supply of goods that leads to the demand for these goods. In this paper, I will concentrate on consumer perception of and demand for quality and safety and about their trust in quality and safety, and also their risk perception regard quality and safety.

Quality

There is an abundance of ways in which the term quality, both in food and otherwise, has been defined (see the 1995 special issue of Food Quality and Preference for a broad range of proposals). There is general agreement that quality has an objective and a subjective dimension. Objective quality refers to the physical characteristics built into the product and is typically dealt with by engineers and food technologists. Subjective quality is the quality as perceived by consumers. The relationship between the two is at the core of the economic importance of quality. In the subjective realm we can, as a gross simplification, distinguish between two schools of thought about quality. The first one, which we can call the holistic approach, equates quality with all the desirable properties a product is perceived to have. The second, which we can call the excellence approach, suggests that products can have desirable properties that consumers, in their own language, may not view

as part of quality. In food, convenience is sometimes named as an example: consumers may say that 'convenience goods are generally of low quality', even though they regard convenience as a desirable property of food products (see, e.g. Zeithaml, 1998; Olsen, 2002). In the following, we will use the holistic approach. It follows from the holistic approach that food safety is part of food quality, at least to the extent that consumers believe food safety to be a desirable property. We can usually assume that this is the case, at least up to a point. Safety may, however, be different from other quality aspects in the way in which it affects consumer decisions, a question to which we will return.

Modern agriculture produces a great variety of food products which provides us with clear evidence of consumer demand for specific product features. The demand for food products is related to consumers' perception of the food quality. How consumers form their perceptions of food quality has been subject to intensive investigations in the literature (Grunert, 2005). The total food quality model was proposed as a common framework for describing food quality perception (Grunert et al., 1996). This model acknowledges that food products typically have different types of quality characteristics which together form the total food quality. Search characteristics, e.g. colour, shape and appearance, can be ascertained before purchase, whereas experience characteristics, e.g. taste and tenderness, can be scertained only after purchase. Finally, credence characteristics, e.g. zoonotic bacteria, GMOs, hormones, pesticides, animal welfare, etc., are not visible and cannot be ascertained even after purchase (Bernue´s et al., 2003; Grunert,2005). In order to evaluate the quality, the consumer needs informational cues. While intrinsic cues relate to readily available physical characteristics of the food product, e.g. search or experience characteristics such as colour, shape and taste, extrinsic cues relate to everything else, including credence characteristics such as production information, origin and labelling which are not necessarily available to the consumer (Bernue´s et al., 2003).

Food safety characteristics are typically credence goods. Hence, unless extrinsic cues are provided, it is difficult for consumers to identify and accordingly incorporate food safety quality characteristics into the total food quality which affects their intention to buy. Even if extrinsic cues about food safety are provided, they rely heavily on credibility and trust as it is not possible for the consumer to validate such cues. (Grunert 2005) notes that there is thus a risk that credence quality characteristics will lose out to experience quality characteristics which do not rely on credibility

and trust. In addition,as food products are associated with an increasing number of credence quality characteristics (Grunert, 2005) such as food safety characteristics, the relationship between a single food quality component and the total quality of a given food product becomes more and more complex. Although labelling of the end product can be used as a remedy to provide consumers with clearly visible extrinsic food safety cues, this is far from always being used in practice (Grunert, 1997).

The concepts of risk and trust should be combined as a result of the increasing inability of consumers' to make their own assessment of the risks related to food hazards and the consumers' dependence on those in social and political spheres to provide appropriate information. It is the complexity of this inter-relationship between risk and trust in the food industry that further supports the need for the development of a more articulated framework for researchers and policy makers.

The paper is structured as follows, firstly we define food quality, trust and risk and explores how it can be quantified, focuses on the possible interaction between risk and trust in relation to food safety and discusses some novel studies present in the literature and concludes this review as well as providing a possible framework for examining the issues of consumer risk and trust in food safety. Research for this paper was conducted and results of the research are presented in the text. The results are from internet inquiry on 850 internet users from Republic of Macedonia, randomly chosen. First question was "What is your main interest in food"

Chart. No 1

We can realize from this chart that food quality and safety is significantly most important food aspect to the Macedonian consumers. Price is very important factor also. Second question was “Are you interested about geographical and biological origin of the food”. 59% of respondent answered that they are interested, 33% was partly interested, 6% was not interested and 2% was without attitude regard the question. We can realize that consumers make difference regard this question and geographical and biological origins of the food are connected with food quality and safety in their perception.

Next question was about how consumers are informed regard food quality and safety. Distribution of answers was like following: from personal experience 39%, declaration of producers 22%, mediums 15%, and friends 10%, from the sales place 6%, advertising 4% and others 4%. We can realize here that consumers not very trustful to the other sources and that they believe most to their personal experience. Declaration of producers is very important also, but it should be proofed by personal experience.

Risk

When we talk about food risks, there are three main theoretical approaches to consumer risk decisions, the technical approach (risk assessment), political approach (risk management), and the social process approach (risk communication). The social process approach is the focus of this paper as it relates specifically to social sciences literature rather than scientific literature. The technical approach defines risk as ‘‘an objective,essentially value-free assessment of the probability of negative consequences’’ (Sapp, 2003), this application is particularly relevant when discussing the ‘‘safety’’ of foods containing genetic modification.

This suggests that different means of assessment are required when measuring the publics’ risk perception and different methods of policy should be deployed to ensure that the correct informational strategy is provided for different categories of food hazards. Risk management is the decision-making process involving political, social, economic considerations with relevant risk assessments to develop,analyse and compare regulatory options and to select the optimal regulatory esponse.

Alternatively, the social process approach defines risk as a variable that is determined through public opinion, that is, ‘‘risk arises from public discourse about the technology and the political and economic conditions that influence expert assessments’’ (Sapp, 2003). There is a wide literature to support the social approach, in relation to media and food issues, which suggests that ‘‘risk perception is socially constructed, and that it is psychological elements which guide peoples’ responses to a particular hazard rather than the technical risk estimates’’(Frewer, 1999). Also known as ‘‘social amplification of risk’’ (Kasperson et al., 1988), this notion has been investigated in relation to food scares. There have been many media and information related studies conducted which are closely associated with the concepts of trust in information sources, reporting bias and knowledge bias. Social amplification of risk aims to link the risk preferences of individual and collective consumers with other social forces, such as their specific sources of information (‘‘the effects of the media’’), and hence explains the impact of food scares. This suggests that as a food safety issue unfurls the potential hazard will be sensationalized and the risk will be amplified across society (Grunert, 2002; Henson, 2001). There are many studies in this area which use a variety of sociological and economic techniques to explain the social intensification of risk, for example Miller and Reilly (1995), Verbeke and Ward (2001),and Piggott and Marsh (2004). Of particular interest is Beardsworth and Kiel (1996) who discuss the concept of ‘‘news spirals’’. News spirals can be defined as the diffusion or reaction process following a food or another type of scare, firstly, new information is released in the mass media, then the public becomes aware or ‘‘sensitized’’ to this information and begins to react, often in an unpredictable manner, and in turn this reaction becomes ‘‘news’’itself, often a short term verreaction, and is again reported in the media creating a ‘‘positive feedback loop’’.

A consumer’s risk perception can be viewed as being dependent on information from various sources with differing impacts for negative and positive (often deemed ‘‘incomplete’’) views (Liu et al., 1998). Sources can be official or derived from personal experience of the consumer or their friends or family. Negative news tends to reduce demand for a good and the response (consumer’s reaction).A consumer’s risk perception is likely to be ‘‘asymmetric’’ (disproportionate) and to change over time, as a result of both positive and negative news, which is also seen to be ‘‘asymmetric’’ and to have temporal effect (Liu et al., 1998). It is interesting that psychological (Rowe et al., 2000) and economic (Smith et al., 1988) research concur that ‘‘media exposure will increase fear of

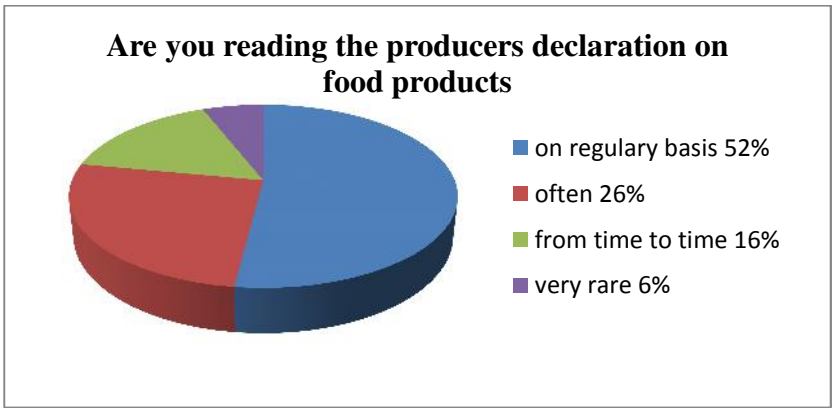
hazards relative to the degree of exposure'' (Rowe et al., 2000). That is, regardless of the nature of information, the risks perceived or the view taken (positive or negative), it is the volume of coverage (''quantity coverage theory''), that will elicit a negative response from the general public.

The measurement of consumer risk perception and trust in food safety information is not an easy task. A key distinction involves the object of measurement. The focus of applied social science is the actual final consumer behaviour; attitudes and beliefs are seen as determinants of behaviour rather than the final aim of measurement (see East, 1997).

There is a wide range of qualitative and quantitative research, across many disciplines, which focuses on the issue of technical risks and food safety particularly in the areas of chemical and microbial food risks. Qualitative analyses seem popular as the nature of risk often makes data difficult to collect. Furthermore, as the reaction to food safety information is subject to social amplification and filtering, it is perceived that qualitative group studies should better address such issues as compared to quantitative but individual studies.

In context of Macedonian consumers the next question was "Are you reading the producers declaration on food products".

Chart No. 2



From this chart we can realize that almost all consumers are interested more or less (significantly it is more) about possible ingredients in the food in context of food quality and safety.

Next question was “Are you think that declarations are clearly visible and understandable”. Macedonian consumers think that: it is completely visible and understandable 3%, partly visible and understandable 48%, sometimes there is not completely clearly and understandable 39%. , they are totally invisible and in understandable 8%, don’t know 2%. From this distribution of answers we can conclude that Macedonian consumers expect more information from producers and that this issue is very important for them.

Trust

When we talking about food safety and consumers perception on it, trust is main key word. There are many definitions of trust that can be found across a large range of disciplines. For a comprehensive review of the trust literature see Kramer (1999) or Mollering (2001). A successful definition of trust was given by Lewis and Weigert (1985), based on Simmel’s seminal work of the early 20th century, who describe trust as ‘‘a functional alternative to rational prediction for the reduction of complexity’’. An alternative, and perhaps more simple, definition, quite interesting for the objective of this paper, is provided by Morrow et al. (2003), where trust, or more broadly, ‘‘general trust’’, is seen as ‘‘the extent to which one believes that others will not act to exploit one’s vulnerabilities’’. From this, trust can be conceptualized as being a combination of rational thinking (cognitive process) and feelings,instinct and intuition (affective influences), and often dependent on past experience (Lewis &Weigert, 1985).

The relationship of trust to risk and food safety issues has been widely investigated in media and information related studies (Slovic, 1992; Frewer et al., 1996; Liu et al., 1998). From an economic view point, it is also important to look at trust in ‘‘institutions’’ or individuals (suppliers of food or government/regulators) on consumers purchasing behaviour (Bocker & Hanf, 2000; Eiser et al., 2003). Determining who, how and why a consumer trusts certain information sources or suppliers is an important component for food safety projects. A consumer’s trust in the ‘‘institution’’ or individual they purchase from, to some extent, must be unconditional as consumers are fully reliant on a provider’s reputation and a regulator’s competence. Beyond the intricacies of defining trust it is possibly more important to analyse how trust is perceived and conveyed in society, as it is trust that plays a crucial role in modern society regardless of its weak basis (Mollering, 2001).

That is, who do we trust to provide us with the information we need to make an informed decision, and perhaps, out of the scope of this review, why we trust them. A more structured and operational definition of trust in communication is given by Renn and Levine (1991). Five different components for trust are identified and they include the degree of perceived expertise of the source, lack of biases in information,fairness, consistency over time and good faith. A similar breakdown is proposed in Frewer et al.(1996), where the identification of trust dimensions is supported by factor analysis. In their studies,Frewer et al. (1996) found only two dimensions to be relevant across cultures, defined as perceived expertise (i.e., competence) and trustworthiness (i.e., honesty).

There are several sources of information on food safety available for consumers that we can categorize as follows: (a) labels; (b) advertising; (c) other point-of-purchase information; (c) wordof-mouth; (d) diet and health guidelines from the medical profession, government, independent authorities, consumer groups; (e) media news. Other forms of information (e.g., outcome of scientific research) are usually conveyed through one of the above channels. The role played by these sources is discussed in Caswell and Padberg (1992) who also underline how the technical complexity of some information might make it inaccessible to consumers. Trust measurement can be decomposed into two perception factors, (1) the reporting bias and (2) the knowledge bias, where the first refers to specific trust in the honesty of the source of information and the latter to the (perceived) degree of knowledge (expertise) of the source. There has been more focus on reporting bias in the literature and there have been some interesting results from surveys conducted across Europe and in the UK. Henson's study (2001) examines ''reporting bias''from a Eurobarometer study (INRA, 1998) surveying consumers across the EU about which sources can be relied on for information.

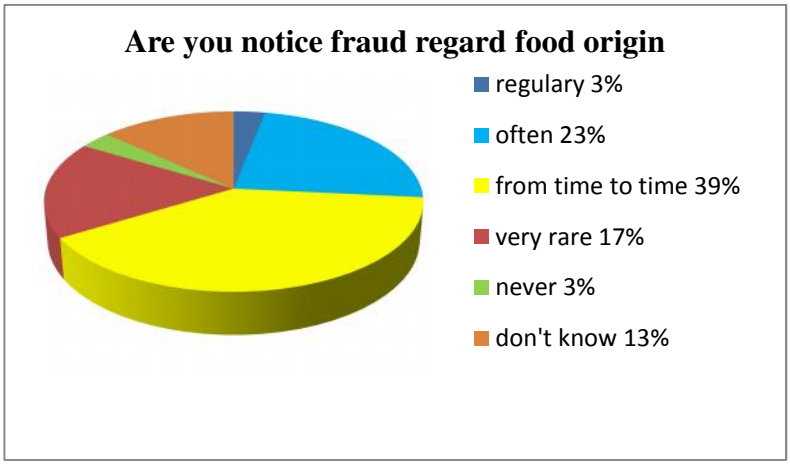
Consumers were asked to consider which persons or institutions always provided truthful information about food safety (see Figure 1). This Figure illustrates a lack of trust in the information obtained from all food related people and institutions, with the exception of consumer organizations. The direct policy implication of such research would suggest that any information that needed to be conveyed to the European public about food related issues should be done principally by consumer organizations.

Henson suggests that, regardless of the knowledge or expertise that these bodies have, consumers are loathe to place explicit trust in the information these organizations, other than consumer organizations, provide. Trust attributes for information sources for genetically modified (GM) foods have also been measured by Hunt and Frewer (2001) using ANOVA to determine the mean trust, mean reporting bias and mean knowledge bias. Tabloid newspapers, government ministers and food industry (manufacturers and supermarkets) were least trusted with the main reason assumed to be the perceived ‘‘vested interest’’that these individuals or bodies have in reporting information (Hunt & Frewer, 2001). Interestingly friends and family were perceived to have less of a reporting bias and hence a higher degree of trust than in previous research, although it was acknowledged that this source was the least knowledgeable (Hunt & Frewer, 2001).

Trust is shown to be most prominent in consumer organizations and medical practitioners, less in governmental sources and little in tabloid newspapers and friends, who are thought, from previous research, to ‘‘sensationalise’’information (Frewer et al., 1996). ‘‘Government officials are perceived to be insensitive to the information needs and concerns of the public. To be trusted, information must be provided by sources that are not self-serving’’ (Frewer et al., 1996,p. 474). Frewer et al. (1999) further note that trust in information is deemed more important in influencing consumer selection in the case of genetically modified (GM) foods, than the information strategy adopted.

It is widely agreed that risk perception can be altered depending on a person’s trust in the information,or the source of that information. For example,if a consumer were to read a food safety related article in a trusted newspaper, quoting from a credible, and hence trusted, source, then the consumer’s risk perception is likely to alter as a result of their trust (see McGuire, 1985 or Johnson & Slovic, 1995). Eiser et al. (2002) noted that controlling the acceptance of technology decreases the positive correlation between trust and risk perception. This suggests that any erosion of public trust, or an increase in perceived risks, in response to some specific hazard is likely to decline the general acceptance towards the related technology, e.g.,distrust in nuclear power following the 1986 Chernobyl incident. When we are talking about Macedonian consumers, in question “Are you notice some fraud regard food” they are answering:

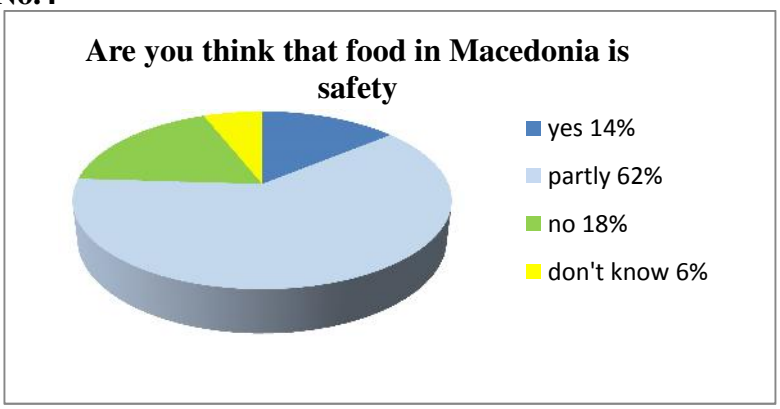
Chart No. 3



We can realize from this chart that consumers are not very satisfied with declaration and that they can't have trust in producers. Only 3% from responded thinks that there is not any fraud regard food origin in producer's declaration. If their perception is completely true this is very important problem regard food safety issues.

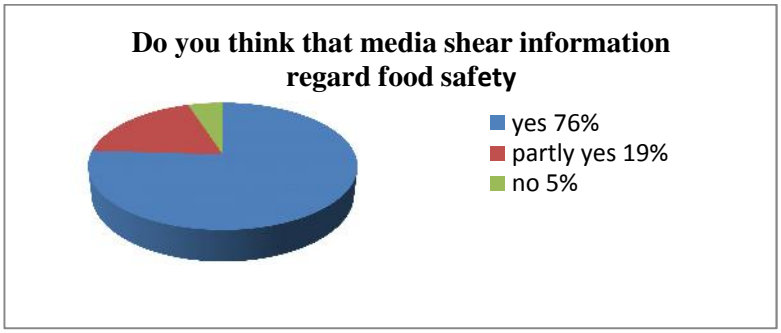
Next question was "in what kind of fraud regard food you was victim". The answers were distributed regard following: food with inappropriate quality 32%, inappropriate or unclear declaration with invisible dead line of the product 24%, inappropriate packaging 12%, others 12%, don't know 20%. In the next question, "Are you think that food in Macedonia is safety", the answers were:

Chart No.4



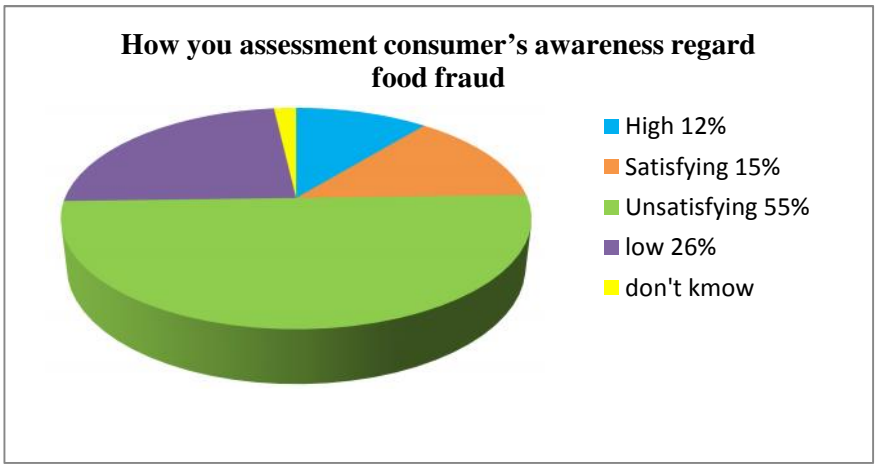
We can realize that only 14% of Macedonian consumers have trust in food safety in Macedonia. This is very worry like fact regard trust building and the question is their perception correct, which can be topic in some further research. Next question was regard mediums and media information.

Chart No. 5



Regard these chart Macedonian consumers are satisfies from role of media in information about food safety. The last question was "How you assessment consumer's awareness regard food fraud" Consumers think that it should be done a lot regard food safety awareness racing in Republic of Macedonia, because it is very important issues.

Chart No. 6



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Interactions between risk and trust

Risk is commonly focused on in economic analyses of food safety and trust is becoming an increasingly important variable, however, it is the interaction between these two variables that is key for policy development and effective policy communication in the food safety arena. Both concepts are inexplicably linked in relation to consumer behaviour and this connection is of paramount importance to policy makers, risk managers, regulators and the food industry in general. There are two developing schools of thought which show how risk and trust interact in the area of food safety: trust in technology; and, the interaction between risk, trust and information . Beyond food safety studies there is of course a wider body of trust literature. One area is in the industrial organization literature where trust has been measured as cognitive (knowledge-based informational trust) and affective (emotional_/institutional and inter-personal trust). There is also a relatively large body of literature focusing on trust and GMO or trust in technology.

However, due to the focus on the technological aspect of the GM issue, few papers are based specifically on GM and food safety issues. What is truly required is an adequate measure of trust in food safety research. With the exception of the reporting bias and the trust in technology measurements no clear measure exists in the current literature. Two novel approaches to examining trust and risk in relation to food safety, ‘‘Institutional Trust’’ and ‘‘Interpersonal Trust’’, are presented and the manner in which both public and private sector actors can influence a consumer’s risk behaviour beyond media information has been discussed. ‘‘Institutional Trust’’ is trust in food safety regulators, generally public authorities for example, governments and EU institutions. The establishment of the new EU Food Safety Authority (EUFSA) has attempted to separate these two functions of government (risk regulator and risk generator). The aim is to minimize any vested interest that the public may feel the government has by clearly distinguishing the EUFSA as an independent body allowing it to act solely as a risk regulator.

Interestingly, it remains to be seen whether this distinction will be able to command consumers’ trust. The economic modelling techniques which can be used to effectively study risk and trust as interactive variables include, amongst others, structural equation modelling, factor analysis and experimental auctions, where low trust, high risk perception (and vice

versa) scenarios can be analysed. Although surveys appear to be the most effective form of data collection in this area, it is perhaps desirable, even if it is difficult to collect panel data to investigate how risk and trust vary over time.

Conclusion

Consumers' attitudes to trust and risk in food safety issues play an increasingly significant role in research in this area. Consumers in Republic of Macedonia are not exception from this rule. Attention needs to be focused on defining a succinct framework for analysing consumer behaviour in these terms. It is hoped that, with further research, more effective policy programmes may be initiated to better communicate relevant issues to consumers. This review helps to provide an insight into the modelling procedures available to analyse consumers'attitudes to risk and trust. Also this paper provides basic information regard Macedonian consumer's perception on food safety issues. Are they trust in food safety and are they perceived food safety risk during the food buying.

The interaction between trust (in information and sources; interpersonal and institutional) and technical and social risk is at this stage a unidirectional process, and it is only through future research that these relationships can be tested and interaction and/or direction or causality be determined. It is hoped that this framework may assist with the development of new ways to measure both trust and risk, in order to apply effective policy and communication strategies to consumers in the food safety arena.

Finally, it is important to reiterate that food safety and consumer behaviour in relation to risk and trust be measured in a multi-disciplinary framework utilizing the skills of psychologists, sociologists and economists, deploying a variety of qualitative and quantitative techniques and especially in Republic of Macedonia because this topic is unsatisfactory researched.

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FUNDAMENTATION OF A FINANCIAL SCENARIO OF EUROPEAN FUNDS FOR AGRICULTURE AND RURAL DEVELOPMENT IN PRAHOVA COUNTY

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Abstract

This paper aims to analyze the economic situation from a county from Romania, named Prahova. Prahova is one of the 42 counties from Romania (including Bucharest), with high performances regarding industry and services, mostly tourism. Agriculture has an important share in the economy of the county and with all the European founds for agriculture and rural development from the actual and future period could help at the development of Romanian agriculture. The paper is being closed with an analysis of the European founds accession in the county and with a financial scenario for the remained founds in order to increase the economic efficiency of the county.

Key-words: *rural development, tourism, agriculture, priorities.*

Introduction

Prahova is a county located in the historical region of Muntenia in Romania[3]. Territorial administration, the county is located in the central-southern part of Romania, in northern Muntenia, the southern slopes of the Carpathians, along the rivers Prahova and Telejean. Within these limits, the county covers an area of 4716 km2 (1.98% of Romania). Population density in Prahova County reaches highest values in the country. If in the area, Prahova County ranks in group of small counties, the large number of people has led to an average density compared to the national average that is 172.35 inhabitants per km2 in 2010.

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[3] http://ro.wikipedia.org/wiki/Jude%C8%9Bul_Prahova

Agriculture – important activity in the economy of the county

The structure of Prahova County land, by use, it is shown in the following table:

Table 1. *Land structure, by use, at 31 of December 2010*

	Prahova County	TOTAL	% in total
Total surface (ha)	471587	23839071	1.98%
Agricultural surface (ha)	272834	14635520	1.86%
From which private:	260572	13808087	1.89%
Arable (ha)	144267	9405024	1.53%
Pastures (ha)	71677	3288811	2.18%
Meadows (ha)	38641	1529671	2.53%
Vineyards	8134	213431	3.81%
Orchards	10115	198583	5.09%
Forests	151332	6757573	2.24%
Water	8167	833625	0.98%
Other surfaces	39254	1612353	2.43%

Source: *Romanian Statistical Yearbook.*

Analyzing data from the National Statistics Institute, we can see that in 2010 the land in Prahova County was 471,587 ha by use distributed as follows: 57.85% agricultural land: 30.59% arable land, 15.20 % pasture, 8.19% ha meadows, vineyards and nurseries 1.72%, 2.14% orchards and 32.09% forests and other forest lands, waters and swamps 1.73% and 8.32% other surfaces. The structure of the cultivated area is shown in the following table:

Table 2. *Cultivated area with main crops in Prahova County in the period 2000-2010*

Specification (ha)	2000	2005	2006	2007	2008	2009	2010
Cultivated area, from which:	142435	136091	128695	132467	133946	136685	133868
Cereals	103592	104817	96195	98263	100778	103257	97688
Wheat	32703	35655	33559	25637	34569	36931	34930
Rye	-	-	-	-	-	-	-
Barley	4105	3916	2326	3050	3467	5372	5171
Corn	65103	64073	59920	69183	61805	60018	56459
Potatoes	4465	3898	3763	5715	3500	4056	3933
Sugar beet	50	40	353	14	-	-	-
Oil plants	12001	12943	13111	13137	13329	15083	17183
Sunflower	10450	11516	10748	7762	8202	9153	10688
Vegetables	5919	4871	6319	4518	4706	4858	4486

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011.*

From the above analysis it is observed that the total cultivated area has decreased in the last 10 years with 8,567 hectare,s cultivated surfaces grew for wheat and barley, barley and maize cultivated area decreased. We can also observe an increase in area under oilseed crops and potatoes the reduction in the period. As shown in the table below, production of agriculture in Prahova County grew by 36.53% during 2005-2010:

Table 3. *Agricultural production in Prahova County in the period 2005 – 2010 (thoundas lei in current prices)*

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Agricultural producation	1010938	1062600	1032022	1613979	1422634	1380309
- Vegetable production	492421	559712	582717	1022187	765492	852176
- Animal production	507009	491411	433940	573593	639382	514852
- Agricultural services	11508	11477	15365	18199	14760	13281

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011.*

It is worth noting that the value of crop production increased by 1.73 times in the period, while livestock production value of only 1.01 times and 1.15 times agricultural services. In the county of Prahova, the maximum agricultural production is recorded in the period in 2008. Regarding the evolution of crop production, grain for grain production increased 2.11 times in the period, as shown in the table below:

Table 4. *Agricultural vegetable production in Prahova County at main crops in the period 2000-2010*

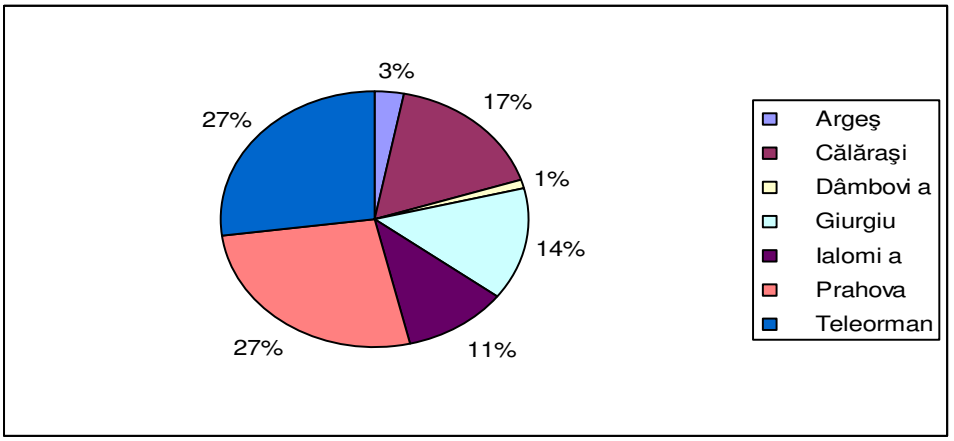
Specification (tones)	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Cereals	163921	334505	278186	141910	294547	357200	347030
Wheat	66532	96513	76221	399918	109625	104098	90780
Rye	-	-	-	-	-	-	-
Barley	10057	7069	4331	4067	11897	13806	14434
Corn	86423	228175	196934	97502	171033	237292	239604
potatoes	32577	36880	41505	38897	52911	58468	42734
Sugar beet	673	648	8951	7	-	-	-
Sunflower	8463	12283	11445	5054	8938	16459	13588
Vegetables	51150	50375	74936	56595	65498	64880	51750
Grapes	53915	8047	30358	37470	51510	51113	27922
Fruits	33460	68231	43072	40241	45118	42078	63540

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011.*

Analyzing corn production in the period 2000-2010, it is noteworthy that this increased to 2.77 times in the period, while owned by this culture area decreased by 13.28%. As shown in the development of crop production values, agriculture is one of the most exposed sectors affected by climate change. Size extended component maintains subsistence agriculture production variation dependence priority natural conditions, strongly influenced by climate change, and still induce significant changes on GDP, but perhaps to mitigate the social effects of the economic crisis. In viticulture, Prahova County is known as being a great tradition and international renown.

Between the river Buzau and the river Teleajan, lies one of the largest vineyards in the region Muntenia named Dealu Mare vineyard. Vineyard vines centers of production and marketing of wine is made in specialized units who won fame both domestic, international and especially the wines. The analysis of bearing vineyards area by region in 2010 we can see that the South Region has 16% of the total area. A detailed analysis of the structure of the area under vines in South Region, we show that Prahova County has 27% of the total area of the region.

Figure 1. *Structure of vineyards in the South Region in 2010*



Source: *author's prelucration.*

In the county of Prahova, livestock grazing and spread is favored by natural grassland (40.43% of total agricultural area. Dynamics total herd animals from 2000 to 2010 shows the following situation:

Figure 2. Evolution of livestock number in the period 2000 – 2010

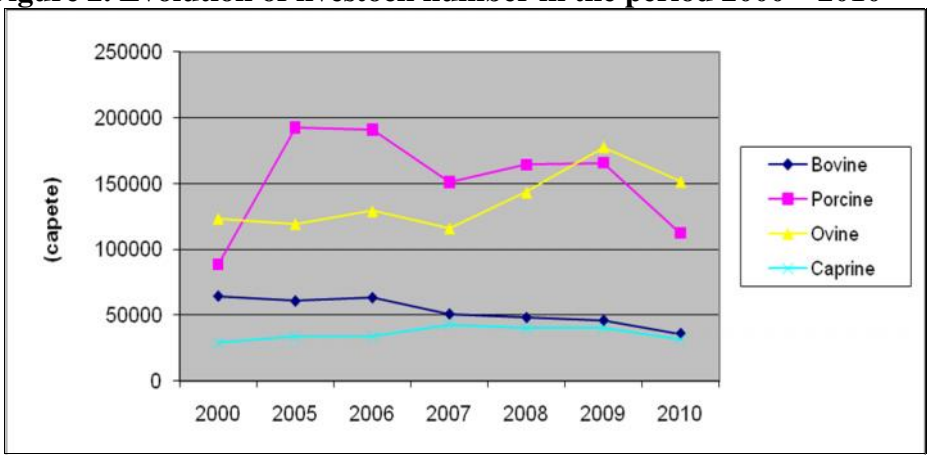


Table 5. *Number of animals in Prahova County in the period 2000-2010*

Specification (heads)	2000	2005	2006	2007	2008	2009	2010
Bovines	64495	60736	63317	50788	48085	45985	35901
Pigs	88699	192345	190842	150979	164202	165593	112363
Ovines	123472	119461	129117	116053	143446	177649	151439
Goats	28923	33797	33731	43035	40007	40449	31907

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011.*

In the past 20 years, Romanian livestock underwent a period of decline, drastically reducing livestock, the bankruptcy of many livestock units. Given past experience, to revive this sector are necessary, in addition to appropriate actions of policy makers, and the solutions developed by scientific research.

Regarding cattle, we can see that it shows a decreasing trend in the period. Pig sector is considered one of the most dynamic sectors of livestock, as shown in the chart above. With regard to sheep and goats, they have an increasing trend during the analyzed period. When referring to the structure of the fleet of tractors and agricultural machinery in period, it is shown in the following table:

Table 6. *Number of tractors and agricultural machinery in Prahova County, in the period 2000-2010*

Specification (number)	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Tractors	2771	2835	2809	2808	2820	2824	2745
Plows for tractors	1818	2098	2096	2072	2103	2115	2030
Mechanical seeders	917	1051	1046	1054	1069	1075	1065
Propelled combine harvester grain and fodder	386	373	332	328	334	334	290

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011*

Analyzing the structure of the number of tractors and agricultural machinery agricultural core, we see an increasing number of plows for tractors and mechanical drills.

Other components of tractors and agricultural machinery fleet Record a downward trend. When referring to the structure of farms in the county Prahova, this is:

Table 7. *Farms, by legal status, in Prahova County, in 2010*

Specification		**Number**
Individual agricultural exploaitations		165301
Authorized individuals, sole proprietorships, family businesses		90
Agricultural exploaitations with juridical status	Autonomus	1
	Companies / agricultural associations	37
	Privately owned companies	705
	States owned companies	2
	Institutes, research stations, the agriculture schools (high schools)	6
	Local councils / municipalities	101
	Other public institutions	5
	Cooperatists units	-
	Other types (political, religious etc)	191
	TOTAL	1048
TOTAL		**166439**

Source: *General Agricultural Census 2010 Provisional Results, June 2011.*

Prahova County owns 4.31% of total farms in Romania. Individual holdings are 99.31% of the total, while farms with only 0.62% legal and authorized individuals, sole proprietorships and family businesses only 0.07%. These percentages are unfavorable for the development of the agricultural sector, given that competitiveness is conditioned by the market capitalization of proper agricultural products in terms of quality and quantity, and to achieve this, farmers should join. Regarding agricultural area that is averaged over a farm, it is shown in the table below:

Table 8. *Agricultural holdings and utilized agricultural area UAA average holding in Prahova County in 2010*

	TOTAL	**Prahova County**
TOTAL agricultural exploitations (no)	3856245	166439
Farms using agricultural area (number)	3721885	154001
Utilized agricultural area *(hectares)*	13298190,89	250309,25
Average utilized area *(hectares)*		
On one agricultural exploitation	3,45	1,50
On one agricultural exploitations that utilizes agricultural area	3,57	1,63

Source: *General Agricultural Census 2010 Provisional Results, June 2011.*

Prahova County holds 4.32% of the total number of farms. Pronounced fragmentation of agricultural land is a major problem for Prahova county, as shown by the data in the table above. Thus, in Romania the average area per agricultural holding is is 3.45 ha, Prahova county it is only 1.5 ha. So, as I said above, it requires the creation of associations of producers to increase the performance and competitiveness of farms.

Tourism activity in Prahova County

The beautiful Prahova Valley has many resorts and facilities available, along with a number of other factors (population, the important business center, university, crossed the main road and railway that connect with the rest of the country and other European countries) make Prahova County lie in 4th place in the country (after Bucharest, Constanta and Brasov counties) in terms of the number of tourists accommodated in 2010.

Table 9. *Tourist accommodation capacity and activity in the territories, in 2010*

		Existent accommodation capacity (places)	Existent accommodation capacity in function (thousands places - days)	Arrivals (thousands)	Nights (thousands)	Utilization of the existent capacity (%)
1	Municipiul Bucureşti	20828	7401.9	1046.2	1849.6	25.0
2	Constan a	124643	9965.6	803.1	3166.7	31.8
3	Braşov	16742	5341.6	510.2	1078.3	20.2
4	Prahova	9906	3606.6	318.8	799.0	22.2
5	Cluj	6960	2588.9	242.4	427.9	16.5
6	Sibiu	6538	2018.6	228.2	401.6	19.9
7	Timiş	6857	2142.5	216.2	506.3	23.6
8	Mureş	6093	1770.2	202.9	521.6	29.5
9	Suceava	8033	2263.7	194.4	460.6	20.3
10	Bihor	9152	2354.6	194.1	885.4	37.6
11	Vâlcea	10719	2376.0	184.3	960.5	40.4
12	Iaşi	3367	1175.2	173.0	343.1	29.2
13	Arad	5554	1349.6	161.8	304.9	22.6
14	Neam	5478	1566.5	131.0	274.8	17.5
15	Argeş	5419	1164.6	111.3	206.2	17.7
16	Satu Mare	1616	469.5	96.6	162.4	34.6
17	Caraş-Severin	7139	1525.1	92.8	471.0	30.9
18	Maramureş	4368	1564.0	92.5	200.7	12.8
19	Ilfov	2292	624.1	79.0	130.8	21.0
20	Harghita	6909	952.0	76.9	207.6	21.8
21	Hunedoara	3707	933.4	72.0	222.7	23.9
22	Tulcea	4288	549.1	68.4	108.7	19.8
23	Bacău	2756	788.5	63.4	195.9	24.8
24	Covasna	3638	962.7	60.9	409.2	42.5
25	Buzău	2574	939.3	58.6	148.6	15.8
26	Dâmbovi a	2478	885.2	56.2	218.5	24.7
27	Gorj	1974	556.4	55.0	105.7	19.0
28	Mehedin i	1524	508.3	54.9	135.9	26.7
29	Bistri a-Năsăud	2626	718.7	52.9	137.9	19.2
30	Brăila	2082	532.0	51.1	183.8	34.6
31	Alba	2109	619.6	47.8	101.1	16.3
32	Ialomi a	2807	573.1	36.5	199.6	34.8
33	Gala i	1452	250.4	32.2	75.0	30.0
34	Vaslui	773	262.2	31.2	48.8	18.6
35	Vrancea	1836	357.9	30.6	51.5	14.4
36	Dolj	1646	592.5	28.8	65.7	11.1
37	Giurgiu	806	236.8	28.2	85.0	35.9
38	Botoşani	872	303.2	28.0	49.4	16.3
39	Sălaj	1381	409.6	24.4	70.2	17.1
40	Olt	547	193.3	14.1	22.5	11.6
41	Teleorman	675	223.7	11.3	28.8	12.9
42	Călăraşi	534	191.6	10.6	27.6	14.4

Source: *Romanian Statistical Yearbook*

Regarding the development of tourist accommodation capacity and the activity of the county Prahova, it is shown in the following table:

Table 10. *Capacity and tourism activity in Prahova County in the period 2000-2010*

Specification	2000	2005	2006	2007	2008	2009	2010
Existent accommodation capacity (places)	10020	10289	9234	9249	9818	9465	9906
Existent accommodation capacity in function (thousands places - days)	3016,9	3223,0	3075,5	3177,9	3333,8	3471,9	3606,6
Arrivals (thousands)	326,8	346,5	371,2	416,2	417,1	329,7	318,8
Nights (thousands)	911,5	929,0	966,1	1062,5	1017,2	816,8	799,0
Utilization of the existent capacity (%)	30,2	28,8	31,4	33,4	30,5	23,5	22,2

Source: *Highlights regional economic and social: Territorial Statistics, 2011; Romanian Statistical Yearbook, 2011.*

Number of arrivals in the main structure of tourist's reception with functions of tourists' accommodation was 318,800 and net capacity utilization index operation was 22.2% in 2010. Tourism network available to tourists in Prahova County comprises 233 tourist accommodations, of which 71 hotels and motels, 3 hostels, 13 chalets, 38 villas, 1 bungalow, 3 camps for students and 76 boarding houses and 28 rural locations who respond well to current requirements of tourists. By analyzing the elements of the county tourism potential results the existence of favorable conditions for tourism development following forms:

a) mountain tourism;

b) recreation tourism;

c) tourism traffic in several forms: transit tourism, cultural tourism rejuvenation with meanings, thematic tourism;

d) tourism for hunting and fishing;

e) tourism for meetings, congresses,business.

Prahova County has a somewhat homogeneous distribution sightseeing, whilst tourist areas distinct.

The analysis of european agriculture and rural development found in prahova county

A viable solution to address the problems faced by Romanian agriculture, deepened further in the context of the current situation on the financial market can provide funds to finance agriculture and rural development. Therefore, special attention should be paid to promoting a balanced rural development program for all our regions, the concept of rural development refers to economic and social integration of Romanian villages while ensuring a favorable environment for attracting foreign capital on favorable terms, to support investment and development programs of agricultural production. Special attention should be given to the implementation of Community programs, projects run by the World Bank and other foreign-funded programs.

Moreover, through the European Agricultural Fund for Rural Development (EAFRD), Romania has allocated 8.022 billion Euros, which adds about 2 bil. Euro national co-financing provided by the state budget. For the period 2007-2013, through the National Rural Development Programme (RDP) appropriate measures are undertaken grouped into four priorities:

Increasing the competitiveness of agriculture and forestry (Axis 1) - total funds allocated for 2007-2013 - Euro 3,967,311,581, of which EAFRD contribution in the amount of 3,173,849,264 euros,

- Improving the environment in the countryside (Axis 2) - total allocated funds allocated for 2007-2013 - Euro 2,293,413,375, of which EAFRD contribution in the amount of 1,880,598,967 euros,
- Quality of life in rural areas and diversification of the rural economy (Axis 3) - Total funding allocated for 2007-2013 - 2,473,739,880 euros, of which EAFRD contribution - 1,978,991,904 Euro

• LEADER Axis (Axis 4) - total funds allocated for 2007-2013 - 235,074,871 euros, of which EAFRD contribution in the amount of Euro 188,059,896.

The program includes significant funding for vital investments in farms, processing units and processing agricultural products, investment in non-agricultural activities, tourism and the establishment of micro-enterprises. To be eligible an investment made by the EAFRD should be located on Romanian territory, which can be carried out in compliance with current legislation, economic activities falling within the following areas: crop production and / or livestock and forestry, processing industrial agricultural and forestry products.

However, although the National Rural Development Programme is intended as a continuation of the SAPARD program for pre-accession instrument that addressed the modernization and restructuring of the agri-food sector, compared with it, RDP is a program that provides increased opportunities.

First, the funds allocated to rural development sector are more generous forms of support are more diverse and there are several categories of beneficiaries. In the same direction is expanded eligible investment, high degree of flexibility and implementation procedures are greatly simplified.

By March 2, 2012, the measures launched in the county Prahova were contracted a total of 127 projects worth about 73.8 million euro public, representing approximately 1.62% of the net amount allocated for measures in implementation period and about 0.92% of the total allocation for the entire program period (data are summarized in Table. 11).

However it should be noted the large number of projects submitted to NRDP to ensure a high potential to access pretty good up to the present (even accessing the entire amount), which is well above the level recorded for the SAPARD program (pre-program) and the other operational programs.

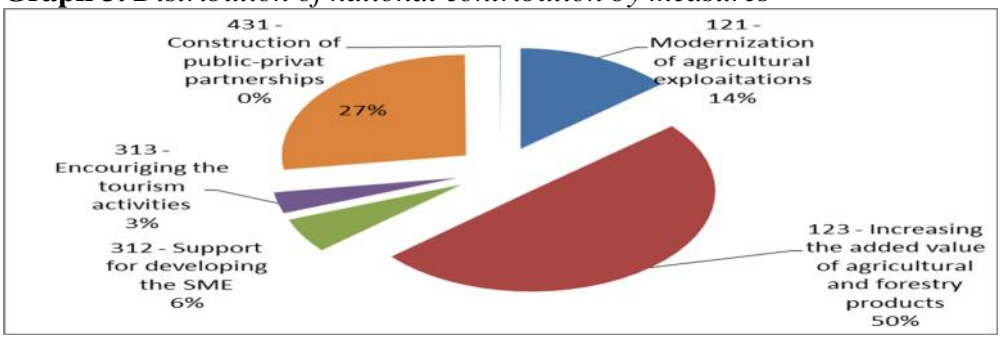
Table 11. *Analysis of EARDF accession rate in Prahova County at 2 March 2012*

Measure from NRDP	Allocated amount through EARDF (euro)	Number of projects with closed contracts	Total value of the contracts		Public value		Accession rate
			Lei	Euro	Lei	Euro	
121 – Modernization of agricultural exploaitations	991,827,895.00	32	88,653,237.00	20,377,243.83	44,538,898.83	10,237,415.26	1.03%
123 – Increasing the added value of agricultural and forestry products	1,071,174,126.00	39	320,275,486.00	73,616,394.52	160,137,743.00	36,808,197.26	3.44%
312 – Support for the creation and development of SME	383.429.681.00	30	25,884,719.00	5,949,689.47	18,106,686.00	4,161,882.50	1.09%
313 Encourging tourism activities	544.222.774,00	15	21,127,371.00	4,856,197.08	10,937,739.00	2,514,075.99	0.46%
322 – Villages development	1,546,087.425,00	9	87,322,807.00	20,071,440.03	87,322,807.00	20,071,440.03	1.30%
431 – Contruction of public-private partnerships	14,161,138.00	2	459,734.00	105,671.40	367,786.00	84,536.85	0.60%
TOTAL	4,550,903,039.00	127	543,723,354.00	124,976,.33	321,411,659.83	73,877,547.89	1.62%
TOTAL NRDP	**8,022,000,000.00**	**-**	**-**	-	**-**	**-**	0.92%

Source: *authors calculation based on data from the MARD.*

1 euro = 4,3506 lei

Graph 3. *Distribution of national contribution by measures*



Source: *author's calculation.*

From the point of view of the year when the projects were submitted in the county Prahova situation is as follows:

Table 12. *Annual situation of submitted projects in Prahova County at 2 of March 2012*

Measure	Number of projects with closed contracts :	Year			
		2008	2009	2010	2011
121 – Modernization of agricultural exploitations	**32**	21	1	4	6
123 – Increasing the added value of agricultural and forestry products	**39**	20	3	12	4
312 – Support for the creation and development of SME	**30**	1	15	14	-
313 Encouraging tourism activities	**15**	1	7	4	3
322 – Villages development	**9**	4	5	-	-
431 – Construction of public-private partnerships	**2**	-	2	-	-
TOTAL	**127**	**47**	**33**	**34**	**13**

Source: *authors calculation based on data from the MARD.*

From this detailed analysis of the situation RDP projects contracted by the county Prahova, we considered appropriate and necessary forecasting (design) number of projects for which annual payments to be made in order to ensure a degree of access of 90%. In determining the level of access we took into account the experience - both public institutions and

applicants for funds - the SAPARD pre-accession program. Were taken into account only the NRDP measures for which the RDP projects were completed until 02.03.2012. Thus, the financial allocation of the amounts available at 02 of March 2012 was fair for each county, or the ratio of the remaining public on 02.03.2012 and the number of Romanian counties (41).

Table 13. *Public value remaining on measures of NRDP on 03/02/2012*

Measure fron NRDP	Allocated amount from EARDF (euro)	Payments from public contribution at 02.03.2012 (euro)	Remained public value at 02.03.2012 (euro)	Average public value remained per county at 02.03.2012 (euro)
121	991,827,895.00	346,441,211.00	645,386,684.00	15,741,138.63
123	1,071,174,126.00	151,647,186.00	919,526,940.00	22,427,486.34
312	383,429,681.00	163,679,539.00	219,750,142.00	5,359,759.56
313	544,222,774.00	24,805,085.00	519,417,689.00	12,668,724.12
322	1,546,087,425.00	654,747,667.00	891,339,758.00	21,739,994.10
431	14,161,138.00	4,863,112.00	9,298,026.00	226,781.12
	4,550,903,039.00	**1,346,183,800.00**	**3,204,719,239.00**	**78,163,883.88**

Source: *authors calculation based on data from the MARD.*

Based on the average remaining public value Prahova County and taking into account a degree of access of 90% for the period 2012-2015, the financial allocation amounts was as follows:

- 2012: 30%;

- 2013: 25%;

- 2014: 25%;

- 2015: 10%;

For 2015 was allocated to the smallest amount, because it is the last year for making payments to the beneficiaries of projects, and if Romania will enter the amounts, they will be reimbursed the European Commission.

Table 14. *Projection of public value remaining payments on 03/02/2012 for the period 2012-2015 in the county of Prahova*

Measure fron NRDP	Remained public value of projects for Prahoca county at 02.03.2012 (euro)	2012	2013	2014	2015
121	14,167,024.77	4,722,341.59	3,935,284.66	3,935,284.66	1,574,113.86
123	20,184,737.71	6,728,245.90	5,606,871.59	5,606,871.59	2,242,748.63
312	4,823,783.60	1,607,927.87	1,339,939.89	1,339,939.89	535,975.96
313	11,401,851.71	3,800,617.24	3,167,181.03	3,167,181.03	1,266,872.41
322	19,565,994.69	6,521,998.23	5,434,998.52	5,434,998.52	2,173,999.41
431	204,103.01	68,034.34	56,695.28	56,695.28	22,678.11
TOTAL	**70,347,495.49**	**23,449,165.16**	**19,540,970.97**	**19,540,970.97**	**7,816,388.39**

Source: *authors calculation based on data from the MARD.*

Also, based on the public value average project determined the number of projects for which payments to be made in the period 2012-2015 in order to ensure a degree of access of 90%.

Table 15. *Forecasting the number of projects that will make payments the period 2012-2015 in the county Prahova*

Measure from NRDP	Public value accesed at 02.03.2012 (euro)	No. of projects with closed contracts at 02.03.2012	Averege value of one project 02.03.2012 (euro)	2012	2013	2014	2015	Total no. of projects for the remained period 2012-2015
121	10,237,415.26	32	319,919.23	15	12	12	5	**44**
123	36,808,197.26	39	943,799.93	7	6	6	2	**21**
312	4,161,882.50	31	134,254.27	12	10	10	4	**36**
313	2,514,075.99	14	179,576.86	21	18	18	7	**64**
322	20,071,440.03	9	2,230,160.00	3	2	2	1	**8**
431	84,536.85	2	42,268.42	2	1	1	1	**5**
TOTAL	**73,877,547.89**	**127**	**3,849,978.71**	**60**	**49**	**49**	**20**	**178**

Source: *authors calculation based on data from the MARD.*

It should be noted that progress in accessing European funds for agriculture and rural development is due, on the one hand, pursuit, in good condition, a pre-program (SAPARD), and on the other hand, firms experience advice of our country to develop and implement projects with European funding. Not the same can be said of other operational programs have problems in accessing these funds.

Conclusions

Comparing with other operational programmes, the Rural Development Programme has a good accession of the founds, but although the degree of access of funds is good compared to other operational programs NRDP implementation faces a number of problems caused by both exogenous and endogenous factors, of which the most important are:

- Sharp and prolonged economic crisis in our country;
- The length of the evaluation process and selection;
- Lack of qualified personnel in the local government;
- Procurement system involving long time due to cumbersome procedures;
- Fluctuations in the exchange rate euro - lei;
- Additional costs for project applications (approvals, certificates), etc.

The analysis has presented the actual rate of accession of European founds for rural development in an important county from Romania, Prahova county. As well, the financial scenario presented for the future period represents an important instrument in the allocation of the remained founds.

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FOREIGN TRADE OF AGROINDUSTRIAL PRODUCTS SERBIA AND MONTENEGRO IN THE CEFTA AGREEMENT[1]

Branislav Vlahović[2], Boris Kuzman [3]

Abstract

For food producers in Serbia, the process of trade liberalization is a tough competition. This implies the necessity of raising the technological level of production, productivity, efficiency and application of marketing concept. Increased competition in the domestic market should contribute to improving the quality and supply of goods. It is realistic to expect a decline in product prices, which in the future may be difficult to domestic producers, reducing their income. At the same time, this process provides an opportunity for consumers to have a wider choice of products by varied offer of cheaper goods. The subject of this paper is the foreign trade of agro-industrial products of the Republic of Serbia and the Republic of Montenegro within the framework of the CEFTA agreement signed in accordance with the agreement on free trade. CEFTA agreement contributes to the Western Balkan to become economically integrated area for goods and services. Meanwhile, it should be a destination for foreign investment. The aim of the research is considering possibilities of improving and expanding foreign trade of agro-industrial products of these countries. The analysis of foreign trade relations is necessary to detect the strengths and opportunities for improving trade relations between the two countries.

Key words *CEFTA, food, Serbia, trade, Montenegro, competition*

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Introduction

Exports of agro-industrial products is the basis of agricultural development, and therefore the economy as a whole. Each country tends to increase export. It also tends to minimize the import, or to achieve a positive balance of foreign trade. To achieve the best possible results in foreign trade it is necessary to constantly explore the market and its products adapted to the requirements and needs of foreign consumers. The subject of this paper is the foreign trade of agro-industrial products of the Republic of Serbia and the Republic of Montenegro within the framework of the CEFTA agreement signed in accordance with the agreement on free trade. CEFTA agreement is covered by industrial and agricultural products, with the grater liberalization of industrial products. Agricultural products are covered by the limited range of commercial benefits because of the particular sensitivity of the agricultural sector.

Serbia has started with the implementation of CEFTA agreement on 24th October in 2007. With this agreement the parties, in mutual trade in industrial goods, eliminated all quantitative restrictions on imports and exports, customs duties on exports, export duties of a fiscal nature, customs duties on imports, import duties of a fiscal nature and extent of the same effects. As for agricultural products, with the entry into force of the Additional Protocol to CEFTA agreement, Serbia is fully liberalized bilateral trade with Montenegro.

The aim of the research is considering possibilities of improving and expanding foreign trade of agro-industrial products. . The task is, among other things, to quantify the change in order to gain insight on the movement and actual trends, as well as to determine the mutual interdependence of the factors that influenced the dominant tendencies manifested. Regional cooperation in South East Europe is necessary for several reasons:

- Many problems can be successfully solved only on a regional basis (the fight against organized crime, human trafficking, prevention and fight against natural disasters and the like)
- Attracting of investments is more successful on a regional basis.
- WTO currently has 150 members. Countries have greater opportunities to promote their interests when acting in concert (within certain groups).

- International financial institutions have more regional approach to providing financial assistance.
- Regional cooperation is considered as a primary condition for joining the European Union.

Since it was first granted preferential access to a market of Serbian products, Serbia has made significant growth of trade with foreign countries. There is an increase in the indicators of openness of the domestic economy, which points to the possibility to make use of comparative advantages. By the value of this coefficient, Serbia is at the last place in the region, so the conclusion is that there is necessity for a higher degree of openness to encourage specialization and economies of scale and easier access to modern technology through foreign direct investment, which is undoubtedly important for the development of the country (www.pks.rs/Default.aspx?tabid=3929).

Data sources and methodology

The main source of data is a foreign trade statistics, Department of Agriculture materials, Chamber of Commerce and other relevant sources. It is performed an analysis of exports by commodity groups according to the Standard International Trade Classification. The research covered the time period from 2006-2009. The same is determined by the available documentary material. The research is based on the use of available data using standard statistical and mathematical methods. Intensity of change is quantified by calculating the rate of change using the function of the best adapted trendline to original data. The stability of exports and imports was calculated using the coefficient of variation.

Researching results

Exports of agricultural products in the Republic of Monteneegro

The Free Trade Agreement (CEFTA) is a free trade agreement between the countries of Central and Eastern Europe and means trade liberalization among countries which are members. CEFTA has political and economic significance as it is meant as a condition for EU membership, and because its goal is to attract investment, develop infrastructure, improve business image in the region, increase the competitiveness of the region,

facilitate better supply of cheaper and better products, and increase employment and living standards of population. Advantage of CEFTA in relation to bilateral agreements is that it allows greater transparency in business, easier administration for the government, greater uniformity and better discipline of participants.

The main reasons for initiating multilateral agreement are:

- Trade liberalization and the promotion of the development potential of the region;
- The introduction of uniform rules (in relation to the significant differences in bilateral agreements) and increase security for investors (increase transparency and uniformity, reducing complexity and administration), increased competition, economies of scale, changing the image of the region, greater legal certainty in the application of the legal framework during the implementation of the agreement (multilateralization rights and obligations, arbitration, etc.);
- Simplify procedures facilitate and encourage domestic and foreign investors to invest more in the region and contributes to the rise of more complex forms of cooperation, such as joint ventures, exchange of experts, technical innovation and a joint appearance on third markets;
- Preparation for EU membership (regional cooperation as a condition for progress in the integration process) and a way to introduce the acquis communautaire at the sectoral level;
- Facilitating the criteria for expansion and change current CEFTA agreement to allow better cooperation (introduction of new areas such as services, intellectual property and trade-related investment, the introduction of new procedures, strengthening institutional perspective - Secretariat) represent a significant improvement of this regional arrangements;
- Trade liberalization provides a broader context for a common energy market in South East Europe and the coordinated development of transport, transport infrastructure and infrastructure of environmental protection.
- The support that multilateral agreement is given by the European Commission, the Stability Pact for South Eastern Europe, the World Trade Organization, the World Bank.

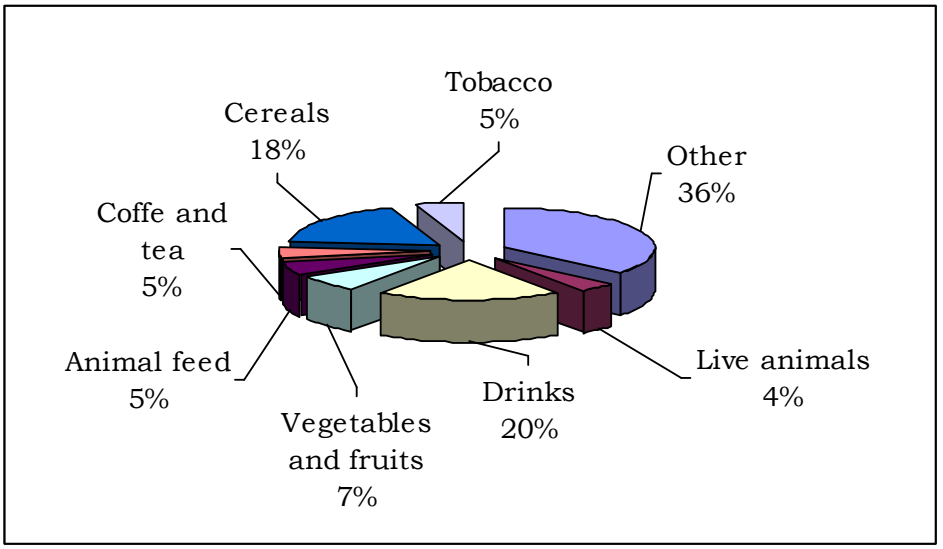
It is expected that CEFTA 2006 bring positive changes in the region and its citizens. The new agreement should contribute to the political stability of the region, attracting investment, developing infrastructure and improving the business image of the region. From the standpoint of consumers there are expected from agreement to provide better and cheaper products in the short term and in the long term growth in living standards due to the increased competitiveness of products from the region, and exports and employment. Republic of Serbia and Montenegro legally and formally separated in 2006t, and then begun the establishment of bilateral relations and foreign trade of two independent countries. Despite the fact that the Republic of Serbia has foreign relations with Montenegro a few years, this is an important foreign trade partner of the Republic of Serbia. The Republic of Serbia in the analyzed period from 2006 to 2009 exported to Montenegro the agricultural and food products amounted to more than a billion dollars or 25.9% of total exports to CEFTA countries *(Vlahović,2010.)*.

The analysis of exports in the observed time period from 2006 to 2009 shows constant growth in exports, except last year, which can be justified by the global economic downturn and a drop in transport activity, both globally and in the region of CEFTA. Seizing the export curve it is seen constant growth in exports to Montenegro at the rate of change of 17.1%, with a coefficient of variation of 24.6%.

By he analysis of export from the Republic of Serbia according to commodity groups of the Standard International Trade Classification (SITC), Serbia has exported drinks (alcoholic and nonalcoholic) 20%. Cereals and cereal products (wheat grain and wheat flour), corn in grain accounted for 18% of total exports, but it should be noted that the export of these agricultural products increased significantly from year to year. If we analyze the structure of the exported product groups (SITC) from Serbia to Montenegro, it is evident that Montenegro needs for the entire range of products. It may be noted that Serbia exported to Montenegro the most diverse group of food products, while seven groups of agricultural and food products accounted for 50% of exports (*picture 1*). The most common items in the export structure of Serbia are cereals (wheat grain, corn), and drinks (non-carbonated juices, soft drinks and alcoholic beverages), and trade groups fruits and vegetables (frozen and processed vegetables, fresh seasonal vegetables - tomato, cucumber, cabbage, etc ..., as well as fresh

seasonal fruit - apples, plums, cherries, cherry, raspberry, etc ...). The market of agricultural and food products in Montenegro in perspective can absorb more agricultural products from the Republic of Serbia, and in particular, the more processing final products and products of higher market value (meat, milk, fruits and vegetables).

Picture 1. *The structure of export of agricultural products from Serbia to Montenegro (2006-2009)*



Source: *Authors calculation.*

If we analyzes the export per year, it can be seen that in the first year of Serbian foreign trade it exported the most nonalcoholic drinks worth more than $ 24 million, which accounted for over 13% of total export. It also placed significant amounts of canned meat products, over 9% of total exports or $ 18 million worth, milk and milk products (9%) and cereal products (over 9% of the total). The structure of export in 2007 is not changed significantly. It dominated the export of non-alcoholic beverages (15%), cereal products (9%) and canned meat and milk (17%). These three product groups have pursued over a million dollars worth of export. Exports in 2008 are characterized by the growth of exports of non-alcoholic beverages at 16%, but also the placement of completely different product groups: live animals 6% and 5% of animal feed, coffee, tea, cocoa and spices 4%, and others. In 2009 into the export structure still dominated the same group of products - the export of non-alcoholic beverages (16% of total exports to Montenegro), followed by dairy products (10%),

meat and canned products (6%), cereal products (8 %). Exports of live animals increased to 7%, while the other product groups have a similar share in exports, as well as in previous years. It may be noted that Montenegro is one of the most important markets for agricultural and food products to the Republic of Serbia. Commodity groups that dominate of the export of Serbian are drinks and cereals and cereal products. By the analysis of the rate of change can be noted the low rate of change, that indicate the constant slight increase in export and a low coefficient of variation in grain (24.4%) and beverages (29.3%), which indicates the safety of placement of these product groups. The highest rate of change in the analyzed period was recorded live animal trade groups from 108.1%. The result of this high growth can be found in the growth of export of this product group in 2009, which resulted in a coefficient of variation of 94.4%. Serbia has a negative rate of change in the marketing department group of various food products (canned meat and meat products, milk and dairy products, confectionery, etc ...), and it can be concluded that the Republic of Montenegro imports from other countries products with more final processing. In the future Serbia would have to handle this important market niche and to improve the quality of the final food product if it wants to participate in the market of Montenegro. Seizing the rate of change it is evident that the market of Montenegro is a stable market for the sale of agricultural and food products from the Republic of Serbia. Although Serbia and Montenegro have relations for only four years, the balanced growth rate changes and a low coefficient of variation clearly indicate the dependence of Montenegro from sales of food products from the Republic of Serbia. The drop in export of Serbian products on the market of Montenegro in 2009 very much contributed the economic crisis, as well as restrictive budgetary measures of the Government of Montenegro. Seizing the presented rate changes it is expected from Serbia in the future to recover lost market position and achieve slowed growth of export. The decline in exports in 2009, which is higher than the 59 million dollars, is a clear indicator that shows variability of the market of Montenegro. The Republic of Serbia in the future can expect slowdown in exports, and it is possible stagnation due to the limited market potential of Montenegro. It should be noted that CEFTA prohibits government export subsidies in any form. Each CEFTA countries can take appropriate measures if it considers that the other party applies subsidies, thus causing serious damage to the other party (Article 21).

Measures to increase exports of agroindustrial products in the Republic of Montenegro

In order to increase export, it is necessary to take advantage of the comparative advantages of agroindustry of Serbia (favorable growing conditions, the existence of manufacturing facilities, professional staff and the like.). All the above mentioned factors should be aimed at creating viable export food surplus to meet the quality requirements of the market of Montenegro. We should not forget that during the touristic season our products are bought also by foreign tourists. It is necessary with appropriate measures to stimulate the revival of whole agricultural production, which appears as an essential prerequisite for export. However, according to the signed CEFTA agreement there are not allowed export subsidies in these countries.

It is essential that the agro-industrial products are custom to standards prevailing in the market of the Republic of Montenegro: ISO, HACCP, GLOBAL GAP (in terms of product quality, size, type of packaging, types of packaging, etc.). Quality requirements, sanitary and veterinary care are much stricter than in the previous period. An important issue is the export price and the amount of agricultural products. Specifically, the cost needs to be competitive in comparison to other exporters (Croatia, Slovenia, and the like.). Presnall and al. (2003.) suggest that price competitiveness is no longer a defining export advantage, but important qualitative factors: design, packaging, reliability and speed of delivery, trade mark ("brand"), the ability to meet specific customer requirements and compliance with contractual obligations in the export business, permanent advertising in the media, representing trade interests of our country and building a positive image of the Company's production and promotion of national identity. It is necessary to take account of the competitiveness. In the broadest sense, the international competitiveness of the national economy is based on measuring and comparing macroeconomic indicators and living standards where the focus is productivity, while more narrowly it is defined as a country's ability to export its products to the international market.

Products from Serbia are significantly preferred by consumers in Montenegro (confectionery and meat products, beverages, milk and dairy products, fruits and vegetables, etc.). This trend should continue in the future. It

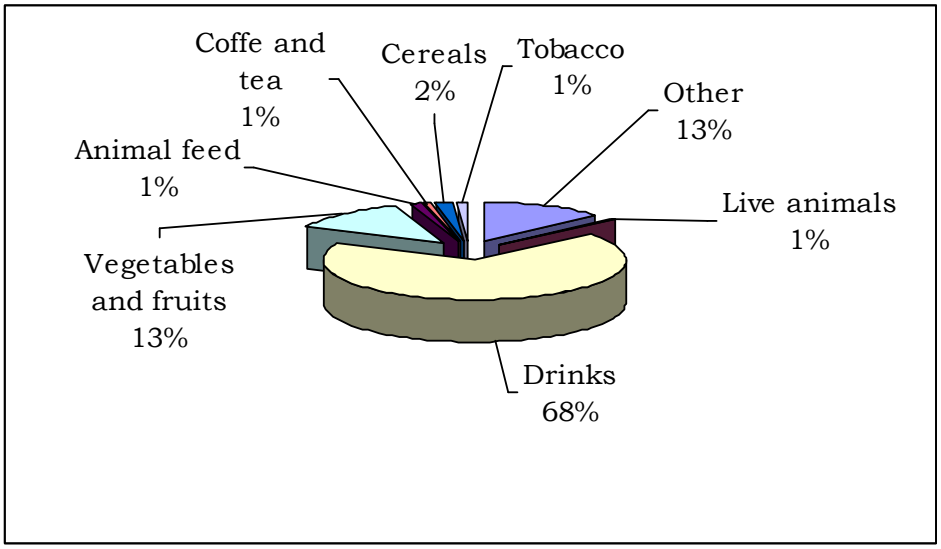
is necessary to define appropriate promotional activities which should be aimed at increasing exports. In order to increase the export, Serbian Republic's products must be competitive in terms of quality, range and price.

Import of agricultural products from the Republic of Montenegro

As the market of Montenegro has absorption limit, Montenegro has a natural production limit. Confirmation of this thesis is reflected in the line of imported agricultural and food products from the Republic of Montenegro to the Republic of Serbia *(Stanojević, 2003)*. Import of agricultural products from the Republic of Montenegro in observed period had a trend of slight growth, except 2009, when the import declined by nearly seven million dollars. Last year significantly contributed to a negative rate of change of the total imports of -4.7%. Serbia has imported an average of over 25 million dollars worth of agricultural food products annually. Import was annually enlarged with more than ten million dollars, except in 2009, when it recorded a decline in import. Unlike export, which is very heterogeneous, import from the Republic of Montenegro in the analyzed period can be characterized as very homogenous, where over 68% of total import by SITC makes import of trade group drinks (alcohol-wines). In addition to wines, the Republic of Serbia imported salted meat products, fish, dried fruits and frozen vegetables. These commodity groups account for over 80% of the amount of agricultural products imported from the Republic of Montenegro in the study period (*picture 2*). Thus the homogeneous structure of import is a clear indication of natural and industrial constraints of the Republic of Montenegro in the agro-industrial production. Natural limiting factors are, above all, lack of arable land, while the industrial constraints reflected in outdated technology, limited raw material resources and the absence of a clear vision in the field of agricultural and food industry (complex). Clear indicators that confirm this theory are reflected in the modest production and processing of seafood, bottled water, herbs, etc. The area in which the Republic of Montenegro uses its exceptional geographic location and natural resources is the production of alcoholic beverages, especially wine, which is the most important export item of the Republic of Montenegro to Serbia. The Republic of Serbia from Montenegro, in the analyzed period, imported alcoholic drinks worth more than $ 70 million which represents 68% of total imports of agricultural and food products.

In addition to the mentioned goods imported from Montenegro, in the analyzed period, especially in 2006, there were imported spices worth more than 100 thousand dollars, sugar, molasses and honey (160 thousand dollars) and bovine fresh meat worth more than 165 thousand dollars. However, in this year is dominating the import of alcoholic beverages (wine) worth more than $ 17 million, which accounted for 69% of Serbian import from the Republic of Montenegro.

Picture 2. *Structure of import of agricultural products to Serbia from Montenegro (2006-2009)*



Source: *Authors calculation.*

The following year (2007) is characterized by the growth of import of alcoholic beverages, so that import of this product group comprises over 70% of imports from Montenegro or 194 million dollars. Other product groups occupy a symbolic place in the structure of import. The only group of products that have a positive upward trend in terms of Montenegrin export is salted meat products and import of this product group makes 7.8% of total import. Next analyzed year (2008) is determined by the further growth of import of salted meat products (processed pork and beef), so that import of this product group comprises over 12% of total import, while import of alcoholic beverages fall in the percentage of 65%, and rated at 187 million dollars. Last year of the analysis is characterized by a further decline in import of alcoholic beverages at 60%, and the co-

nstant growth of import of salted meat products, which in 2009 accounted for 16% of total import. In addition to these two product groups, it can be distinguished import of fish 6% and dried fruit and frozen vegetables 10%. Therefore, export from the Republic of Montenegro to Serbia is very homogeneous, it is made by five product groups, and in the future Serbia probably wan t expand the import contingent. The Republic of Serbia has a negative rate of change in import of -4.7%, with a coefficient of variation of 11.5%. To the negative rate of change of import significantly contributed the most recent year in which it is recorded decline in import higher than 100 million dollars. If we analyze the rate of change of import from the Republic of Montenegro, it is evident that it is negative for more than 50% of cargo that is imported into the Republic of Serbia in the observed period. Significantly higher rates of change realized commodity groups fruits and vegetables and tobacco and tobacco products. These commodity groups had significant fluctuations in import. The import of fruit and vegetables in 2006 and 2008 recorded a record amount on average per year from four million dollars, while 2007 and 2009 are characterized by a decline in imports per year more than two million dollars on average. Commodity group of tobacco and tobacco products has almost identical characteristics as the commodity group of vegetables and fruits, but the Republic of Serbia this group mostly imported in the first two years of the study period, followed by a sharp drop in import. It is indicative the negative rate of change of -33.9% of commodity group various food products (meat, fish - freshwater - saltwater, canned food), which generally has a higher level of final processing.

One would assume that Serbia by substantial reduction of import of this product group increased its own production and sales of the same, which is not the case because the Serbian exports recorded a negative rate of change. Negative rates of change and high coefficients of variation of product groups (different food products) clearly indicate the quality of these products and that both countries this group of products supplied from the other countries from CEFTA, which have higher levels of processing, and perhaps higher quality (Croatia). The analysis of commodity group drinks there is a visible decline in import, especially of wine, in the Republic of Serbia from Montenegro.

The Republic of Serbia has reduced import of alcoholic beverages from Montenegro in the last two years to more than six million dollars,

resulting in a negative rate of change of -2.2% and a coefficient of variation of 29.0%. Although the Republic of Serbian declined the import of wine, this group of products continues to dominate in the structure of imports with 68% and amount higher than $ 70 million, so that the coefficient of variation of 29.0% clearly indicates that in perspective group of drinks will dominate from the Republic of Montenegro. Although Serbia has great potential as a natural geographic and technology to produce high-quality wines, due to unclear policy of the Government of the Republic of Serbia, this branch of the Serbian economy in the future can become a stumbling block of Serbian agriculture.

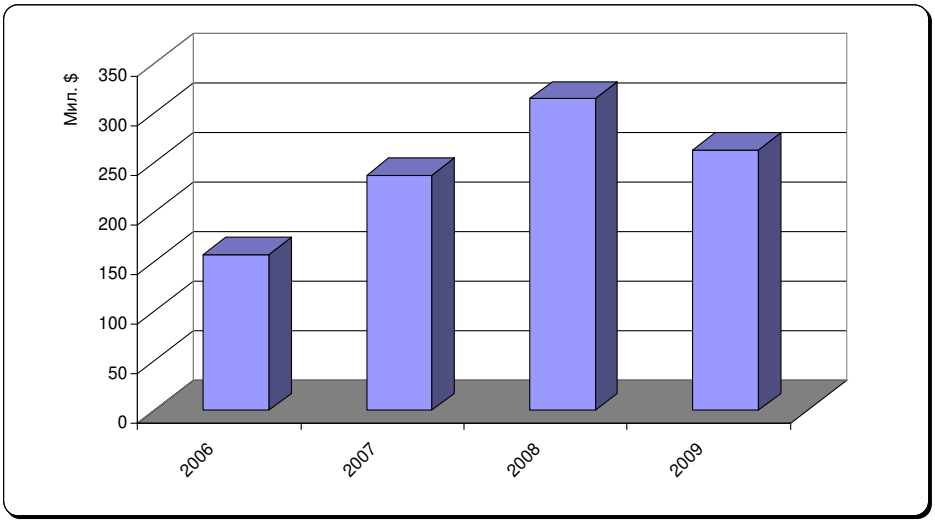
As the Republic of Montenegro is a country of limited natural production capacity, it is expected that import from this country in the future will decrease or be maintained at current level. Apart from the low proportion of the active population of only 29.3%, Montenegro is burdened with outdated technologies in production and processing of agricultural and food products and poorly implemented privatization of existing agricultural complex. Commodity group which may have propulsion in perspective on the Serbian market, in addition to drinks, is eatable vegetables and fruit (mandarin, lemon, fig, etc...).

Balance of foreign exchange

It is important to note that the foreign trade of Serbia and Montenegro has over 34% of total trade agricultural products with the CEFTA countries. Montenegrin market is of great importance for Serbia, because this market, in a very short period (four years), positioned as the second most important. Analyzing the period of foreign trade of the Republic of Serbia and Montenegro, it can be concluded that the Republic of Serbia has achieved a trade surplus more than 970 million dollars.

During the analyzed period, the largest surplus in foreign trade in agricultural products was achieved in 2008 in the amount of 300 million dollars (*histogram 1*). In the same period, the Republic of Serbia imported products worth only $ 100 million, or 7.6% of total import from countries which signed CEFTA agreement. Serbia notes continued surplus in foreign trade in agricultural products with Montenegro, annually by an average of almost 243 million dollars.

Histogram 1. *Balance of foreign exchange of agricultural products between Serbia and Montenegro (2006-2009)*



Source: *Authors calculation.*

Serbia is in the studied period from 2006 to 2009 achieved a positive balance of the rate of change of 20% and a moderately low coefficient of variation of only 27%. Significantly higher rate changes and lower coefficient of variation would be possible to realize if both economies have not fallen into a recession caused by the global economic crisis, which has resulted in reducing the volume of trade between Serbia and Montenegro. By the analysis of the rate of change of product group in the balance of foreign trade, it is symptomatic that the commodity group of vegetables and fruits has a negative rate of change of -20.6% and coefficient of variation of 61.5%.

These data clearly indicate a sharp decline in interest of Serbian market to import fruits and vegetables from Montenegro, although it could be assumed that the Serbia in perspective could significantly import fruits from Montenegro. Commodity group - miscellaneous food - also recorded a negative rate of change of -0.2%, which is the result of the previously mentioned technical and technological capacity limitations in the Republic of Serbia and Montenegro. The coefficient of variation indicates that the balance exchange of this product group almost died out between Serbia and Montenegro, and that the Republic of Croatia covers market with this product group.

Table 1. *Balance of foreign exchange agricultural products between Serbia and Montenegro (2006-2009)*

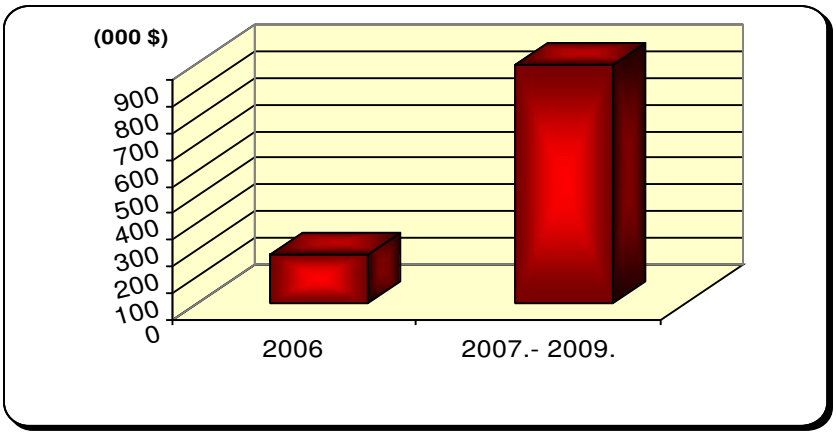
Department	*Product groups*	*Value (mil.$)*	*Rate of exchange (%)*	*CV (%)*
00	Live animals	11,40	180,6	94,5
04	Cereals and cereal products	48,42	13,4	25,0
05	Vegetable and fruits	15,34	-20,6	61,5
06	Sugar, sugar products and honey	2,90	14,1	18,6
07	Coffee, tea, cocoa and spices	12,61	22,4	25,3
08	Animal feed (except wheat in grain)	12,76	22,1	30,8
09	Miscellaneous food	17,44	-0,2	1,3
11	Drinks	36,94	40,7	43,4
12	Tobaco and tobacco products	12,22	66,0	52,1
	Other	72,79	11,0	21,0
	In total:	***242,82***	***20,0***	***27,0***

Authors' calculations based on the data of the Statistical Office of the Republic of Serbia, Belgrade

Considering the analyzed data it can be concluded that the most promising commodity group in terms of foreign trade between Serbia and Montenegro were cereals and cereal products. The Republic of Serbia in the analyzed period achieved a balance surplus of this product group over 48 million dollars. Trade in cereals and cereal products, in addition to earned surplus, had a rate of growth of 13.4% with a coefficient of variation of 25%, which are data of stable and long-term exchange. Extremely high rate of change, which is manifested in the exchange, is a trade group of beverages (40.7%) and coefficient of variation of 43.4% and this unequivocally indicate that it will dominate in the future. Analysis of coverage of import by export, Republic of Serbia, in the period of four years achieved significant results. Import of commodity groups 00 and 01 from the Republic of Montenegro, in terms of SITC classification, is the multi-covered by export from the Republic of Serbia. Strategic product groups with which the Republic of Montenegro on the Serbian market performance are the drinks, especially wines. Commodity beverage group is covered by export from the Republic of Serbia to the Republic of Montenegro with over 300%. Commodity group of vegetables and fruits with which the Republic of Montenegro has real possibilities to significantly participate in

the Serbian market is covered by more than 500% of Serbian exports in relation to import from Montenegro. Indicators of coverage of import by export undoubtedly provide to Serbia a relaxed position in terms of trade balance, however, free trade zones and the possibility of export of agricultural and food products from other countries of CEFTA environment in the future may significantly jeopardize such a good balance sheet position. Observing the same period by the product groups it could be note that in all commodity groups Serbia has made a positive balance.

Histogram 2. *Comparison of exports before and after the signing of CEFTA (000 $)*



Source: *Authors calculation.*

The most significant positive balance the Republic of Serbia has achieved primarily with grains and wheat products. Drink is a trade group that has also made a significant positive financial result in the amount of approximately $ 150 million. Other commodity groups have a uniform positive balance, while sugar and sugar products are commodity group with the lowest surplus of 11.6 million dollars. A negative balance the Republic of Serbia in the analyzed period, in terms of SITC, has not made in any of a single commodity groups.

After the first year of implementation of CEFTA, 2007, Serbia has exported agricultural and food products more than 80 million dollars than in 2006. After signing the CEFTA, export increased on average by 28% per year, or more than 295 million dollars annually (histogram 2.). This high

growth in exports resulted in a high coefficient of variation for the last three years more than 122%.

The Republic of Serbia has a growing trade surplus by 33% annually. This high growth in export Serbia has achieved only with Bosnia and Herzegovina. However, the market of Montenegro has significant limiting factors which in the future will certainly lead to a slowdown in export growth, and possibly to stagnation. Factors that could be characterized as primarily limiting are the negative growth rate of the Montenegrin population, slow economic growth and the occurrence of significant impact of competitive agricultural and food products and agro-industrial complexes in the region.

Conclusion

The results clearly show the advantages of the CEFTA agreement in the foreign trade of Serbia and Montenegro. The Republic of Serbia has made significant surplus in foreign trade, an average of nearly $ 250 million. If we take into account the demographic constraints, and a slight recovery of the economy of Montenegro, and add a significant presence of agricultural and food products from the region, Serbia will in the future have significantly more aggressive appearance on the market of Montenegro. Entry into force of CEFTA 2007, it is allowed to Serbia placement of the non tariff barriers and a number of other limitations. Implementation of CEFTA agreement allowed the Republic of Serbia (agro-complex) easier access to the market of the Republic of Montenegro and taking a leadership position on the same. Maintaining the leading position in the market of Montenegro in the future will involve significant analysis of this market with the full marketing concept and participation on the same. In order to increase export it is necessary to take account of the design, packaging, reliability and speed of delivery, strengthening of brands, the ability to satisfy the specific costumers' requirements with respect of contractual obligations. It is necessary to take strict account of standards. It is necessary to keep advertising in the media, representing trade interests of our country and building a positive image of the product and the company as well as the promotion of national identity. Also, it is necessary to take account of the competitiveness of Serbian products in terms of quality and price.

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ECONOMIC CONDITIONS AND POSSIBILITIES OF HAZELNUT PRODUCTION IN SERBIA

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Abstract

Hazelnut is economically highly important, since the plant itself as well as its fruit are widely used in various domains of life. Products deriving therefrom are all the more frequent both in domestic and international trade. Therefore, the subject matter of this paper covers: hazelnut production conditions, economic profitability and production improvement possibility. The aim of this paper is to give the insight in hazelnut production conditions in Serbia, to consider expansion possibilities of plantings, production scope and placement on the market. The following methods have been applied during the research: content, SWOT and comparative analysis, mathematical and ststistical methods, calculation and payback period method. Analyses of financial reports, break even point and performance indicators, have been made. Although conditions are advantageous, hazelnut tree production in Serbia is unsatisfactory, and needs for this fruit are met mainly through the import. This paper also presents hazelnut tree planting business, thus explaining positive effects the realization of such an undertaking may have on the income, business and estates. Such state of facts make possible to: expand plantings of this cultivar, decrease import, employ more people and acquire more income.

Key words: *hazelnut, production, conditions, possibilities, Serbia.*

Introduction

Hazel *(Corylus sp.)* is a very old plant species. It is estimated to have existed as early as 8000 years. It is distributed worldwide in the form of a

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bush. For industrial needs it is grown only in the areas in the vicinity or under the influence of large water areas. These areas are characterised by mild winters and chilly summers. The Ancient Greeks started growing hazel 2000 years ago, followed by Romans. Some sources claim that domestic hazel was brought from Asia Minor to Greece, and hence to Italy and Sicily. Later on, it was spread over Europe by Roman legionaries.

The greatest significance in the creation of noble varieties has ordinary (European) hazel *(Corylus avellana L.)*, followed by Lambert's (Macedonian) hazel *(Corylus maxima)* and Caucasian (Pontica) hazel *(Corylus pontica)*.

Nowadays, hazel is spread worldwide, mostly in Asia Minor, Southern Europe and North America, and can also be found in Eastern and Western Europe.

Prices on both foreign and domestic market are stable and high, which makes that its production could be highly profitable and economical. Considering the price per one kilo, and with the average yield ranging from 1,500 to 2,000 kg of nut per hectare, this is one of the most profitable productions in agriculture. Accordingly, annual net income could be around 10,000 euros. This profit per hectare cannot be made by growing any other agricultural species. All this contributes to growing a very interesting fruit species, which can yield multiple benefits.

Due to its high energy value, pleasant aroma and consumers' requirements oriented towards confectionery products, both in the world and in our country, there is an increasing interest for maximising areas under hazel.

The economic significance of hazel is multiple and second to walnut it is the most significant nut fruit. Hazelnut is a valuable foodstuff. It is estimated based on the content of substances which are extremely important for human organism. Hazel oil, flour, butter and milk are produced from the nut. The greatest use of nut is in confectionery industry for the production of chocolate, cream and other sweets. In intensive production, hazel varieties require special conditions of both climate and soil. The hazel tree is also important. It is used for making furniture, various home made products and craft products. It is a perennial plant which can live for more than 100 years.

Material and methods

For the purpose of this paper the data from FAOSTAT were used, as well as material from other internet sources, books and papers. There are several methods used in this work: content analysis, different mathematical and ststistical methods, comparative analysis, SWOT analysis, calculation method and payback period method. Analyses of financial reports, low profitability point and success indicators, have been made.

Results and discussions

The production of hazelnut in Serbia is very small, so small in fact that it is insufficient even for the needs of domestic market for this kind of fruit, so that there are no statistical data on this production. It is estimated that there are around 1,500 ha under this culture in Serbia, mostly represented on small areas and private gardens, as bulk fruit, while large plantations are extremely rare. Average yield is less than 1 t/ha. Therefore, the scope and quality of this production is not in compliance with the natural and social and economic conditions in our country. The first plantation hazel plantings in Serbia were raised only in the eighth decade of the last century, in the vicinity of Gornji Milanovac and Subotica. However, interest for establishing new commercial plantings has increased again in the past few years. The varieties prevailing in the assortmet are: Roman Hazelnut, Long Istrian, Tonda gentile dela lange, Kosford and Hall's Giant. The most recent, young plantings increasingly grown Enis variety. The most frequent growing form is a open center crown, a bush with a short trunk *(Mratinić et al., 2007).*

Apart from the perennial and high economic value of hazel, we should note that there is an obvious disproportion in Serbia between the actual need for fruits of this fruit variety and situation in this production, notwithstanding the possibilities to increase the scope of this production to a great extent, owing primarily to favourable agroecological conditions in our country. Various factors and indifference of our producers to hazel have largely contributed to this situation.

Relatively modest attention has been paid to research of this fruit species in our country, unlike the other countries in the world which have favorable conditions for its growth, and unlike other fruit varieties. Insufficient knowledge of hazel had effect on slow introduction into production and raising large plantations, although our country has highly

favourable natural conditions for its growth. Hazel had been considered a wild fruit for a long time and when it was first cultivated not much attention was paid to its growing. There is no succesful or profitable production without professional approach to growing hazel. This certainly entails the use of contemporary agrotechnical and pomotechnical measures. Easy vegetative propagation, favorable conditions and the possibility of making satisfactory profit should be sufficient motives for raising new, modern plantations on much greater areas. This would substitute the import of hazel in our country with export, and hazel would thus, among other things, give its contribution to raising standard and providing existence for a greater number of people. However, the lack of adequate technology prevented intensification of production of this highly significant fruit species.

Tolerance to agroecological conditions, profitable production and favorable price on the market induced the transition of extensive hazel production in the main producing countries into intensive one. In the first decade of 21^{-th} century the price changed only once, in 2005, when it changed from 5.5 € (the lowest price in the past 15 years) for kilo to as high as 11 € for one kilogram. The reason for this change was frost which significantly lowered the yield *(Milinković, 2009)*. Global demand for hazel is on the constant increase, making it a deficitary food item. The European Union has no limitations regarding the plantings under hazel.

The Ministry of Agriculture of the Republic of Serbia subsidized the raising of hazel plantings and provided funds for the purchase of seedlings. The amount depends on the planting materials supplied. Namely, certified, grafted seedlings, at the amount of 6 euros per seedling, for no less than 600 planted seedlings per hectare. Whereas subsidy for the purchase of seedlings obtained from shoots, certified as well, 1.75 euros, for no less than 500 seedlings per hectare (*Milinković, 2009)*.

The life of hazel is 70 – 100 years. On an average, hazel starts bearing fruit in the 3rd or 4th year from its planting and bears fruit for 50 – 70 years. The period of full fertility starts at 7 – 8 years and lasts for 30 – 50 years. In its full crop one tree yields 8 – 12 kg. Around 50% is wasted to shell. Depending on the growing form, the formation of crown, the density of planting, the age and other agrotechnical factors, hazel yields of 2.2 tons of fruit, up to 3.6 tons/ha.

Hazel is a highly demanded and yet deficitary fruit in Serbia. Between 90 and 95% are imported for domestic needs. Hazel plantings are rare and mostly cover small areas (except for several large plantations). Over the last 20 years there has been an increasing interest for growing hazelnut on larger areas and in intensive production. 250 ha have been raised on the territory of Gornji Milanovac for the needs of PIK ''Takovo'' and another 500 ha of plantings have been planned in the vicinity of Dečani and Peć. There are several plantations in Srem nowadays, occupying the area of around 40 – 50 ha. It is estimated that hazel production in Serbia is no more than 2,000 tons, enough for only around 15 – 20% of needs for this fruit. The demand for hazel is great, that is why it has great prospects in the development of Serbian fruit growing. Annual global production of hazel in 2010 was 857.759 tons (Table 1).

Table 1. *Distribution and production of hazelnut with shell in some countries in 2010*

No.	Country	Area		Country	Annual production		Country	Yield (t/ha)
		ha	%		tons	%		
1.	Turkey	432.439	71,67	Turkey	600.000	69,95	Armenia	4,17
2.	Italy	55.904	9,26	Italy	90.270	10,52	Greece	3,25
3.	Azerbaijan	22.691	3,76	Azerbaijan	29.454	3,43	Romania	2,80
4.	Iran	21.000	3,48	Georgia	28.800	3,36	Cyprus	2,53
5.	Georgia	15.000	2,49	USA	25.401	2,96	USA	2,16
6.	Spain	13.800	2,29	Iran	24.300	2,83	France	2,16
7.	USA	11.736	1,94	China	19.500	2,27	Georgia	1,92
8.	China	10.300	1,71	Spain	15.100	1,76	China	1,89
9.	Kyrgyzstan	5.000	0,83	France	8.288	0,97	Slovenia	1,74
10.	France	3.834	0,64	Croatia	3.333	0,39	Denmark	1,67
	Others	11.691	0,50	Others	13.313	0,46	Others	1,14
	World	603.395	100	World	857.759	100	World	1,42

Source: *FAOSTAT.*

The table presents data on the major producers of hazelnut in the world, as well as on areas where hazel is grown. For a long time Turkey is at the top of the list of the greatest raisers and producers, in 2010 with 71.67% of areas covered with this fruit kind (432,439 ha), and it also participates with approximately 69,95% of global production in hazel production (600,000 tons). Turkey is therefore able to define the prices of hazel in the world. Italy is the second on the list, where plantations are found in the areas of Piemonte, Aveline, Sicily and Apulia. It is grown on around

55.904 ha (9.26%), and total production is around 90,270 tons (10.52%). Global needs for this fruit are covered with approximately 70%, meaning somewhat more than 800,000 tons. Data on the major importers and exporters of hazelnut and funds allocated for import and export of this fruit kind are shown in Table 2a and 2b.

Table 2a. *Major importers of hazelnut in the world in 2010 based on value and quantity*

Rank	*Hazelnut with shell*				*Hazelnut shelled*			
	Area	**Quantity (tonnes)**	**Value (1000 $)**	**Unit value ($/tonne)**	**Area**	**Quantity (tonnes)**	**Value (1000 $)**	**Unit value ($/tonne)**
1	China	17.986	54.643	3.038	Germany	67.728	441.732	6.522
2	Italy	3.959	11.274	2.848	Italy	31.034	203.605	6.561
3	Germany	2.705	9.883	3.654	France	21.190	136.257	6.430
4	Canada	1.722	5.657	3.285	Russia	11.188	53.055	4.742
5	China	1.241	2.690	2.168	Belgium	10.014	64.338	6.425
6	Egypt	665	2.272	3.417	Switzerland	9.460	56.735	5.997
6	Tunisia	665	663	997	Canada	8.709	63.563	7.299
8	Spain	524	1.767	3.372	Spain	5.621	32.666	5.811
9	USA	518	1.182	2.282	Egypt	3.896	24.582	6.310
10	Ireland	363	481	1.325	Netherlands	3.344	21.402	6.400

Source: *FAOSTAT.*

Table 2b. *Major exporters of hazelnut in the world in 2010 based on value and quantity*

Rank	*Hazelnut with shell*				*Hazelnut shelled*			
	Area	**Quantity (tonnes)**	**Value (1000 $)**	**Unit value ($/tonne)**	**Area**	**Quantity (tonnes)**	**Value (1000 $)**	**Unit value ($/tonne)**
1	USA	22607	70234	3107	Turkey	149605	892254	5964
2	China	9882	27194	2752	Italy	13869	89406	6446
3	Georgia	5540	13793	2490	Georgia	9610	50218	5226
4	France	3443	11486	3336	Azerbaijan	8468	35172	4154
5	Italy	2422	7960	3287	Germany	3668	26420	7203
6	Chile	2203	6436	2921	Netherlands	2191	12242	5587
6	Turkey	1608	4981	3098	Spain	2109	11808	5599
8	Canada	520	1177	2263	France	1094	7442	6803
9	Netherlands	341	1102	3232	Belgium	943	3920	4157
10	Germany	309	1110	3592	USA	714	4484	6280

Source: *FAOSTAT.*

The greatest importer is Germany, allocating arround 450 million dollars, placing it among the major hazelnut importers, followed by Italy with around 200 million dollars. The greatest exporter is Turkey, allocating arround 900 million dollars, followed by Italy with around 100 million dollars. Globally, the quantity of imported hazelnut is around half a million tons.

Current demands for hazelnut in Serbia are more than 10,000 tons, with the tendency of further increase. This indicates that there are possibilities on domestic market for much greater marketing of this product than the currently produced quantity on the territory of the Republic of Serbia.

Due to the lack of data on individual producers of hazelnut in Serbia (their number, size of plantings and quantity of yield), the market share of all suppliers of this product in our country cannot be determined exactly.

The situation in the production of hazelnut in Serbia and the possibilities for its improvement may be represented using the SWOT analysis method. This is a strategic management technique for identifying strategic choices in the production of hazelnut by comparing strengths and weanesses with opportunities and threats in external surroundings (Table 3).

Table 3. *SWOT table*

Strenghts	**Weaknesses**
- owning the land and mechanisation - easy storage and long preservation - stable market prices - selection of good quality planting material - use of modern achievements in hazelnut production and processing - great motivation - finished product and intermediate - introducing irrigation system je	- lack of monetary assets - small interest of domestic co-operative buyers and processors - full crop after 7 – 8 years - no associations - no domestic equipment for processing (cracking and classification) - long period of investment refund
Oportunities	**Threats**
- great demand - deficitary product - opportunity for export - use of new technologies - additional processing of nut into finished product - increase of yield per hectare	- hyperproduction in the world - uncontrolled import - non-payment for the delivered product - natural disasters - diseases and pests - buy-up price on a decline

Source: *Authors.*

Relevance of a Business Plan

A business plan is to stipulate company (estate) goals and strategies, i.e. the manner such goals are possible to achieve. It is to indicate whether or not there is a chance for future business success of a company (estate). A business plan helps reveal weaknesses in organizational structure, identify issues and determine responsibilities.

A business plan is most frequently used when an entrepreneur faces great dilemmas. It is the basis for negotiations with possible financiers (banks, investors etc.). Financiers will be informed of the entrepreneur's business idea risk level.

A business plan proves financial cost-efficiency of the project, decreases the risk of business operations and takes into consideration the amount of necessary capital.

It is to help take into consideration the vision of an estate and possible strategies of business operations.It is also to prove market justifiability of such business idea.

A business plan should be complete, precise, concise and well-presented. Once making i.e. writing of a business plan is done, it should answer the following questions: what will be produced, for whom will it be produced, where will it be produced, by which means will it be produced, at which costs will it be produced, what profit should be expected, who is the main competition, which issues should be expected and how will they be tackled?

Business goals, principles of work, methods and business activities of the period to come are appropriately connected within the business plan. This paper presents business plan for hazelnut tree planting

Financial analysis

This part of the business plan encompasses the whole financial analysis and provides a clear image of the project.

Initial investments for 5 ha of hazelnut tree plantings
Initial investments for the establishment of 5 ha of hazelnut tree plantings are presented in Table 4.

Table 4. *Calculation of initial investments in the establishment of hazelnut tree plantings*

Ord. no.	Material / services	Unit of measurement	Quantity	Price (EUR)	Total
I	**Materijal**				
1.	Nursery trees	piece	2,500	2	5,000
2.	Farmyard manure	ton	12.5	20	250
3.	NPK	ton	1.5	215	320
4.	Wire	meter	1,100	2	2,200
5.	Concrete columns	piece	300	2	600
Total material					**8,370**
II	**Services**				
1.	Soil analyses	hectar	5	30	150
2.	Subsoiling	hectar	5	70	350
3.	Ploughing	hectar	5	50	250
4.	Disc harrowing	hectar	5	30	150
5.	Hole digging and planting	piece	2,500		200
6.	Watering	litre	25,000	0.002	50
7.	Digging of holes for columns	piece			100
8.	Wire setting	hour			200
9.	Other expenses				500
10.	Orchard maintenance (first 3 years/ha)		15	500	7,500
Total services					**9,450**
Total I + II					**17,820**

Table 4 provides an insight in necessary operations that need to be performed first, during and upon the hazelnut tree planting.

Basic assets investments

Neccesary basic assets investments for the planting stipulated are presented in Table 5.

Table 5. *Basic assets investments*

Ord. no.	Name of the basic asset	Pieces/ hectares	Price per piece VAT included (EUR)	Value
I	**Mehanizacija**	pieces		
1.	Sprinkler or atomizer	1	3,000	3,000
2.	Milling machine or mulcher	1	3,500	3,500
3.	Roller	1	500	500
4.	Harvester	1	9,000	9,000
	Total mechanization			**16,000**
II	**Equipment**	pieces		
1.	Calibrator	1	500	500
	Total equipment	hectares		**500**
III	**Perennial planting**			
	Hazelnut tree planting	5	3564	**17,820**
	Total Σ I + Σ II + Σ III			**34,320**

Table 5 presents machines and equipment vital for successful hazelnut production and processing. The most expensive and the most complex machine is a harvester, which needs to be imported, since such a machine is not produced in our country, while other equipment and machines can be provided in Serbia.

Financing sources
Financing sources of the production analyzed are presented in Table 6.

Table 6. *Financing sources*

Ordinal number	Description	Assets entered	New investments	Total Investments	Share in the total investments %
I	**Own resources**	**44,000**	**0.00**	**44,000**	**56.18**
	Basic assets	39,000	0.00	39,000	49.79
1.	Soil	30,000	0.00	30,000	38.30
2.	Permanent plantings	0.00	0.00	0.00	0.00
3.	Equipment	9,000	0.00	9,000	11.49
	Operating assets	5,000	0.00	5,000	6.38
1.	Cash	5,000	0.00	5,000	6.38
II	**Other resorces**	**0.00**	**34,320**	**34,320**	**43.82**
1.	Bank-loan	0.00	34,320	34,320	43.82
Total I + II		**44,000**	**34,320**	**78,320**	**100**

Acording to Table 6, the relevant investment will, apart from the estate's own assets, also require those borrowed from a bank, with thereto pertaining interest.

If the estate files a request with the Ministry of Agriculture, the estate could be awarded subsidized loan for the establishment of perennial planting, which includes subsidized interest to the assets taken from the bank, as well as three-year delay in payment of the first installment (grace period).

Loan:

Principal – EUR 34,320 (in the RSD countervalue as at the day of payment to the account, according to the loan lender's bank exchange rate)
Interest – bank interest is 10% + euribor and the bank provides 60% of the assets, while the Ministry provides 40% of the assets, and interest on such assets is 0%, average interest rate on such assets being 5%.

Grace period: 3 years
Repayment time: 10 years (yearly annuity repayment)
Number of installments: 20

Table 7. presents loan repayment in twenty semi-annual installments. For the first year the installment is paid during the second half of the year, while for the last year at the year's beginning.

Table 7. *Loan repayment*

Number of installments	Date	Principal	Interest	Installment	Outstanding debt
1.	July 1, 2015	1,343	858	2,201	34,320
2.	January 1, 2016	1,377	824	2,201	32,976
2.	July 1, 2016	1,411	790	2,201	31,599
3.	January 1, 2017	1,467	755	2,201	30,188
3.	July 1, 2017	1,483	718	2,201	28,741
4.	January 1, 2018	1,520	681	2,201	27,258
4.	July 1, 2018	1,558	643	2,201	25,738
5.	January 1, 2019	1,597	604	2,201	24,180
5.	July 1, 2019	1,637	565	2,201	22,583
6.	January 1, 2020	1,678	524	2,201	20,946
6.	July 1, 2020	1,720	482	2,201	19,268
7.	January 1, 2021	1,763	439	2,201	17,548
7.	July 1, 2021	1,807	395	2,201	15,785
8.	January 1, 2022	1,852	349	2,201	13,978
8.	July 1, 2022	1,898	303	2,201	12,126
9.	January 1, 2023	1,946	256	2,201	10,228
9.	July 1, 2023	1,994	207	2,201	8,282
10.	January 1, 2024	2,044	157	2,201	6,288
10.	July 1, 2024	2,095	106	2,201	4,243
11.	January 1, 2025	2,148	54	2,201	2,148

Based on the loan taken from the bank in the amount of EUR 34,320, the estate undertakes to repay EUR 44.020 within 10-year period, and that in equal annual annuities, with the total interest of EUR 9,700 at the end of repayment.

Financial plan
One of assessment parameters of the business plan cost efficiency is income presentation (Table 8).

Table 8. *Establishment of the total income*

Ord. no.	Product	Unit of measure	Project years																	
			IV			V			VI			VII			VIII			IX		
			Price per unit of measure	Annual quantity	Total income	Price per unit of measure	Annual quantity	Total income	Price per unit of measure	Annual quantity	Total income	Price per unit of measure	Annual quantity	Total income	Price per unit of measure	Annual quantity	Total income	Price per unit of measure	Annual quantity	Total income
1.	Hazelnut in a shell	kg	2.70	1,250	3,375	2.70	1,250	3,375	2.70	2,500	6,750	2.70	7,500	20,250		11,250			16,250	
2.	Hazelnut kernel	kg													7.00	5,100	35,700	7.00	7,300	51,100
Total					**3,375**			**3,375**			**6,750**			**20,250**			**35,700**			**51,100**

Table 8 presentes income within the first 9 project years. Income occurs at the fourth year's end, when the first hazelnut yield is expected (symbolic yield of 250 kg/ha), which is 3,375 in total, however the income increases, and in the ninth year of life they reach the quantity of 3,250 kg/ha, i.e. the value of EUR 51,000.

Expense structure
The estate's total production expenses over the period observed are presented in Table 9.

Table 9. *Total expenses*

Ord. no.	Expense name	Project years									
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
I	**Tangible expenses**	**550**	**550**	**550**	**600**	**650**	**750**	**950**	**1,150**	**1,300**	**1,500**
1.	Raw material and material	250	250	250	300	350	400	450	500	550	600
2.	El. power	50	50	50	50	50	50	200	300	400	500
3.	Fuel	250	250	250	250	250	300	300	350	350	400
II	**Intangible expenses**	**509**	**618**	**2,928**	**5,338**	**5,547**	**5,756**	**6,165**	**7,774**	**9,483**	**11,692**
1.	Depreciation	109	218	327	436	545	654	763	1,672	1,881	2,090
2.	Labour force	300	300	300	400	400	500	800	1,500	3,000	5,000
3.	Lease	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.	Loan interest	0.00	0.00	2,201	4,402	4,402	4,402	4,402	4,402	4,402	4,402
5.	Services	100	100	100	100	200	200	200	200	200	200
Total I+II		**1,059**	**1,168**	**3,478**	**5,938**	**6,197**	**6,506**	**7,115**	**8,924**	**10,783**	**13,192**

Table of the total expenses displays a structure of the expenses incurred while erecting plantings and growing hazelnuts. Expenses are lowest at the project's beginning, although more burdensome to the estate, because there is no inflow of assets during the first three years. Expenses increase as the planting begins to give yield, reaching their maximum of EUR 13,192 in the tenth year.

Balance Sheet and Income Statement
Balance sheet for the stipulated time period is given in Table 10.

Table 10. *Stipulated balance sheet (€)*

Assets		Liabilities	
Position	Amount	Position	Amount
I basic assets	**39,000**	**I own resources**	**9,680**
Land	30,000	Entered basic own assets	4,680
Equipment	9,000	Entered operating own assets	5,000
II Operating assets	**5,000**	**II Other resources**	**34,320**
Cash	5,000	Long-term loan	34,320
Total I+II	**44,000**	**Total**	**44,000**

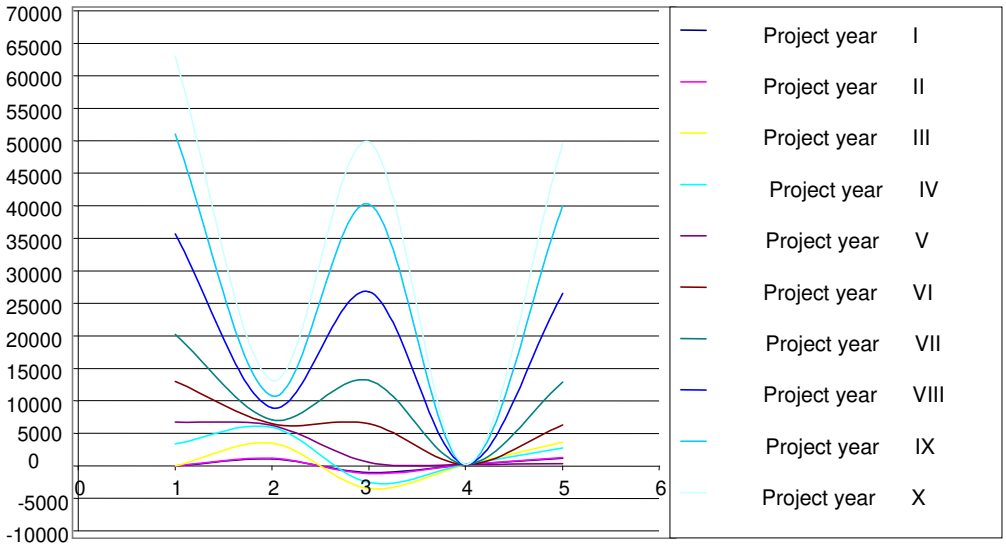
Analysis of assets will stipulate size and structure of the property at the estate's disposal. It indicates that basic assets (as for the relevant estate – land) have the most important share within the estate's business assets. On the other hand, the analysis of business liabilities indicates that liabilities i.e. long-term loans have the dominant share in the total liabilities. Net income movements of the analyzed 10 years is shown in Table 11.

Table 11. *Stipulated income statement*

Ord. no.	Name	Project years									
		I	II	III	IV	V	VI	VII	VIII	IX	X
I	**Total income**	0.00	0.00	0.00	3,375	6,750	13,000	20,250	35,700	51,000	63,000
II	**Total expenditure**	1,059	1,168	3,478	5,938	6,197	6,506	7,115	8,924	10,783	13,192
III	**Gross income (I - II)**	-1,059	-1,168	-3,478	-2,563	553	6,494	13,135	26,776	40,217	49,808
IV	**Estate tax**	150	150	150	200	200	200	250	250	250	250
V	**Net income (III- IV)**	**-1,209**	**-1,318**	**-3,628**	**-2,763**	**353**	**6,294**	**12,885**	**26,526**	**39,967**	**49,558**

Analysis of the income statement indicates negative net income during the first four of the years observed, while the first positive result occurred in the fifth year and continued its progressive growth, so that in the tenth year it was EUR 49,558.
Chart 1 presents the stipulated income statement per project year.

Chart 1. *Chart presenting the stipulated income statement*



Minimum profitability point

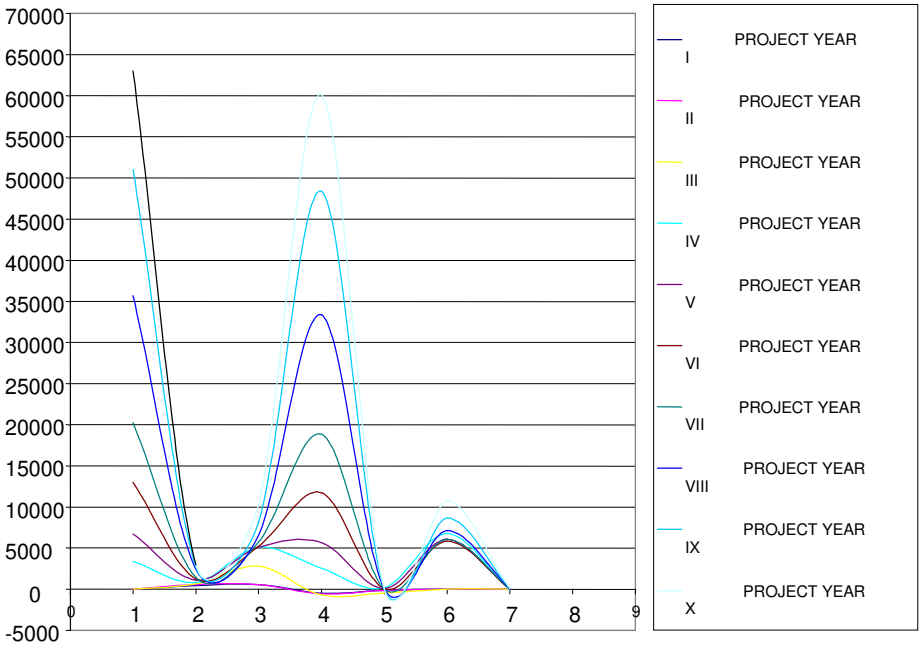
Minimum profitability point is a necessary amount of income from the sale, where business profit equals 0, i.e. at which neutral business result is achieved.

Table 12. *Minimum profitability point*

Ord. no.	Description	Project year									
		I	II	III	IV	V	VI	VII	VIII	IX	X
1.	**Total income**	0.00	0.00	0.00	3,375	6,750	13,000	20,250	35,700	51,000	63,000
2.	**Variable expenses**	459	568	677	836	1,095	1,254	1,413	2,372	2,631	2,890
3.	**Fixed expenses**	600	600	2,801	5,102	5,102	5,252	5,702	6,552	8,152	10,302
4.	**Marginal results 1 - 2**	-459	-568	-677	2,539	5,655	11,746	18,837	33,363	48,369	60,110
5.	**Break-even profitability point (3) : (4) x 100**	-131%	-106%	-414%	201%	90%	45%	30%	20%	17%	17%
6.	**Break-even point by value (1) x (5) : 100**	0.00	0.00	0.00	6,784	6,075	5,850	6,075	7,140	8,670	10,710
7.	**Safety level [(1) - (6) : (1)] x 100**	0.00%	0.00%	0.00%	-101%	10%	55%	70%	80%	83%	83%

Indicators and amounts necessary for graphic (Chart 2) presentation of the minimum profitability point. The minimum profitability point shows where fixed and variable expenses overlap with the income, based on which the conclusion is made that the business profit is equal in the cross-section point of the total income and the total expense lines (Table 12). Within the analysis of minimum profitability point, one should also define the safety level which represent the difference between the total income and the break-even point expressed in %, which is an indicator of the necessary cover of a part of fixed expenses, variable expenses by net profit.

Chart 2. *Graphic presentation of the minimum profitability point*



Economic indicator of the investment

Among dynamic indicators for the assessment of economic efficiency of the investment, the investment refund term was the one used. The investment refund was expected for the 11th month of the 7th year.

Among statistical indicators, the cost-efficiency, profitability and accumulativeness coefficient was used.

Cost-efficiency = income / expenditure

- average $E_1 = 193,075 / 64,360 = 3$ $E_1 = 3$
- full capacity $E_2 = 63,000 / 13,192 = 4,78$ $E_2 = 4.78$

Since: average cost-efficiency coefficient $E_1 = 3$ (calculated for 10 years), and cost-efficiency coefficient calculated in the full capacity $E_2 = 4.78$ (in the tenth year), are higher than 1, it may be concluded that the investment is economically justifiable.

Cost-efficiency = total income / total investment

- average $R_t = 193,075 / 78,320 = 2.46$ $R_t = 2.46$

Since cost efficiency coefficient is higher than 1, the investment is considered economically justifiable.

Accumulativeness = (ann.net income of the project / the total invetment value) x 100

- average $A_k = (126,665 / 78,320)x100 = 161,73$ %

Since average accumulativeness exceeds the discount rate, one may conclude that the investment is economically efficient.

Final assessment of the project

Based on the data, financial analysis and economic indicators previously presented, one may conclude as follows:

- the project is solvent during its validity,
- the project is economical, cost-efficient and accumulative,
- assets pay-back is due in the 11th month of the 7th year,
- loss risk is low and acceptable and

the project is socially justifiable.

Conclusions

Notwithstanding the awareness of multiple and large economic value and significance and the possibilities (agroecological and social and economic) for producing hazelnut in a much greater quantity, we may conclude that there is a noticeable discrepancy between actual demands for this kind of fruit and the situation in this type of production. There are many diverse factors which contributed to this treatment and lack of interest of our producers in hazel.

Relatively modest attention has been paid to researching this fruit kind in our country. Insufficient knowledge of hazel had great impact on its slow introduction into production and raising large plantations.

In the absence of professional approach to growing hazel there is no successful and profitable production, and this entails the use of modern agricultural and pomotechnical measures. Easy vegatitive propagation, favorable natural conditions and satisfactory profit should provide stimulus to raising new modern plantations on significantly greater areas, so that our country could substitute import with export and so that hazel would give its contribution to raising standards and providing existence for a large number of people.

This paper presents a business plan for hazelnut tree planting on individual agricultural estates in order to stimulate and assist producers in the production of this fruit. It explains multiple positive influence on the performance of such an undertaking on the income, business operation and development of the estate itself. Namely, analyses carried out within the given plan, as well as the indicators observed, show that the suggested business plan is economically justifiable and that the project can be positively assessed.

The current demands for hazelnut in Serbia are more than 10,000 tons with the tendency of further increase. Since production in Serbia is no more than 2,000 tons, we may conclude that the demand is covered with only 20%, meaning that there are large opportunities for marketing hazelnut in much greater quantity than the one being currently produced on the territory of the Republic of Serbia. That is why we can rightfully claim that the needs for this kind of fruit are great and that it is a fruit with great prospects in the future development of Serbian fruit growing.

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SPECIFIC INDICATOR FOR EFFICIENCY'S EVALUATION OF INVESTMENTS IN DIFFERENT AREAS

Claudiu Cicea[1]

Abstract

Efficiency is one of the most important aspects of the economic life, in the current global economic crisis. Moreover, in the context of extremely limited financial resources, spending money in the economy should be made based on using a set of indicators to indicate which is the proper choice at a time. These indicators differ from one area of activity to another.

Keywords: *indicator, efficiency, investments*

Introduction

The efficiency evaluation is very different, depending on the activity being analyzed. There are certain features of evaluation, according to the characteristics of the investment process for each branch of the economy. The main difference to be mentioned relates to the field of activity (economic or social) which is subject of the analysis. In the economic sphere the focus is equally on both efforts and the effects, while in the social area emphasis is placed on effects.

In this paper we aim to present the key indicators specific to both economic area (branches such as oil industry, agriculture, electric and thermal power) and social area.

Efficiency evaluation in the economic area

a. Oil industry. The main feature of this industry is the fact that in all cases the production capacity is decreasing. Investments allocated to oil industry are focused with priority on the following areas: the discovery of new deposits, maintaining oil production and modernization of the

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operating facilities [6]. The discovery of new deposits is required on one hand by consuming the discovered reserves, and on the other hand, by the creation of technical conditions to ensure identification of new reserves while conducting drilling at great depths. When starting the operation of the well, its production is high and is done with little expense. While the existing amount of oil in the deposit decreases, quantitatively the wells' production is also reduced, fact that requires new spending to ensure maintaining or even increasing production.

From all mentioned above it results that the analysis of investments' economic efficiency, investments allocated to the oil industry, should be undertaken on two distinct directions, namely:

a) the analysis of economic efficiency of investments on specific goals, such as: tectonic block, location, deposit and so on;

b) the analysis of economic efficiency of investments on actions (drilling, equipping wells, roads and so on).

For a complete analysis of economic efficiency it is good that efforts and effects evaluation to be done on goals split on actions. Also, more than in any other branch, between investments and operating costs of the deposit there is a strong interdependence in the sense that a greater investment fund will provide both higher production and a relative reduction in the deposit's operating expenses; this imply appropriate indicators for the two categories of expenditures. Specific indicators that can be used in the oil industry are:

1) The specific investment of the deposit. Calculation of this indicator will be based on the principle of specific investment formula, namely:

$$s_i = \frac{I_i}{q_i} \ ,$$

Where:

s_i represents the specific investment of the i variant;

I_j - the investment of the i variant;

q_i - annual production capacity of variant i.

As investments have multiple destinations in the oil industry, they must include the entire investment effort which, in particular, is made for operation and injection drilling, for equipping wells and for general investments. The production capacity varies each year, so an annual

average capacity is calculated for 10 years of exploiting the deposit. In this case, the calculation relationship will be:

$$s_z = \frac{I_t}{q_m} ,$$

s_z represents the specific investment of the deposit;
I_t – total investment for exploiting the wells from a tectonic block;
q_m – average anual production.

This indicator expresses the total investment effort necessary to ensure a tone of oil.

2) The specific investment of extracting oil. This indicator can be compared with specific investment for modernization and development as it ensures the comparability of investments allocated to oil extracting and production from new wells; the following relationship is used:

$$s_e = \frac{I_e}{q_n}$$

Where:
s_e represents the specific investment of the extraction;
I_e – investments allocated to the extraction;
q_n – new wells' production.

In the volume of investments allocated to the extraction are included primarily investments to create new capacities, investments to maintain existing capacity and investments needed to create new reserves. In this context, q_n the production capacity will include new wells' production, the production realized for maintaining the production extracted at the same level and newly discovered and put into service reserves. In this case the specific investment of the extraction expresses the investment effort for ensuring the growth of capacity with one tonne.

Taking into account the structure of investments allocated to the extraction (I_e) and new wells' production (q_n), it results that the specific investment of the extraction can also be structured in specific investment for obtaining production from new capacity, specific investment to maintain capacity (of production) and specific investment for creating new reserves of capacity.

3) The specific investment for comparisons with other branches. Sometimes, for orienting economic agents on fields that ensure a higher efficiency it is necessary to calculate indicators to allow comparability of

economic efficiency by branches or other industries. One of these indicators is specific investment for comparisons with other energy sectors, which is calculated by the formula:

$$s_c = \frac{I}{q_c}$$

Where:
s_c represents the specific investment for comparisons;
I – total investments;
q_c – wells production expressed in conventional fuels (kilocalories).

This indicator expresses investment expenditures that are made in the oil industry to achieve a capacity of one kilocalorie [7]. Specific investment thus calculated is compared to specific investment from other energy branches. In this way we can talk about specific investment heat – energy objectives, hydropower objectives, nuclear - energy, natural gas industry and so on. If all these variants are unfavorable, than it resorts to imports.

4) Real unit cost. This indicator is particularly important in assessing the economic efficiency that is carried in the oil industry; while wells are functioning pressure in the reservoir drops, the operating expenses for each deposit or tectonic block are increasing, unlike unit cost. The formula for calculating Real unit cost is:

$$c = \frac{C}{D_b} + \frac{C_Z}{Z}$$

Where:
c represents the cost of one tone of extracted oil;
C – the anual expenses for a well;
D_b – the anual average flow of the well (in tons);
C_z - annual cost of works to discover reserves;
Z – the amount of new discovered reserves for the deposit (in tons).

As the well's flow decreases from one year to another, an annual average flow for a period of about 10 years should be calculated; when investments expenses are also made for maintaining this flow, then they should be taken into account for determining the unit cost.

5) Payback time of the investment. As a result of obtaining a higher production in the first period of operation for that wells with a lower operating expenses, the yield is higher, which will contribute in the first

2-3 years to recover about 70% of the investment. After this period the annual profit decreases and investment is recovered increasingly harder. The payback time is that period of time after which the profits compensated the investments:

$$I_t = \sum_{i=1}^{T} P_{h\,i}$$

Where:
Ii represents the total investment;
T – payback time;
Ph i – annual profit from the i year.

As seen, the formula has nothing specific in it; specificity is that the first 2-3 years about 70% of the investment is recovered.

6) The factor of assurance (provision). It is a particularly important indicator because expresses the time period for which the national economy is provided with oil from domestic production, under given conditions of production and known reserves. The formula is:

$$f = \frac{Z}{q_c}$$

Where:
f represents the factor of assurance (in years);
Z – total discovered reserves;
q – wells' annual production.

This indicator can be calculated both for each reservoir, oil exploration region (scaffold extraction) and the entire national economy. Increases of this indicator is very important for taking measures to ensure normal supply for consumers either by discovering and exploiting new deposits either by purchasing oil from foreign markets.

b. Electricity and heat industry. This branch of the national economy that ensures normal working and living conditions for members of society and a normal course of production processes of other branches and activity spheres, has a number of features, namely:

- Electricity, in principle, cannot be stored, as happens with other results of economic units, being consumed as it is produced (with some exceptions). This implies a high reliability, a continuous production of electricity and a variation of this production based on peak consumption;

- For electricity, transport is easy and fairly inexpensive.

Besides these features, there are a number of issues that differentiate it from other branches.

- Investments allocated to this sector become different objects, such as the actual power plants electricity generation, electricity transforming stations from a voltage to another, electricity transmission lines and automation installation specific to this activity. Although these objects are very different both in terms of construction, location and functionality and they constitute a whole where the operation of an object implies the operation of the others.

- Electricity prices vary or should vary depending on the period in which the electricity is consumed, during the 24 hours of the day and by season. In this sense, there are three important periods, namely: peak period, and during normal operation. For each of these periods not only the energy selling price differs but also the expenditure made to achieve this energy; it results need for extensive analysis on the economic efficiency of investments allocated to this sector.

- Reducing the production of electricity, or its suspension, in a power plant, directly affects economic outcomes in related units. After ending the production process in power plants, especially thermal plants, it results besides the production of basic electricity, a series of products such as heat, energy ash used in cement industry and others.

- Some investments made in the energy industry, particularly hydropower, provide multiple uses, as in the case of complex arrangements where once with electricity production, are ensured: regulation of watercourses, giving back the land for agriculture, expanding the fishery, performing operations on water transport that is cheaper than rail or road, providing water supply for settlements and economic units and so on.

- When transporting electricity from supplier to customer, losses occur in the network, which makes electricity production in the industry to be higher than that charged to the consumer.

All these aspects require developing a specific methodology for assessing the economic efficiency of electricity and heat industry. Using it, one can follow precise evaluation of all investment efforts but particularly

economic effects, especially where we are dealing with complex arrangements, with investments that will facilitate multiple direct and propagated effects [8]. For evaluating economic efficiency, a complex system of economic efficiency indicators is used: specific investment, determined according to production capacity expressed in kWh, payback time, economic return on investment and so on, plus a number of specific indicators.

As in the case of other analyzed industries, specific indicators of economic efficiency are dependent on the particularities of this sector and must capture a number of issues related to: the flattening of load curves and reduction of power reserves in the system; the use with maximum efficiency of inferior fuels and more efficient use of secondary resources; optimizing the appearance of unitary power tranches, optimizing the structures of power (hydro, thermal, nuclear, wind, etc.); reducing specific consumption; reducing network losses; increasing automation in power and heat plants and so on. These issues can be determined using several indicators, of which are presented:

1) Recalculated annual expenditure or the Z criterion. This indicator is derived from the specific recalculated expenditure indicator and is determined by the formula:

$$Z = \frac{I + C * D}{q_h}$$

Where:

Z represents the annual recalculated expenditure;

I – the necessary investment to build the power plant;

C – annual maintenance and operating expenditure;

q_h – annual production capacity.

This indicator expresses the total expenditure corresponding to a kWh. If expenditure changes from one year to another, the relationship becomes:

$$Z = \frac{I + \sum_{h=1}^{D} C_h}{q_h}$$

Where C_h represents the annual maintenance expenditures of the h year.

Regardless the relation used, is adopted the option for which the expenses are minimal. Besides quantitative aspect, a great importance is given by bringing variants to the same effects, by equivalence of solutions in at

least three issues, namely: the quantity of electricity supplied, the production capacity needed to generate electric or caloric equivalent energy, the power quality delivered, or the safety of the delivery of electricity. This equivalence is required for the following reasons: installed capacity and quantities of electricity varies from one variant to another, backup power differs among versions; consumption of the plant is different between variants, loss of power and electricity in the transmission lines and stations of the analyzed systems are different and so on.

2) Specific discounted expenditures. Given the number of differences appearing among variants, both in terms of production capacity size and technological solutions adopted and the period of power plants' operation, is required, more than in any other branch, using discounted calculations to ensure comparability, at one time, of efforts and effects that are made in different periods of time [2]. This comparability is ensured using the indicator specific discounted expenditures calculated with the next formula:

$$c_s = \frac{\sum_{h=1}^{d} I_h * \frac{1}{(1+a)^h} + \sum_{h=1}^{d+D} C_h * \frac{1}{(1+a)^h}}{\sum_{h=1}^{d+D} q_h}$$

Where:
c_s represents the specific discounted expenditures;
I_h – the investment from h year;
C_h – annual production expenditures;
q_h – annual production capacity expressed in kWh;
h – the year expenditures are made;
a – the coefficient of discount.

Indicator expresses the total discount effort, with the investment and production to achieve a kWh electricity (the discount problem of various values scattered over time will be widely treated in one of the future chapters of this work).

3) Safety in operation. Reduction of electricity in a power plant without being compensated by increases in production in other units, may have undesirable effects on the population and the national economy, effects that are sometimes catastrophic for units with continuous fire. Therefore, each project must be completed with indicators expressing safety in the

facilities' and equipment's operation. The problem of reliability arises with the same acuity, not only in power plants but also in the supply installations of the plant, in transport stations and electricity distribution and so on. The main issues that require attention in power supply to consumers are: ensuring a high degree of safety in supply, maintaining tension within certain limits imposed by the particular receivers, reducing voltage shocks etc.

Parameters characterizing the degree of power plants safety in operation are: the probability of being in use at any given time, the average use over a period of time, the average downtime in the same period, the minimum function duration between two faults, the average duration of an accidental repair etc.

4) The crash coefficient k_a, is calculated using the formula:

$$k_a = 100 * \frac{T_a}{T_f + T_a}$$

Where:

T_a represents the total length of a crash;

T_f – the actual operating time in a specific period.

This ratio indicates the proportion of the period of time spent as damaged equipment within a given time; it should be as small as possible.

5) The relative rate of unavailability for accidental causes.

$$k_i = 100 * \frac{T_{oa}}{T_{oa} + T_e}$$

Where:

k_I represents the relative rate of unavailability;

T_{oa} – the duration of accidental stops;

T_e - operating time between two consecutive accidents.

The size of this indicator should be minimal.

6) The relative rate of unavailability. It indicates the weight of operating time in total time, which includes operating time and break time. The calculation of this coefficient is made with the formula:

$$k_d = 100 * \frac{T_e}{T_{oa} + T_e}$$

In choosing the optimal variant this indicator should be as great as possible.

Other issues followed in assessing the economic efficiency of investment projects in heat and thermal power industry are:

7) The type of fuel. Because heat and electricity industry provides low fuel recovery, their lower quality is intended, but without impurities that can lead to difficulties in the operation of the power plant facilities and equipment.

8) Specific consumption. This indicator is particularly important because the existence of a lower specific consumption, in terms of achieving appropriate quantitatively and qualitatively production, expresses a high tech facility and an appropriate level of mechanization and automation of production in electric and thermal plants.

Efficiency evaluation in the social area

In the national economy besides investments that materialize in fixed capital directly productive, valuable resources for building fixed capital with social-cultural character are consumed. Sometimes, they are called non-productive investments. We appreciate that they are unfairly regarded as unproductive as it contributes indirectly - but sometimes directly - to obtain material production. For example, such investments are aimed at improving the health of the main factor of production, human being, raising its standard of living and civilization, increasing knowledge. Therefore we consider it is more appropriate that these branches to be called social - cultural rather than unproductive branches; the first term will be used it in this section.

Another aspect that needs to be clarified is that social - cultural investments are not found only in socio - cultural industries but also in economic sectors [4]. On the one hand these investments materialize in actual social – cultural sectors (schools, hospitals, theaters, stadiums, housing etc.), on the other hand in the economic sectors for building administrative halls, canteens, homes for single etc. There is, however, one aspect to be highlighted here. Investment in economic sectors and those in the socio – cultural branch are closely connected. On the one hand, the development of economic sectors requires the building of new homes, schools, cultural facilities and so on, and on the other hand social – cultural investments, through their contribution to improve employment outcomes in the first branches, are establishing a connection with them. Thus, a school, a hospital, a theater, a stadium, etc. do not represent economic units, but the activity that takes place within them, through their work contributes directly to the results of actual economic units.

The assessment the economic efficiency of investments in social – cultural sectors, is based on the formula that compares the level, the quality and the structure of efforts with the obtained economic effects. In this context, evaluating economic efficiency in the social – cultural sectors is complex. This complexity is driven mainly by the impossibility of quantifying all effects resulting from an investment [3]. If the investment effort can be calculated with great precision through projects and estimates developed for each investment objective, the achieved effect may not be fully quantified. Effects of social –cultural investments can be divided into two categories, namely **direct effects** through which people receive health care, education, development of new methods of investigation etc; **indirect effects**, which will be reflected in production process precisely as a consequence of direct effects. For example consider a healthcare unit: the direct effect will be patient recovery, restoring its ability to work; the indirect effect will be achieving an additional production precisely because of reducing the period of inactivity and incapacity for work, with direct results on the activity (in fact, the indirect effects are propagated effects of the direct effects).

Therefore, to express useful effects resulting from putting into service a social – cultural objective, we use the usage capacity indicator, which expresses the physical capability of objectives, for example, seats tuition for an educational institution, the number of locations within a show room, number of beds for a hospital, sales area for a commercial unit etc. [5]. But the assessment of the economic efficiency of social – cultural objectives cannot be given only by the usage capacity because the results depend on the endowment of units, on the professional and intellectual ability of workers, who will be working in such establishments etc. So when assessing the economic efficiency of an socio – cultural objective, one should have many reserves because of the diverse forms of economic, social, strategic effects' manifestation. Despite the limitations to quantify the economic effects in assessing social- cultural investment project, a series of indicators presented below is used.

a. Indicators that can be applied to all social-cultural investment objectives

1) Specific investment per square meter. It is calculated using the formula:

$$s_p = \frac{I}{A_d}$$

Where:
s_p represents the investment for a square meter of built area;
I – the volume of investments;
A_d – the built area (in square meters).
Sometimes for this indicator is also used the following formula:

$$s_p' = \frac{I}{A_u}$$

Where A_u represents the useful area of social-cultural objective.

The indicator calculated by the first formula expresses the investment expenditures per one square meter of built area and in the other case it shows investment spent on a square meter of useful area. For some social-cultural objectives their capacity can also be calculated (for instance the number of seats in a school, number of beds in a hospital and so on). In such cases, in addition to the above indicator, the indicator presented below can also be calculated.

2) Specific investment. This indicator expresses the investment effort made to obtain a unit of capacity.

$$s = \frac{I}{q}$$

Where
s represents the specific investment;
I – the total value of investment;
q –the usage capacity.

This indicator quantifies the minimum of investment effort per unit of capacity; it is not always significant in assessing alternatives, because a higher specific investment can provide very good equipment which allows better results at work for employees operating in this place. For example, a hospital with a good endowment ensures greater opportunities for investigation, diagnosis and cure for a patient than a unit with a modest endowment. Such issues are found in a school, a research institute etc too. However the calculation of this indicator is particularly useful for ensuring comparability between several similar goals; it must be completed with the analysis of other concrete issues, specific to social-cultural objectives.

b. Indicators specific to housing. In the national economy, the fact that the state, individuals or specialized units are building houses represents an important aspect. For investment activity undertaken in construction of housing a well organized system range of indicators was developed. The main indicators that can be used to assess the economic efficiency of investments in residential buildings are:

1) *House,* which consists of appropriate living rooms and outbuildings (kitchen, pantry, bathroom, etc.), intended to serve a single family. A house is a functional and constructive unit.

2) *The apartment* has the same purpose and characteristics as a house, but it lies generally in a housing complex. An apartment is a dwelling; a studio apartment is also a dwelling.

3) *Total surface*. This indicator means the area of land affected for housing (housing surface area, the surface of neighborhood).

4) *The built area*, which expresses the entire area occupied by the building determined to ground level.

5) *Built deployed area.* This area consists of the surfaces constructed of horizontal sections of the ground floor, attics, floors etc. measured outer contour of the surrounding walls. It has the same meaning as in economic objectives.

6) *Living space* consists of that part of the area from a dwelling that is designed to own housing (bedrooms and living rooms). It is measured in inner contour of the walls. This area does not include areas like bathrooms, kitchens, corridors or other spaces that have ancillary purposes (other than housing).

7) *The usable area of a house* consists of the sum of housing areas, measured by the inner dimensions without common use areas, such as common area corridors, stairwells, areas designated for drying, office etc. The inner surfaces are included in the usable area of the building where they are located.

8) *Number of apartments.* This indicator can be set in actual units (actual apartments) and conventional units (conventional apartments). Actual

apartments refer to the apartments themselves, regardless the number of rooms that comprise them. Conventional apartments may be determined by the formula:

$$n = \frac{A_{loc}}{a_{loc}}$$

Where

n represents the number conventional apartments;

Aloc – total living space;

aloc – living space in a conventional apartment.

This last indicator is less used in practice and more in statistical evidence.

9) *The average value of an apartment.* This indicator expresses the average investment expenses, for a flat, calculated using the formula:

$$V = \frac{I}{n}$$

where :

V is the average value of an apartment;

I – total investments for constructing the building;

n – the number of apartments (actual or conventional) from that building.

Considering a normal use of resources, higher this indicator is, the more it expresses a higher level of equipping the house. If comparing two or more types of investments, the minimization of this indicator will be followed only when apartments were performed under the same technical conditions and with the same degree of equipment complexity.

10) *The land occupancy index*. This indicator is calculated as:

$$k_1 = 100 * \frac{A_{cl}}{A_t}$$

where:

k_1 is the land ocupancy index;

A_{cl} – the landa rea covered by buildings;

A_t – the total land surface given for the housing construction.

Although this indicator should be as higher as possible to express a better use of land for the construction of housing, it must be carefully analyzed;

a high occupancy involves reducing the space for green areas, with direct effects on the environment.

11) *The housing density*. This indicator has a greater use than that previously presented. It can be calculated with the formula:

$$k_2 = 1000 * \frac{n}{A_t}$$

Where Ad is the built deployed area.

This indicator should be as higher as possible, but the growth should not reflect a horizontal occupation of land, but an increased number of floors leading to increased built deployed area, with relatively constant conditions of built area.

12) *The habitable index.* It expresses the level in which the built deployed area is used for living:

$$k_3 = 100 * \frac{A_{loc}}{A_d}$$

Where:

k_3 is the habitable index, calculated as percentage.

The indicator must have a value between 40 and 60%, because a value over 60% indicates a home with a low comfort, specifically a designated area for very small spaces annexes, more specifically with a small surface designated to annexes.

13) *The usage index of a residential building* is expressed as a percentage and calculated with the formula:

$$k_4 = 100 * \frac{A_u}{A_d}$$

k_4 represents the usage index for a residential building;

A_u – the useful area of the residential building.

14) *The habitable level of the useful area* is calculated with the following formula:

$$k_5 = 100 * \frac{A_{loc}}{A_u}$$

Where:

k_5 represents the habitable index of the useful area.

This indicator is complementary to habitable index, so it has a lower degree of applicability.

15) *Housing needs*. In fact, this is not an indicator but a system of indicators. In order to determine present and future housing needs, United Nations developed some recommendations and documents that are presented next:

15.1.) *Current housing needs.* The relationship for calculation is:

$$L_1 = \frac{P_1}{P_g}$$

Where:

L1 represents the current hosuing needs;

Pl - number of people living in unacceptable houses;

Pg - average number of persons forming a household.

This indicator is used especially where living conditions are below normal standards of life and they express urgent housing needs to be developed.

15.2) Total housing needs. This indicator is determined with the following relationship

$$L_t = L_1 + L_2 - n_2$$

Where:

Lt represents the total housing need to be build;

L1 – current housing need;

L2 - the number of cohabiting households without their consent;

n2 - number of dwellings used by households denoted by L2.

This indicator calculates the total number of homes to be built in the near future to create better living conditions for population.

15.3.) The future housing needs. For establishing the future housing needs it is necessary to calculate, in the first place the number of houses needed to decrease the occupancy density of housing fund, using the relationship [1]:

$$L_3 = \frac{P - g * M}{\overline{P}}$$

L3 represents the number of houses for decreasing the occupancy density of housing fund;

P – total number of population;

g – the density of a room occupancy, which is aimed to be realized;

M – the number of rooms from existing houses;

$\bar{P}$ - average size of a household.

In determining future housing needs, houses that are being demolished should be taken into consideration too.

$$L_v = L_3 + L_D$$

Where:

Lv represents the future housing needs;

LD – the number of houses that will be demolished.

The calculation of indicators on housing needs is not only important to the national economy, but also locally in some cities, in major cities, on areas and residential neighborhoods.

Conclusions

In this paper we want to present some aspects considered relevant for the efficiency evaluation of investments in different fields. Undoubtedly, there are other important areas that can be analyzed (eg. educational area, healthcare area etc.) will be the subject for a future analysis.

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REFLECTING FOOD SECURITY REQUIREMENTS IN AGROALIMENTARY, FOOD AND NUTRITION POLICIES

Corina Ene[1], *Nikola Njegovan*[2]

Abstract

In every country, the public power has limited prerogatives - imposed even by the very meaning of free market in democratic states - towards social stability by mitigating the conflict between food producers and consumers. These interventions include monetary, fiscal, trade and social measures, as well as incentives for investments, in order to create a context for food security. Thus, further interventions of other entities - national or international - is required, which, by the specific powers and resources, are able implement the principles and measures adapted to local programs to meet the goal of food security.

Key words: *agriculture, food security, food system, food and nutrition policy*

Introduction

Recent FAO reports underline several consumer and market trends, including: increased concern with health and food safety; rising demand for high quality and safe foods food vulnerability.[3]. Also, at global level, there are vulnerabilities such as "not ensuring abundant supply of food for all; slow progress in reducing food insecurity; unstable supply and high price variability; increased vulnerability of local food systems to externally driven events."[4]

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[3] FAO, p.3

[4] ibidem, p. 35

Policies to ensure appropriate national average consumption - implicitly food security – are based on improving purchasing power, access to food resources and technologies to optimize production capacity, increase in non-agricultural employment and social policies.

Closely related to the concept of food security, „food sovereignty", born at the World Food Summit in 1996, is defined by the international peasant movement Via Campesina as "the right of peoples, countries, farmers and consumers to define their agricultural policy and the way food is produced and consumed, without harming third countries or the environment".[5]

Since the food price increase of 2007–2008, accompanied by volatilities in global food supply and demand, many policy reports and statements tackled the problems of global food security.[6]

The role of agriculture as a priority economic sector in ensuring food security

Primary field of activity, agriculture has experienced over time stages that have increased or decreased its share in gross domestic product (GDP), but that have strengthened economic and strategic importance of its results, its results being linked to the very existence and evolution of mankind.

Harmonious physical, mental and intellectual development - crucial for human productive capacity and for an active participation in the social, economic, cultural and scientific life - depends largely on the quality of food. Scientific litterature shows that many scientists debate over the meaning of quality[7], as it become more and more a subject of globalization.

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[5] Fritz, Th., Globalising Hunger: Food Security and the EU's Common Agricultural Policy (CAP), October 2011, p. 89

[6] Marsden, T., Towards a Real Sustainable Agri-food Security and Food Policy: Beyond the Ecological Fallacies?, The Political Quarterly, Vol. 83, No. 1, January–March 2012, p.139

[7] Stancu, A., „Quality Globalization versus Global Quality", Proceedings of the XIst Session of Scientific Communication of Teachers with international participation, „ Increase of Economic Competitiveness in the Context of Romania's Integration into the European Union", 19-20 May 2006, Romanian-American University of Bucharest, pp. 115-119

Through the market which agriculture represents - as seller and buyer for the upstream and downstream sectors, by its contribution to financing the construction industry, the GDP growth, we can highlight the agriculture's overall entrainment effect of on other sectors[8]; this effect is stronger as agriculture holds a significant share in many economies of the world countries.

The success of efforts to overcome economic underdevelopment status depends not only on industrial policy, but also on the progress in agricultural sector, which has the highest share in GDP of most Third World countries, thus facing - not by chance - the worst aspects of the food issue.

Holding the advantage of being still the least polluting of all spheres of material production, agriculture has been and remains the main source of food for a growing population, especially in the context of demographic explosion in lower-income countries. Agriculture concentrates a large part of the working population and its development determines the increase of rural incomes, which will have two important effects:

a) increasing purchasing power in the countryside;
b) braking labor migration to the city, which would aggravate the urbanization issues in developing countries.

The lowest-income countries face great difficulties due to lack of conditions for the development of agriculture, leading to failure in ensuring the minimum required food for population survival. Thus, agriculture in developing countries is characterized by:

- low productivity;
- insufficient diversification;
- lack of capital;
- lack of skilled labor;
- incomplete or improper use of the land (the main production factor);
- irrational agrotechnics.

Feeding the population is an issue of vital importance, with a dynamic evolution, but with many inequalities between world countries in terms of requirements, degree and means of satisfying them.

[8] Ştefan, M.: „ Agriculture - priority branch", in „ Economic Tribune" nr. 15/11 apr. 2001

In this context, agriculture, as a vital sector of any economy, faces particular problems arising from the specificity of its features, different from other sectors. These problems are basic motivations for the implementation of agricultural policies:

1. Short-term price volatility due to perfectly competitive market, when crops are abundant, prices fall sharply.
2. Long-term trend of declining agricultural prices compared to prices of other product categories.

Overall, within food markets that do not face a crisis, the foodstuffs supply is growing faster than the demand for these products, so that equilibrium price is reduced. On one hand, positive developments of agricultural yield determine a ground for the supply increase; on the other hand, the demand may increase due to population and income growth. However, food expenditures grow more slowly than durables, holidays and leisure. Supply and demand of agricultural products are therefore inelastic to income.
3. Increased competition, due to oversupply in the market of food products, expansion of export supply and agricultural reform results - factors leading to increased productivity and self-sufficiency level.
4. Indebtedness of farmers (whose incomes are affected) under considerable fluctuation of land prices, domestic and foreign prices on food products[9].
5. Climate change; impact of climate change on countries varies, but, at international level, over 80% agricultural land is rainfed. Also, agriculture may have a significant contribution to prevention of climate change, and the two influence each other.

In developing and transition countries, the need to develop and modernize agriculture in the process of production stocks adjustment, strengthening private property and economic organization derive from the requirements of ensuring normal physiological consumption for the entire population and therefore national security. These goals require *reconsideration of the role of agriculture* in overall economic strategy by providing agriculture a strategic sector role within the overall success of economic reforms.

This includes giving priority to modernizing facilities, to increase the capacity of agriculture to feed the population, based on the rational use of

[9] Dumitrescu, St.: „World Economics", Deva Ecological University, 1992

natural and economic resources[10] and on the sector opportunities that support the development of numerous upstream and downstream activities, rural revitalization and increase attraction for rural areas. For these reasons, it is clear that agriculture plays a decisive role for the rapid progress of the whole economy, as the very industrial development and raising living standards depend on it, ultimately conditioning the access to food security.

Agricultural policies – a basis for food security strategies

Theoretical approaches recorded both as a manifestation of extending the area of scientific interest in this field and as a result of pressure from agricultural economic progress required to be focused and delimited in order to shape and outline the concept of "*agricultural policy*". For the delineation of this concept against other related, Malassis L. (1992) identifies the following types of policies aimed at agro-food development towards satisfying all consumers[11]:

- *agricultural policies* refer to farming activities and capacities;
- *food policies* relating more specifically to food products and consumption and also consumers;
- *agri-food policies* meaning all interventions that cover the food chain in its entirety, with the seven main components: agriculture, related industries, agri-food distribution, restaurants, industries and related services, foreign foodstuffs trade and food consumption.

Agricultural and food policies cannot be interpreted elseway than within a *given* socio-economic context, a context which contribute strongly to determining these policies[12]. Thus, the relative importance of food expenditure depends in particular on the purchasing power of consumers. It is determined both by global economic policy and agri-food policy. Macroeconomic policies are usually more or less discriminatory, tending to favor some sectors of the economy over others (changing the terms of the inter-sectoral exchange) or favor either consumers or producers[13]. "*The food dilemma*" which arises oscillates between the support for consumption (which leads to a policy of short-term equity) or production (which implies a policy of long-term efficacy). On the other hand, agriculture poverty is a key factor in blocking

[10] Zahiu, L.: „ Food function of agriculture", in „ Economic Tribune", nr. 12/24 mar. 1999
[11] Gavrilescu, D., Giurcă, D. (coord.): „ Agri-food economy", Expert Publishing House, Bucharest, 2001
[12] Zahiu, L.: „Agricultural management", Economic Publishing House, Bucharest, 1999
[13] Gavrilescu, D., Giurcă, D. (coord.), op. cit.

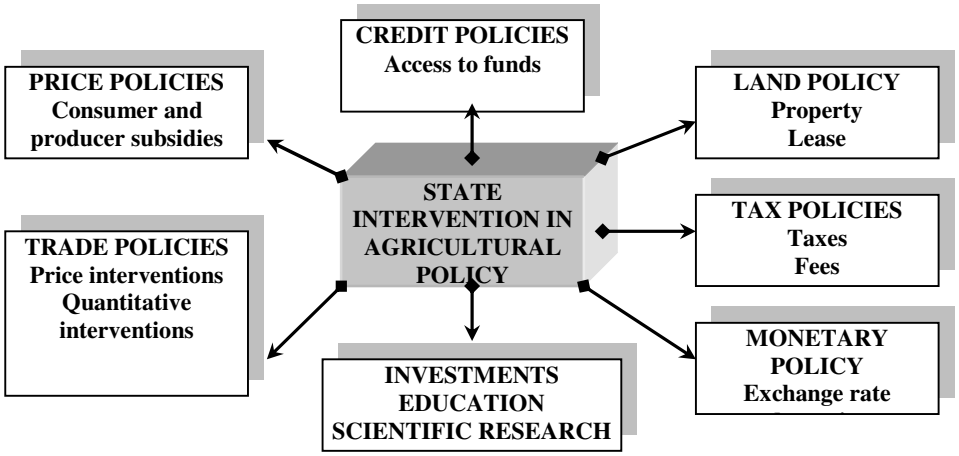
agricultural development and benefiting consumers can contribute to rural poverty. Therefore we can say that the simultaneous equity or effectiveness cannot be reached.

Regarding the possibilities of measurement, they are divided as follows[14]:
→ efficiency of food production can be measured by labor productivity allowing effective satisfaction of demand corresponding to a given level of economic development;
→ food equity is measured by social distribution of actual consumption (percentage of the population that meets or exceeds the nutritional recommended threshold depending on population structure).

In relation to the development, the economy becomes more industrialized, average purchasing power is increasing and food equity improves. In a low-income society, only 20-30% of its population will fulfill its food needs, while in a consumption society that proportion reaches 80-90%[15].

Levers of state intervention in agricultural policy are:
➔ direct levers: the price of sale, the tax, credit, insurance systems, organization of institutions;
➔ indirect levers: supporting education, scientific research, introduction of new technologies.
They are based on a series of tools presented in Fig. no. 1.

Fig. 1. *Levers of state intervention in agricultural policy*



Source: *adaptation from Chivu, L., 2002.*

[14] ibidem
[15] Gavrilescu, D., Giurcă, D. (coord.), op. cit.

Economic theory shows that redistribution should be preferably achieved through the tax and social security system, interfering as little as possible with the market mechanism[16]. Thus, direct payments to farmers are preferable to price support and if liberalization negatively affects low-income consumers, it is desirable to supplement income from generalized food subsidies.

Insufficiency of social security network can be compensated by food programs (eg. subsidized school meals, which ensure proper feeding for a vulnerable category of population).

It should not be overlooked that, equally, lack of correlation between different interventions in the context of a coherent overall strategy of agricultural development can cause severe adverse effects for the future of this branch. [17]

Agri-food policies correct or supplement the effects of global economic policy on food security. They aim to increase food production efficiency and improve fairness between food chain partners, coordinating and organizing the food chain development and regulation subsidies. Interventions can target consumers, food production (farming industry related services), domestic and foreign trade.

However, within agri-food policies, the concerns about price support and protection should not overshadow most important objectives such as creating viable structures throughout all links of the agri-food system.

Economic growth is a necessary prerequisite, but is not sufficient to eliminate poverty and malnutrition, whatever the level of development. Widespread quantitative sufficiency may be achieved by adopting appropriate socio-economic policies.

Correlation between agricultural policy and nutritional status of the population

Beyond the obvious impact of agriculture on food, we consider as of core importance the correlation between agricultural policy and nutritional status of the population.

[16] Tracy, M.: „Food and agriculture in a market economy", A.P.S., Publishing House Impex-92, Bucharest, 1993

[17] Chivu, L.: „ Competitiveness in agriculture - European comparison and analysis", Academia Română, Romanian Center for Comparative Economics and Consensus, Expert Publishing House, Bucharest, 2002

An important fact is that not all agricultural projects that have a potential nutritional impact provide explicit nutritional goals. Often, nutritional impact emerges as an unplanned, indirect effect; in this case, the projects do not monitor it[18], even if it exists.

A relevant example of this situation is the USAID assistance programs that allow the establishing of easy connections between nutrition and agriculture (Table no. 1). Tracking nutritional impact is more difficult in case of support development projects, as they involve less complete reporting procedures.

Table 1. *Characteristics of malnutrition and potential agricultural interventions*

Cause	Agricultural interventions
Seasonal lack of food	Diversification of production, storage and food processing
seasonal flooding	Flood control, irrigation
Cultural taboos for pregnant women	Education, the introduction of compensation practices
Epidemics	-
Conflicts	Rebuilding infrastructure, low energy intensive agriculture (gardening)
Poverty	Getting income from agriculture

Source: *adaptation from Bonnard, P.: „Increasing the Nutritional Impact of Agricultural Interventions", presented in „The Greater Horn of Africa Regional Workshop: Agricultural Policy, Resource Access and Human Nutrition", Etiopia, 3-5 Nov. 1999.*

Existing links between agriculture and nutrition can be outlined in a conceptual framework centered on the family decision maker, based on specific agricultural interventions that emphasize:

- implications for decision-making at the family level;
- interference with other factors;
- influence upon the nutritional status.

[18] Bonnard, P.: „Increasing the Nutritional Impact of Agricultural Interventions", presented in „The Greater Horn of Africa Regional Workshop: Agricultural Policy, Resource Access and Human Nutrition", Ethiopia, 3-5 Nov. 1999

It is estimated that improving nutrition and human physiology has contributed significantly to economic growth and technological progress in Europe the last three decades; thus, agriculture and nutrition synergistically form a cycle, each supporting and promoting the other.

This framework aims to illustrate the essential complementarity between agriculture and nutritional intake in promoting desired outcomes[19]. Thus, while agricultural interventions potentially support improving consumption and achieving nutritional effects, the results may not be measurable in a given time. On the other hand, an important role lies with the health services and fair practices that create prerequisites for the desired effects. It is therefore important to stress the complementarity between agricultural programs and health interventions. Such programs seek participation of small business ventures, women, low-income people etc. To increase the impact of nutritional interventions in the agricultural sector, scientists have established a series of necessary steps[20]:

1. development of nutritional strategies that can be explicitly linked to agricultural interventions; they must clarify the local problems approaching, in relation to overall economic growth;

2. encouraging and enhancing the interaction between agriculture and health sector, promoting programs integration; while intersectoral collaboration is difficult, it is necessary in order to achieve nutritional objectives;

3. decision making based on information regarding local deficiencies of macro-and micronutrients; decisions must be based on the delimitation of the area with high incidence of poverty and on crop selection. Interventions can be identified by comparing annual fluctuations of malnutrition with harvest timing, setting constraints and opportunities etc.

In this context, we consider that success in linking agriculture to nutrition by interrelated activities or groups of activities depends on a *three-step approach*:

a. setting of agricultural component that generates results, income, added value and co-involvement of target entities;
b. establishing the nutritional component associated to services, education, which aims to solve local problems related to malnutrition;

[19] ibidem
[20] ibidem

c. mutually reinforcing agricultural and nutritional component, professionals' involvement.

Nutrition and food policy: conceptual boundaries

Currently, national and international institutions' concern for global food problem is materialized in the influence that specific initiatives exert - in this fundamental area - in the context of food policy at all levels.

Food and nutrition policies are represented by a coherent set of objectives, priorities, principles, rules and decisions adopted and applied by those factors and institutions vested with the necessary powers to provide the entire population socio-economic conditions of good nutrition and adequate nutritional status, which lead to good individual and public health.

The need to adopt and implement food and nutrition policies is evident, but their effectiveness depends on opportune and realistic foundation on scientific grounds, and coherent integration within economic and social development plan of the society.

Food and nutrition policies are involved in the development of food supply at micro- and macroeconomic level, in economically but also metabolically matching the supply and demand, given the impact of scientific and technological progress and consumer protection imperative.

In this context, we consider that in order to accomplish the aim of achieving food security, the *food economy* must undertake a series of large and complex actions, as follows:

- study of the dietary intake evolution in relation to different stages of socio-economic development;
- accurate food needs assessment;
- determination of the food demand coordinates regarding: increasing population, increasing urbanization, socio-professional changes, changes in food resources, price changes etc.

The conclusions of these economic studies may be related with nutritional studies, thus serving as a necessary scientific foundation in the formulation of *nutrition and food policy* objectives.

Food policy can be a basic policy, explicitly formulated as a document of a stand-alone program within the overall economic and social policy, or

may be a result of various business sectors activity of the national economy.

Within food policies – on the impact of which depends, in the final analysis, the nutritional status of the population – one can distinguish two types of *interventions*[21]:
→ interventions on the supply and quality of foodstuffs; they aim to provide consumers food in sufficient quantity and of sufficient quality by quantitative policies, including agricultural and trade policies in particular;
→ interventions that relate directly to the consumer and consumption capacity, they tend to increase the food purchasing power to satisfy a nutritional threshold and/or to increase the consumption capacity through direct transfers in kind (self-consumption).

These interventions are based on government levers (regulatory, administrative, financial etc.) and usually target one or more of the following *objectives*:
A. stabilizing food prices against strong fluctuations in international prices (for net food-importing countries);
B. limiting inflationary pressure by controlling food prices;
C. offsetting or reducing the retail price as measures to encourage production (by increases in producer prices);
D. ensuring a minimum dietary intake for the undernourished population;
E. stabilizing food prices for vulnerable groups with low purchasing power and effective redistribution of income.

Food policy can be defined as a coherent set of principles, objectives, priorities and decisions adopted by the state and implemented by its institutions, within the national development plan, to ensure that the entire population benefit from rational nutrition and social, cultural and economic conditions that are indispensable to adequate nutrition and, as a consequence, good health.

Food policies may also be strictly[22] regarded as government interventions aimed at restoring food imbalances due mainly to insufficiency (as

[21] Gavrilescu, D., Giurcă, D. (coord.), op. cit.
[22] Dima, D., Pamfilie, R., Procopie, R., op. cit.

imbalances due to excess are usually generating less consistent government actions).

Nutrition policy aims at ensuring a balance between physiological necessities of food consumption and necessary nutrients intake. Nutrition policy accompanies economic and food policy in improving the nutritional quality of food intake, ensuring consumer protection and reducing nutritional risks abundance or scarcity societies.

Nutrition policy envisages also correcting nutritional failure in a particular nutrient consumption (eg vitamin A, iron, iodine and so on). Correcting vitamin deficiencies by distributing vitamins or adding iodine to cooking salt can reduce malnutrition, but avoids addressing the real causes of poverty and that is only a temporary measure and not a permanent solution. Therefore, in developing countries these policies to combat nutritional deficiencies should not be established as long-term acceptable solutions. In this case, agricultural policies must complete nutritionally interventions through land reform measures, pricing policies and supply control.

Aimed at optimizing food intake, nutritional policies should focus on strengthening positive behaviors and eliminating harmful ones, so that food may perform as sanogenetic factor and consumer habits do not become fundamental causes of a permanent state of individual or collective malnutrition[23].

Developing food and nutrition policies rely on nutrition standards for population, which can be used to assess the volume and structure of basic food demand, of food resources that need to be transformed into direct ingestible food and of the amount and structure of necessary nutrients. From here derives the importance of the food policy - agricultural policy correlation, since the latter can act towards creating availability of agricultural raw materials.

Although some authors include nutritional measures into the global food policy, thus assimilating nutrition policy into food policy, the two notions and their area are not synonymous or replaceable, even if they share common aspects. Thus, if food policies concerning undernourished populations should include measures of land reform, price and supply

[23] Popescu, D. V.: „Food and nutrition policies impact on foodstuffs international trade", Phd. thesis, Bucharest University of Economic Studies, Bucharest, 2003

control, it does not mean that applying production structural reforms cancels the need for nutritional intervention for poverty mitigation[24].

In such a context, the measures must target information assimilation through proper nutritional education (focusing on children in their youngest ages, but also on women, producers, community as a whole) to exclusively promote scientifically justified eating behaviors (eg consumption of fresh fruit and vegetables), home gardening, information on drinking water quality, culinary practices, customs and food preferences, using mass media (brochures, leaflets, TV, radio and so on).

In addition, we can say that food policy is characterized by a higher degree of harmonization worldwide, dealing mainly with the quantitative dimensions of consumption in connection with economic development, while nutritional policies - focusing on the quality - depend essentially on education, culture and tradition, being differentiated by nutritional specificity of target entities.

Thus, at global, macroeconomic level, international policies are becoming more coherent and connected, directly contributing to orientation, organization and implementation of national policies in the field.

A national nutrition model is a part of broader complex determinations in which operate variables of the following areas: ecology, geo-bio-chemistry, economic development, demography, food and pricing systems, demand, supply and distribution, income and social security, land policy etc.

The main problem that needs to be the current focus of any government is to enforce laws ensuring food security while protecting consumers by improving quality[25].

A first step consists in the designing, developing and implementing of an effective quality and food security control program that must comprise laws, rules and regulations, effective inspection and security systems, including required laboratory analysis for chemical and microbiological control of foodstuffs.

[24] Dima, D., Pamfilie, R., Procopie, R., op. cit.
[25] Popescu, M.: „ Transition and food insecurity", in „ Economic Tribune", nr. 2-3/ian. 1996

Based on these principles, food and nutrition programs developed in each country fro its population must take into account the recommendations of science, customs, traditions and specific food consumption of the population, as world experience in the field.

Conclusions

The need for balance between needs and food resources requires not only forecasting supply resources, but also forecast food needs, in order to establish relevant agro-food system development objectives.

In this context, we consider that due to the negative impact of poor nutrition, assessment of human nutrition at all levels have particular importance. Accurate determination of the nutritional status of a population requires more study variables by covering the necessary steps, as follows[26]:
1). determining population size and structure on relevant criteria (age, sex, etc.), using census;
2). determine food availability for the period considered using the balance method;
3). estimate the share of income allocated to meet food needs through food survey method;
4). assessment of needs (in accordance with the national guidance, FAO etc.) and actual consumption in terms of quantity and quality by the production method, the distribution method, the questionnaire method, clinical examination, somatologic tests (actual weight /standard weight ratio, the weight/age ratio, the height/age ratio, the weight/height ratio etc.). We consider that the distribution method is more realistic as it takes into consideration the actual quantities of consumption, regardless of their origin.

In macro-economic and policy terms, the bio-economic models issues "are now of such global and local concern that they will require national and international government bodies to proactively incorporate agrifood security and sustainability into foreign, international development".[27]

[26] Popescu, D. V., op. cit.
[27] Marsden, T., Towards a Real Sustainable Agri-food Security and Food Policy: Beyond the Ecological Fallacies?, The Political Quarterly, Vol. 83, No. 1, January–March 2012, p. 144

Today, significant consideration should be attributed to the need for a new strategic framework for agri-food research and the related areas of environment and rural economies.[28]

The forecasting activity of future demand, of food needs and food resources development should become a permanent research field that provides scientific reasons substantiating nutrition and food strategies at all levels.

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INOVATIVE SYSTEMS OF WIND POWER TURBINES FOR IRRIGATION IN AGRICULTURE

Cristina Ni escu[1]

Abstract

The present paper is a study which proposes a new integrate system of irrigation using clean renewable wind energy in the form of wind mills able to irrigate medium and large surfaces of agriculture lands using independent energy source produced by wind force and also able to deliver electric power to the National Energy System. In the present context, when Romanian agriculture is almost totally dependent on the meteorological conditions, this proposal represents an opportunity to rehabilitate the agriculture sector and the rural development and to improve significantly the agriculture production with direct benefic results on the entire national enonomy and the Gross Internal Product of Romania.

Key words: *agriculture, irrigations, wind turbines, integrate systems.*

Why wind power?

Since very old times man used to take advantages from the nature's energy. Water

Overview of evolution of the irrigation systems in Romania

Former important producer and exporter of cereals on the European and worldwide market until 1990, Romania used to occupy the first places in terms of agriculture production. The statistics show that in 1990 Romania was on fifth place in Europe, as shown in the Table below:

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Table 1. *Wheat and corn production in 1990 in some European states*

kg/hectare

Country	Wheat production	Corn production
France	6,151	7,230
Germany	6,838	7,481
Czechoslovakia	5,283	5,460
Italy	4,760	7,492
Romania	3,364	2,473

This level of production was mainly duet o land improvement works, using of fertilizers and other specific works but also due to irrigation systems for which the state used to provide important financial resources. Nevertheless, twenty first century Romania suffered significant changes within the agriculture sector under the pressure of geo-political changes which resulted in the reconfiguration of the entire national economy with structural consequences on the Gross Internal Product of the last twenty years.

The social-political realities occurred during the second part of twentieth century contributed to the trend of improving of the conditions of agricultural production, mainly of cereals, obtained from large surfaces through the irrigation systems.

Between 1950 - 1990 in Romania over 3 million hectares of agriculture lands were arranged for irrigation which placed Romania among the first countries in Europe with the largest surfaces irrigated, such as Spain with 3.39 million hectares irrigated and Italy with 3.14 million hectares, and on the fifth place worldwide in terms of surface arranged for irrigation per capita.

Until 1989 the agriculture sector used to ensure places of work for 24% of the active population and out of the 15 million hectares of agriculture lands 9.5 million were cultivated. The surface of over 3.1 million hectares endowed with irrigation systems ensured the appropriate conditions for the cereals and vegetable crops, mainly along the shore of the Danube River.

However, the operation and maintenance of these systems required high cost if we consider that 60% of the surfaces arranged for irrigations included pumping heights of 75 meters while the rest of the systems were located at altitudes of over 200 m. The way that these systems were kept

in operation proved in time to be too costly and consequently the state was unable to support the costs of maintenance and operation therefore these systems were almost totally abandoned. After 1990 the arrangements for irrigation were ignored and after the privatization of the agriculture sector many of the former irrigation systems were destroyed or simply disappeared. Due to lack of investments and small funds allocated as well as the low interest of both the state and the farmers to invest in the rehabilitation of the old irrigation systems the subject of irrigation was forgotten. For the farmers these systems were much too costly considered be considered profitable investments and therefore they waited financial support from the state and, later on, from the European Union.

Technical and constructive characteristics of the irrigation systems in Romania

The irrigation systems in Romania, considered during their implementation and operation, in terms of design and construction, worldwide competitive before 1990, were defined by several characteristics such as: size, constructive solutions, water sources, location landscape, power specific consumption, level of projects' completion, etc. Compared to a scale where the hydro-improving systems exceeding 500 hectares are considered large, the surfaces arranged for irrigations in Romania can be considered, as a whole, giant systems. In terms of percents as irrigated surface out of 100 irrigation systems four were located on surfaces of over 100,000 hectares, 13 measured between 50,000 and 100,000 ha, 18 were between 25,000 – 50,000 ha, 29 between 10,000 – 25,000 hectares and 39 were under 10,000 h as surface. Thus, in average the surface of an irrigation system stretched on 28,144 hectare which represented a high surface.

However, the constructive solutions ware differently applied, according the land characteristics. Thus, for the water catching and distribution were used either open surface irrigation channels or overground reinforced concrete ditches. Also, for the inside arrangements was used the pressure piping system (about 88% of the surface of the greenhouses was irrigated like this). In the first stage for the water distribution a large number of pumping installations was used. In time, both these installations and the distribution system through over ground reinforced concrete ditches became non-operating and were replaced. In terms of energy consumption, due to the high levels of pumping and the large transport distance of the water, along with the giant dimensions of the irrigation systems in Romania during the

communist period, these systems were considered some of the high consumption installations. Depending on the energy consumption, necessary for water pumping and distribution to the surfaces necessary to be irrigated, these systems were grouped in four power consumption categories:

I - low consumption: under 700 Kwh/ha for 10.0 % of the surface;

II – medium consumption: between 700 – 1,400 kwh/ha for 28.6% of the surface;

III – Medium – high consumption: between 1,400 – 2,100 kwh/ha for 48.2 % of the surface;

IV – High consumption: over 2,100 kwh/ha for 13.2% of the surface.

Table 2. *Evolution of the surface arranged for irrigation during the 1960-1989*

Thousands of hectares

Year	Surface arranged for irrigations
1960	199.7
1965	229.9
1970	716.6
1980	2,221.8
1985	28,973.9
1989	3,109.0

Source: *Annual Statistic Catalogues of Romania years: 1960 – 1989.*

Table 3. *Evolution of the surface arranged for irrigation during the 1990 - 2007*

Thousands of hectares

Surface arranged for irrigation	1990	1995	1996		2005		2006		2007	
Total	3,215.8	3,211.1	3,190.6	Private sector	45.7[1]	Private sector 42.0	96.2[1]	Private sector 90.3	320.2[1]	Private Sector 241.1
Agriculture Lands	3,109.0	3,110.01	3,095.6	2,120.7	-	-	-	-	-	-
Arable lands	2,931.9	2,943.6	2,921.4	2,040.1	44.6[1]	41.0	97.5[1]	Private sector 89.9	315.6[1]	Private sector 239.2

[1]Represents the surface irrigated only within the internal system of the National Administration of Land Arrangements (N.A.L.A.)

Source: *Annual Statistic Catalogues of Romania years: 1990 – 2007.*

As shown in the above tables the irrigated surface, at national level, had a positive trend until 1989 when it reached a maximum level of 3,109,000 hectares arranged for irrigations followed by a decreasing trend up to 241,100 hectares in 2007. At present, the statistics data of N.A.L.A. show that the total surface arranged for irrigation is of only 340,562 hectares, including the following irrigation methods:

- spray irrigation 2,660 ha;
- furrow irrigation 281,982 ha;
- flooding irrigation 55,920 ha.

The overground ditches are not used anymore because of high cost reasons. The rest of the agriculture surfaces are dependent on the meteorological conditions. The above tables show clearly that compared with 1989, the surface irrigated was less and less with negative significant variations from one year to another. The statistics data of N.A.L.A. also show a significant decrease of the irrigation rates and the regularly irrigated surfaces which compared with 1989 slightly exceeded the irrigation rate. Poor rates of irrigation were recorded in the rainless years, such as: 1997, 2003, and 2007. In these periods the vegetal production suffered prominently. The irrigation was applied randomly, irrationally and with high waste of power resources.

Under these circumstances fluctuations of the agriculture production occurred, as shown in Table 4, while the dependency on the meteorological conditions constantly increased with negative consequences on the agriculture sector, in particular, and on the national economy in overall.

Table 4. *Evolution of the vegetal production at the main vegetables during 1997-2006*

SPECIFICATION	**MU**	**1997**	**1998**	**1999**	**2000**	**2005**	**2006**
Cereals - total							
Cultivated area	thou ha	6,319.8	5,920.6	5,370.7	5,655.2	6,294.9	6,038.1
Total prod	thou t	22,107.3	15452,7	17037,3	10477,5	18870,9	14356,5
Wheat + Rye							
Cultivated area	thou ha	2,424.4	2033,4	1686,9	1954,3	2496,7	2029,8
Aver prod	kg/ha	2,964.0	2561,0	2776,0	2280,0	5336	4818

Total prod	thou t	7,185.6	5207,9	4682,5	4456,2	7389,7	5561,9
Corn							
Cultivated area	thou ha	3037,7	3128,9	3013,4	3049,4	2628,5	2520,1
Aver prod	kg/ha	4171,0	2756,0	3627,0	1603,0	3952	3565
Total prod	tho t	12686,7	8623,4	10934,8	4897,6	10388,5	8984,7
Sun flower							
Cultivated area	thou ha	780,7	962,2	1043,0	876,8	971,0	991,4
Aver prod	kg/ha	1095,0	1115,0	1243,0	821,0	1381	1540
Total prod	thou t	858,1	1073,3	1300,9	720,9	1340,9	1526,2
Sugar beet							
Cultivated area	thou ha	128.8	117.8	65.5	48.4	25.2	39.8
Aver prod	kg/ha	21,166	20045.0	21608,0	13,787	28,932	28,942
Total prod	mii t	2,725.5	2361,4	1414,9	666.9	729.7	1,152.2
Potatoes							
Cultivated area	thou ha	255,0	261,3	273,7	282,7	284,9	278,0
Aver prod	kg/ha	12531	12642	14434,0	12249,0	13078	14191
Total prod	thou t	3206,4	3319.0	3957,1	3469,8	3738,6	4015,9

Source: *Annual Statistic Catalogues of Romania years: 1997- 2006.*

One of the direct consequence of the decrease of the cereals production was the diminish of the animal breeding and meat production sectors during in the same period, as seen in the Table 5, which resulted in the increase of the meat and meat products import.

Nevertheless, not only the lacks of irrigations lead to the decrease of the vegetal productions. Several factors such as the high costs of the agriculture inputs (fertilizers, fuel, etc), liquidation of the large slaughter units and meat processing such as the one in Timisoara, legislative problems, retrocession of the agriculture lands, after 1990, to the former owners as well as financial and economic factors determined these drastic decreases in the vegetal and animal sectors.

Table 5. *Evolution of the animal effectives and production during 1997-2006*

Specification	UM	1997	1998	1999	2000	2005	2006
Cattle total	thou heads	3.43	3.23	3.14	3.05	2.87	2.42
Cattle meat production	thou t	421	371	364	362	357	318
Milk production	thou hl	52.58	50.90	49.24	48.51	50.03	48.01
Swine total	thou heads	8.23	7.09	7.19	5.84	4.79	4.25
Swine meat production	thou t	820	825	687	600	579	498
Sheep total	thou heads	9.66	8.93	8.40	8.12	7.65	7.20
Sheep meat production	thou t	138	130	120	119	112	120

Source: *Annual statistics catalogues of Romania years: 1997 – 2006.*

Among the reasons which lead to drastic reducing of the irrigated surfaces we mention the following:

- Liquidation and dissolving of the large size agriculture production units, former agriculture cooperatives, at the beginning as result of application the Law no. 18/1993 regarding the Land Fund and later on Law no. 1/2000, regarding the Land Restitution, both implemented incoherently and even chaotically;
- Damage of the infrastructure of the hydro-ameliorative equipment existing at that time, by destruction, stealing, physical and moral outdated, abandon, lack of interest from the new (agricultural) land owners. All these effects occurred on the background of incapacity of the decisional factors to administrate, organize and operate an important patrimony of the agriculture and of the national economy at the same time;
- The mismanagement of the agriculture resources and the surfaces covered with forage crops lead to an unbalance between the vegetal and animal production;
- Constant increase of the tariffs for the irrigation water and mainly the differentiation on pumping speeds also contributed significantly to the diminish of the agriculture land owners to purchase rehabilitate the irrigation systems;

- Constant destruction of the electric power transport network existing, before 1990, along with dismantling of the network routes (stealing of the transformers) motivated by its malfunction;
- Failure to convince the land owners and poor of information regarding the economic advantages of the agriculture using the irrigation systems, despite of high costs, associated with the delayed establishment of the Associations and Organizations of Water for Irrigation, Emergency Ordinance of Government no. 174/1999 followed by Law no. 138/2004;
- Lack of equipment necessary to manage the water for plants irrigation;
- Lack of correlation of the rehabilitation works of the irrigation infrastructure with the real water demand at the hydro technical system level;
- Unsafe marketplace of the production for the vegetal responding better at irrigations, such as: corn or vegetables, having in view the highly permissive policies regarding the imports.

Regarding the irrigation infrastructure it includes two basic components:

- Water pumping system including basic pump substations, re-pumping substations, water pressure substations;
- Transport infrastructure including channels, piping and afferent construction works.

Also, the water source related to the irrigation facilities is provided from Danube River for 2,547,859 ha (85%), from interior rivers and lakes for 449,621 ha (15%).

At present the National Administration for Land Arrangements has in administration 296 of complex irrigation facilities while the irrigation systems in the private sector are much to poor represented.

In terms of the existing infrastructure for irrigation facilities it includes:

- Water supply and distribution: 10,975 km;
- Underground piping network: 28,773 km;
- Floating and fix pumping stations as well as hydro technical structures: 2,908 pieces. They also include: gates, automate hydraulic valves, small bridges, lateral spillways falls. The installed power of the pumping stations is at present of 4,134 MW.

However, only one fifth of the pumping stations are presently in operation which deepens even more the actual irrigation crisis. One of the consequences of drastic diminishing of the irrigated surface was the

drastic decrease of the agriculture production in overall, mainly of the cereal grains as well as in vegetal sector with direct negative results on the rest of the agricultural sectors and on the food production sectors as seen in Tables 4 and 5.

As we previously mentioned most of the irrigation systems operating before 1990 were destroyed. Therefore the ones damaged cannot be considered as operational but their existing infrastructure, channels, remained piping systems, can represent a logistic support to reconsider new possibilities so that to be able to provide the necessary water to achieve efficient vegetal and cereal productions.

Thus, our proposal, through the hereinafter study, regards the implementation in the agriculture sector of the ***integrate wind turbines irrigation systems*** which should use renewable clean energy, i.e. wind power, to operate irrigation installations on medium and large agriculture surfaces. These irrigation systems could be either connected to the existing wind farms, in the vicinity of agriculture lands, or specially constructed for certain surfaces needed to be irrigated.
During the last 10 years the specialists and the investors begun to give more and more attention to renewable energy sources, such as wind power, solar energy, bio fuels, etc) which should gradually replace the classic fuel resources (coal, oil) which polluting emission generators.

However, in Europe and worldwide this type of energy is already over two decades used. Recently in Romania the investments in wind power turbines begun to be implemented and financially supported by the Government and the European funds granted to Romania starting with 2000, as a condition of joining the European Union structures. For example, the target provided for Romania in the Directive 2009/28/CE is 24% production of renewable energy out of the total national gross power production. Among the renewable power sources the wind power has a significant weight. Thus, according to the last Report of the National Authority for Energy Regulation (on 2011), in 2010 35.24% of the electric energy production was achieved from renewable and out of this percent 22% was produced by the existing wind turbines existing in Romania.

Presently, the wind turbines, so called ***wind farms***, which generate renewable electric power, are located mainly in plain areas in South, South East, West and North regions of Romania, see Picture 2, where the average wind speed of 4.5% m/s allows the efficient operation of wind

turbines. The present paper proposes the implementation of some innovative systems, called by us ***integrate irrigation systems***, connected to the already existing wind turbines which will produce electric power to be delivered to the National Energy System and to ensure, at the same time, the power necessary to the operation of the irrigation systems whose aspersion pumps and pumping systems could be integrate within these wind turbines. Depending on the distance where the agriculture lands, necessary to be irrigated, are located these systems can ensure the transport of the water from the irrigation channels or rivers as well as water pumping to the sprinkler systems and their efficient operation.

Our proposals

If we consider that the irrigation systems having as water source ensure the largest arable lands, namely 2,017,420 hectares, and the energy consumption necessary to irrigate these surfaces is in average of 1,400 – 2,100 kwh/ha, as well as the fact that most of the wind turbines are located in the Romanian Plain counties, along the Danube River, we can easily see the advantages of implementation of these integrate irrigation systems in these areas.

It is also important to know that the areas which ensure the optimal conditions necessary for efficient operation of the wind turbines are in the same location or in the vicinity of the agriculture lands which need irrigations to ensure increased vegetables and crops productions. These areas are located in the Romanian Plain, along Danube River, on a distance of 20 – 30 km from the river bank and in Dobrogea even on larger distances from the river bank.

Also, in case of larger distances from the river banks local wells can be drilled, at depths and distances determined based on hydrological studies. Thus, these wells can be drilled in the vicinity of wind turbines and the irrigation water shall be extracted and pumped toward the agriculture lands using the energy locally produced by the wind turbine.

Depending on the dimension and capacity the wind turbines can also deliver energy to the National Energy System. However, the costs of the wind turbines' equipment are very high, for the moment, so very few investors would construct such independent wind turbines. Therefore, it would be more efficient if these integrated systems would be adapted to the existing wind turbines.

If we consider that in irrigations systems the most important costs are the ones related to the energy consumption, necessary to operate the pumps (the most used are the sprinkler systems), in our opinion these integrate irrigation systems, which include renewable energy sources and electric equipment to operate the irrigation pumps, although expensive, would be able to increase the agriculture production with over 30%.

The implementation of these systems would eliminate, on one hand, the independence of the agriculture production on the meteorological conditions and, on the other hand, would place Romania again in the first places in terms of agriculture production.

Once integrated within the wind turbines these irrigation systems can be developed and implemented on various network configurations, such as: *honeycomb type networks; comb type networks* or can be placed on *amorphous networks,* depending on the geo-morphological nature and the needs of the lands had in view. Among the advantages of using these irrigation systems are the following:

- We consider that the financial effort for the construction of these irrigation networks will be reduced as a result of using, on one hand, of the same locations and the wind turbines, on the other hand;
- The irrigation systems can be developed out of plastic tubular modular elements in order to ensure their resistance and liability. Thus, the installation of the systems can be executed on the spot which reduces significantly the commissioning and putting in operation period;
- The removable character of the configuration of these modular irrigation systems provide the advantage to locate them on the land which need to be irrigated as well the possibility to extend them whenever necessary, depending on the local demands;
- Elimination of the electric power losses caused by the transport from the supply source (National Electric Network) to the user (electric pumps for water suction).

In order to diminish the energy loss a transfer of mechanical work can be carried out directly between the axis of the wind turbine and the irrigation pumps which would be placed within the infrastructure area (inside the wind turbines column). The automate systems,

afferent the wind turbines, will be able to administrate simultaneously the turbine operation so that to ensure both the irrigation system's functioning (water pumping and sprinkling) as well as the delivery of the electric power to the Electric National System. Thus, the power consumption shall be significantly reduced and the increase of the efficiency of these integrate systems shall be ensured. Another, advantage of these innovative systems is that the maintenance can be commonly done both for power producing systems and for the users, in our case the water absorption and pumping installation, which represents another way to reduce the operation costs.

Operation characteristics

We consider that both the irrigation networks and the integrate component of the wind turbines can be developed based on complex technological designs. The documents regarding the development of these integrate irrigation systems should provide:

- Type of the crops to be cultivated on the irrigated lands, geo-morphological nature of these lands, topographical surveys, geological and technical surveys, land improvement studies;
- Wind speed surveys in the areas where the wind turbines are to be implemented (detailed wind maps). These surveys will be carried out in cooperation with the wind power plants investors.

In order to increase the efficiency of these integrate irrigation systems we propose complex surveys to determine the lands having high agricultural potential and appropriate wind speed able to satisfy as many as possible the requirements in terms of efficient operation of the wind turbines.

Depending on the morphology of the lands which need such irrigation systems the planimetric configuration is determined as well as the type of network:

- ***Honeycomb type networks***. We consider that this type of network is appropriate for lands with minimum asperities as it has the advantage of a smooth and uniform distribution of the water in all the modular components;

- ***Branch type networks.*** Made up of main network tunnels this type of configuration is capable to transport the water toward the secondary branches which will ensure the soil humidity. Also, this type of network is able to operate on medium asperity lands and higher inaccessibility;
- ***Mixed networks*** made up of tubular modules able to ensure only the water transport toward the possible lands with agriculture potential and where, by case, honeycomb type networks branch type networks will be placed.

What, in our opinion, could diminish the chances to develop such systems? Here are few examples:

- High investment costs;
- Financial support for these investments sometimes difficult to obtain and heavy bureaucracy within the state administration institutions;
- Appropriate operation of these systems during the harsh winters in the limitary areas on the Danube River and in Dobrogea.

During wither season these system will need additional logistic elements and maintenance operation to preserve and protect the wind turbine and irrigation equipment.

Economic effects produced by the land improvement actions

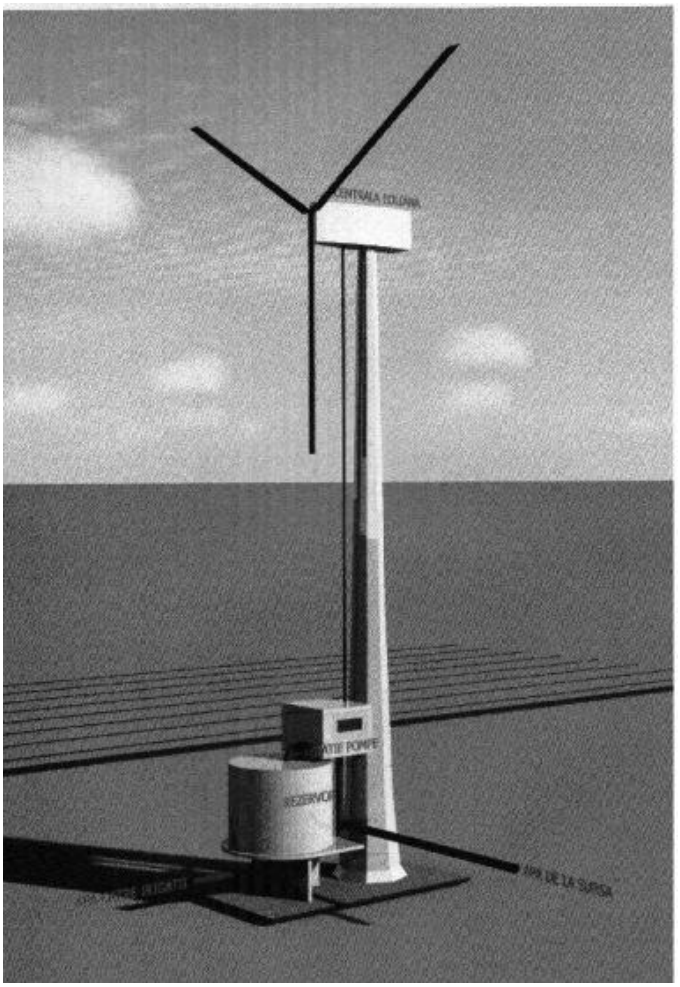
By application only of irrigations the agriculture production could increase in average with 30 - 40% and by application of additional agro technical measures, such as fertilizers, pesticides and herbicides, the vegetal production could double with direct benefic effects on all the upstream and downstream activities in agriculture.

By embankment works, drainage works and soil erosion prevention works important surfaces or arable lands are reintroduced in the agriculture sector. The direct effect of this action is the increase of the arable lands and the vegetal production.

These lands could be included in the area served by the integrate irrigation system. The increase on the agriculture production creates the premises of transit from the subsistence agriculture to medium

farms and associative type farms able to produce cheaply and efficiently.

Picture1. *Example of wind turbine operating in integrate system (power production and irrigation system – sprinkling and pumping)*

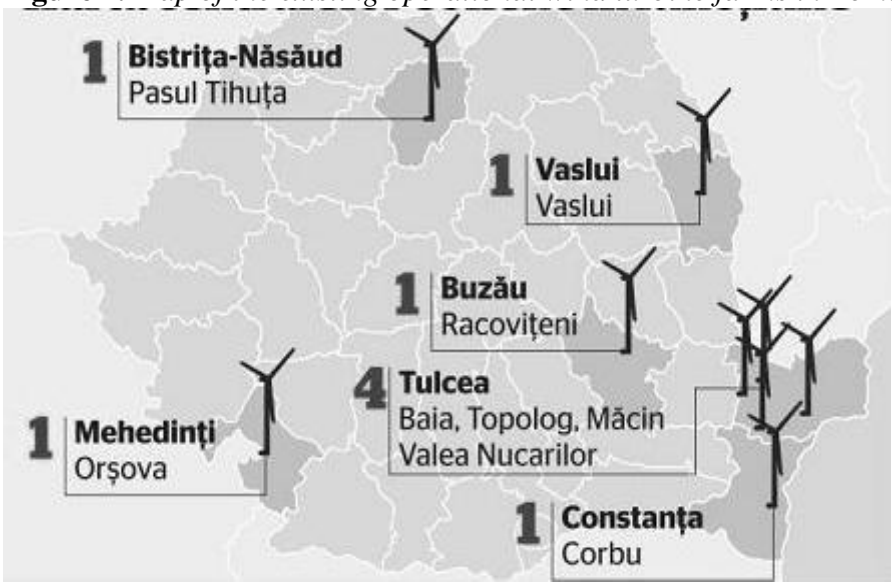


Brief SWOT analysis on the implementation of the integrate irrigation systems in Romania

No.	Strengths	Weaknesses	Opportunities	Threats
1.	Agriculture potential and arable lands of large dimensions (6% of the Used Agriculture Surface of EU).	Excessive breaking up of the arable lands after 1990.	Integrate irrigation systems could encourage the farmers to form associations and to practice large surface agriculture	Poor informing of the land owners regarding the advantages of associations leads to lack of interest of the farmers/investors.
2.	Existence of water sources represented by large hydrographic basins of Danube and the interior rivers in the vicinity of large agriculture plains in Baragan, Western Plain, etc	Poor exploitation of these resources by lack of partnerships and associations to develop these investments.	Accessing the EU funds and for agriculture and environment protection could encourage the investors and farmers to develop such projects to produce electric power and for irrigations.	High costs of these equipment and long period of amortization.
3.	Good wind potential in several areas and in the vicinity of large agriculture lands and existence, in these areas, of wind turbine farms (see map at Picture 2)	Low interest of farmers and passivity of local authorities combined with lack of a detailed map, at national level, regarding the speed and wind direction.	Access of specific EU training programs for the interested investors and farmers and for elaboration of wind maps as well as irrigation demand maps.	Maintenance costs too high and incomplete legislation discourage the farmers to initiate associations in order to develop such investments.

Foreign investments in wind energy in Romania

Figure 2. *Map of the existing operational wind turbine farms in Romania*



Source: *Nature Energy Magazine*.

In the wind renewable energy sector in Romania investors such as: CEZ (Czech Republic), ENEL (Italy), Energias de Portugal (Portugal) şi Iberdrola Renovables (Spain) developed wind turbine farms, in the last years. For example CEZ installed 115 turbines at Fântânele, Constanta County, out of which 90 are already connected to the National Energy System. The wind turbines have about 100 m height and are delivered by the giant industrial American General Electric.

Energias de Portugal (Portugal), the third largest worldwide investor in wind energy completed the construction of a wind farm of 69 MW at Cernavodă, Constanta County in May 2011. The energy produced supplies 70,000 domestic users and cost 200 million dollars. Presently wind several turbines are operational in Dobrogea area which produce in total 600MW compared with 2009 when only 14 MW were installed. In 2010, in total 462 MW of wind turbines were installed. Thus, in 2011 Romania reached 850 MW installed in total in wind energy.

At the beginning of 2012 over 500 wind turbines were installed. The Czech from CEZ, Portuguese from EDP or Italians from Enel invested in wind energy in Dobrogea.

At the beginning of 2012 Romania had over 1000 wind turbines which in total deliver 3% of the energy production. The investments in wind energy created about 1,000 places of work at the national level.

The wind turbines in Romania produce in average 150 - 200 de megawatts hour. The cost of wind energy is of 170 euro on megawatt/hour, three times over the power produced by the hydro power plants, which make them still costly for Romanian investors.

According to "green map" of Romania the renewable energy consists of: 65% biomass, 17% wind energy, 12% solar energy, 4% small size hydro power plants, 1% voltaic + 1% geothermal. However, in Romania except the mountain areas, where installing and maintenance of wind turbines are difficult because of the meteorological conditions, wind speeds of 4 m/s and over are in mainly in Moldavian Central Plateau and Dobrogea. The Black Seaside has also a good wind potential as in this part of the country the yearly average wind speed exceeds 4 m/s. Moreover, in the seaside area on short and medium time periods the installed power potential of the wind turbines reaches about 2,000 MW with an average power production of 4,500 GWh/year.

According to a survey released in 2011 by Erste Group the wind potential of our country is estimated at about 14,000 de MW which is the highest potential in the South East of Europe and the second in Europe.

Conclusions

Considering the above mention, in overall, the advantage of Romania in terms of wind potential and wind turbines already constructed is a reality which cannot be ignored. Also, the fact that significant surfaces of agriculture and arable lands are located in the areas of these wind turbines provides for agriculture sector/irrigations good perspectives regarding the implementation of the integrate irrigation systems.

On the other hand, important financial support is expected from the European Union for the rehabilitation of the irrigation infrastructure.

The European Fund for Agriculture and Rural Development is one of the financial instruments to support the agriculture investments. In this context the Ministry of Agriculture announced this summer that 60 million euro is available for investment in irrigation systems after some financial reallocations among supporting measures. Knowing that the summer of 2012 was extremely dry the Government decided to take some measures aimed to encourage the farmers and the investors to associate together, within the Organizations of Irrigation Water Users, in order to rehabilitate the old irrigation systems and to construct new ones where necessary. We consider that the integrate irrigation systems proposed by us would be an opportunity achieve these goals.

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THE FAMILY HOLDINGS IN THE VAT SYSTEM

Djojo Arsenović[1], *Srdjan Lalić*[2]

Abstract

The main objective of this paper is to present the agricultural record of value added tax and to point out its most important characteristics. Furthermore, certain agricultural enterprises are exempted from the system of value added tax because their incomes are not large enough to be taxed. In order to provide more complex analysis of the problem, it is also perceived the type of taxable income and how big it is. In the end, legally speaking, in a situation of operating two or more companies where one of them is not the taxpayer, and the second is, it comes to some disagreement in the record of value added tax. Just because of this mismatch it is pointed to some disadvantages of accounting records and the legal coverage of this matter.

Keywords: *value added tax, accounting, agricultural production, farms.*

Introduction

Bookkeeping in our rural farms is getting more popular. In the new system of registration of agricultural farms, where commercial companies have a completely different treatment, this question becomes even more popular.

Agricultural farms that are in the system of VAT (value added tax) and so far needed to have adequate records.

Agriculture is a specific economic activity because the mode of production in this activity is still remained at a lower level, when we

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compare it with other industrial companies. Of course, this is true for small agricultural companies, but to some extent for highly developed farms too, because the production process can not be the same as in the other industries. In fact, these differences compared to the other branches, mostly come to the fore when it comes to an accounting record.

Through various calculations, calculations of cost and other accounting methods, we find that this is a more specific type of bookkeeping and that basically some accounts that are not present in other areas of the human economy are used.

The essential difference can be seen in strong agricultural subsidies, which are becoming more powerful instrument for further development and modernization of agriculture. It should be noted that the European Union since its establishment, its budget and most of the income has focused on agriculture. The total budget of the EU, in essence, has two important components, the development of agricultural production and the development of current operations.

The hypothesis, methodology and empirical data

The subject of this work, in the context of testing the primary hypothesis, is that (H1) in the terms of revenue, only a certain agricultural enterprises are included in the VAT system. The main motive of the analysis of this problem is to: thoroughly, using accounting methods, examine agricultural record of value added tax and point out, primarily, legally speaking, what conditions an agricultural company necessary need to meet in order to get into the VAT system, and also to point out the advantages of this system.

During the test of research methods, in this work we will use the combined research methods (relevant methodology). This is primarily related to the research through literature, financial-accounting method, historical method and other relevant general scientific methods (induction, deduction, synthesis).

Based on the research through literature and specific empirical research, primarily on examples of agricultural enterprises operating in Bosnia and Herzegovina and other developing countries, and by applying relevant research methodologies, hypotheses were confirmed.

These findings are important for the practical application of the theoretical and methodological issues treated, i.e. records of agricultural value added tax and its essential characteristics.

Value added tax

Value added tax since 01 January 2006. replaces the existing tax on goods and services. Main common feature of both forms of taxation is that they are used to tax consumption.

Value added tax is an indirect tax, which means that it is not collected directly from the person who is the taxpayer, but from those persons who are considered as consumers. Considering that VAT is intended as a tax on consumption, export (which by definition is consumed abroad) is not subject of taxation.

It is a multi-stage tax, which is calculated and paid in all stages of production and distribution of some product and services to the final consumer. This means that what is taxed is the new value which is added at each stage and the difference in price which is charged in the sphere of trade from each trader, ending with retail and selling to the final consumer.

The process of taxation of added value is carried out as follows:

- Each company when selling goods (products, goods) and services on the invoice, as a separate line item, shows the value added tax under the prescribed tax rate, which is applied to the selling price of invoiced goods and services.

- The buyer of the goods and services paid calculated VAT to his supplier along with the invoice value, but does not include the VAT charged on the invoice in the supplier's cost of purchased goods or the cost of purchased services, but record it within active time separation on the account of Advance payment VAT.

- When selling their goods and services, customer calculates VAT under the prescribed rate applicable to the invoice value of sold goods and services, but calculated VAT from the customer's

invoice record within passive time separation on the account of Charged VAT.

- ❖ When comes the deadline to pay VAT to the government, the taxpayer compares the Advance payment VAT balance with the Charged VAT balance. If the Advance payment VAT balance is less than the Charged VAT balance, that difference represents a commitment to the state. If Advance payment VAT balance is higher than the Charged VAT balance, in the amount of that difference, taxpayer submits an order for refunding the overpaid calculated/charged VAT or tax credit is granted.

Basic characteristics of the law on VAT in BiH:

- *The subject of taxation:*
  - Trade of goods and services which taxpayer do within its activities on the territory of Bosnia and Herzegovina, for a fee.
  - Imports of goods into Bosnia and Herzegovina
- *VAT is not paid (because it is not consider as trade of goods and services):*
  - The transfer of all or part of the property of the taxpayer which form a separate business entity with or without compensation, or as an investment, if the acquirer is the taxpayer or becomes the taxpayer through that acquisition, and if he continues to perform the same economic activity, provided that the customer has the ability to obtain the same rate for deduction input tax as a seller.
  - Free giving of business samples to customers or potential customers in the usual quantities for that purpose, provided that these customers do not use them for the sale, other words they are in a form that prevents the sale.
  - Giving gifts of little value for the purpose of improving the taxpayer's business activity if they are given only occasionally, and are not given to the same persons.
- *The tax debtor*:
  - the taxpayer
  - the tax representative appointed by a foreign person who is not established in BiH, but who is doing trade of goods and services in Bosnia and Herzegovina

    - The recipient of the goods or services, if the foreign person not appointed a proxy
    - The person who shows VAT on the invoice and is not obliged to calculate and pay VAT
- *Tax rate:*
    - The standard VAT rate on taxable trade of goods and services and goods imports in BiH is 17%.
    - Special rate (on export) 0%.
- *Pre-tax:*
    - The VAT calculated in the previous stage of trade, paid during good import , that a taxpayer may deduct from the VAT he owes.
    - Requirements for Pre-tax deduction.
    - Pre-tax is deducted from the owed VAT in the same tax period, under the conditions and in the manner determined by Law.
- *A special taxation procedure:*
    - For the construction work
    - small firms
    - farmers
    - Travel Agencies
    - used goods, art works, collectors' pieces and antiques.
- *Tax returns*:
    - 60 days
    - The taxpayer whose main business is the goods export, and who in successive VAT registrations shows the amount of input VAT, which is greater than the amount of his output tax obligation, is entitled to a refund within 30 days of submission the VAT registrations.
    - Individuals who do not have permanent residence in BiH are entitled to a VAT refund on goods they buy in BiH, take out from BiH, except for: mineral oil, alcohol and alcoholic drinks and tobacco products.

VAT stimulates mutual control among taxpayers, and that represent the main advantage compared to the sales tax. By introducing VAT, for each taxpayer becomes important if his suppliers are registered as VAT payers as well and whether the accounts he received from these suppliers are correct. By this, state switches a significant portion of control to the tax payers, who take on the role of tax inspectors. The lack of current taxes

on goods and services is that the tax is collected only in transaction to the final consumer and thereby offering incentive to unfair taxpayers that selling goods and services on the black market fraud entire amount of the related taxes.

Value added tax shows the ability of a given commercial or agricultural company that purchase price of goods, including the purchase price of materials and services, increase for the added value in order to determine its selling price.

Example 1. The agricultural farm, which is in the system of VAT a purchased 30 dairy cows. The supplier invoice including VAT is 35.100 KM (30.000 * 17/100 = 5.100KM).

The booking records of procurement of dairy cows

No.	DESCRIPTION	Account number	AMOUNT	
			O	C
1.	Herd of cows	0260	30.000	
	Advance payment VAT	2820	5.100	
	Supplier fee	4321		35.100
	Procurement of Goods .			

Value added is calculated as the difference between the actual sales price and purchase price of goods sold, including the cost of materials and services. It is used for payment of salaries, wages and amortization, as well as to realize some profit. Profit, therefore equals to the difference between value added and wages, salaries and amortization.
In commercial and agricultural enterprises is very difficult to express the work as a result of human labor. It is manifested by providing appropriate services to consumers as users of the goods. Approximately, according to some authors, it can be expressed through the size of value added, in addition to expressing the size of the gross margin as sales price of commercial services, that is ,through the value of goods sold. In practice, generally, the work of the commercial companies is expressed through the value of goods sold. The main reason for this is the simplicity and the inability (due to the nature of work) to accurately show the work of commercial enterprises in the same way as in the case of manufacturing companies (produced quantity of finished products for the market).

When we know what the added value is, it is very easy to conclude what the value added tax is. "The Value added tax, as the name suggests, is the tax on the increased value of the purchased goods or services. It is charged in each stage of the production or distribution through which the product passes from the producer to the final consumer. "[3] The final consumer is, ultimately, the person who pays it. The methodology of VAT is illustrated in the example. It is shown in the table.

Table 1. *Methodology for determining the value added tax*

The tax payer	cost price	selling price	added value	VAT	price with VAT
Forest keeper	0	500	500	42.5	542.5
Manufacturer	500	1200	700	59.5	1259.5
Retailer	1200	2000	800	67.5	2067.5
Consumer	-	-	-	169.5	-

Source: *Lukic Radojko (2009.), ACCOUNTING OF TRADE COMPANIES, Faculty of Economics Belgrade, pages 196.*

Agricultural activities and the vat system

Agriculture is the economic sector, from which, directly or indirectly dependents the biological survival of the population. In many countries, such as B&H, agriculture is the industry in which the majority of the population is employed. The system of VAT in relation to the turnover tax significantly differs in relation to the taxation of the overall agricultural production, from procurement of agricultural equipment and materials, to the sale of agricultural products.

Registration of agricultural companies in the system of VAT:

1. Registration obligors:
    a. Required
        i. Turnover > from 50.000KM,
    b. Ex officio
        i. Cadastral income > from 15.000KM,
2. Not registration obligors:
    a. Turnover < from 50.000KM,
    b. Cadastral income < from 15.000KM,

[3] Lukic, Radojko, ACCOUNTING OF TRADE COMPANIES, Faculty of Economics Belgrade, 2009. pages 193-196.

c. Renting and processing of agricultural land

3. Farmers unregistered:
    a. Cadastral income < from 15.000KM,
    b. Lump-sum compensation for input VAT (approved by the ITA)
    c. Does not show VAT on invoices and does not keep books.

The right to VAT deduction has:

1. Registered VAT payer,
2. When the purchase was made for business purposes,
3. If the supplier is registered VAT payer
4. The trade of goods and services must be taxed

The Legal Act on VAT stipulates that the person who represents the household and performs agricultural or forestry activity for which the income tax is paid in accordance with the cadastral income of agricultural and forest land management, is not the taxpayer if the total cadastral income of all members of his household is lower than 15,000KM.

The term "household" marks a community which lives, earns and spends joint income. In Republic of Srpska, cadastral income is determined in the manner and procedure stipulated by The Law on Determination of the Cadastral Income, i.e. by The document on establishing the cadastral income of the land.

The cadastral income is defined as the average income acquired on land realized by the usual way of doing business in that particular area by producing crop and livestock, lowered by the average material costs of such production. The calculation of the cadastral income is done by the Republic Authority of Geodetic Affairs.

Benefits for farmers

Circumstances that farmers must consider are:

1. whether the procurements of goods and services are mostly from the taxpayers or
   persons outside the system of VAT.
2. whether the deliveries of goods and services are mostly to taxpayers or persons outside the system of VAT.

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Benefits for farmers to be outside the system of VAT are[4]*:*

- if they have a low purchase of goods and services,
- if they have a high delivery of goods and services.

Table 2. *Benefits for farmers to be outside system of VAT*

	Farmer outside the system of VAT		**Farmer in the system of VAT**	
	Value	VAT	Value	VAT
Purchases	100	17	100	17
Deliveries	1.000	0	1.000	170
Tax obligation		no		153

Source: *The basis of VAT in Agriculture (USAID).*

Benefits for farmers to be in the system of VAT are[5]*:*

- if they have high purchase of goods and services,
- if they have a low delivery of goods and services.

Table 3. *Benefits for farmers to be in the system of VAT*

	Farmer outside the system of VAT		**Farmer in the system of VAT**	
	Value	**VAT**	**Value**	**VAT**
Purchases	100	17	100	17
Deliveries	1.000	0	1.000	170
Tax obligation		no		153

Source: *The basis of VAT in Agriculture (USAID).*

Categories of farmers

The status of various categories of individual agricultural producers is specified by the law and it is possible to distinguish three distinctive categories:[6]

[4] The basis of VAT in Agriculture (USAID)
[5] The basis of VAT in Agriculture (USAID)
[6] Nikola Vukmirovic, (2009.), SPECIAL ACCOUNTING, Tax accounting, Banjaluka, p.142

- The persons who manufacture and sell agricultural and forest products or provide services in this area, who are not registered as taxpayers through cadastral income, accordingly they can not get the approval of the Indirect Taxation Authority (ITA) which grants the right to lump sum VAT refund– these persons have the same status in the VAT system as other end consumers and all other citizens;

- The farmers who are registered as taxpayers by the cadastral income and who had not filed a request for voluntary registration, and whose cadastral income of all members of their household does not reach 15,000 KM – these farmers must get the official consent from the ITA, which grants the right to lump sum VAT refund;

- "Regular" VAT taxpayers who acquire this status by the official act of ITA if their cadastral income is 15.000 KM or more, or on the grounds of voluntary registration for VAT, regardless of the size of their cadastral income .

A special group of farmers in the VAT system is composed of legal and natural persons registered to perform some of the activities in the field of agriculture or forestry. Such persons (agricultural cooperatives, farms, fishponds, forestry enterprises), are considered as taxpayers if their taxable supply of goods and services exceeds or is expected to exceed the prescribed threshold of 50,000 KM, with all the rights and obligations that such a status implies. If they remain outside the VAT system (that is, if they do not realize the right to lump-sum refund), they shall have no obligation or right to incorporate VAT into the sales prices, nor to keep tax records and submit tax returns, they will also not be able to deduct the input tax which is paid upon purchases from taxpayers. Farmers who register as VAT payers have the same tax status as other registered taxpayers – they calculate the output tax and deduct input tax on purchased goods and services.

Special Tax

For farmers who are not registered as VAT payers, a special taxation procedure is provided. The aim of a special procedure is to leave farmers out of the VAT system, but allow them to compensate the tax paid at the

inputs and to allow the customers of agricultural products to be entitled to deduct an input VAT.[7]

This special procedure considerably deviates from the principles on which the VAT system is based. The essence of the procedure is to give farmers, who supply the goods or services to a registered VAT payer, the right to increase the price of their product or service by a lump-sum fee of 5%.

A person - registered VAT payer, to whom the farmer sells products or services with incorporated lump-sum compensation, adds that compensation by input tax in monthly VAT return.

In order to qualify for a lump-sum fee (and a buyer to deduct input tax), the farmer must get approval from the ITA for the calculation of lump sums. The approval will be given if the ITA submits evidence to the competent authority that the farmer receives income from agriculture and forestry, and that the goods or services are sold to registered VAT taxpayers. The condition that the goods are sold to registered VAT payers is strange, because a farmer can not calculate a lump-sum fee to a registered taxpayer if he does not have the approval of the ITA, and he can not get the approval if he does not sell the goods to a registered taxpayer.

Lump-sum compensation

A VAT taxpayer who purchases goods or services from a farmer is entitled to deduct a lump-sum fee as input tax, provided that the goods and services, with a lump-sum fee, are paid to the farmer and that he had issued the certificates of payment and receipt.

Lump-sum compensation is the amount of input tax that farmers who are not taxpayers are entitled to during delivery of agricultural and forest goods and services to taxpayers.

Conditions for obtaining approval for the calculation of Lump-sum compensation:[8]

[7] Nikola Vukmirovic, (2009.), SPECIAL ACCOUNTING, Tax accounting, Banjaluka, p.143

[8] The basis of VAT in Agriculture (USAID)

1. evidence from the competent authority that the income is from agriculture,
2. trade of agricultural goods and services to tax payers
3. approval from the ITA on the farmer's request

The fee is paid to the farmer, and is determined by the ITA before the end of the current year for the following year.

A farmer who sells goods and services to the end consumer does not calculate the output VAT, nor does he have the right to charge the lump-sum fee.

"A farmer who sells goods and services to the person who is not VAT payer does not have the right to add a lump-sum fee, nor does his customer have the right to deduct a lump-sum fee as input tax."[9]

A farmer who did not receive the approval from the ITA, and sells goods and services to registered VAT taxpayers is not entitled to lump-sum compensation, nor does his customer have the right to deduct lump-sum fees as input tax.

The percentage of lump-sum fee is determined by the ITA before the end of the current year for the next year. VAT fee is determined by the net value of goods and services.

Agricultural production and law on value added tax in B&H

In order to clear all uncertainties regarding the value added tax, when agricultural enterprises are concerned, we should pay attention to the Law on Value Added Tax which is defined and adopted in Bosnia and Herzegovina. Articles 44 and 45 clearly define terms of taxation of agricultural enterprises.

Article 44 Law on Value Added Tax[10]
A person whose total supply of goods or services (hereinafter referred to

[9]Nikola Vukmirovic, (2009.), SPECIAL ACCOUNTING, Tax accounting, Banjaluka, p.143

[10] LAW ON VALUE ADDED TAX, Amendments to the Law on Value Added Tax, Bosnia and Herzegovina, Articles 44 and 45 that define farmers and the obligations to value added tax.

as turnover) in the previous year does not exceed or is not likely to exceed the amount specified in Article 57 Paragraph 1 (50,000 KM) of this Act shall not be liable under the provisions of this Act.

The regulation of paragraph 1 of this Article shall not apply to a taxpayer who is previously registered, i.e. whose total turnover was higher than the amount specified in the article 57 Paragraph 1 of this Act.

The person representing the household that performs agricultural or forestry activity for which income tax is paid in accordance with the cadastral income on agricultural and forest land (hereinafter referred to as a farmer) is not liable under the provisions of this Act if the total cadastral income of all his household members is below of 15,000 KM. The term "household" refers to a community which lives, earns and spends a joint income.

The persons referred to in paragraphs from 1 to 3 of this article do not have the right to show VAT on invoices or to deduct input tax and are not obliged to keep books as prescribed by this Law.

The persons referred to in paragraphs from 1 to 3 of this Article may, at any time, apply for VAT to the ITA.

ITA, upon request by the persons referred to in paragraph 6 of this article, makes the decision on their registration for VAT, and the obligation of VAT payment for such persons lasts at least 60 months.

Article 45 of The Law on Value Added Tax

All farmers, as described in paragraph 3 Article 44 who are not taxpayers are entitled to lump-sum compensation for input tax (hereinafter referred to as lump-sum benefit) when purchasing agricultural and forestry goods and services which arise as a result of activity in which tax is paid on the cadastral income from agriculture and forestry, under the terms and conditions set forth in this Article, provided that they have previously received approval from the ITA.

A lump-sum compensation is paid to farmers who deal with agricultural and forestry goods and services for persons who are taxpayers under this Law. Taxpayers in paragraph 2 of this Article, to whom farmers supply

goods or services, are required to add a lump-sum fee to the amount paid for the supply of goods or services.

Taxpayers in paragraph 3 of this Article shall be entitled to deduct the lump sum as input tax under the terms of this Law. Detailed conditions for the implementation of this Article are issued by the ITA.[11]

ITA before the end of the current year determines the annual fees for the next year.According to this Article,VAT will be compensated to the taxpayers, which was calculated by farmers for their goods and services.

Recording value added tax in agricultural accounting

A farmer has delivered a certain amount of vegetables to the Agricultural Cooperative in the total net value of 2.000 KM and for that the Cooperative shall calculate and pay a lump-sum fee to the farmer in the amount of 100 KM (2000. X 5%) and issue a receipt of payment. This Cooperative has sold the vegetables to a company which is engaged in vegetable processing for net price of 3,000 KM and calculated the VAT at the rate of 17% in the amount of 510 KM. The Cooperative shall be entitled to deduct a lump-sum fee of 100 KM as input tax, provided that it paid lump-sum fee and the value of received vegetables to the farmer.[12]

The bookkeeping records of the procurement of agricultural products:

No.	DESCRIPTION	account number	AMOUNT	
			O	C
1.	Goods in warehouse Advance payment VAT Supplier fee *Procurement of Goods*	1301 2820 4321	2.000 100	 2.100
2.	Supplier fee Main treasury *Paid Duties* .	4321 2430	2.100	 2.100

[11] LAW ON VALUE ADDED TAX, Amendments to the Law on Value Added Tax, Bosnia and Herzegovina, Articles 44 and 45

[12]Assignmentand tabulation taken from Nikola Vukmirovic, (2009.), SPECIAL ACCOUNTING, Tax accounting, Banjaluka, p. 143

The bookkeeping records of the sale of agricultural products:

No.	DESCRIPTION	account number	AMOUNT	
			O	C
1.	customer receivables	2010	3.510	
	sales revenue	6011		3.000
	Calculated sales VAT	4830		510
	For sale of goods			

The bookkeeping records of the procurement of agricultural products used for further processing:

No.	DEPCRIPTION	Account number	AMOUNT	
			O	C
1.	Material in the warehouse	1001	3.000	
	Advance VAT	2820	510	
	Supplier receivables	4320		3.510
	For the procurement of materials			

We can see the specificity in the records of procurement of agricultural products which are used for further processing, because the bookkeeping is done like in procurement of materials and the product, in the true sense of the word, has such properties.

Conclusion

The paper has primarily explained the notion of value added and value added tax and its use. When we know what added value is, then it is very easy realize what value added tax is.

Value added tax, as the name suggests, is the tax on the increased value of the purchased goods or services. It is charged at each stage of production or distribution through which the product passes from producer to the final consumer.

The final consumer is, ultimately, the one who pays it. It was also explained which specific factors that occur in agricultural enterprises affect the calculation and payment of VAT.

The Act on VAT stipulates that the person representing the household and performing agricultural or forestry activity for which income tax is paid in accordance with the cadastral income of agricultural and forest land management, is not the taxpayer if the total cadastral income of all the members of his household is lower than 15,000 KM.

Furthermore, we gave a detailed legal description of farmers and agricultural companies that pay value added tax.

As an important difference compared to other activities, there is a lump-sum compensation which is, in every sense of the word, incentive from the state where the farmer resides, to boost the agricultural production.
Finally, we have shown the way to record the value added tax when we purchase and further sell agricultural products, but we also gave a review of the products which are purchased for further processing, i.e. supply of materials.

The importance of monitoring small farm business and also the treatment of this theme is reflected through two reasons: keeping the books is completely ignored on farms, and farmers may not recognize the benefits from this additional activity which is quite unconnected with everyday practical work they do.

We have seen that agricultural production is specific, and as such, has a specific way of recording the value added tax in the terms of cost calculation, lump-sum compensation and VAT calculations.

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ECONOMIC-FINANCIAL ANALYSIS OF GREENHOUSES' MODERNIZATION AND NURSERY BEDS' CONSTRUCTION IN CENTRAL DANUBE REGION[1]

Drago Cvijanović[2], Anton Puškarić[3]

Abstract

Taking into consideration a significance of natural potentials, a significance of agriculture, as well as a strategic priority of economic effectiveness and sustainability for development of Central Danube Region zone (metropolitan area Belgrade- Novi Sad), in the paper was made an evaluation of economic sustainability on agricultural husbandry within the mentioned protected zone in the Republic of Serbia. In this paper were used data collected in the Central Danube Region zone, i.e. on the territory of metropolitan area Belgrade- Novi Sad, during 2011, and which were obtained by surveying agricultural husbandry, which developmental perspective lies in function of economic sustainability. The authors point out to a significance of existing greenhouse modernization in husbandry, aiming to decrease the costs of thermal energy, which will primarily affect fully exploitation of production capacity, as well as obtaining higher price per a product unit, due to market performance in conditions of poor supply. Besides that, in the paper was pointed out to a significance of greenhouses construction, in which will produce a plantlet of various vegetable species. Building the nursery bed will provide continuous supply of husbandry with plantlet of controlled quality vegetable, as well as obtaining the additional incomes according to the plantlet sale, which has not been used in production on husbandry.

Key words: *greenhouses, nursery bed, vegetables, economic-financial analysis.*

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Introduction

The investment projects in agriculture have been mostly directed to making fixed assets which use during long period. These projects' exploitation is much longer than regarding, for example, industrial projects *(Jovanović, 2000).*

Production in greenhouses represents the most intensive form of vegetable production. This production has been characterized by optimal conditions for growth and development of plants, which implicates significantly higher yields in regard to an open field production, but also in regard to yields which realize in case of production in other types of protected space. The production in greenhouses has an advantage in regard to the other forms of plant production, because it is possible to plan production cycles, which is important from timely delivery of products to a target market point of view.

Independent production of plantlets is important for encircling the production cycle in the husbandry, and significantly affect, as on realization of homogenous plantlet quality, as well as on continuity in supply with this important input in the production.

The Central Danube Region, i.e. the territory of metropolitan area Belgrade-Novi Sad, represents the area characterized by good conditions for vegetable production, which provide the intensive production in family husbandries. In this area are also good conditions for products sale, as on domestic, as well as on foreign market.

From vegetable production point of view, the most significant advantages of the Central Danube Region are high quality land, water resources and highly qualified labour. The advantages are also developed infrastructure and good geo-strategic position, from vegetable sale possibility point of view.

Material and method of work

This paper's goal is to evaluate the investment project of greenhouse modernization and nursery bed construction, according to the data collected in the zone of Central Danube Region, i.e. on the territory of metropolitan area Belgrade - Novi Sad, during 2011, by surveying the

holder of agricultural husbandry, and which should significantly affect to development of vegetable production in the husbandry.

In accordance to the evaluation of the investment project and benefit which the investment brings, according to similar business conditions and other conditions which requires the agricultural production in the specific territory, the analyzed project can represent an example of good investment to other vegetable producers in the zone of the Central Danube Region.

Results of the research and discussion

Significance of vegetable production in protected space

In geographic area where the Republic of Serbia is, the production of fresh vegetables in open field has prominently seasonal character, i.e. it can realize only in the period April-September. Heating the greenhouses and other types of protected space can realize a persistent, whole-year supply of fresh vegetables.

According to *Ilin (2010)*, the production of vegetable in protected space has agro-technical, biological, ecological and an exceptional economic significance. The significance of the protected space reflects also in possibility of controlling rational water, energy, agricultural chemicals consumption, and the consumption of vegetables is possible both without land and in lands on which classic production can realize.

A peculiarity of greenhouse production reflects in that, unlike the classic vegetable growing production in open field, it develops in the protected space, during the whole year, by which decreases a risk in the production. It also has a great importance, while, through this production provides the supply of vegetables in the period autumn-winter, i.e. in period when the climatic conditions do not make possible the open field production.

The vegetables production in protected space is highly profitable, i.e. it represents the most intensive form of plant production. *Ilin (2010)* quotes that yields of tomato are 8-10 times higher than the yields in open fields, pepper for 5, and cucumber up to 10 times higher. On economic indicators the most influence has time of production, yield and quality of produced vegetables. In absolutely controlled conditions is possible to plan the production and the picking in the moment when, due to lesser

supply, the prices on the market are significantly higher. One kilo of vegetables, produced in the protected space, usually has 5 and often even 10 times higher price than the vegetables in summer months from the open field.

Characteristics of the analyzed family agricultural husbandry

The family agricultural husbandry, which has been a subject of the analysis, has been development-oriented and the priority has been put on the production of vegetables and plantlets by the existing business strategy, while the production of fruits represents the supplementary activity.

Prevalent activity of the husbandry is the production of various vegetables in the existing greenhouse, potato production on leased and own land and the production of fruits in own orchard.

The greenhouse, which represents a prototype of an old Dutch greenhouse, has a work-surface of 6 m of width and 40 m of length, which amounts 240 m^2. The height of the greenhouse is 12 meters. The greenhouse heats by a closed heating system, with boilers and burner systems on heating oil. Besides various vegetables, in the greenhouse is also produced a part of plantlet necessary for vegetable growing in the husbandry.

Besides the greenhouse, the agricultural husbandry owns also 6 ha of land, of which 2 ha under fruits. In fruit plantations, the most represented is cherry, which occupies 1 ha, on which were planted 350 trees, apricot which grows on 60 a with 300 planted trees and 300 trees of peach, planted in area of 40 a.

The production in the analyzed agricultural husbandry realizes on principles of an integral agricultural production. According to *Miskovic and associates (2008*), the integral production can be defined as economic production of high-quality products, where the priority is put on ecologically safer production methods, minimalization of unwanted effects of pesticides application, increase of safety regarding human health and the environment.

One hectare of land has been prepared, according to the plans on the production enlargement, for construction of the greenhouse in which will

produce the vegetable plantlet for sale on domestic, and later on, on the international market.

In 2009, the analyzed family husbandry was investing in construction of 2 research-exploitation wells with depth of 165m and 287m, while the investment value was 208,400 euro. The husbandry uses water from own wells, and the quality of water is satisfying, appreciating it from the chemical, mechanical and microbiological point of view.

Building the well of 287 m of depth was attained the approach to thermal water, which will, along with minimal heating, be used for floor heating in the greenhouse. In this way will achieve possibility for off-season production of early and late vegetables of good quality, along with high yields, as well as the possibility to realize higher prices on target market due to lesser supply.

Qualifying structure and salaries

Managing the husbandry, organization of production process and products' sale on the target market is done by members of the family agricultural husbandry.

The production in the greenhouse is done under a supervision of one manager who organizes the production process with four workers, fully employed. Of four workers, one is directly responsible for distribution of products, i.e. delivery to buyers. The products delivery is done by a vehicle which belongs to the husbandry, while the delivery is included in costs structure.

Casual and temporary workers in production and realization of the products were observed at the level of three totally employed workers during a year, with average net salaries of 214 euro per a month, and the costs of salaries for a protection engineer, a production organizer, and a business administrator are 428 euro per a month. In accordance to it were calculated the total salaries costs, which would represent the total real expense of 54,115 euro per a year, with paid taxes and contributions.

Exploitation level of the greenhouse's production capacity

The capacity exploitation in the greenhouse is high in the period spring-summer-autumn, or is in really acceptable limits. However, the

exploitation in time period when grow early and late vegetable cultures is low. Observed from the aspect of overall period in which is possible to produce vegetables in the greenhouse, the level of exploitation is evaluated on 80% of possible capacity.

The basic reasons of insufficient exploitation of production capacities are high costs of heating in winter period. Installing the floor heating in the greenhouse, the heating costs would be reduced to a minimum, because, as it was previously mentioned, the husbandry owns its own thermal source. With the project realization, the level of capacities exploitation would increase significantly, and the costs would decrease. In that way, the husbandry would make more significant revenues.

Supply market

The quality of raw materials and continuity in supply are one of very important factors for successful production in greenhouses, on which, the analyzed family agricultural husbandry, bases its long-term production. From the same reasons, the husbandry purchases the necessary raw materials from tested suppliers, i.e. from the suppliers with whom there is long-term cooperation.

Regarding that the husbandry plans to build the nursery bed, there can conclude that, in the following period, will have the plantlet of various vegetables as its own product, which will affect the final product costs' reduction, but also keeping up the plantlet quality level.

The production of plantlets will provide that the production process does not depend on external factors, i.e. will be possible to make continuity in supply, regardless to the condition on plantlets market. Except for own production, a part of the plantlet will be meant for sale on, primarily, domestic market.

Economic-financial assesment of the investment project

The investments of the analyzed agricultural husbandry are oriented in two directions:

1. Installation of floor heating in the existing greenhouse, by which the heating expenses in winter period (October-April) will significantly decrease, i.e. heating the greenhouse will be more efficient. The

mentioned will provide the production increase for 20-30% in that period.

2. Building the nursery bed for production of vegetables plantlet, which will later on plant in greenhouses, in a way that this kind of production will encircle as a whole. In the nursery bed of 1000 m^2 will grow the plantlets of aubergine, broccoli, crucifers, tomato and pepper. Of the total amount of produced plantlets 93% will sell on the market, and the other7% will be used for own needs.

It is important to quote that the investment, by its character, represents reconstruction and modernization of an existing facility. The total preliminary calculation of necessary investments amounted 303,407 euro, of which the investment for installation of floor heating would amount 171,490 euro, for the nursery bed construction 123,512 euro and for working assets 8,405 euro.

The priority in the total investments on the agricultural husbandry was put on the floor heating installation. This investment is more important than the investment in the nursery bed, because it is more payable, i.e. it will bring to the husbandry higher income, primarily, due to enlargement of production capacity and decrease of production costs, which will result by higher competitiveness of the husbandry.

According to experience which bases on production and market results which were characteristic for previous years, the investor will base the following production on growing the most profitable vegetable species which prefer higher temperature conditions, which primarily considers the production of cucumber and tomato.

Necessary assets for construction of the floor heating, i.e. the source for financing the total work, in lack of own assets, the investor intends to provide by bank credits. After the floor heating installation will not be changed fixed work method, i.e. the production will be organized by fixed system, while this part in work process has been automated. After the nursery bed construction, aiming to produce high quality vegetables, i.e. the plantlets production, the husbandry will engage additional seasonal workers.

There is significant to mention that the investment from the aspect of eventual environment pollution is not risky. The production in the existing greenhouse and construction of new greenhouse does not deteriorate the conditions of human environment. The reasons for that are as follows: facilities do not produce harmful waters, facilities in exploitation do not release toxic gases, and facilities do not make noise.

According to all previously mentioned, there can conclude that there are not necessary any special measures of human environment protection, so they were not anticipated by this project.

Investments in fixed assets

The total investments of the family agricultural husbandry in fixed assets, anticipated by business strategy of the family agricultural husbandry, amount 295,032 euro *(table 1)*.

Table 1. *Investments in fixed assets*

Fixed assets (equipment/flock/plantations)	**Value (Euro)**	**Structure (%)**
Installing underfloor heating	171.492	58,1
Building nursery bed	123.540	41,9
Total investment value	**295.032**	**100,0**

In the total investments, the value of the floor heating construction in the greenhouse will participate with 58.1%, while the participation of the nursery bed construction will be 41.9%.

Forming incomes

On the occasion of the investment planning, the husbandry has put the priority on the floor heating installation, because the production, in the period when heating is necessary, would increase for 20-30%.

Table 2. *Revenue from investment per years of the project*

Product	Measure unit	Price/MU	Annual amount in MU	Revenue from investments per years of the project				
				1	2	3	4	5
				Total income (eur)	Total income (eur)	Total income (eur)	Total income (eur)	Total income (eur)
Cucumbers	kg	1	11.875	11.875	11.875	11.875	11.875	11.875
Tomato	kg	1,1	10.688	11.756	11.756	11.756	11.756	11.756
Salad	head	0,23	24.875	5.721	5.721	5.721	5.721	5.721
Pepper	kg	1,5	11.875	17.813	17.813	17.813	17.813	17.813
Cucumber plantlet	stalk	0,28	52.800	14.784	14.784	14.784	14.784	14.784
Tomato plantlet	Struk stalk	0,3	60.000	18.000	18.000	18.000	18.000	18.000
Salad plantlet	Struk stalk	0,03	627.200	18.816	18.816	18.816	18.816	18.816
Pepper plantlet	Struk stalk	0,3	60.000	18.000	18.000	18.000	18.000	18.000
TOTAL				116.765	116.765	116.765	116.765	116.765

Regarding the preliminary calculation of the total income were taken into consideration minimum amounts which can get per a stalk of a plantlet. Such review of revenues points out that final net profit per a profit and loss account can only be higher, which shows how the project is payable and acceptable.

Costs structure

In preliminary calculation of direct materials per a product unit has been taken into account minimal amounts, which can get per a stalk of plantlet. This review of expenditure points out that it cannot be higher than the planned one, while there was taken into account the maximal expenditures, not the minimal.

Different indicators point out to the significance of investments in nursery bed construction. Besides significant distinctions in costs, which burden the vegetable production, the significance has also providing undisturbed supply with the plantlet, without the external factors influence, as well as

the possibility of providing high quality, which had oscillated in case of purchasing the plantlet from various suppliers. Although the most important is direct saving, this realizes by production in the husbandry. In *table 3* were given reviews of plantlets prices by species of vegetables before investments and after investments in the nursery bed.

Table 3. *Price of plantlet before and after investment in nursery bed (eur)*

Vegetables	Measure unit	Price before investment	Priceafter investment
Cucumber plantlet	kg	0,049	0,020
Tomato plantlet	kg	0,067	0,030
Salad plantlet	head	0,030	0,015
Pepper plantlet	kg	0,067	0,030

It is important to emphasize that the capacity of plantlet production will be higher than needs of the analyzed family husbandry, so the rest of quantities will be placed on domestic market, which will significantly affect income growth in the future period.

Table 4. *Expenditure of investment (eur)*

Expenditure	**INVESTMENT EXPENDITURE**				
	1	2	3	4	5
	Total expenditure (eur)	Total expenditure (eur)	Total expenditure (eur)	Total expenditure (eur)	Total expenditure (eur)
Expenditure per years of the project with investment	67.716	67.716	67.716	67.716	67.716
Expenditure per years of the project without investment	61.119	61.119	61.119	61.119	61.119
TOTAL	**6.597**	**6.597**	**6.597**	**6.597**	**6.597**

Especially important, from aspect of financial-economic payability of investments, is also the distinction in energy costs, which had burdened the vegetables production before the anticipated investment and in production process after the anticipated investment.

Table 5. *Energy costs with and without investment (eur)*

Name of material	DURATION OF PROJECT'S INVESTMENT				
	1	2	3	4	5
Calculation of energy with investment	18.415	18.415	18.415	18.415	18.415
Calculation of energy without investment	41.435	41.435	41.435	41.435	41.435
Total energy costs	-23.019	-23.019	-23.019	-23.019	-23.019

After the realization of the investment project, the costs of energy will decrease for 23,019 euro per a year. This data shows that the husbandry would save 138,115 euro for 6 years, which is the investment project duration, or 46.81% of loan.

Credit pay off

The investments can differ by funding resources. Observed from this point of view, the investment of the analyzed husbandry represents the investment funded from foreign sources. In the total investments dominate the assets taken from the commercial bank, with participation of 60%, while the assets of the Ministry of Agriculture, Forestry and Water Management were participated with 40% (*table 6*).

Table 6. *Paying off loans*

Principal	295.000	
Source of loans	Bank MAFWM	– 60 %, 177.000 – 40 %, 118.000
Payoff term	6 years	
Grace period	1 year	
Annual interest	Bank MAFWM	– 11,2 %, 33.040 – 0 %, 0
Annuity calculation	Quarterly	
Period of credit payoff	Grace period Bank MAFWM	– I godina – II, III i IV godina – V i VI godina

There should emphasize that grace period lasts 1 year, which is important, because the husbandry won't refund the loan from other incomes of the husbandry, i.e. before the modernized greenhouse, as well as new-built nursery bed won't be in the process of production or won't start to yield a profit. The credit pay off will be done in a way that, after the grace period, the assets will be refunded to the bank in second, third and fourth year, while the assets borrowed

from the Ministry of Agriculture, Forestry and Water Management will be refunded during the fifth and the sixth year.

The project's profit and loss account

Table 7. *Profit and loss account per the project's investments duration (eur)*

	Position	THE INVESTMENT PROJECT DURATION				
		1	2	3	4	5
A	REVENUES AND EXPENDITURES					
I	POSLOVNI PRIHODI BUSINESS REVENUES	118.765	118.765	118.765	118.765	118.765
1	revenues from products sale	118.765	118.765	118.765	118.765	118.765
2	other revenues					
II	BUSINESS EXPENDITURES	43.159	43.159	43.159	43.159	43.159
1	Prime value of sold goods					
2	Materials costs	16.568	16.568	16.568	16.568	16.568
3	costs of salaries, reimbursements and other expenditures	0	0	0	0	0
4	amortization costs	20.652	20.652	20.652	20.652	20.652
5	other business expenditiures	5.938	5.938	5.938	5.938	5.938
III	BUSINESS PROFIT	75.607	75.607	75.607	75.607	75.607
IV	BUSINESS LOSS					
V	FINANCIAL REVENUES					
VI	FINANCIAL EXPENDITURES	19.959	17.785	11.598	4.689	0
VII	OTHER REVENUES					
VIII	OTHER EXPENDITURES					
IX	PROFIT FROM BUSINESS OPERATIONS	55.648	57.822	64.009	70.918	75.607
X	LOSS FROM BUSINESS OPERATIONS					
XI	CUT OFF PROFIT					
XII	CUT OFF LOSS					
XIII	PROFIT BEFORE TAX	55.648	57.822	64.009	70.918	75.607
XIV	LOSS BEFORE TAX					
XV	PROFIT TAX	5.565	5.782	6.401	7.092	7.561
XVI	NET (CLEAR) PROFIT	50.083	52.040	57.608	63.826	68.046
XVII	NET LOSS					

Financial course of the project

In *table 8* was shown the financial course of the greenhouse modernization project and the construction of the nursery bed in the family agricultural husbandry, where was taken into consideration only new loan which the investor required from the bank.

Table 8. *Financial course of the project investments per duration (eur)*

Elements		THE INVESTMENT PROJECT DURATION				
	0	1	2	3	4	5
I TOTAL INCOMES (1+2+3)	303.440	118.765	11.8765	118.765	118.765	310.536
Total revenue		118.765	11.8765	118.765	118.765	118.765
Funding sources	303.440					
-foreign	295.032					
-own	8.408					
Rest of the project's value						191.771
-in fixed assets						191.771
-in working capital						
II TOTAL EXPENDITURES	303.440	48.030	98.695	99.272	99.917	89.073
3. Investments	303.440					
-in fixed assets	295.032					
-in working capital	8.408					
Business expenses without amortization		42.465	40.291	34.104	27.195	22.506
Profit tax		5.565	5.782	6.401	7.092	7.561
Liabilities to funding sources		0	52.621	58.767	65.631	59.006
III NET INCOMES (I-II)		70.736	20.071	19.493	18.848	221.462

According to previously shown can conclude that the project is positive and that the loan for the greenhouse construction and the nursery bed modernization will be refunded in terms, anticipated by the plan.

Economic course of the project

The economic course of the investment project represents a review of all incomes, expenses, and then their values' distinction. According to the data in *table 9* can be concluded that net current value from the economic course has been positive during the entire project duration.

Table 9. *Economic course of the investment project*

Elements		THE INVESTMENT PROJECT DURATION				
	"0"	1	2	3	4	5
I TOTAL INCOMES	0	118.765	118.765	118.765	118.765	310.536
Total revenue	0	118.765	118.765	118.765	118.765	118.765
Rest of the project's value	0	0	0	0	0	191.771
- -fixed assets	0	0	0	0	0	191.771
- -working capital	0	0	0	0	0	0
II TOTAL EXPENDITURES	303.440	68.682	66.726	61.157	54.939	50.719
Investments	303.440	0	0	0	0	0
-in fixed assets	295.032	0	0	0	0	0
-in working capital	8.408	0	0	0	0	0
Business expenses	0	63.117	60.943	54.757	47.847	43.159
Profit tax	0	5.565	5.782	6.401	7.092	7.561
III NET INCOMES (I-II)	-303.440	50.083	52.040	57.608	63.826	259.817

The shown data point out that, due to the given size of investments, prices ratio and funding structure, the enterprise would be capable to settle its obligations from business operations and to pay off regularly the credit, granted for equipment and production materials purchase.

Internal profitability rate

The internal profitability rate makes equal positive and negative effects brought down to the current value. In other words, it is the rate under which could encumber and place the resources engaged by the project, and the result to be neutral in the total duration of the project.

Table 10. *Internal profitability rate (eur)*

Year	Net incomes	Discount rate 10%	Current value	Net incomes	Discount rate 20%	Current value
1	2	3	4	2	3	4
		Discount factor 1,1			Discount factor 1,2	
0	-303440	1	-303440	-303440	1	-303440
1	50083	0,909091	45530	50083	0,833333	41736
2	52040	0,826446	43008	52040	0,694444	36139
3	57608	0,751315	43282	57608	0,578703	33338
4	63826	0,683013	43594	63826	0,482252	30780
5	259817	0,620921	161326	259817	0,401877	104414
			33300			-57033

In this case, it amounts 15.84% and, in regard that the interest rate of loan is lower than the internal profitability rate, during the project exploitation will realize the positive financial result from funding, i.e. the financial leverage will be positive. From the previously mentioned can conclude that the project is acceptable.

Period of the investments refund

According to got result, a time necessary for refund of investment is more than 4 years and, regarding this period is shorter than the economic duration of the project, the project evaluates as acceptable.

Table 11. *Period of investments refund of the project*

The project duration	Net value of incomes	Uncovered part of investment
0		-303.440
1	50.083	-253.357
2	52.040	-201.317
3	57.608	-143.709
4	63.826	-79.883
5	259.817	179.934
Totally	483.374	179.934

The investment project liquidity is its ability to reconcile its obligations in every moment. The liquidity in the project's duration uses permanent prices of incomes and expenses from the time of the investments' program preparation, and carries out according to information from financial course, which incomes comprise all items

and business operations which increase financial potential of the project, and expenses those which decrease it. In regard that net incomes in the entire project's duration have been positive, i.e. above zero, the project is acceptable.

Bottom profitability point

Bottom profitability point or a critical point represents the level of production on which the investment project does realize neither profit nor losses, i.e. on which it still realizes a positive financial result (*Subić, 2010).*

Table 12. *Bottom profitability point*

Description	THE PROJECT'S DURATION				
	1	2	3	4	5
Total revenue	664.883	664.883	664.883	664.883	664.883
Variable costs	245.525	246.008	247.085	248.279	249.302
Fixed costs total	232.192	227.355	216.590	204.647	194.423
Marginal results (revenues-variable costs)	419.358	418.875	417.798	416.604	415.581
Turning point of profitability –value-	368.136	360.882	344.681	326.608	311.055
*Safety level fixed costs/contribution*100	**55,37**	**54,28**	**51,84**	**49,12**	**46,78**

* Shows a minimum percentage (%) of sale (production) in conditions of profitable business, necessary for not doing business at a loss

The bottom limit of capacities exploitation for this project is 55.37% and, after this criterion, evaluates that the project is flexible to the capacity change.

Financial-market assesment of the project

In accordance to the data in *table 12* can conclude that the project's efficiency, as a ratio between total revenues and total expenditures, is higher than 1, which shows that the analyzed project is acceptable.

Table 12. *Financial-market assessment of the project*

	I	II	I/II
EFFICIENCY TI/TE			
-Efficiency rate of the project	118.765	63.117	1,88
ACCUMULATION PROFIT/TI *100%			
-Rate of the project's accumulation	50.083	118.765	42,17 %
PROFITABILITY PROFIT/IVI*100%			
-Profitability rate of the project	50.083	303.440	16,51 %

The project accumulation rate amounts 42.17%. The project accumulation rate, as the ration between accumulation and investments in fixed and working capital shows the project's ability that realizes certain accumulation, along with costs burden, on account of fixed and working capital.

Conclusion

Future activities of the agricultural husbandry will be directed toward keeping the existing quality of products and to enlarge the market with good prices, as well as to transfer the existing system of integral production into the production system which will base on organic principles.

Elements for statistic and dynamic evaluation were given in past projections. Out of them results:

- That net current value from economic course is positive during the entire project duration, which means that, in specific size of investments, price ratio and funding structure, the enterprise would be capable to reconcile its accounts from current operations and to pay off regularly the credit for purchase of equipment and production materials,
- That the rate of accumulation of the project is 42,17 %,
- That efficiency of the project is 1,88,
- That profitability of the project is 16,51 %,
- That invested assets refund after 2 years of the project, which shows that the project is profitable,
- That internal profitability rate is 15,84 %

- That refunds 46.81% of investments by saving in heating of 138,116 euro.

According to the mentioned parameters can conclude that the investment project of the greenhouse modernization and the nursery bed construction in the analyzed agricultural husbandry is justified in economic and financial sense.

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ROMANIA'S AGRO-FOOD ECONOMY AT FIVE YEARS AFTER ACCESSION TO EU – CONVERGENCES AND DIVERGENCES

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Abstract

The paper attempts to identify certain sets of macroeconomic variables determining non - performed generation of value added, which induced radical structural changes in the share of the main branches (agriculture, industry and constructions) in the essential resources of the economy (employment, fixed capital stock and net investment) and in its results (gross value added). The first set of variables is of correlative type, at macro-economic level (energy intensity of the economy; "real wages – productivity" correlation; intra-component ratios of the consumer price index). The second type of variables is of sectored type, at the agro-food economy level (disintegrative "double fracture"; upstream and downstream economic driving effects). The third set of performance reductive variables is of structural type, in the so-called "agro - food" chain (tri-dimensional structure of the agro-food chain – economic operators, employed persons and generated gross value added; average agro - food commercial openness).

Key words: *global competitiveness, agro-food integration, backward linkages, forward linkages, degree of commercial openness, size structure of holdings;*

Introduction

Romania's european economic convergence need depends, to a considerable extent, on the agro-food sector performances, which, at five years after accession, are still a desideratum.

Starting from the external "positioning" of Romania's economy (in which the agro-food sector represents a significant economic driving factor) on the global competitiveness scale (where it fell ten places, in the last year), the paper attempts to identify certain sets of macro-economic variables

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determining the non-performing generation of value added (as annual level and dynamics), which induced radical structural changes of the share of main branches (agriculture, industry and constructions) in the main resources of the economy (employment, fixed capital stock and net investments) and in its results (gross value added).

Global context of Romania's economy competitiveness

According to the most recent evaluations on the global scale, five development stages of economies are identified[2]: Stage 1 – factor - driven; Transition from stage 1 to stage 2; Stage 2 – efficiency - driven; Transition from stage 2 to stage 3; Stage 3 – innovation - driven. Each economy is characterized on the basis of certain "batteries" of indicators, and further on, through the aggregation of partial "scores", it is "positioned" in one of the five economic development stages.

In essence, on the global competitiveness scale, Romania's economy went down 10 places (from the position 67 in the year 2010, to position 77 in 2011 and 78 in 2012).

On the other hand, it should be mentioned that out of the four countries placed outside the "block" of the first ten competitive economies in the world (innovation - driven), three countries (China, Bulgaria and Romania) are part of stage 2 of economic development (efficiency - driven), and Poland is in the stage of transition from the efficiency - driven stage to the innovation - driven stage.

The partial conclusion derived from the analysis of economies positioning on the global competitiveness is that five years from the accession to the European Union, Romania's economy has not fructified this status, in the sense of acceleration and deepening of its real economic convergence with the performing economies from the European Single Market.

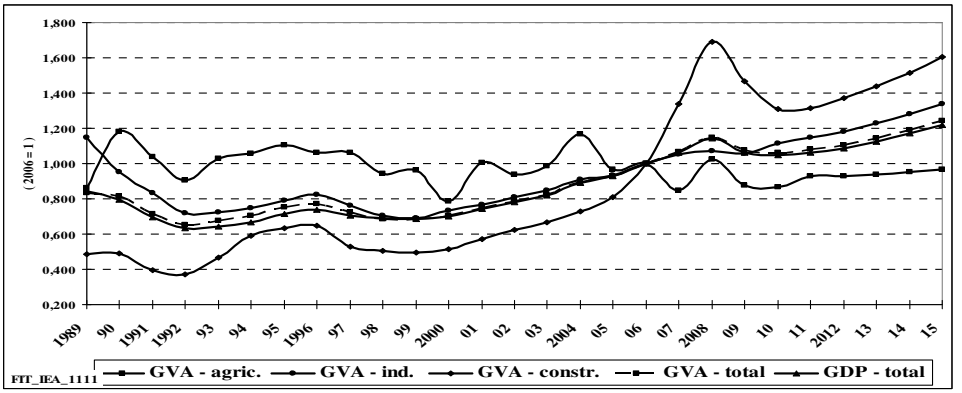
Macroeconomic framework of agro - food economy

At the end of 2006 (considered as reference year in the present study, as preceding Romania's accession to the European Union), namely after 17 years of economic-social transformations, national production (measured by GVA of main activities and total GDP) was up by 18,5% compared to

[2] See: The Global Competitiveness Report 2011 - 2012, WEF, Geneva, 2011;

that of 1989, in total GDP and up by 20.1% in total GVA, with great dynamic discordances between the three main activities (according to NACE classification), from rebound by 12.7% in GVA–industry, to 105.9% increase in GVA–constructions and 16.0% in GVA–agriculture (Graph 1).

Graph 1. *GDP – total and GVA in Romania's economy, 1989 – 2015 (2006 = 1)*



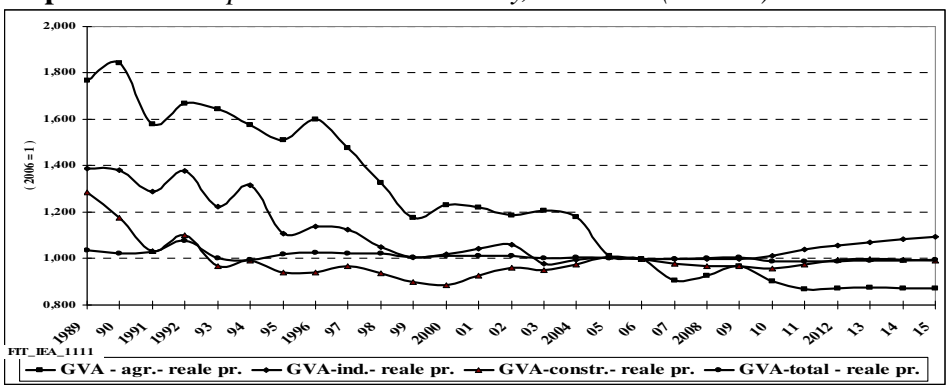
Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011.*

The post-accession evolution of economic growth, after half of decade, features a few interesting characteristics, from the perspective of manifest tendencies:

- Total GDP would be, at the end of this year, by 6.2 % higher than in 2006, due to slightly higher growth of total GVA (by 8.1 %) which, in its turn, was induced, among others, by certain industrial activities (+ 14.9 %) and by constructions (+31.6 %);
- Agricultural GVA would be, at five years after the accession, by 7.2 % lower than in the reference year 2006, after a sinuous evolution (three decreases and two increases), which reflects not only the relative high instability of agriculture (weather-dependence), but also the functional non-assimilation of the Community management mechanisms of the agro-food markets.

In the year 2006, the real prices (deflated by the implicit deflator of GDP) in overall economy were by only 3.4 % lower than in 1989, yet with high discrepancies between the three investigated branches (agriculture by 43.4 %, industry by 27.9 % and constructions by 22.3 %) (Graph 2).

Graph 2. *Real relative prices in Romania's economy, 1989–2015 (2006 = 1)*



Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011.*

A few intermediary conclusions can be drawn with regard to the dynamics of sectored real relative prices:

- At five years after the accession, agriculture is still "working" with the lowest real prices, and their level is expected to be by 13.1% lower in 2011 compared to 2006;
- The sector constructions also operates with real prices less than unit, yet of lower order (- 2.6 %);
- The real prices of industrial activities slightly increased, by 4.0 %.

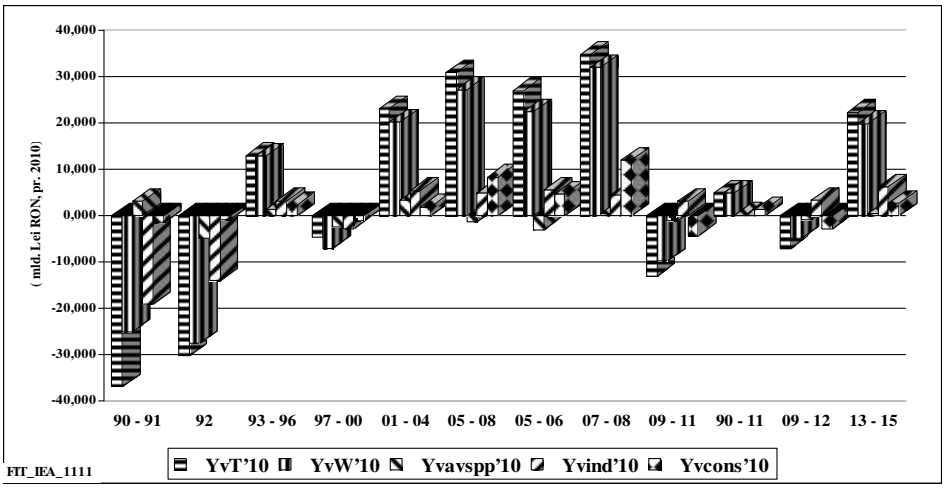
Hence it results that from the overall rebound by 56.5 % of real relative prices of agriculture in the period 1990 – 2011 (1989 = 1), 13.1 pp (23.2 %) is the "contribution" of the first five years after the accession to EU.

In comparable terms (2010 prices), the asymmetric evolution of GVA (GDP) corresponding to the five economic aggregates, more strongly revealed by the absolute yearly average modification (increase or decline) of the newly created value, throughout the period 1990 – 2011 and by different periods considered as relevant, reaffirm the relative instability as persistent phenomenon.

Practically, throughout the period 1990 – 2011, the yearly average of GDP absolute modification (*YvT'10*) reached about 4.9 billion RON, which can be explained by the differential (107.0 billion RON)

between the GDP cumulative increase – total (283.4 billion RON), obtained in the 14 years of economic growth and the cumulative decline of the same indicator (of 176.4 billion RON), in the 8 years of economic decline, against the 22 investigated years (Graph 3).

Graph 3. *Yearly average changes of GDP (GVA) in Romania's economy, 1990 – 2011 (billion RON, 2010'prices)*



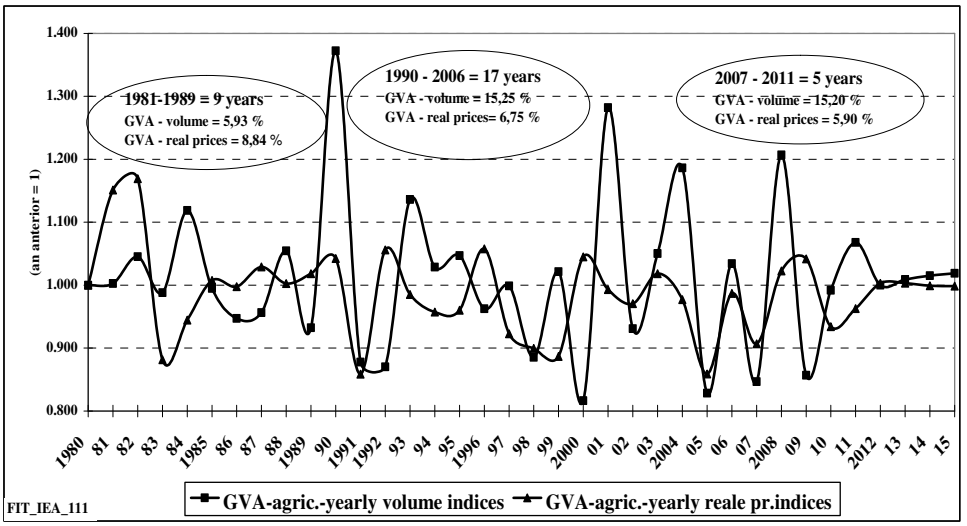
Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011.*

Among the other 4 aggregated indicators taken into consideration, only GVA – industry (*Yvind'10*) had an yearly average increase of about 0.02 billion RON throughout the whole period, while agriculture *(Yvavspp'10)*, constructions and overall economy had an yearly average increase ranging from 0.11 billion RON to 4.8 billion RON.

A persistent economic phenomenon, with noticeable reductive performance effects in overall national economy and in the agro-food sector in particular, is the relative instability of the variables measuring the results, which can be quantified by the so-called variation coefficients.

The simultaneous presentation of the relative variation of the annual volume index and of yearly real price index of the gross value added in agriculture is relevant in this respect (Graph 4).

Graph 4. *Relative instability of GVA - agriculture (yearly volume and real price indices), 1980 – 2015*



Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011.*

From the perspective of this indicator as well, it has to be noticed that Romania's five years of EU membership mitigated the relative instability phenomenon only to a lesser extent.

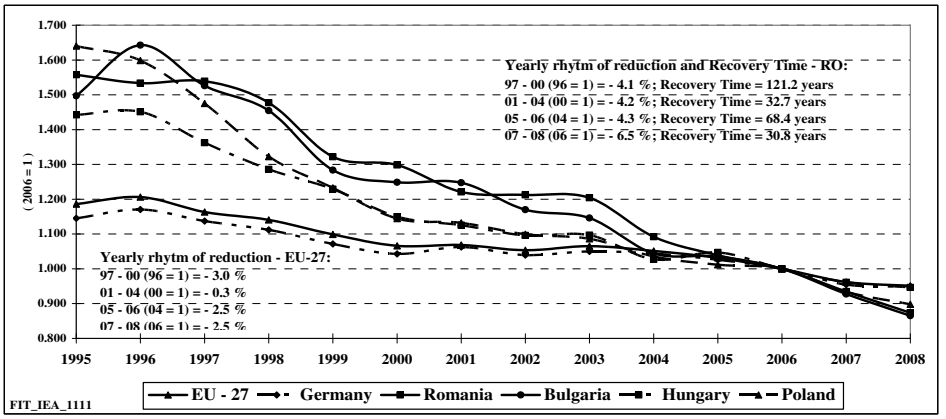
Thus, the relative variation of the volume index of GVA – agric., in the accession period (2007 – 2011) taken into consideration was 15.2 %, quite similar to that in the 17 years prior to accession (1990 – 2006).

On the other hand, the yearly index of GVA - agriculture real prices has a 5.90% variation coefficient, in the years 2007 – 2011, compared to 6.75 %, in the 17 previous years (1990 – 2006).

Hence, it results that Romania's presence on the European Single Market meant a slight diminution of relative instability, rather in prices than in quantities.

As reference macro-economic variable in revealing convergence through competitiveness, the energy intensity of the economy has had a strong regressive trend in Romania compared to the EU-27 average (Graph 5).

Graph 5. *Energy intensity of the economy in Romania, compared to EU-27, 1995 – 2008 (2006 = 1)*



Source: *own calculations, on the Eurostat data, http://epp.eurostat.ec.europa.eu/tgm/table*

Thus, while in EU-27 on the average the decline of the energy intensity of the economy was 21.2 % in 2008 compared to 1996, in Romania, the regression of the energy intensity of the economy (measured as kg oil equivalent / 1000 euro GDP) was twice as strong (43.0 %).

One of the main consequences of the significant differences in the energy intensity levels, both at the beginning of the investigated period (1996), and at the end of this period (2008), and of the different rates of energy intensity diminution consists in unusual large periods of time needed for the 2008 level gap recovery (between 30,8 years and 121,2 years).

As it is considered in all the functional market economies as one of the "pillars" of macro-economic competitiveness, the correlation between real wages and labor productivity can reveal – to the extent it evolves in the economic rationality limits – the tendency towards economic convergence and social cohesion in the respective country (zone, region).

In the period 1990 – 2011 (2006 = 1), the dynamic correlation between real wages and labor productivity in Romania' economy generally evolved within the economic rationality limits, in the sense that in the 22-year period, only in two years (1990 and 1991), the real wages index was greater than the productivity index, while after 1992, the ratio of the two terms of the correlation was reversed (Graph 6).

Graph 6. *Correlation "labor productivity - average real earning" in Romania's economy, 1989 – 2015 (2006 = 1)*

Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011.*

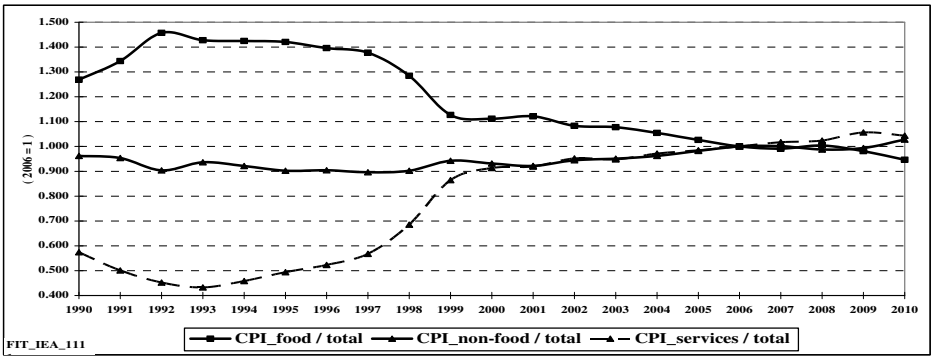
At the same time, it can be easily noticed that in the first 17 years of transition to the market economy (1990 – 2006), starting with the year 2003, the difference between the productivity dynamics and the real wage dynamics gets lower in trend, due to productivity outstripping as growth rate by the average real wages; this means the beginning of a non-rational correlation, strongly reductive of performance and domestic and foreign competitiveness of Romania's economy.

To sum up, the fact that out of the eight time periods, convened as relevant for comparative judgments, only in two of them (1993 – 1996 and 2001 – 2004) the "real wages – productivity" correlation was within the limits of economic rationality, reflects the mostly fragile tendency of Romanian economy for the sustainable setting up of one of its "engines" generating performance and competitiveness, as support to real social cohesion.

As a macro-economic variable with general competitiveness reductive effect, inflation (reflected by the consumer price index) erodes the purchasing power of incomes in the economy, which in its turn induces a narrowing of the solvent demand for goods and services.

As not all the consumer prices evolved with the same intensity in the period of transition, it is worth presenting the dynamics of ratios between the three main components of the CPI and the aggregate itself (Graph 7).

Graph 7. *Dynamics of ratios between the CPI components, 1990 – 2015 (2006 = 1)*



Source: *own calculations on the data base of Nat. Inst. of Statistics.*

The reference year 2006 marks two tendencies of the 'parts / whole' ratio: the decreasing tendency of the ratio between the consumer price indices of the 'food commodities / total commodities and services', by 26.9 % compared to 1990, on one hand, and the increasing tendency of the other two ratios – slower, by only 3.8 % for 'non-food commodities / total commodities and services' and much stronger, by 1.74 times for 'services / total commodities and services' – on the other hand.

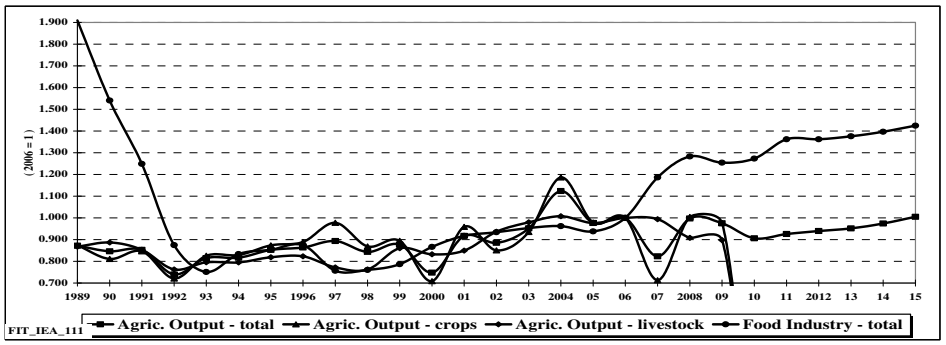
Romania's accession to the European Union has not modified the nature of tendencies signaled out for the period 1990 – 2006, namely slight decline of the 'food commodities / total' ratio and increase of the other two ratios.

The partial conclusion, which derives from the analysis of tendencies for the three consumer price ratios, can be formulated in the sense that, considered from the agro-food economy perspective, the contribution of the evolution of food commodity prices to 'feeding' the general increase of consumer prices has an obvious diminution tendency, compared to the other two components of the total aggregate. The explanation, be it a partial explanation, may be that the agro-food commodities still have a domestic production base, which, in the conditions of little remunerating producer prices, largely attenuate the inflationary effects of the agro-food imports and exchange rate.

Performance reductive factors in the agri-food economy

The way in which the two main components of the agro-food economy (agricultural production and food processing) contributed to the creation of the domestic supply of agro-food products can be revealed by the dynamic correlation between the agricultural production and food production (Graph 8).

Graph 8. *Correlation between the agricultural production and food production in Romania, 1989 – 2015 (2006 = 1)*



Source: *own calculations, for the period 2008-2014, NCP, Autumn Prognosis 05.11.2010; for the period 2009-2015, NCP, Autumn Prognosis, nov-2011;*

In the year prior to Romania's accession to the European Union (2006), the agricultural output was by 12.8 % lower compared to that in 1989, in only one year (2004) throughout the transition and pre-accession period the agricultural production index was larger than unit. At the same time, in 2006, the food production was down by almost 91 % compared to 1989, yet by 24.9 % up the maximum decline level (1993 = 0.751).

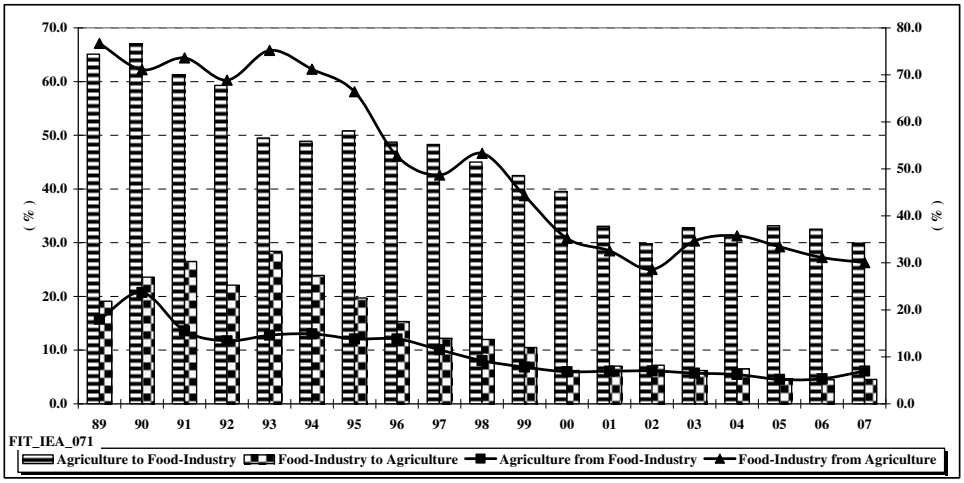
Five years of EU membership meant the maintenance of agricultural production rebound (by 7.4 % in 2011 versus 2006), yet a consistent advance of food production (by 36.2 %), which can only make up for less than one half of the decline compared to 1989.

The synthetic expression of the presence of an agro-food disintegration process in Romania's economy, throughout 1989 – 2007, results from the analysis of the intensity of economic flows between the general aggregate "agriculture" and the "food industry" aggregate, both from the

perspective of intermediary deliveries (forward linkages) and from the perspective of intermediary acquisitions (backward linkages).

Thus, from the perspective of intermediary deliveries a diminution by over 35 % of the intensity of intermediary deliveries of agriculture to the food industry can be noticed (from 65.1 % in 1989 to only 29.9 % in 2007, with maximum 67.0 % in 1990 and a variation coefficient of 27.6 %) (Graph 9).

Graph 9. *Evolution of interrelations between agriculture and food industry, 1989 – 2007*



Source: *own calculations, on the data from Nat. Accounts, 1990 - 2007, National Institute of Statistics, Bucharest.*

At the same time, the intensity of intermediary deliveries flows from the food industry to agriculture was down by over 14.5 percent (from 19.1 % in 1989 to 4.6 % in 2007, with maximum 28.4 % in 1993 and a variation coefficient of 60.7 %).

The manifested regressions have multiple causes, which can be found both in the development pattern of the agro-food sector in the command economy period and in the failures of the transition period, among which the following stand out:

- Asymmetry in the restructuring process from agriculture (much faster and more radical) compared to that in food industry (slower and more superficial);

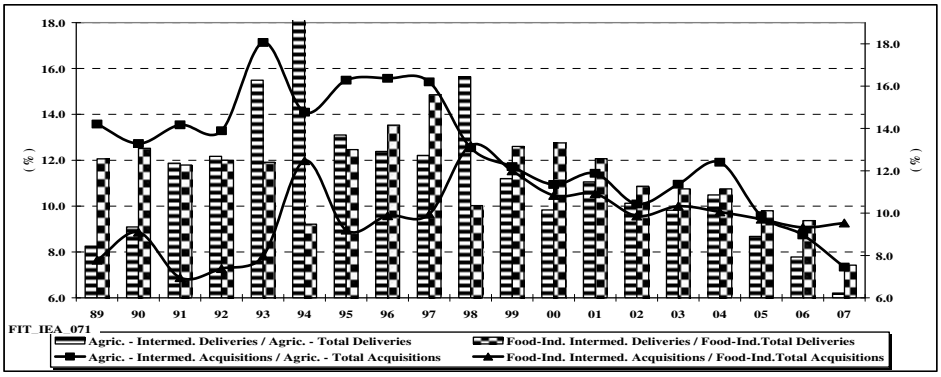
- Narrowing the population's final agro-food consumption demand, following the general economic rebound, under the background of persistent hyperinflation.

On the other hand, from the perspective of intermediary acquisitions, it is worth mentioning a stronger diminution (by 46.7 %) of the intensity of intermediary purchases flows of the food industry from agriculture (from 76.7 % in 1989, to 30.0 % in 2007, with a variation coefficient of 35.8 %).

At the same time, the intermediary acquisitions of agriculture from the food industry diminished their intensity by 11 % (from 18.0 % in 1989 to 7.0 % in 2007, with maximum 23.7 % in 1990, with a variation coefficient of 46.7 %).

The other modality to reflect the internal agro-food economy convergence consists in measuring the intensity of intermediary deliveries and of intermediary acquisitions respectively, of each of the two component aggregates (agriculture and food industry) in the corresponding total (Graph 10).

Graph 10. *Share of agriculture and food industry in total intermediary deliveries and acquisitions, 1989 – 2007*



Source: *own calculations, on the data from Nat. Accounts, 1990 - 2007, National Institute of Statistics, Bucharest.*

A few comments can be formulated with regard to the persistence of the agro-food disintegration phenomenon in the Romanian economy:

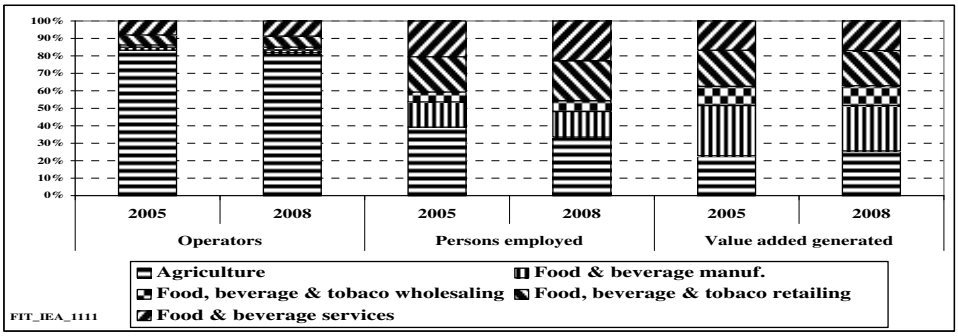
- The highest relative instability (measured by the variation coefficient) is found in the aggregate "agriculture", its shares ranging from 18.2 % (1994) to 6.2 % (2007), with a variation

coefficient of 26.2 %, in the intermediary deliveries and from 18.1 % (1993) to 7.5 % (2007) respectively, with the variation coefficient 21.2 %, in intermediary acquisitions;

- The "food industry" aggregate presents lower decreasing shares, from 14.9 % (1997) to 7.4 % (2007), with an average variation of 15.2 %, in the intermediary deliveries and from 13.2 % (1998) to 7.0 % (1991) respectively, with a variation coefficient of 16.8 %, in the intermediary acquisitions.

We consider useful to present a brief comparative diagnosis between Romania and EU-27 average, from the perspective of structures of the agro-food chain, in two reference years (2005 and 2008) for which the most recent relevant statistical data are available (Graph 11).

Graph 11. *Multi-criterions structure of the agro-food chain in the European Union, 2005 – 2008*



Source: *own calculations, on the data from "Food - from farm to fork statistics", Eurostat Poketbooks, 2011 edition.*

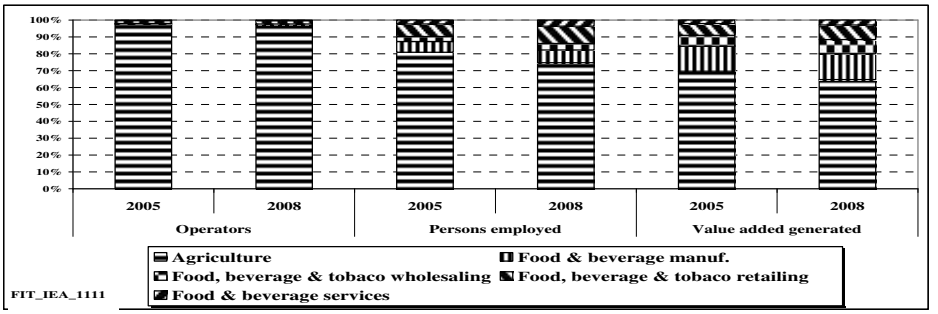
From the perspective of the criterion "number of enterprises" (economic operators), at EU-27 level, structural changes of the agro-food chain can be noticed in 2008 compared to 2005, in the sense of the absolute decrease (from 14.4 mil. to 13.7 mil.) and relative decrease (from 83.2 % to 81.8%) of the economic operators in agriculture.

From the perspective of the criterion "number of employees", in three years' time (2006 – 2008), the share of the segment "agriculture" decreased by 5.7 percent, and these percentage points are distributed to the other four segments of the agro-food chain. The diminution in number of the economic operators from the first segment of the chain (agriculture), in the conditions of a likely relative release of labor force,

on the basis of productivity increase, induced a favorable effect in the EU agro-food system.

Romania went through the transition and pre-accession period with a relative rudimentary "agrarian – structural endowment" representing constraints to the plenary manifestation of the technical – organizational and managerial progress factors. Unfortunately the multi-structural structure picture of the agro-food chain in Romania looks entirely different from the overall picture of EU-27 (Graph 12).

Graph 12. *Multi-criterions structure of the agro-food chain in Romania, 2005 – 2008*



Source: *own calculations, on the data from "Food - from farm to fork statistics", Eurostat Poketbooks, 2011 edition.*

Briefly, between the two reference years (2005 and 2008), the structural changes in the configuration of certain performance agro-food chains through competitiveness were not produced yet; we rather experience the persistence of certain trends that reduce the multiplying effects of value added generated by the sector throughout the national economy. Otherwise, no full explanation could be found for the diminution of the share of agriculture in total economic operators of the agro-food chain from 97.5 % to 97.2 % in three years' time, i.e. a non-significant decrease.

Furthermore, the problem is that the diminution of the share (by 0.3 percent) of the segment agriculture in total operators of the agro-food chain was "outflanked" by a simultaneous diminution by 6.2 percent of the share of this segment in total labor input that consequently led not to a plus of value-added generation, but rather to a minus (of 5.0 percent).

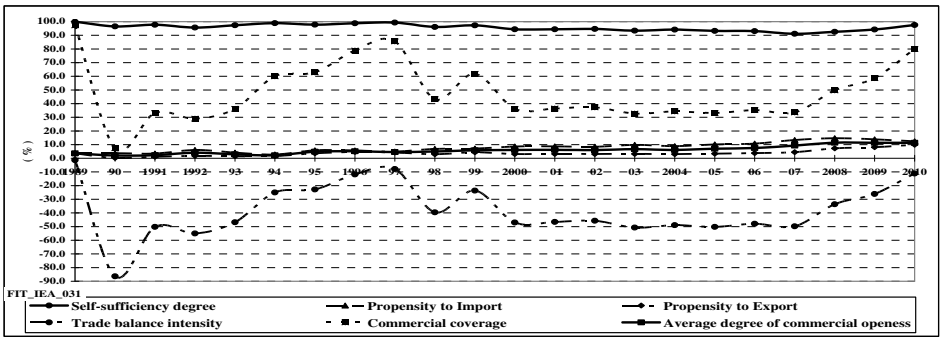
The other four segments of the agro-food chain, whose cumulated shares with regard to the economic operators, accounted for 2.5 % (2005) and 2.8 % (2008), i.e. a very small number of non-agricultural economic operators put to work 19.1 % of the employees from the entire chain, in the year 2005, and 25.3 % in the year 2008, these generating 30.3 % (2005) and 35.3 % respectively (2008) of the value added from the Romanian agro-food chain.

Therefore, the brief diagnosis of the structural changes produced in the agro-food chains confirm certain partial conclusions formulated in other previous segments of our scientific approach.

Simultaneously with the reductive effects of Romania's agro-food economy domestic competitiveness, in our opinion, it is quite interesting to reveal certain aspects linked to the external competitiveness of this important sector.

The determination of the average degree of commercial opening[3] of the agro-food economy is based on a panel of indicators, calculated on the basis of National Accounts data, the most relevant being the export and import propensity of an economic entity (Graph 13).

Graph 13. *Average degree of agro-food economy commercial openness in Romania, 1989 – 2008*



Source: *own calculations on the base of INEA- Bologne - Methode (1992), and data from National Accounts, NIS, Bucharest.*

A few conclusions can be formulated from the analysis of the determinative indicators of the average degree of commercial openness:

[3] Method developed by INEA Bologna in 1991 and presented in *Italian Agriculture in Figures*, 1992;

- The radical and asymmetrical destructive processes that took place in the agro-food sector after 1989 certainly induced strong reductive effects of the capacity of expression of Romania's agro-food economy on the foreign market;
- The disintegration phenomenon, present in the Romanian agro-food economy and pointed up by the so-called "double fracture" made the import propensity of this sector to reach relative values ranging from 2.8 % (1994) to 13.4 % (2007) in the period 1980-2008;
- Consequently, the very low export propensity, corroborated with the very strong import propensity determined an average commercial openness ranging from 2.2 % (1994) to 9.7 % (2008).

Inside agriculture, a factor that generates economic performance, at least at theoretical level, is considered to be the concentration of land resources, known in the specialty literature as "land consolidation". Certain signals are provided, in this direction, by the concentration process of agricultural holdings, which can be measured by the structural changes in the, produced between the two general agricultural censuses (GAC – 2002 and GAC – 2010) (Table 1).

Table 1. *Basic data on the agrarian structure and concentration coefficients in Romania's agriculture, 2002 – 2010*

Hectares	GAC – 2002				GAC - 2010			
	Total holdings		Total Utilized Agric. Area		Total holdings		Total Utilized Agric. Area	
	'000	%	'000 Ha	%	'000	%	'000 Ha	%
< 0.10	539,9	12.56	23,9	0.17	384,1	10.32	19,5	0.15
0.11 - 0.30	581,4	13.52	103,7	0.74	661,7	17.78	120,4	0.91
0.31 - 0.50	323,4	7.52	124,7	0.90	354,5	9.53	136,0	1.02
0.51 - 1.00	724,5	16.85	506,5	3.64	617,3	16.59	431,4	3.24
1.01 - 2.00	897,9	20.88	1272,6	9.14	712,2	19.14	1010,5	7.60
2.01 - 5.00	952,4	22.15	2907,9	20.87	727,1	19.54	2229,0	16.76
5.01 - 10.00	218,9	5.09	1440,9	10.34	182,2	4.90	1208,9	9.09
10.01 - 20.00	37,4	0.87	471,1	3.38	43,5	1.17	570,2	4.29
20.01 - 30.00	5,5	0.13	131,6	0.94	9,7	0.26	233,5	1.76
30.01 - 50.00	3,9	0.09	149,6	1.07	8,2	0.22	314,6	2.37
50.01 - 100.00	3,8	0.09	258,0	1.85	7,5	0.20	525,2	3.95
> 100.00	10,23	0.24	6540,1	46.95	13,6	0.37	6498,9	48.87
TOTAL	**4299,4**	**100.00**	**13930,7**	**100.00**	**3721,9**	**100.00**	**13298,2**	**100.00**
	Concentr. Coeff. Lorenz 2002 = 0.952				**Concentr. Coeff. Lorenz 2010 = 0.960**			

Source: *Own calculations, based on NIS data, 2011.*

The data from the synoptic table above reveal, on one hand, that out of the 12 farm size groups, two "packages" of sizes are noticeable whose shares significantly changed in the year 2010 compared to 2002:

- In the first place, in four farm size groups, ranging from 0.51 to 10.00 ha, diminution of cumulative shares can be noticed, both in number (-4,8 %) and in utilized agricultural area (-7.3 %);
- In the second place, in other five farm size groups, ranging from 10.01 - > 10.00 ha, an increase of cumulative shares are noticeable, both in number (+0.8 %), and in area (+7.05 %);
- Under the background of a general diminution of the number of agricultural holdings, by 13.4 % in 2010 compared to 2002, of a "loss" of utilized agricultural area of 4.5 %, and in the context of above-mentioned structural changes, the Lorenz concentration coefficients[4] were determined, which range from 0.952 (2002) and 0.960 (2010) respectively.

The increase of Lorenz concentration coefficient in the period between the two agricultural censuses, by an annual average rate of 0.105 % reflects the existence of a true process of farm consolidation.

Conclusions

GVA in agriculture, five years after the accession, is by 7.2 % lower than in 2006, after a sinuous evolution (three drops and two growths), reflecting both the relative high instability of agriculture (weather dependency) and the non-functional assimilation of the EU agro-food market management mechanisms. At five years after accession, agriculture continues "to work" with the lowest real prices and their level is expected to be by 13.1% lower in the year 2011 compared to the year 2006.

In the half decade of existence of the European Single Market, there is still the same "defective" correlation of the Romanian economy – faster growth of the real average wages (+34.2 %) compared to labor productivity (+6.9 %), the sharpest increase being signaled out in the period 2007 – 2008, followed by that estimated for this year.Five years of EU membership practically meant a persistence of agricultural production rebound (by 7.4 % in the year 2011 compared to 2006), but also a consistent advance of food production (by 36.2 %), which can make up for less than half of the decline compared to 1989.

[4] see Etude FAO Development Economique et Social, No. 47, FAO, Rome, 1986;

The structural changes in the configuration of certain agro-food chains that generate performance through competitiveness have not been produced yet; we rather witness the persistence of reductive trends of value added multiplying effects generated by the sector in overall national economy.

The very low export propensity, corroborated with the very strong import propensity, determined in essence an average commercial openness level ranging from 2.2 % (1994) to 9.7 % (2008).

Under the background of a general diminution of the number of agricultural holdings by 13.4 % in 2010 compared to 2002, and of a "loss" of utilized agricultural area of 4.5 %, and in the context of the previously mentioned structural changes, the Lorenz concentration coefficients were determined, which reached 0.952 (2002) and 0.960 (2010) respectively.

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ASSESSMENT OF CLUSTERS' ECONOMIC VALUE AND THEIR INFLUENCE ON COMPANIES IN SERBIA

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Abstract

This is the study of clusters and their influence on companies and environment in Serbia. The aim of this study was to analyze information regarding companies, clusters and process of cluster development in Serbia. Some of the most interesting features for Serbian companies were drawn out and presented in order to identify and analyze similar processes and externalities in future research of Serbian companies. In order to create comprehensive study, both quantitative and qualitative research methods have been applied. In total thirty nine companies have been surveyed in five Serbian clusters gaining valuable answers regarding companies who joined clusters and the expectations and aspirations of cooperation within cluster. Each research methodology was analyzed in-depth and valuable conclusions have been withdrawn. The study came across interesting conclusions. Serbian companies did not start cooperating because they were all aware of the benefits clusters are offering, but they grouped out of need to overcome some of the common legal and business problems. Majority of the companies within clusters are micro and small companies, without research and development. This study showed that even clusters in Serbia do not have R&D division, leading us to the conclusion that companies need to improve knowledge management in the companies, to support innovations and invest in new material and products development.

Key words: *clusters, competition, economic value, innovation, less developed countries, Serbia*

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Introduction

This research aims to provide some of the answers on how Serbian companies perceive clustering and potential benefits for local businesses and development of their competitive advantages. „What kind of economic benefits does cluster provide in Serbian economy?“ represents the main research question of the paper. Principally, this research study reviews the already well-documented field of clusters and noted benefits this type of collaboration brings, with focus on Serbian economy and peculiar business environment imposed upon the Serbian companies. The main goals and the most important research questions of this comprehensive research study was to examine and explore: How do clusters form in Serbian industries and economy as a whole; What motivates clustering in Serbia; Where does clustering appear, in which industries; What is Serbian Government's approach to clusters; How does clustering influence local economy, suppliers and buyers; How does it help in the development and branding a region; In particular how does it affect companies' competitiveness, level of production and research and development; and What are the implications of clustering on Serbian small and medium sized enterprises and Serbian market in general. Theoretical contribution of the paper is presented as an overview of applicability of the clusters concept in Serbian business environment and comparing results with other regional developing economies. This gives further insight into speed and direction of changes within Serbian industries and economy. Due to civil war and long term economy isolation, Serbian market and Serbian companies have been neglected by global trends and their development has been systematically abandoned by political system. Since year 2000, situation in Serbia has changed, society has seen democratic movements and the economy has become market oriented. Alteration of the system changed the way how business is conducted and this denoted the dawn for many entrepreneurs seeking market expansion and profit. By embracing new market orientation Serbia has taken a step towards the acceptance of modern global economy trends, leaving local businesses in search of a way to cope with mature and ever developing competition. Considering that the local government imposes import restrictions and quotes in order to make the country more competitive and to attract foreign direct investments, it is not easy for small and medium sized enterprises to compete with multinational enterprises. These multinational enterprises are using competitive advantage of different markets in order to maximize their revenue growth, reduce costs, use the advantages of economy of scope and improve

international competitiveness (Begg and Ward, 2003). As small and medium sized enterprises do not have such access to international markets and sources of international competitive advantage, they have to seek other options in order to stay profitable and secure presence on the market. Therefore, competition is firm and companies have to come up with ways to reduce costs, increase sales and, at the same time, invest in knowledge management and R&D. Wilson and Popp defined clusters as a wider agglomeration of industries that may be connected by common products, technologies, markets (either supply or demand) or industrial frameworks (Wilson and Popp, 2003, pg. 3). Joining a cluster presents itself as an option for companies in less developed countries which do not have significant resources required for the increase of production output, to gain advantages of economy of scale and to invest into exporting markets. Clustering is seen as a means of developing and transforming industries in the countries, consolidating the industrial resources and achieving international competitiveness. In less developed countries, developing industrial clusters is perceived as boosting the industrialization and supporting the entrepreneurial activity grouped around a cluster. All the clusters have been forming, working and vanishing in a similar pattern called cluster lifecycle (Porter, 1998). This life-cycle theory can be used to model the researched Serbian cluster development, assess current stage of clusters and recommend further development stages. Moreover, it is worth noting that the entire original cluster had been formed around a certain geographical area which offered unique key business factors to certain industry and was more attractive for investments and growth (Wilson and Singleton, 2003). Typically, when conducting a study about clusters, the process starts with reviewing the work of Marshall, one of the first and most cited scholars who laid the foundations for further exploration and description of clusters. The general idea behind the clusters is to combine in a single geographical location all of the necessary mechanisms for an industry to function in the most efficient manner (Marshall, 1920). Thus, apart from gathering companies that are in the same industry sector and that are complementing each other or competing with each other, it is imperative for a successful cluster to have good logistical support in terms of well-organized supply and distributions chains, institutional, governmental and academic support, as well as easy access to numerous markets. When combined together, all of these elements should provide a synergy effect under which companies could develop more rapidly, enrich their competitive advantages on the market regarding similar industries from different regions and encompass knowledge spillovers that are positively

influencing the company organization and product research and development. Nevertheless, creation of virtual clusters is far beyond the economic situation in Serbia as small and medium sized enterprises still did not implement appropriate internet communication technologies and systems. Another reason for lagging behind the western world is the fact that the human potential of these companies is not capable of taking advantages out of such cooperation.

Materials and methods

The scope of this research paper focuses on companies within the same geographical region, thus providing a realistic test scenario. Some of the most interesting features for Serbian companies were drawn out and presented in order to identify and analyze similar processes and externalities in future research of Serbian companies. As these outcomes are very important for fragile Serbian clusters, the main question of the research have been wrapped around subjects of cost cutting, increased productivity, knowledge transfer (both tacit and codified) and joined presentation on foreign markets. Some of the companies in Serbian clusters are too small to be competitive on foreign markets, as their production capacities limit the bargain power. The research shows whether Serbian companies discern ways to maximize their position in a cluster and how successful they are in absorbing and implementing knowledge from other businesses in their cluster. Another major point drawn by the research is that almost all of the clusters were composed of microenterprises selling on the localized markets, and only two clusters had internal structure and wider market access that is typical for successful clusters in the developed countries. This information could be significant for better understanding of Serbian clusters, which companies form them, how they are formed and what kind of influence they are having on the industrialization in Serbia. One of the aims of this study is to discover if Serbia, as many other less developed countries (McCormick, 1998, pg. 8), is facing the problem of small domestic market and how clusters are handling and developing in the economic context. This paper examined what is the level of awareness of clusters in Serbia and what specific steps state has taken in order to help companies in clusters and clusters to develop and expand. It is inevitable that clusters have some obstacles in the business. This research gives answers at what level is the role of the local and regional government in Serbia regarding clusters. Not so much research has been done on developing clusters in less developed countries, especially in the region of ex-communist

countries and the Balkans. Therefore, this research reveals how clusters are formed in Serbia, what is a local businesses attitude toward clustering and how are clusters seen as a means of development for industry and whole society. This research is designed to reveal the present state of clusters in Serbia. Firstly, this paper curves and examines main research questions that need to be answered in order to get the overview of the situation, while explaining motivation and actions of Serbian companies and level of involvement in development and internationalization of business. Secondly, used methodology have been presented as this study uses both qualitative and quantitative data analysis. The research has been done on two levels:

• on firm-level thirty nine companies have participated in the survey uncovering some of the answers to the research questions and giving the perspective from the companies point of view,

• on cluster-level seven in-depth interviews have been conducted in order to back up conclusions of the survey and to explain the situation in most of the Serbian clusters and general legal framework.

Unfortunately, there are some limitations to the research due to the data collection problems. Firstly, not all available data are valid and accurate as bureaucracy was not strictly followed by the companies. Secondly, people lack trust and companies are not willing to share its confidential business information. Due to hard times in Serbia in the past period, three wars, inflation, numerous bank and financial frauds, Serbian businessmen do not trust and do not share financial information. The Republic of Serbia, along with some Balkan countries, is still in the transition period from communism to capitalism and market orientation. Since Serbia has been in the process of transition for the last twenty years, it was a victim of many financial irregularities where management did not track financial results in order to pay smaller taxes and try to save some of the profits for the company or for themselves. Due to this and similar problems it was impossible to gather exact economic information and benefits of the companies within the clusters in Serbia. Therefore, this research makes an effort to explain the benefits of clustering for Serbian companies, but it does not comprise economic figures. Considering the specific situation in less developed countries and scarcity of information available to the researcher, many authors have used a combination of the following two research methodologies: qualitative and quantitative data analysis (Saxenian, 1994; Schmitz, 1995; Nadvi, 1996; Kesidou, 2005). Authors (Marsland et al, 1998; Brannen, 2007) argue that validity of information acquired by research will be greater if two methodologies are used in

combination. Research effort encountered problems already recognized by other researchers, namely very few valid examination samples available, lack of some crucial data due to bureaucracy inefficiency and limitations of time and research topic. Therefore, this research has to rely upon multiple sources of information and a multidisciplinary approach. Three main methods that were used in this research are:

- A survey of the firms which are engaged in the activities of the clusters, aimed at quantifiable results,
- Interviews with the key informants who can give an overview of the development of the cluster and its composition,
- Secondary sources of information, official statistics and data from business associations and other relevant sources.

A survey was developed comprising a range of questions that need to reveal information about Serbian companies in clusters, their competition, suppliers and clients, cooperation with institutions and future development of the company and the cluster. The survey consists of eighteen questions. Further on, qualitative and quantitative data analysis methodology used in this research have been explained. Questionnaire has been distributed to more than fifty companies in five Serbian clusters, and a response was received from thirty nine companies. Tailored survey consists out of qualitative questions as respondents did not need to give quantifiable results. Data were processed using SPSS tools and descriptive statistics to uncover if there are significant similarities and differences among the clusters and to present an overview of all surveyed companies in Serbia. Therefore, research relies on gathering appropriate firm-level data by using a survey based on a structured questionnaire, specially designed to capture the situation in Serbian companies within the clusters. The information from the data analysis has been enriched by qualitative information derived from the interviews. The primary sources of information for qualitative data analysis were interviews with government and NGO high officials, company managers and other relevant informants. This research consists out of two analyses: quantitative data analysis of the survey, qualitative data analysis of the interviews and interviews with the Memos cluster members. Therefore, the quantitative research consisted out of questionnaire divided into 18 questions. In the quantitative data analysis, research tries to provide the answers to research questions and to construct the picture of clusters in Serbia. Qualitative research has been conducted through several in-depth interviews with relevant members of cluster and supporting organization members, whose answers were utilized in order to gain a broader image

of the companies, clusters and clustering processes concerning Serbian particular industries and effects on local economy. Qualitative data analysis examines seven in-depth interviews with chosen personnel of government officials, development centers, NGOs and agencies and cluster members. Results of the analysis were used to give relevance to the quantitative results and to answer questions that have not been covered by the questionnaire. These findings were used in building the arguments in the conclusion. For the purpose of this research there were thirty nine companies surveyed in five clusters in Serbia. The information gathered from the questioner was run through SPSS statistical data analysis program. The questioner consists out of two set of questions: single answer and multiuser questions. Prior to data analysis, error screening and data cleaning was undertaken. After insuring that there are no missing values or values of the variables that fall outside defined ranges, it was preceded to the data analysis. The most common variants are the Pearson chi-square test and the likelihood ratio chi-square test. It tests a null hypothesis that the frequency distribution of certain events observed in a sample is consistent with a particular theoretical distribution. Pearson Chi-Square test has been used as a tool in order to work out statistically significant differences and describe the relationship between the answers in different clusters and different companies. Since answers gathered from the survey are categorical, and therefore Pearson Chi-Square test have been used. Serbia currently has around 30 clusters where the most important ones are: Alko cluster of South Serbia; AC Serbia – Car parts manufacturer cluster; cluster Bipom, Belgrade; Istar 21, Novi Sad; cluster Jato, Subotica; Fond "Royal vacation", Kraljevo; cluster Memos, Indjija; cluster Passage, Pancevo; cluster Netwood, Kragujevac; Shoemakers, Knjazevac; Serbian Software cluster, Belgrade; Tourism cluster of Palic micro-region, Subotica; SPA cluster; Agrocooperativa cluster, Horgos; Fungiland, Vrsac; Aluminium cluster, Pancevo and cluster Sombor's Farmsteads, Sombor. The research has been done in five Serbian clusters: cluster Bipom, cluster Fungiland, cluster Jato, and cluster Memos and clusters Kanizsa. Total of thirty nine companies has participated in the survey that was conducted in field trips to the companies and over the e-mail. Surveyed companies come from diverse industries and regions, therefore this sample can be used for creating general picture of the Serbian companies in clusters. This survey has been conducted on the firm-level, and the analysis have been presented on the cluster level in order to view significant similarities and differences in their answers and attitudes. Cluster Bipom consists out of fourteen companies in Belgrade. The main industry is production of

machinery and equipment for agricultural sector. They employ close to 1000 workers and had a turnover of around 15 million Euros in previous year. There are ten companies in cluster Fungiland. The main industry is production, processing and sales of mushrooms and mushroom products. They are stationed in Vrsac. In Subotica, cluster Jato is operating with 17 companies, out of which 12 are production companies and five are service companies. The main industry is production of plastic, plastic products and containers. Cluster Memos operates in Indjija and has 13 company members. Their main purpose is production and processing of metal and metal products. They are well integrated and organized, and this cluster has been examined more thoroughly through in-depth interviews.

Results and discussion

Companies in Serbian sector are usually small and medium sized enterprises and do not have the power and bargain strength to fight for their interests. Therefore, government has to be supportive for clusters in order to make the entrepreneurship flourish and boost up the economic development. Legal framework in Serbia is not on the satisfactory level, and that clusters had legal and technical problems with their plans and operations. As for every other country in the world, clusters are the place of business creation and they constantly attract big investments and specialized labor. Majority of the enterprises in Serbia are too small to be competitive even on the local Serbian market, and thus cannot invest into further innovation and development. The size of the market commands the output of the companies. Compared to the multinational companies entering the Serbian market, local businesses do not stand a chance. Local businesses employ local people. From this aspect, the interest is on how important clusters can be for keeping the production levels and assuring the business survival. Companies cooperation within the clusters can range from sharing machinery to business contacts and lobbying in the government. Obviously many companies joined clusters in Serbia with some of the clusters formed on the company's own initiative. With Serbia being a less developed country, companies do not have the required funds to invest in R&D or in new technology acquisition. But still, they can collaborate with universities and institutes in terms of young professionals' employment, special skills and stuff development programs, quality management cooperation and many other fields. Firstly, management level of the companies has to value the information coming from the universities in order to be able to use it accordingly. As companies find the need to cooperate among each other, clusters can

easily do as well. Results that showed high level of significance between the clusters (p values for Pearson Chi-Square lower than 0.05) have been discussed according to different groups of examined issues. From stated first question „What is the type of your company?“ results shown that Chi-Square = 36,850; & p = 0,002. Companies have shown significant differences in answers to what type of companies form clusters in Serbia. Most of the sample companies are limited-liability companies (48,5%); where in cluster Bipom all of the companies are this type. The sample is showing that different clusters consist of different types of companies, depending of the industry. Fungiland has three sole partnerships as they have producers of the mushrooms, which are privately owned farms; Memos again has five private workshops that are operating within the cluster. Bigger companies are usually pre-owned by the government and have been privatized, as well as the two companies in cluster Jato. There is no general rule what kind of companies form clusters in Serbia, as they have different size, ownership and organization types. On second question which states „What is the primary activity of your company?“ respondents have answered that the most of the companies in sampled clusters are production companies, but there is also a high percentage of the service companies. Some of the companies are offering both products and services, but only one company in five Serbian clusters is offering IT products and services. Cluster Kanizsa clearly indicates that it is not cluster, but rather is a combination of service and tourist industry, spa center and hotel chains. Notion that these are all production clusters gives us information that there are possibilities for further development of real service centers and other service networks for support of further growth. On third question which states „For what kind of activity do you use computers in your company?“ respondents answered that Serbian companies use computers mostly for accounting and in the production process. About 25% of the companies are using computers for communication, and only one for E-business. Serbian companies are not using all the possibilities of the IT systems and can see further development in automating some of the processes. With fourth question that follows „How old is your machinery and equipment?“ results have shown that Chi-Square = 20,536; & p = 0,008. In these answers there is significant difference among sample clusters. Bipom and Kanizsa clusters have mainly brand new machinery and equipment, while Memos has mostly used and older technology. It is evident that cluster Fungiland has seen some investments into new machinery and equipment, where we can see that agricultural sector in Serbia is seeing prosperity and stable growth. Jato cluster has companies that have newer and older machinery.

From the general point of view, seventeen companies have answered that their tools are brand new which could indicate that clustering has some positive effects on the production process and sales. Fifth question which says „Average age of machinery and equipment in your company?“ arises interesting values of Chi-Square = 23,414; & p = 0,103. Results yield from this question are indicating that more production and finance intensive industries such as metal industry – Memos cluster; plastic industry – Jato and agricultural machines industry – Bipom, tend to have older machinery and equipment. This data indicates that investing into these industries returns the investment in longer period, therefore higher investments and no new technology breakthrough gives standard returns. In this case, it is evident that companies are seeking positive effects of clustering, in later stages of the questioner they will answer how they see the further steps for their companies and cluster they belong to. With sixt question that follows „Do you have products and services analogue to yours in the region where your company operates?“ obtained results are for Chi-Square = 16,126; & p = 0,186. The result implicates that there are no significant differences in the answers between clusters. Most of the surveyed companies 45,5% has opinion that there are a few competitor companies within their region and they do not feel that threatened and do not put high importance on fighting competition. Another interesting opinion is 42,4% of companies think there is no direct competition to their services and products. This situation can be alarming as these companies do not feel the peer pressure, therefore are not that keen in investing into know-how and innovation. If answer is analyzed on the cluster level, again it shows the difference between clusters of Memos, Bipom and Jato, and on the other hand Fungiland and Kanizsa. Obviously Fungiland is an example of new economy enterprises in Serbia, as mushrooms were not traditionally grown and used in the past. Therefore, there is no strong tradition in the region, and competition from other regions of Serbia is not strong as well. This cluster was founded as producers were gathered around the bigger processing company in order to satisfy Serbian market needs and to export to neighbouring countries. Another aspect is that clusters Fungiland and Kanizsa are located in the smaller industrial municipalities of Kanizsa and Vrsac. Clusters Bipom, Jato and Memos are settled in the vibrating industrial districts of Belgrade, Subotica and Indjija, which are home to many different industries. Naturally, these companies have more substitutes on their local markets and competition is much stronger. In seventh research question which states „What is the level of contacts between these companies and your company?“ the value of Chi-Square = 15,049; & p = 0,239; implies

that Pearson Chi-Square index shows no significant differences amongst clusters. Only two companies out of thirty nine have answered that they have contacts with the competition and that they are cooperating more than it is necessary to overcome legal and production problems. In clusters Fungiland, Jato and Memos, more than half of companies have contacts with competition but they are on the basic level and do not include cooperation. On the other hand, half of the companies are not cooperating at all, not sharing information and working on common problems. This way they are spending more resources in achieving less benefits and developments for the company and industry. At this present stage of market development in Serbia, cooperation among competing companies is very week and there is no mutual trust. Eight question which says „Where are your suppliers stationed?“, answers showed that multiple answers were allowed because suppliers can be from close proximity, different region or international suppliers. Companies in cluster Bipom supply the production from a range of suppliers coming from Belgrade and the region, but also all of them have a supplier from distance. Cluster Memos and Jato as well are using materials (plastic and metal) that need to be imported to Serbia and have some regional and long distance suppliers, but have some suppliers in their closeness. In general, it is evident that clusters in Serbia still did not succeed in attracting all the suppliers to closer proximity, but it does not mean that they are not using the economy of scale when organizing supplies. On ninth question which states „Who are your company's suppliers?“, clusters had significantly diverse answers as seen with values of Chi-Square = 23,574; & p = 0,023. Depending on the industry, clusters have different supply channels, quality standards, supply dynamics, material on stocks and guarantees. Fungiland is supplied by smaller entrepreneurs from Vrsac region but it is interesting that 42,9% of the questioned did not want to answer the question. Cluster Kanizsa is not cooperating with bigger companies and corporations, but again 62,5% of the questioned did not wish to indicate their suppliers. In Memos cluster, it is clear that companies in Memos are cooperating with all suppliers, regarding the size and proximity. With answers obtained with tenth question that follows „Where are your buyers stationed?“ it could be concluded that in comparison regarding cluster suppliers, companies have been successful in attracting buyers close to them. More than half of the companies in all clusters are having sales in all three categories in their cities, regions and in different regions. Closeness to the customer base can resolve in better understanding of the market needs and trends. It is interesting that all companies in Jato and Bipom cluster are having sales in distance regions, possibly exporting. It

is highly unlikely that all of them had capacities to do business long distance before entering clusters. Eleventh question which says „Who are your company's most common buyers?" determines that only one third of the companies are selling to corporations, while 70% are selling to the entrepreneurs and medium size companies. This data gives us inside how significant market clusters are covering and where they can develop and improve. Another observation would be that each cluster has at least one company which is dealing with corporation. It is obviously a case that companies should work more toward corporations, as they are bringing more significant and long term business. Twelfth research question that follows „How incensed is competition on the market of your products?" resulted with Chi-Square = 27,465; & p = 0,037. Clusters indicated significant differences in their attitude toward competition on their market. This includes both manufacturers and retailers competition. Examined more closely, it is evident that companies within clusters perceive competition differently, which is a case of companies providing similar services to producers, or producers with standardized products. Cluster Fungiland has the most consensuses regarding competition. Companies in this cluster marked competition as medium in 85,7%, with only one company which feels strong competition. Cluster Kanizsa as well feels medium competition, and as in some previous questions gives similar answers to Fungiland. In cluster Memos 33,3% of companies feel they have no competition, as this is impossible for an open market to have no competition for industrial products, this have been subject to further discussion. Companies in BIPOM cluster have the most diverse competition. Generally, there is no rule how companies in Serbian clusters see competition and answers vary from industry to industry, even within the clusters. Thirteen question wich says „If you would be considering cooperation with other companies, it would be with?" showed significant result of Chi-Square = 33,821; & p = 0,006. As it was shown earlier companies in clusters have different opinion about competition, cooperation, join projects and general believe in the relationships with other companies. Statistical difference in answers is significant. Companies within cluster BIPOM decided that they would most willingly cooperate with companies of their industry and in their region. None of the companies selected cooperation with different industries, where it could be assumed that their supporting services are well covered and they are seeking production cooperation. Clusters Fungiland and Jato have dispersed answers, where companies have selected they would work together with all companies in the region and industry. Memos members are keen in finding partners in their region that could add value to its

products, as supplementary industries would enrich the production process, products and services. They are already good organized in the manufacturing sector, but they lack support in marketing, financing, labor pooling. Interestingly, all participating companies from Kanizsa cluster have decided they would cooperate with companies from their industry regarding the location. As cluster Kanizsa is mainly a tourism cluster, obviously companies in Kanizsa are looking for strategic partners, know-how and possibly a big brand they would attract to their cluster. Companies in sample clusters have different problems and needs, and it is rare they have reached consensus on subject of external cooperation. Cluster Kanizsa is the closest to unified needs. Following fourteenth question that says „Which aspects of cooperation with other companies are important to your company?“, companies have selected what kind of cooperation interests them the most. These are important motivating factors for Serbian companies to join clusters in the first place. Again, companies have diverse answers, where on average 40% of businesses are interested in every way of cooperation. By clusters, Fungiland companies are most interested in better financial arrangements with financial institutions and would use cluster membership to get better deals on credits. Another important aspect is stuff development where 60% of companies would work together in processes of employing, specialized training and educating workers. Memos cluster's members seem aware of possibilities collaboration is bringing, therefore they are ready to develop relationship with other companies in resolving common legal and policy problems, presentation in front of the banks, investment funds and joined stuff development. This is particularly important when companies need to train stuff for the new machinery, where trainings are usually overseas and very costly. They gave similar answer for sharing the machinery, what indicates that companies are recognizing benefits of cooperating, sharing production capacity and using same technology. Fifteenth question that says „Does your company cooperate with educational and R&D institutions?“ with obtained statistical data for Chi-Square = 4,027; & p = 0,402, conclude that companies did not give significantly different answers to this question. In each cluster there are companies who do communicate with universities and some who do not. Although there is not statistical differences, industries still have some distinction among. It is obvious that some problems or obstacles do occur, in present situation companies are not strong enough to invest in innovation projects and on the other hand are not cooperating with universities and R&D institutions. Business relationship with these potentially important institutional partners has not developed in Serbian companies and clusters as well. The

similar answers from respondents were located in sixteenth question which states „Does your company attend industry fairs, specialized seminars and conferences?“. Companies, who are not cooperating with universities and R&D institutions, also do not attend specialized fairs, seminars and conferences. Qualitative research explained this issue in-depth, through analyzing information gathered in the survey. Seventeenth question that follows „What is in your opinion necessary for further development of Serbian companies?“ is one of the most interesting questions in the survey yielded significant results and have been very valuable when explaining the economic benefits of clusters in Serbia. From the company prospective 78,8% finds more opportunities for cooperation with international companies very important and would like to establish a relationship with a distant companies and clusters. Next important issue is stable relationship with suppliers and clients, where 75,8% of the questioned found that they would cherish better relationship with the suppliers and clients. Finally, 54,5% of companies finds Legal framework problematic and would like to see developments in that field. The lowest consensus is achieved regarding easier access to new technologies where only 33,3% of companies finds development in this field necessary. This information could lead to two conclusions. Firstly, Serbian companies are technologically advanced and they have no problems acquiring latest technology and material. Secondly, that Serbian companies are not aware of all the possibilities that clusters and government policies can bring to their businesses. Finally, respondents answers on eighteenth question that follows „What would be main benefits for your company for cooperation with European Union?“ showed that Serbian companies within existing clusters perceive attracting new partners and investors as biggest benefit of cooperating with the companies from European Union, this is how 78,8% responded. Nearly all companies see this as major opportunity for their business, and would be ready to engage in projects offered by European Union funds. About half of the questioned has replied they could benefit from exporting to European Union countries and gaining know-how of organizational culture through cooperation with international partners. It is interesting to notice how Jato, Memos and Bipom clusters have greater aspirations towards exports and organizational knowledge, while clusters Fungiland and Kanizsa are generally interested in European culture and product design as their products are more market oriented. At this stage of development Serbian companies are not ready for international expansion, only 18,2% showed interest in international expansion or outsourcing production.

Conclusion

Clusters in Serbia appeared in 2004 by forming a cluster of car parts manufacturers. Serbian companies did not start clustering because they understood the benefits of clustering, but from the need to overcome some business problems they were all sharing (Zastava, Memos, Fruitland). This is significant difference in motivation compared to the developed world companies, who are clustering for R&D, international competition and other benefits of clusters. Serbian Ministry of Economy run a project "Support of Developing Clusters" in 2005 for two years, and have assisted around thirty clusters to register and organize. Project was funded by international grants, and Serbian government did not finance it further after two years. There is a huge gap between needs of Serbian companies within clusters and Serbian government attitude. Serbian province of Vojvodina also recognized the significance of cluster development for the region, and has organized an office for supporting cluster development in Novi Sad. Main purpose is to assist clusters in communication with government institutions, international clusters, funds, agencies, suppliers and clients. Serbia has no legal framework for companies joining clusters. There are only recommendations for cluster development and establishing the cooperation. Without the recognizable cluster status, it would be harder pursuing international partners, competing for projects and funds. Clusters in Serbia are used as a mean of developing local communities. They employ local resources, workers, invest in infrastructure and pay taxes. Local businesses can overcome some of the disadvantages of small companies in Serbia and stay competitive in developing market. There are different motivating factors for entering clusters for small, medium and big companies. For micro and small companies, clusters are a chance to fight on the market and to attach a label of recognizable brand. For big companies, clusters are a way of controlling the local competition and the market, and achieving export. All companies share interest in government funded programs of cluster and stuff development. Economic benefit for companies have two aspects: cost cutting and regulating prices. Cost cutting occurs in joined orders, lower training expenses, lower marketing expenses, common R&D, particularly in Jato cluster. Working together can often reflect in negotiating minimum prices of products and services, and therefore retaining standard margins. Clusters can help in branding a town or a region. In Serbia, producers of a certain industry serve as a landmark for the whole region, thus developing tourism and making the local

community more likable place for living. Clusters like Kanizsa or Hotel Belgrade cluster (HBC) in Belgrade are attracting tourists and fueling the supporting entertaining industries. Companies within clusters in Serbia are very respectful regarding the company reputation. Good business results and fair business relationship over the years make good reputation are guaranty for Serbian companies, which are traditionally skeptical and untrusting. Serbian clusters usually start off as horizontal organization, where companies of the same industry gather and form a cluster. Institutions and service companies are added as the government regulated nine companies plus three institutions rule. Clusters in bigger industrial centers have more opportunity to find skilled service companies ready to join cluster. Developing good relationship with cluster members is out of crucial importance. Only good communication and mutual understanding can result in synergetic effect and shared vision. Serbian cluster Fruitland is a perfect example of shared vision and great relationship among member companies. Cluster membership is important to Serbian companies, for all the motivation factors stated above. Without a cluster membership many companies would not be able to compete for important tasks, nor would they be respectful partner for international companies. Cluster provides quality guarantee for member companies, therefore it is not easy to be part of the cluster. Smaller companies can group functions such as marketing and logistics and outsource them to cluster. One of the biggest disadvantages of Serbian companies within clusters is that they do not have professional management, which would cope with emerging problems and can execute strategic decisions. Business owners are still not ready to give management to outsiders, but rather employ family members on high positions. Often it takes longer time for decision making and understanding business concepts like clusters. Managers are not keen in investing into intangible assets. Better relationship with suppliers is one of the benefits Serbian companies in clusters are using. Clusters have greater bargain power and can lower cost of inputs and transportation, while maintaining a good quality. It acts like a big company. Leading companies in clusters are attracting more suppliers to the region. They can generate better variety of choices, but they failed attract companies to move to the cluster region. Desire to export is one of the main driving forces shown in the survey and interviews. Almost 80% of all companies would like to find a partner from the European Union country and spread its market overseas. Therefore, companies in Serbian clusters are trying to expand their market to European Union and Russia and to find stabile clients on these markets. Serbian local market is too small for further expansion of industry leaders. Relationships with clients

are built through Serbian government agency Siepa and Vojvodina's Vip. Serbian clusters generally do not cooperate with universities in Serbia, or they have very weak connections. Partly, because universities are more educational oriented and not market oriented, and partly because of management of the clusters do not know how to use information coming from universities. Typically Serbian managers are not pursuing long term goals and not investing into R&D. Lately, there are isolated cases of cooperation in IT industry and machine manufacturing industry. There is no developed consciousness and business culture in communicating with agencies and development initiatives. Clusters are interested in cooperation with government institutions, NGOs and consulting agencies only if they can bring project or funds to the cluster. Usually clusters only use contacts from the supporting offices and continue cooperation process itself without supervision of the government or agencies. At this stage, there is no significant cooperation between Serbian clusters and other clusters internationally. Some of the industrial regions and clusters from Italy expressed interest in finding partners in Serbia and have been active in funding and running educational programs for clusters. The best example of the cooperation would be cooperation of the Italian auto giant Fiat and cluster AC Serbia. There is practically no innovation activity in Serbian clusters. Companies within the cluster do not invest in joined research and development, due to many internal and external reasons evaluated previously. Process of developing relationships and cooperation with cluster is slow but thorough. As clusters in Serbia are relatively new way of organizing business, companies are beginning to develop a sense of mutual cooperation and trust in the cluster. Some of the clusters are developing products produced buy cluster members (Wine cluster and Memos). Companies are not protective enough regarding intellectual property, so as labor pooling exists in software clusters in Serbia, knowledge spillovers may occur. The research showed that idea of clusters is still in its initial stage in Serbia, and much more work needs to be done in order to achieve level of efficiency and economic benefits like other successful examples worldwide. Only a few clusters have developed close internal relationship among cluster members, fostering cooperation and working on common projects. This study revealed that Serbian clusters are in fact not behaving as big companies, but only occasionally cooperate on the topics of common interest. They lack organization, harmonization, stronger vision, resource devotion and research and development. In order to see clusters in Serbia develop to the next stage, companies and government must work together in creating appropriate business environment and legal framework. Serbian clusters could play a

key role in national economy revitalization, if government recognised entrepreneurship and small and medium sized companies as a driving force of economy.

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THE SMEs SECTOR IN ROMANIA: COMPARATIVE STUDY BY ECONOMIC SECTORS AND REGIONAL LEVEL

Georgiana-Raluca Lădaru[1], *Silviu Beciu*[2]

Abstract

This paper aims the approach of SMEs sector at regional level in Romania. It compare their role in the Romanian Regions of Development, as principal beneficiaries of programmes supported by The European Union which are aimed at stimulating and diversifying entrepreneurial sector, stimulating investments in the private sector contribution to reducing unemployment and leading to improved living standards at regional level.

Key word: *SMEs, regional development, Romania, food industry*

Introduction

The socio-economical and territorial development of the EU Regions is based on cohesion policy. As all EU countries, Romania has been affected by the economic crisis, and in this context the structural and cohesion funds become more and more valuable tool for economic growth and social development at regional level.

One of the most important successes of joining the European Union was to create a vast single market which includes over 450 million consumers. At the same time, for many small and medium enterprises (SMEs) national borders still represent a significant barrier in their effort to expand their economic activities, and they continue to depend largely or entirely on the domestic market. Studies have already shown a direct link between internationalization and increased SMEs performance. Proactive internationalization drives growth, enhances competitiveness and support long-term viability of the company.

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Despite its advantages, internationalization continues to be a big step for most small enterprises, even if many support programs have been developed by national and regional governments towards the internationalization of SMEs. Still not all the regions have equal benefit from the access to the single market. The citizens from the Romanian regions don't still feel the same advantages as the citizen of older member countries from the EU regional policy. Regional disparities between the Romanian regions and the other EU regions are significant. Regional and local authorities are the most representative partners with national authorities in planning, managing and supervising the EU funds, but should be considered the SMEs role in the economy, as most of the businesses are part of this category, and they are responsible for the wealth and economic development as major beneficiaries of the cohesion policy. At regional level, the SME sector is considered to have a direct impact on economic and social development, its effect being much faster visible and with direct implications on the welfare of local communities. The private investment and entrepreneurial initiatives are placed in the top priorities of local decision makers, because of their contribution for achieving a high level of regional competitiveness, for creation of necessary conditions for a balanced development, and in order to obtain of competitive advantages [1].

The central role of SMEs in the EU economy has been underlined by adopting of Small Business Act for Europe in 2008, aimed to improve the EU policy approach to entrepreneurship. In 2008, the crisis that hit the world economy, the action of propagators and multipliers factors collaborated with a complex internal factors affected Romanian economy which for the first time after 10 years recorded an negative economic increase of -7.1%. Recession in Romania began on July 1, 2008 and ended on September 30, 2010.

Experts explained that poor economic performance was determined by three major factors of influence, namely: contraction of domestic demand for consumption, withdrawal of capital flows from abroad and sudden decline of foreign trade, both in terms of exports and imports.

In 2009 more than 133 thousand SMEs have suspended business activities, compared with only 12 thousand in 2007 and less than 12 thousand in 2008, which is an explosive growth, of over 11 times compared to previous years[2].

After two difficult years: 2010 and 2011, that affected both private and public sector, the Romanian economy started to have positive economic increase, estimated at 1.7 % in 2012.

Material and methods

Some analyzes will be conducted in the eight development regions: South Muntenia, Bucharest-Ilfov, North-East Moldova, South-East, North-West, South-West Oltenia, West Banat and Centre which were established under the Regional Development Law (Law no. 315/2004) and which is the legal framework for the implementation of the Regional Operational Programme. In analyzing the evolution of regional SME sector indicators will be used and the series of official statistics compiled by the National Institute of Statistics: Number of local units, number of persons employed, turnover.

Results and discussions

Food is an important branch of traditional Romanian manufacturing industry. Synergy between food and agricultural primary production is the vector of economic development in rural areas. Development situation of food units is shown in the following table:

Table 1. *Food industry's contribution to the achievement of key economic and financial indicators between 2008 and 2010*

		2008	**2009**	**2010**
Number of enterprises in food industry	Total	8717	8407	7861
	SMEs	8614	8313	7765
The average number of employees	Total	173596	164825	161665
	SMEs	116970	113710	110967
Turnover (millions lei current prices)	Total	30772	30377	31314
	SMEs	15569	16014	15628
Direct foreign trade (millions current prices)	Total	1098	1190	1745
	SMEs	517	601	769
Gross results of exercise (millions lei current prices)	Total	254	85	-218
	SMEs	76	-5	-137
Investments (millions current prices)	Total	2986	1883	1809
	SMEs	2112	1125	1102

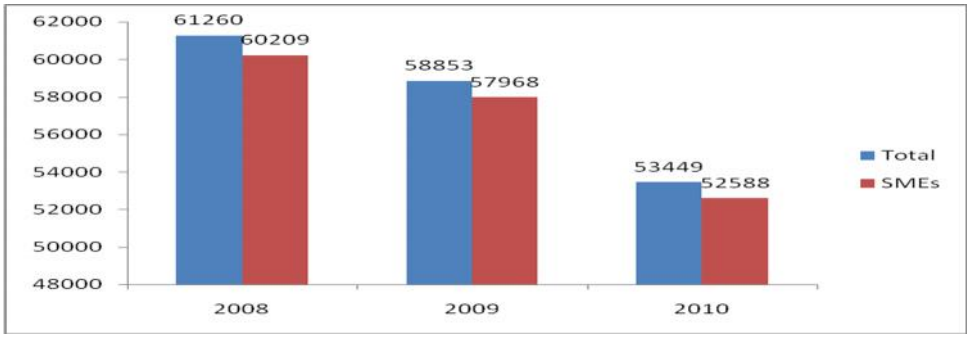
Data source: *INS Romania, 2012.*

It can be seen that in this branch are found over 14% of all enterprises in the industry. When referring to the dynamics of the business, we see that, during 2008-2010, the number of enterprises fell by 856 companies in total, of which 849 SMEs. Also in the period under review, the turnover of food businesses increased by 1.7%.

Exports have been the engine of growth for the Romanian food producers in 2008-2010. They were forced to seek new markets for delivery, while the domestic consumption has been in free fall since the financial crisis. Thus, they increased by 58.92% overall, while SME exports increased by 48.74%.The gross income dynamics of food industry enterprises in 2009 reflects reduction of their profit by 66.53% and in 2010 reached a loss of 218 million overall, respectively 137 million lei.

In a time when bankruptcies, insolvencies and avoid risks are the headlines of the media, in the food industry there are companies engaged in multi-million euro investment. Revival of food industry is achieved through a series of programs promoted by the Ministry of Agriculture and Rural Development (MARD) aiming at, on the one hand, the increasing competitiveness of the food industry and on the other hand to the creation of new processing units in rural areas, supporting the share of projects investment of entrepreneurs. Evolution of the number of SMEs active in the industry, it indicates a reduction of 13.66%, respectively, from 60,209 in 2008 to 52,599 in 2010. At the end of 2010, within this sector operate a total of 52,588 small and medium enterprises, respectively, 860 large enterprises.

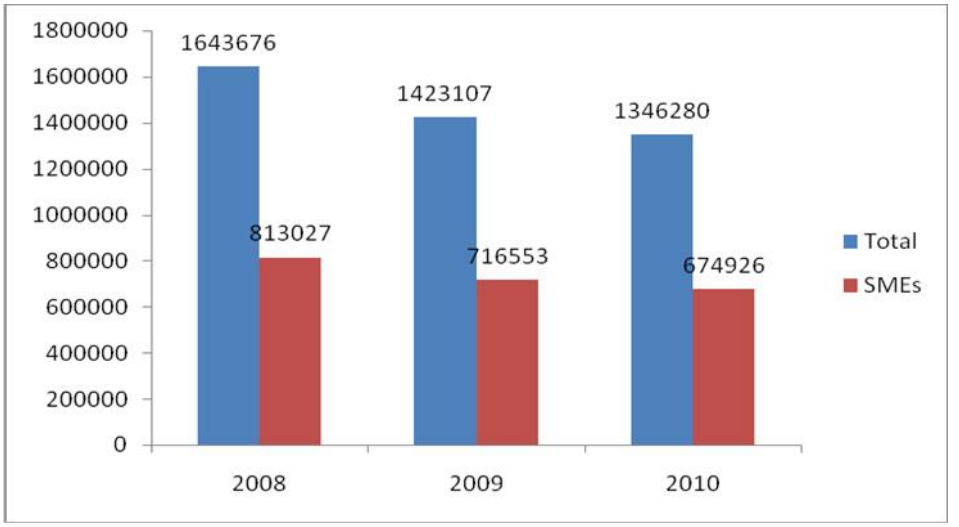
Fig. 1. *Evolution of the number of companies active in the industry: total and SMEs between 2008 and 2010*



Data source: *INS Romania, 2012.*

Another indicator considered in this study is the average number of employees, which is a simple arithmetic average, calculated by dividing the daily number of employees in that year - including weekly rest days, public holidays and other days off - to the number total of calendar days (365 days).

Fig 2. *Evolution of the number of employees in the industry, total and within SMEs between 2008 and 2010*



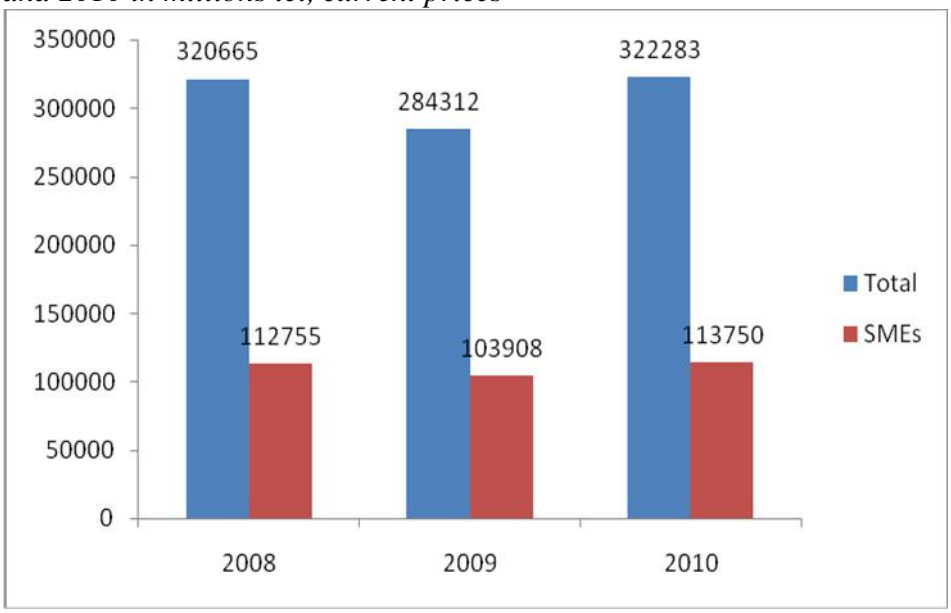
Data source: *INS Romania, 2012.*

The average number of employees in industry between 2008 and 2010 was reduced both by total and those employed in SMEs. It should be noted that the percentage of employees in the industry of SMEs in total employees remains at the same level, about 50%.

If we analyze the dynamics of the industry average number of employees in SMEs, it decreased by 17%, to 3.34 percentage points more than the reduction in the number of SMEs in the industry in the same period.

We also considered for analyze the turnover, calculated as the sum of incomes resulted from sales of goods, sales freight execution of works and supply of services, less rebates, discounts and other discounts to customers.

Fig. 3. *Evolution of turnover, per total industry and SMEs, between 2008 and 2010 in millions lei, current prices*



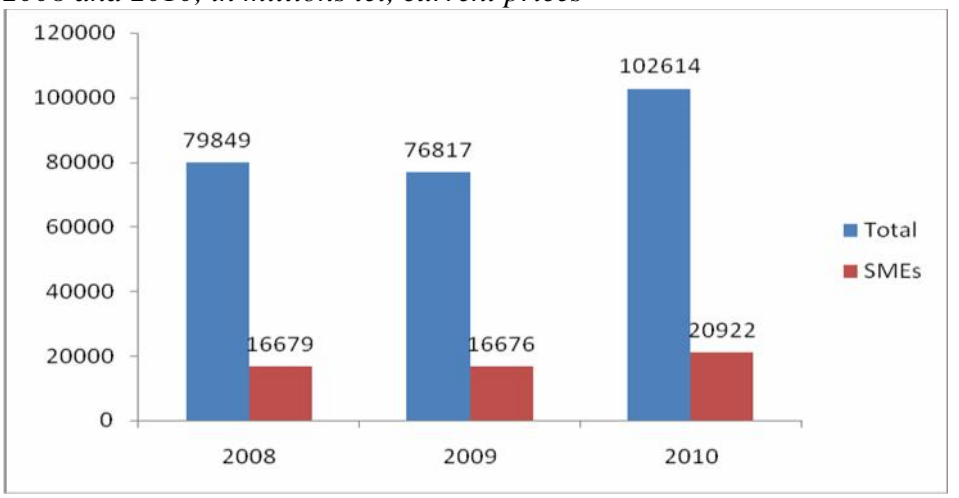
Data source: *INS Romania, 2012.*

It should be noted that the turnover in the industry, both per total and per SMEs grew in 2010 compared to 2008, with 5.04% and respectively with 8.82%, even if their number reduced. Also, within SMEs in 2010 was achieved 35.3% of the total turnover achieved in industry (113.750 million lei).

Over 20 % of the business turnover in the industry is obtained by SMEs. We also analyzed direct exports, calculated as turnover from the export business by selling their products and services without the intervention of a foreign trade companies. It is worth mentioning that direct exports of SMEs in industry increased by 25.43%, during 2008-2010, reflecting their export orientation.

We present here the gross result of exercise, seen as the difference between the revenues from exploitation, financial and extraordinary income and the amount of exploitation, financial and extraordinary expenditure, where positive difference represents profit, and negative ones the losses.

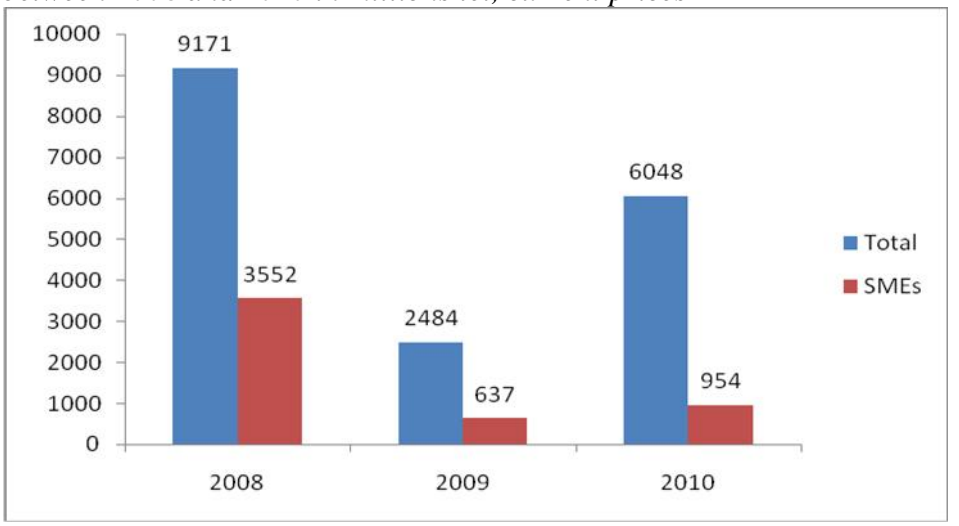
Fig.4. *Evolution of total exports per industry and per SMEs, between 2008 and 2010, in millions lei, current prices*



Data source: *INS Romania, 2012.*

In terms of results, during the period 2008-2010, the situation of SMEs in industry is not favourable, if we consider the downward of the gross result of exercise by 73.15% comparative with 34.06% overall industry. Also, if in 2008, SMEs contributed with 38.73% to the profits in the industry, in 2010 it contribute only with 15.77%.

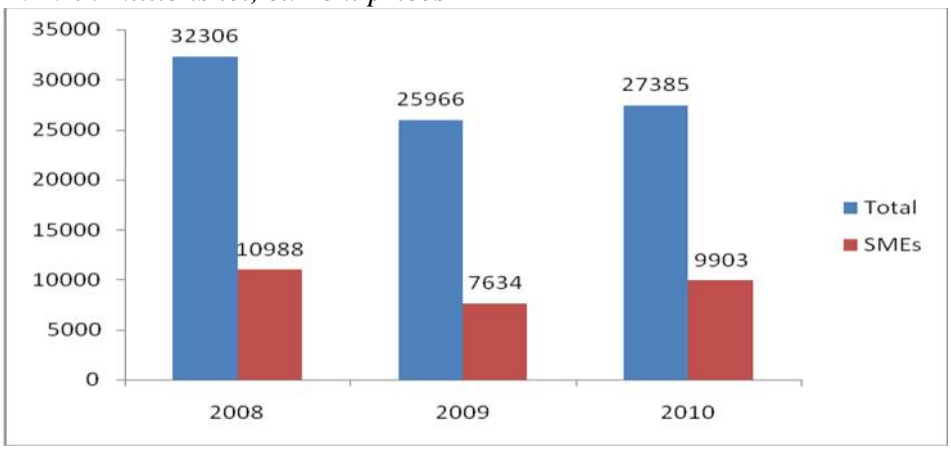
Fig. 5. *The gross result of exercise evolution – per industry and per SMEs between 2008 and 2010 in millions lei, current prices*



Data source: *INS Romania, 2012.*

Other indicator of our study is the investments which represent expenditure for construction, installations and assembly works, for equipment and transport means purchasing, other expenditure for creating new fixed assets, for developing, modernizing, rebuilding the existing ones, as well as the value of services related to ownership transfer of existing fixed assets and lands paid from other units (notary duties, commissions, transport, loading - unloading expenditure). In 2008-2010, investment in SMEs in the industry has been one of their main objectives. Thus, if we consider the dynamics of the industry share of investments made by SMEs in total investment during the period 2008-2010, it is 34.01%, 29.39% and 36.16%. It is worth mentioning that investment in the industry have the same trend during the period 2008-2010.

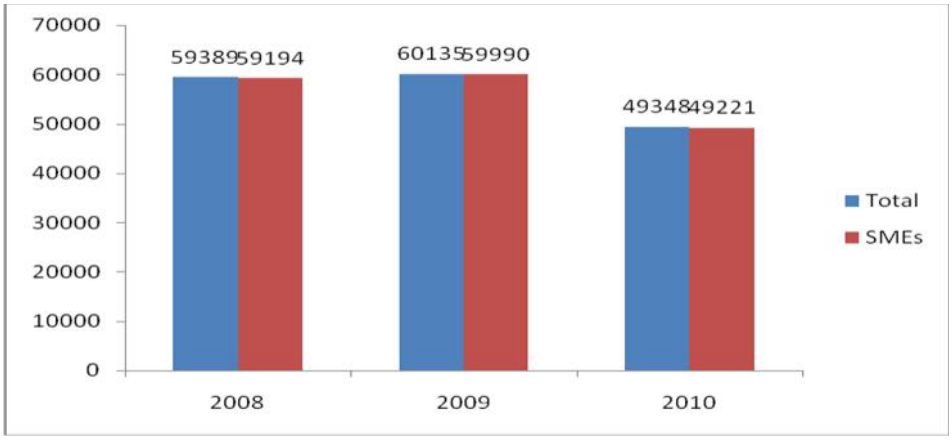
Fig.6. *Investments per total industry and per SMEs between 2008 and 2010 in millions lei, current prices*



Data source: *INS Romania, 2012*.

Between 2008 and 2010, investment in SMEs from industry sector has been one of their main objectives. Thus, if we consider the dynamics of investments share in the industry, made by SMEs in total investments in 2008- 2010, it was of 34.01%, 29.39% and 36.16%. We remarked that it have the same trends as the industry in the same period of time. In total investments in 2010 (27385 million), SMEs have held 36.2%. Structure of investments by source of funding in 2010 was as follows: 66.7% own sources, domestic loans 6.1%, foreign loans 20.4%, state budget and local budgets 1.8%, foreign capital 2.1 % and other sources 2.9%. For SMEs, the structure of funding sources include: 84.0% own funds, 8.8% domestic loans, 0.8% of the state budget and local budgets, 1.0% foreign capital and other sources 2.4%.

Fig. 7. *The dynamic of active enterprises in construction – per total and SMEs between 2008 and 2010*

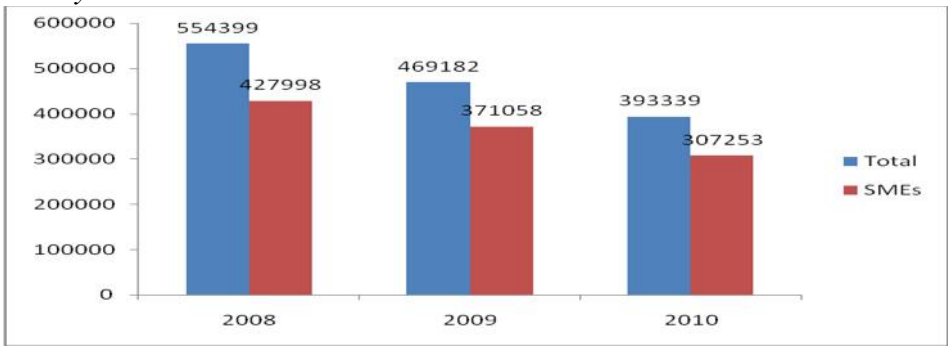


Data source: *INS Romania, 2012*.

The dynamic of small and medium sized active enterprises in industry indicate a decrease with 16.85 %, from 59.154 enterprises in 2009 to 49.221 in 2010. At the end of 2010, in this sector were 49.348 enterprises, of which 99.74 % were enterprises.

In 2008-2010, the average number of employees in construction decreased by 29.06%. As one of the sectors that have been directly affected by the economic crisis that started in 2008, we noted that the average number of employees in SMEs in the construction, in 2010 has been 307.253 people, down by 120.745 persons compared with 2008.

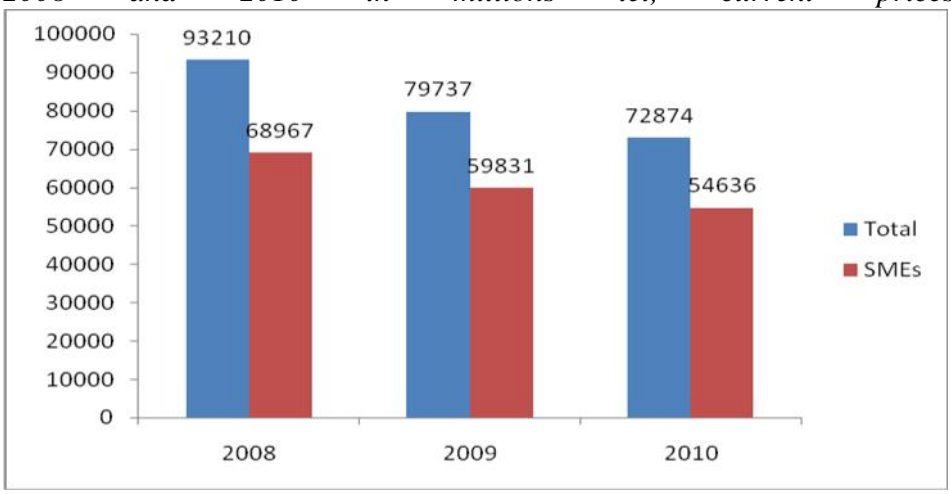
Fig. 8. *Evolution of the number of employees in construction, per total and by SMEs in 2008-2010*



Data source: *INS Romania, 2012*.

Construction sector has been severely affected by the economic crisis, fact confirmed by the dynamics of turnover in construction, which decreased by 21.82% per total, and by 20.77% for the SMEs specialized in construction. In absolute terms, the turnover of construction companies fell by 20.336 million lei in 2010 compared to 2008. In this sector SMEs achieved approximately 75% of total turnover.

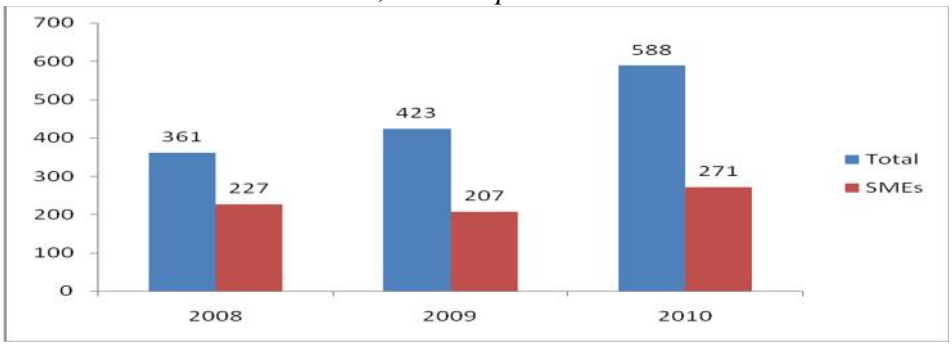
Fig. 9. *Evolution of turnover in industry – per total and by SMEs between 2008 and 2010 in millions lei, current prices*



Data source: *INS Romania, 2012.*

Direct exports in the construction sector recorded growth of 62.88% in 2008-2010, indicating the single market orientation of Romanian companies. If we refer to SMEs in 2010, the export value was 271 million lei, soaring 44 million lei from 2008, respectively 16.24%.

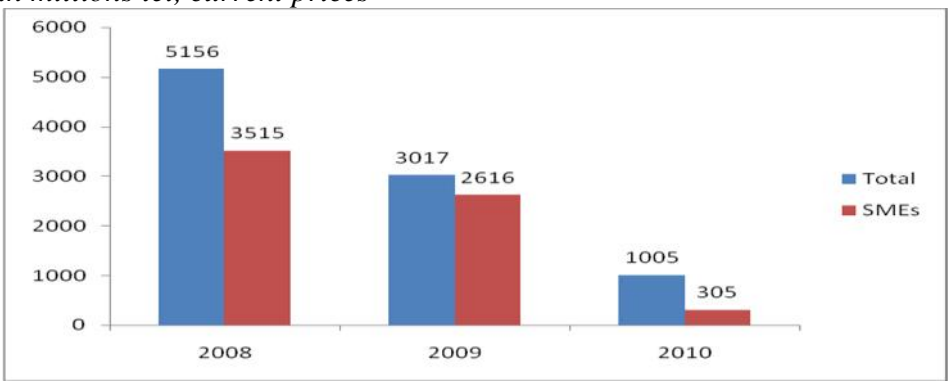
Fig. 10. *Direct export from construction – total and per SMEs between 2008 and 2010 in millions lei, current prices*



Data source: *INS Romania, 2012.*

During the period 2008-2010, the number of enterprises decreased by 16.85%, but profit obtained by construction enterprises decreased more significantly, by 80.5%.

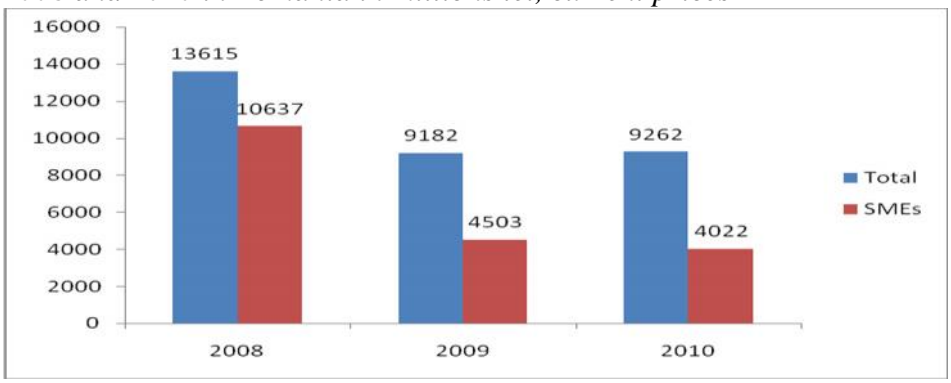
Fig. 11. *The gross result of exercise evolution – per total construction sector and per SMEs within construction sector between 2008 and 2010, in millions lei, current prices*



Data source: *INS Romania, 2012.*

In the SME sector, profits in construction decreased by 91.32%. The total gross result registered in this sector in 2010 was 1.005 million lei, and the SMEs achieved a profit of 305 million.

Fig. 12. *Investments per total construction sector and by SME between 2008 and 2010 in Romania in millions lei, current prices*



Data source: *INS Romania, 2012*

After the boom of 2007, the construction market suffered an unprecedented drop since the end of 2008 when the financial crisis began to make its effects. Lack of new investments in the construction sector

affected in a significant percentage, specialized companies for which contracts concluded in the previous period were an important breath of oxygen. However, a large number of construction companies have ceased activity, reflected by the decrease of investments volume with 62.18% in 2010 compared to 2008. Also, this is due to the lack of financing and commands, which caused the collapse of more than 10,000 companies in the field. Deeper analysis at the level of structure sectors in each region of development can lead to identifying the relationship between the degree of regional specialization in different economic sectors and progress in the development of the SME sector in different regions. In the tables below is shown the structure of SMEs by relevant industries, in each development region in 2008-2010. For 2010 can be drawn from data trends the following information:

a) A more pronounced industrial profile can be found in Bucharest-Ilfov (16.22%), North West (15.82%) and Central region of development (15.24%). It also to be noted the low industrial SME sector in the South-West region of development, where only 7.25% percentage of SMEs are active in the industrial sector of the total enterprises that activate in this geographical area.

Table. 2. *Structure of SMEs in industry and per development regions in 2008-2010*

	Industry		
Number of units	**2008**	**2009**	**2010**
TOTAL	**62029**	**59983**	**54332**
Macro region 1	19603	18656	16874
North West	9951	9492	8594
Center	9652	9164	8280
Macro region 2	14723	14481	13110
North-East	7882	7654	6907
South-East	6841	6827	6203
Macro region 3	17012	16449	14965
South Muntenia	6960	6776	6154
Bucharest- Ilfov	10052	9673	8811
Macro region 4	10691	10397	9383
South-West Oltenia	4414	4377	3939
West	6277	6020	5444

Data source: *INS Romania, 2012.*

b) Construction sector was best represented in 2010 in Bucharest-Ilfov region (22.91% of SMEs located in this geographical area).

Moreover, it is also a novelty which occurred in 2009, unlike previous years, when the higher concentration of SMEs with construction profile was characteristic for the North-West region. According to data for 2010, this level of relative specialization in Bucharest-Ilfov decreases to 17.22%.

Monitoring of SMEs distribution in construction field by regions, in parallel with distribution of SMEs with industrial profile, it reveals relatively similar percentages, leading to the finding of a relationship between the degree of industrialization of the region and construction profile specialization which is more pronounced.

Table. 3. *Structure of SMEs in construction and per development regions in 2008-2010*

	Construction		
Number of units	**2008**	**2009**	**2010**
TOTAL	**59792**	**60610**	**49726**
Macro region 1	18506	18490	14873
North West	10755	10658	8565
Center	7751	7832	6308
Macro region 2	12175	12583	10105
North-East	6110	6241	5122
South-East	6065	6342	4983
Macro region 3	19936	20308	17130
South Muntenia	6673	6942	5739
Bucharest- Ilfov	13263	13366	11391
Macro region 4	9175	9229	7618
South-West Oltenia	3514	3650	3118
West	5661	5579	4500

Data source: *INS Romania, 2012.*

c) External trade is the most important component of all economic activities of SMEs in all 8 regions. The highest percentage of SMEs with trade profile was recorded in Bucharest-Ilfov (29.86%) and North West (13.84).

The prevalence of trade sector in these regions can be associated with an important number of small family business and a low degree of concentration of distribution activities.

d) Specialization in services is a key feature of the SME sector performed across the country and in each Region. However, the strongest representation services sector is in the region Bucharest-Ilfov, justified by the fact that 29.86% of SMEs are located in the service sector.

Table 4. *Structure of SMEs with external trade as main activity and per development regions in 2008-2010*

	External trade		
Number of units	**2008**	**2009**	**2010**
TOTAL	**220994**	**204988**	**188989**
Macro region 1	52939	48560	44395
North West	28334	25772	23499
Center	24605	22788	20896
Macro region 2	57199	52032	47818
North-East	27145	24637	22457
South-East	30054	27395	25361
Macro region 3	71867	68345	63641
South Muntenia	27227	25352	23510
Bucharest- Ilfov	44640	42993	40131
Macro region 4	38989	36051	33135
South-West Oltenia	19484	17920	16679
West	19505	18131	16456

Data source: *INS Romania, 2012.*

This finding can be explained by market size and purchasing power of the resident population and attracted by Bucharest and Ilfov county.

Table 5. *Structure of SMEs with services as main activity*

	Services		
Number of units	**2008**	**2009**	**2010**
TOTAL	**202169**	**205561**	**187741**
Macro region 1	53393	53779	48495
North West	28576	28762	25990
Center	24817	25017	22505
Macro region 2	39800	41069	37256
North-East	18882	19478	17577
South-East	20918	21591	19679
Macro region 3	77503	78417	72494
South Muntenia	17049	17524	16434
Bucharest- Ilfov	60454	60893	56060
Macro region 4	31473	32296	29496
South-West Oltenia	11618	12169	11231
West	19855	20127	18265

Data source: *INS Romania, 2012.*

The consumption within national public institutions located in this geographical area creates the potential for a correspondingly greater demand and diversified services provided by the SMEs from this field of activity.

Acknowledgment

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ANALYSIS OF REALIZED INVESTMENTS IN AGRICULTURE ON THE TERRITORY OF DANUBE BASIN IN THE REPUBLIC OF SERBIA[1]

Jonel Subić[2], Marko Jeločnik[3]

Abstract

Investments represent basic material factor of economic – social development, from whose volume, structure and efficiency in great measure depends how will be and until which level will be solved major questions of sustainable development of agriculture in any country, region or local community. Considering potential perspectives for Serbia that come from the process of European Union (EU) enlargement, as well as that in sustainable development of agricultural husbandries investments will play key role, this paper is focused on analysis of realized investments in agriculture on the territory of Danube Basin in the Republic of Serbia. In that context, frontiers of research include: (1) analysis of realized investments in agriculture on the territory of Upper Danube Basin; (2) analysis of achieved agricultural investments in area of Metropolitan Belgrade - Novi Sad and (3) analysis of realized investments in agriculture in the Carpathians.

Key words: *investments, Upper Danube region, Metropolitan area Belgrade - Novi Sad, the Carpathians, Republic of Serbia*

Introduction

According to research activities and planned frontiers of UNESCO MAB preserve of biosphere „Danube-Drava-Mura“, for the analysis of realized

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investments in agriculture, ***territory of Upper Danube Region*** is observed in wider context and covers administrative territory of the Sombor city, as well as administrative area of the municipalities of Apatin, Bač and Bačka Palanka.

Having in mind solutions from the Regional spatial plan of administrative territory of Belgrade city (Official gazette of Belgrade city, no. 10/2004), Statute of Novi Sad city (Official gazette of Novi Sad city, no. 43/2008) and Draft of spatial plan of Republic of Serbia (2010), as well as considering defined research area, ***territory of Metropolitan area Belgrade-Novi Sad***, for the analysis of realized investments in agriculture, is observed in narrow sense and covers administrative area of Belgrade city (17 municipalities) and Novi Sad city (2 municipalities), as well as administrative area of cities that are located on the axis Belgrade-Novi Sad and gravitated to Danube river: Pančevo and Smederevo, and administrative area of municipalities that also lies on the axis Belgrade-Novi Sad and gravitated to Danube river: Beočin, Irig, Sremski Karlovci, Inđija, Ruma, Pećinci and Stara Pazova.

Observing a frontiers of the Carpathians in the Republic of Serbia, defined by Carpathian convention (Official gazette of RS – International agreements, no. 102/2007) and proposal for their enlargement, during the Convention implementation (REC-EURAC, 2006), as well as area of Spatial plan for special purpose National park „Đerdap“ (Official gazette of RS, no. 118/2009) and Master plan of touristic destination „Lower Danube region“ (2007), ***territory of the Carpathians in the Republic of Serbia***, for the analysis of realized investments in agriculture, includes administrative area of the municipalities Golubac, Kučevo, Majdanpek, Kladovo and Negotin.

Volume, structure and efficiency of investment in great measure affect how and until which will be solved basic issues of economic growth, balanced economic development, employment, level of living standard, etc.

Business ambient within the territory of Danube Basin, as well as in the whole Serbia, has considerably advanced thanks to implementation of number of laws and regulations since 2001 to nowadays. Main goals of law reforms, those are in accordance to European Union legislative, are directed to business simplicity and safer investment. In the process of EU accession is expected a establishment of many new reform laws, so for

investors the highest importance will have laws directed to land and construction, as well as legislation connected to industrial and technological parks (*Subić, 2012*.).

In the context of potentials for investments attraction, it should be underlined that the business costs in the Republic of Serbia are relatively more favourable in compare to other countries within the Region, what represents a result of (www.siepa.sr.gov.rs):

- *Lower tax rates,* as are: corporate tax of 10%; VAT of 8 or 20%; Income tax of 12%;
- *Number of investment incentives,* which includes state subventions for direct investments (3,000 – 10,000 €/new employee), corporate tax exemption in the period of 10 years for big investments, as well as income tax and social insurance exemption for the employees younger from 30 and older than 45 years;
- *Cheaper communal services and products;*
- *Quality and price of manpower* which are according investors opinion one of key reasons for investment. Human resources are characterised by: high productivity (within the industry it grows per annual rate of 11%); excellent technical education (1/3 of around 14,000 graduated students comes each year from faculties of natural sciences); much lower labour costs (they amount less than 50% of salary expenditures in new EU member states from East Europe);
- *Free trade regime,* with Russian Federation and countries of Southeast Europe (CEFTA Agreement);
- *Stimulation of production activities* through lower fees for construction land arrangement based on number of employees.

Material and working method

Conduction of mentioned research imposed data/information collection from many resources (scientific and statistical publications) that before all refer to following thematic areas: investments, economy, agriculture and demography.

For a analysis of realized investments in agriculture on the territory of Danube Basin region in Republic of Serbia was used methodology that implies overview of volume of financial investments in fixed assets, coming from next indicators:

- General characteristics of up today investments;
- Investments as factor of development of agriculture;

- Evaluation of achieved investments in agriculture.

Used analysis method for volume of realized investments in agriculture on the territory of Danube Basin in Serbia, could be used for any other region in Republic, or for complete Danube Region.

General characteristics of previous investments

For more realistic perceiving of up today investment activity, accent was put on trend of totally realized investments in fixed assets on the territory of the Republic of Serbia and Danube Region. Analysis includes period of ten years (2001-2010) for mentioned areas.

On the Republic level, during the complete period of observation was noted a positive trend of investment, that was terminated in 2009, mainly caused by the impact of the global economic crisis.

Level of investments in the Upper Danube region**,** had certain degree of oscillations, but generally had a positive trend (Table 1.).

Share of investments of mentioned area in total investment in Serbia is in range from 1.68 to 3.42%. The largest amount of investments in Upper Danube region was made in 2008 (around 16.18 billion RSD), when share of investment in region in total sum of Republic investments amounted 3.42%. Unfortunately, the minimal amount of investments was made in the region of Upper Danube during the 2001 (1.60 billion RSD), with share in total investments on Republic level of 2.90%. In last analyzed year (2010) total realized investments in observed region took share of 1.99% of total investments on Republic level. Increased participation is before all a result of bigger investment growth in the Upper Danube region in compare to increase in investment activity in Serbia as a whole.

By calculation of the average annual growth rates, it turns out that the rate achieved at the Republic level (25.47%) was higher than the rate achieved at the level of the Upper Danube region (20.30%). Consequently, it can be concluded that the poorer investment activity caused a slower economic growth of the Upper Danube region in compare to economic development of the complete Republic of Serbia. This is a fact that is pointing to greater unemployment and less number of newly created jobs in the economy of the Upper Danube region compared to the national level.

Table 1. *Spatial distribution of totally realized investments* in the Upper Danube region (in 000 RSD)*

Year	Unit of measure	Territory	
		Republic of Serbia**	Upper Danube region
2001.	RSD	55,188,399.00	1,600,745.00
	%	100.00	2.90
2002.	RSD	102,860,663.00	2,922,406.00
	%	100.00	2.84
2003.	RSD	115,662,223.00	2,143,475.00
	%	100.00	1.85
2004.	RSD	152,929,464.00	3,442,369.00
	%	100.00	2.25
2005.	RSD	163,549,507.00	3,794,830.00
	%	100.00	2.32
2006.	RSD	291,845,739.00	4,895,258.00
	%	100.00	1.68
2007.	RSD	398,990,391.00	9,262,916.00
	%	100.00	2.32
2008.	RSD	472,746,680.00	16,178,900.00
	%	100.00	3.42
2009.	RSD	369,438,089.00	7,329,942.00
	%	100.00	1.98
2010.	RSD	425,400,001.00	8,446,205.00
	%	100.00	1.99

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

On the level of Metropolitan area Belgrade-Novi Sad, during the whole period (2001-2010), was noted positive investment trend. Exception was 2009, when started global economic crisis that obviously had impact on Serbia too. Considering that total volume of investments was decreased, fact that in 2009 investments in Metropolitan area Belgrade-Novi Sad were higher, talks about increased share of observed region in total national investments, what can represent positive impulse for further investment activities.

However, in this case it did not happen, because the share of investment in researched area within the total Republic investments in 2010 was decreased (for 4.59%), (Table 2.).

Table 2. *Spatial distribution of totally realized investments* on the territory of Metropolitan area Belgrade-Novi Sad, (in 000 RSD)*

Year	Unit of measure	Territory	
		Republic of Serbia**	Metropolitan area Belgrade-Novi Sad
2001.	RSD	55,188,399.00	26,348,469.00
	%	100.00	42.31
2002.	RSD	102,860,663.00	49,903,466.00
	%	100.00	48.52
2003.	RSD	115,662,223.00	59,551,991.00
	%	100.00	51.49
2004.	RSD	152,929,464.00	81,721,217.00
	%	100.00	53.44
2005.	RSD	163,549,507.00	99,783,262.00
	%	100.00	61.01
2006.	RSD	291,845,739.00	164,440,955.00
	%	100.00	56.35
2007.	RSD	398,990,391.00	239,815,515.00
	%	100.00	60.11
2008.	RSD	472,746,680.00	287,312,769.00
	%	100.00	60.78
2009.	RSD	369,438,089.00	225,899,778.00
	%	100.00	61.15
2010.	RSD	425,400,001.00	240,589,911.00
	%	100.00	56.56

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Share of investments in Metropolitan area Belgrade-Novi Sad in total investments in Serbia range in interval 42.31-61.15%. The highest amount of investments in mentioned area is achieved in 2008 (287.31 billion RSD), when its share within the investments on Republic level was 60.78%. On the other hand, the lowest amount of investments in Metropolitan area Belgrade-Novi Sad was achieved in 2001 (26.35 billion RSD), when its share within the total sum of investments at national level was 42.31%.

Calculating an average annual growth rate, it come to fact that achieved rate at the Republic level (25.47%) was lower than this one achieved at the level of Metropolitan area Belgrade-Novi Sad (27.86%). According to that, it can be concluded that stronger investment activity caused higher economy growth in observed territory in compare to national economy development.

This can be a fact that points out on greater employment, as well as, in average, much more new jobs created within the economy of researched area in compare to Republic level.

Level of investments on the territory of the Carpathians' had expressed oscillations, although it has positive trend (Table 3.).

Table 3. *Spatial distribution of totally realized investments* in the Carpathians' (in 000 RSD)*

Year	Unit of measure	Territory	
		Republic of Serbia**	The Carpathians'
2001.	RSD	55,188,399.00	300,205.00
	%	100.00	0.54
2002.	RSD	102,860,663.00	528,014.00
	%	100.00	0.51
2003.	RSD	115,662,223.00	679,740.00
	%	100.00	0.59
2004.	RSD	152,929,464.00	158,221.00
	%	100.00	0.10
2005.	RSD	163,549,507.00	1,076,931.00
	%	100.00	0.66
2006.	RSD	291,845,739.00	888,768.00
	%	100.00	0.30
2007.	RSD	398,990,391.00	1,521,450.00
	%	100.00	0.38
2008.	RSD	472,746,680.00	1,554,482.00
	%	100.00	0.33
2009.	RSD	369,438,089.00	2,393,200.00
	%	100.00	0.65
2010.	RSD	425,400,001.00	4,278,232.00
	%	100.00	1.11

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Share of investments in observed region within the complete investments in the Republic is extremely low, and was in range from 158.22 million RSD (in 2004) to 4.28 billion RSD (in 2010), or in other words it had share of just 0.10-1.11% in total investments at national level. Increase of mentioned share during the last year, was primarily consequence of greater investment growth in the Carpathians' than the increase of investment activity in the Republic of Serbia.

Calculation of average annual growth rates showed that rate achieved at national level (25.47%) was lower than rate achieved at the level of the Carpathians (34.34%). So, it can be concluded that better investment activity caused higher economy growth in Carpathian region in compare to economic development of compete Serbia. This fact points to currently higher employment, as well as much more created new jobs in Carpathians' economy in compare to Republic level.

Investment as a factor of agricultural development

Realization of national plan and program for national economy recovery and respect of market economy postulates, in large extent is conditioned by realization of more efficient and profitable production, productivity and optimal use of production factors. That is one of the ways which national agriculture has to pass within the reform process and preparing of Serbia for accession to the EU.

Having in mind the process of EU enlargement and perspectives that are arising for Serbia, it is evident that in future development of agricultural husbandries in Serbia investment activities will have crucial place. Investments play a key role in realization of goals and priorities of agricultural and rural development, primarily as a driving tool for quantitative and qualitative growth of agricultural production factors and total production, as well as for creation of conditions for a better life in the village (*Subić, 2010.*).

At this stage, growth of investments in agriculture represents a condition of its technical and technological modernization, and ultimately one of the conditions of stability of whole national economy. Without adequate volume and structure of investments, it cannot be expected growth of fixed assets and permanent working capital, creation of new jobs, better performances of used equipment, higher productivity, diversification of production, etc., as on regional (agricultural and rural) level, as well as on national level (*Subić, 2007.*).

Among activities that are applied in rural areas, important place takes production of goods necessary for human nutrition, as for textile, food and other industries. These activities are directly connected to the economic function of agriculture. They affect the growth of competitiveness and significantly contribute to sustainable development.

By observing of realized investments in agriculture, it can be noticed that they showed increase tendency within the period 2001-2008 on the Republic level,

although existed discontinuity in 2003. Unfortunately, in period 2009-2010 this indicator had exclusively decrease tendency.

At the level of Upper Danube region (during the complete period 2001-2010), indicator was noticeably varied as well as its share within the investments in agriculture, forestry and water management of the Republic of Serbia (2.94-27.01%). Consequently, it can be concluded that sector of agriculture does not give equitable contribution to maintaining of economic-social safeness of population in Upper Danube region, but it represents for sure unused possibility for development of this territory (Table 4.).

Table 4. *Spatial distribution of realized investments* in agriculture** of Upper Danube region (in 000 RSD)*

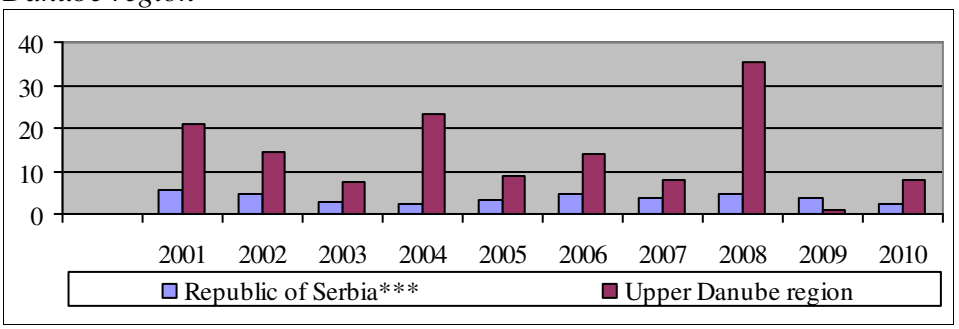
Year	Unit of measure	Territory	
		Republic of Serbia***	Upper Danube region
2001.	RSD	3,146,845.00	332,921.00
	%	100.00	10.58
2002.	RSD	4,947,895.00	417,074.00
	%	100.00	8.43
2003.	RSD	3,260,612.00	157,466.00
	%	100.00	4.83
2004.	RSD	3,721,166.00	807,667.00
	%	100.00	21.70
2005.	RSD	5,028,799.00	329,957.00
	%	100.00	6.56
2006.	RSD	13,016,883.00	681,551.00
	%	100.00	5.24
2007.	RSD	14,111,462.00	713,588.00
	%	100.00	5.06
2008.	RSD	21,099,194.00	5,698,310.00
	%	100.00	27.01
2009.	RSD	13,203,838.00	383,768.00
	%	100.00	2.94
2010.	RSD	9,219,328.00	656,937.00
	%	100.00	7.13

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
***Agriculture, hunting and forestry.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Average annual growth rates of investments realized in agriculture at both levels are positive. Specifically, average annual growth rate, on the Republic territory is above 12%, while at Upper Danube region level is under 8%.

In period 2001-2010, on area of the Republic of Serbia, share of agricultural investments in totally realized investments varied from year to year, so the highest share of this sector was in 2001 (5.7%), while the lowest was achieved in 2010 (2.17%). In same period, share of investments in agriculture in total sum of realized investments on the territory of Upper Danube region was in interval of 5.24 – 35.22% (Graph 1.).

Graph 1. *Share of agriculture* in total realized investments** in Upper Danube region*



** Agriculture, fishery, hunting, forestry and water management.*
*** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

So, there are significant variation in share of agricultural in total investments in Upper Danube region (the lowest in 2009 and the highest in 2008), what is confirmed by high value of standard deviation. After insight into value of variation coefficient, it can be concluded that there are some bigger deviations at the level of mentioned territory. Despite this fact, it can be seen that the area of Upper Danube region, in term of share of agriculture in totally realized investments, is significantly above Republic level.

On the level of Metropolitan area Belgrade-Novi Sad, during the period 2001-2008, indicator had constant growth, while in time interval 2009-2010, it permanently decreased. On other hand, through complete observed period 2001-2010, it was noticeable variation of its share in agricultural investments

on Republic level (17.82-52.88%). According to that, it can be concluded that sector of agriculture does not give balanced contribution to maintaining of economic-social safeness of population whose live in researched area, but represents unused potential for its further development (Table 5.).

Table 5. *Spatial distribution of realized investments* in agriculture** of Metropolitan area Belgrade-Novi Sad (in 000 RSD)*

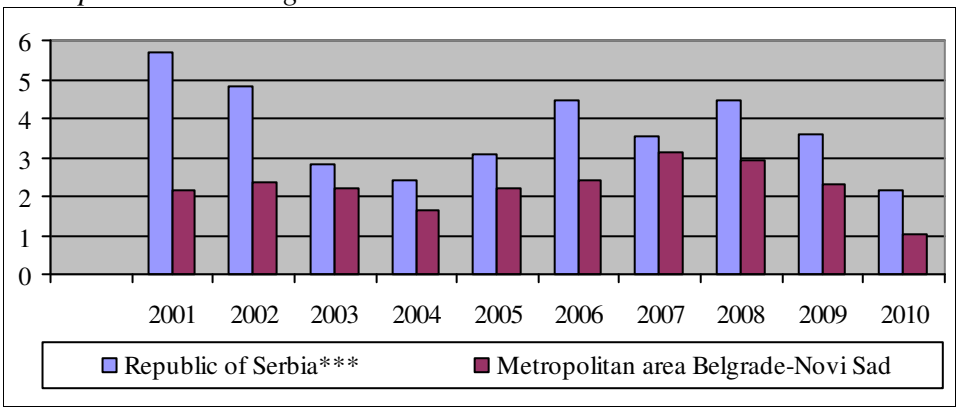
Year	Unit of measure	Territory	
		Republic of Serbia***	**Metropolitan area Belgrade-Novi Sad**
2001.	RSD	3,146,845.00	560,691.00
	%	100.00	17.82
2002.	RSD	4,947,895.00	1,180,848.00
	%	100.00	23.87
2003.	RSD	3,260,612.00	1,324,056.00
	%	100.00	40.61
2004.	RSD	3,721,166.00	1,360,565.00
	%	100.00	36.56
2005.	RSD	5,028,799.00	2,218,088.00
	%	100.00	45.36
2006.	RSD	13,016,883.00	3,957,844.00
	%	100.00	30.41
2007.	RSD	14,111,462.00	7,462,489.00
	%	100.00	52.88
2008.	RSD	21,099,194.00	8,451,244.00
	%	100.00	40.05
2009.	RSD	13,203,838.00	5,184,492.00
	%	100.00	39.27
2010.	RSD	9,219,328.00	2,510,740.00
	%	100.00	27.23

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
***Agriculture, hunting and forestry.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Average annual growth rates of investments realized in agriculture at both levels are positive. Specifically, average annual growth rate, on the Republic territory is above 12%, while on Metropolitan area Belgrade-Novi Sad is above 18%.

In period 2001-2010, share of investments in agriculture in total sum of realized investments on the observed territory was in interval of 1.04 – 3.11% (Graph 2.).

Graph 2. *Share of agriculture* in total realized investments** in Metropolitan area Belgrade-Novi Sad*



** Agriculture, fishery, hunting, forestry and water management.*
*** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

There are obvious variations in share of agricultural in total investments (the highest in 2007 and the lowest in 2010), what is confirmed by high value of standard deviation. After insight into value of variation coefficient, it can be concluded that there are not to big deviations at the level of mentioned territory. On the other hand, it can be easily noticed that this area, according the share of agriculture in total sum of realized investments, is significantly under Republic level.

On the level of the Carpathians' (during the complete period 2001-2010), achieved investments in agriculture had notable variation, just as their share in investment in agriculture at Republic level (0.04-1.49%). In certain years (2003, 2006, as well as period 2009-2010), investment activity was completely absent, so on that way it abridged contribution of agriculture in maintaining of economic-social safeness of citizens in the Carpathians'. But beside that fact, sector of agriculture is unused possibility for sustainable development of researched area (Table 6.).

Table 6. *Spatial distribution of realized investments* in agriculture**of the Carpathians' (in 000 RSD)*

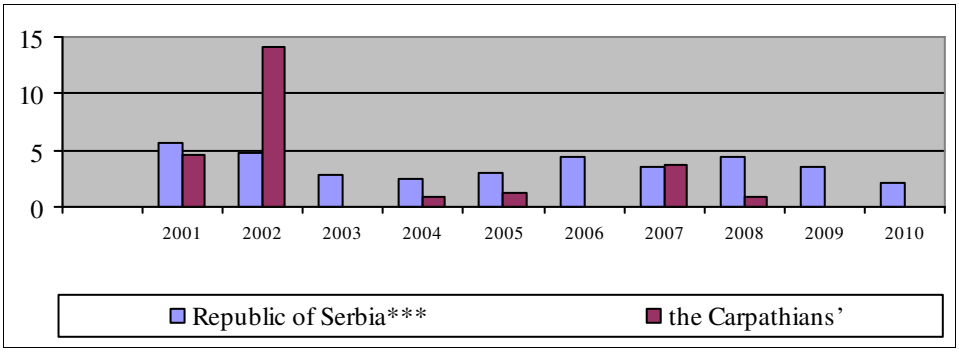
Year	Unit of measure	Territory	
		Republic of Serbia***	The Carpathians'
2001.	RSD	3,146,845.00	13,817.00
	%	100.00	0.44
2002.	RSD	4,947,895.00	74,068.00
	%	100.00	1.49
2003.	RSD	3,260,612.00	0.00
	%	100.00	0.00
2004.	RSD	3,721,166.00	1,506.00
	%	100.00	0.04
2005.	RSD	5,028,799.00	14,162.00
	%	100.00	0.28
2006.	RSD	13,016,883.00	0.00
	%	100.00	0.00
2007.	RSD	14,111,462.00	55,735.00
	%	100.00	0.39
2008.	RSD	21,099,194.00	12,566.00
	%	100.00	0.06
2009.	RSD	13,203,838.00	0.00
	%	100.00	0.00
2010.	RSD	9,219,328.00	0.00
	%	100.00	0.00

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
***Agriculture, hunting and forestry.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Average annual growth rates of investments realized in agriculture are not positive at all levels. Specifically, average annual growth rate, on the territory of Serbia is positive and has value of 12.69%, while on level of the Carpathians' this indicator has negative value (-1.35%).

In period 2001-2010, share of investments in agriculture in total sum of realized investments on the territory of the Carpathians' in Serbia was in interval of 0.81 – 14.03% (Graph 3.).

Graph 3. *Share of agriculture* in total realized investments** on the territory of the Carpathians'*



** Agriculture, fishery, hunting, forestry and water management.*
*** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
**** Data for Kosovo and Metohija are not included.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Therefore, there are obvious variation in share of agricultural in total investments in the Carpathians' (the lowest in 2008 and the highest in 2002), what is confirmed by high value of standard deviation. By insight into value of variation coefficient, it can be concluded that there are bigger deviations at the level of this territory. Beside that fact, it can be seen that area of the Carpathians', according to share of agriculture in total sum of realized investments, is in average above national level (1.89:1).

Evaluation of realized investments in agriculture

For assessment of realized investments in agriculture within the Danube Basin in Serbia (Upper Danube region, Metropolitan area Belgrade-Novi Sad and the Carpathians'), next indicators are used (*Cvijanović et al, 2007*):

- Realized investments in agriculture per agriculturalist;
- Realized investments in agriculture per active agriculturalist;
- Realized investments in agriculture per unit of agricultural surface;
- Realized investments in agriculture per unit of cultivated surface;
- Realized investments in agriculture per unit of arable surface.

For more realistic evaluation of realized investments in agriculture on researched territory are analyzed data that refer as to Danube Basin, as well as to Republic at whole. It should bear in mind that all data/indicators were

not available for same year for all territories, what could indicate that their comparison is not logical. However, comparison was done, based on assumption that there were no big differences, so that similar results will be gained in case that all data for 2010 were available.

According to gained results for ***Upper Danube region***, it can be concluded that from all observed indicators maximum value was achieved at indicator - realized investments in agriculture per active agriculturalist, while minimal value had indicator - realized investments in agriculture per unit of agricultural surface (Republic of Serbia, 3.61:1; Upper Danube region, 9.35:1), (Table 7.).

Table 7. *Evaluation of achieved investments* in agriculture** in Upper Danube region*

Indicator	UM	Territory	
		Serbia***	**Upper Danube**
Realized investments in agriculture per agriculturalist****	RSD	6,055.79	1,748.44
Realized investments in agriculture per active agriculturalist****	RSD	9,349.13	30,519.09
Realized investments in agriculture per unit of agricultural surface*****	RSD	2,590.69	3,263.94
Realized investments in agriculture per unit of cultivated surface*****	RSD	3,097.34	3,305.16
Realized investments in agriculture per unit of arable surface*****	RSD	3,999.95	3,594.75

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Agriculture, fishery, hunting, forestry and water management.*
**** Data for Kosovo and Metohija are not included.*
***** Data for 2002.*
****** Data for 2010.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Popis stanovništva 2002 (Ukupno i poljoprivredno stanovništvo u Srbiji), RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Gained results imply that all indicators at the level of Upper Danube region have much higher values than indicators at national level.

Analysis indicates that concerning first indicator territory of Upper Danube region is significantly behind the Republic level. But, in terms of other indicators (primarily - *realized investments in agriculture per active*

agriculturalists), results from observed territory are in average better than national level.

From the standpoint of realized investments in agriculture evaluation, it can be concluded that in average agriculture has higher contribution to sustainable rural development in the zone of Upper Danube than on Republic level.

After reconsidering of gained results for ***Metropolitan area Belgrade-Novi Sad***, it can be concluded that from all observed indicators maximum value was achieved at indicator - realized investments in agriculture per active agriculturalist, while minimal value had indicator - realized investments in agriculture per unit of agricultural surface (Republic of Serbia, 3.61:1; Metropolitan area Belgrade-Novi Sad, 4.97:1), (Table 8.).

Table 8. *Evaluation of achieved investments* in agriculture** in Metropolitan area Belgrade-Novi Sad*

Indicator	UM	Territory	
		Serbia***	Metropolitan area Belgrade - Novi Sad
Realized investments in agriculture per agriculturalist****	RSD	6,055.79	14,114.00
Realized investments in agriculture per active agriculturalist****	RSD	9,349.13	23,156.06
Realized investments in agriculture per unit of agricultural surface*****	RSD	2,590.69	4,656.62
Realized investments in agriculture per unit of cultivated surface*****	RSD	3,097.34	4,933.53
Realized investments in agriculture per unit of arable surface*****	RSD	3,999.95	7,656.26

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Agriculture, fishery, hunting, forestry and water management.*
**** Data for Kosovo and Metohija are not included.*
***** Data for 2002.*
****** Data for 2010.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Popis stanovništva 2002 (Ukupno i poljoprivredno stanovništvo u Srbiji), RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

According to gained results it can be concluded that indicators at the level of Metropolitan area Belgrade-Novi Sad have significantly higher values than indicators at Republic level.

Also, analysis of obtained results indicates that concerning third and fourth indicator territory of Republic of Serbia is not far behind the Metropolitan area Belgrade-Novi Sad. However, in terms of other indicators (primarily - *realized investments in agriculture per active agriculturalists*), results from observed territory are much above national level.

So, after evaluation of realized investments in agriculture, it can be concluded that contribution of agriculture to sustainable rural development is notably higher in Metropolitan area Belgrade-Novi Sad than in complete Republic.

According to gained results for ***the Carpathians***, it can be concluded that from all observed indicators maximum value was achieved at indicator - realized investments in agriculture per active agriculturalist, while minimal value had indicator - realized investments in agriculture per unit of agricultural surface (Republic of Serbia, 2.26:1; Carpathians, 73.44:1), (Table 9.).

Table 9. *Evaluation of achieved investments* in agriculture** in Carpathians*

Indicator	UM	Territory	
		Serbia***	Carpathians
Realized investments in agriculture per agriculturalist****	RSD	6.055,79	3.802,06
Realized investments in agriculture per active agriculturalist****	RSD	9.349,13	5.455,40
Realized investments in agriculture per unit of agricultural surface*****	RSD	4.142,63	74,28
Realized investments in agriculture per unit of cultivated surface*****	RSD	4.996,59	90,16
Realized investments in agriculture per unit of arable surface*****	RSD	6.389,65	146,15

** Investments in fixed assets of social sector (which includes also cooperative, mixed and public form of ownership) in current prices.*
*** Agriculture, fishery, hunting, forestry and water management.*
**** Data for Kosovo and Metohija are not included.*
***** Data for 2002.*
****** Data for 2008.*
Source: *Opštine u Republici Srbiji 2000-2010, RZS, Beograd; Popis stanovništva 2002 (Ukupno i poljoprivredno stanovništvo u Srbiji), RZS, Beograd; Investicije u Republici Srbiji 2000-2009, RZS, Beograd.*

Gained results imply that all indicators at the level of Carpathians have much lower values than indicators at Republic level.

Conducted analysis indicates that concerning first and second indicator territory of Carpathians has no significant deviations in compare to Republic level. But, in terms of other indicators, results from observed territory are drastically poorer in compare to national level.

It is evident that from the standpoint of realized investments in agriculture, it can be concluded that contribution of agriculture to sustainable rural development in Carpathians is on very low level in compare to whole Republic.

Conclusion

Reconsidering all results gained during the analysis of realized investments in agriculture on the territory of Danube Basin in Republic of Serbia, next observations can be underlined:

- poorer investment activity affected lower economic growth of Upper Danube zone in compare to economic development of whole Republic of Serbia;
- stronger investment activity caused higher economic growth of Metropolitan area Belgrade–Novi Sad in compare to national economic development;
- better investment activity caused higher economic growth of the Carpathians in compare to economic development of whole Republic;
- according to share of agriculture in sum of realized investments, area of Upper Danube region is significantly above the national level;
- according to share of agriculture in sum of realized investments, Metropolitan area Belgrade-Novi Sad is significantly under the national level;
- according to share of agriculture in sum of realized investments, area of Carpathians is, in average, above the national level;
- assessment of realized investments in agriculture indicates that in average contribution of agriculture to sustainable rural development is bigger in the Upper Danube region than on the national level;
- assessment of realized investments in agriculture within the Metropolitan area Belgrade–Novi Sad implies a fact that contribution of agriculture to sustainable rural development in mentioned area is bigger than in whole Republic;

- by insight into the assessment of realized investments in agriculture of the Carpathians can be noticed very small contribution of agriculture to sustainable rural development of observed area in compare to whole Republic of Serbia;

Besides underlined observations, there should be left a room for finding and appliance of new methods for analysis of realized investments in agriculture on macroeconomic level, as well as possibility for free choice in realization of sustainable agricultural and rural development concept (*Subić et al, 2012.).*

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PROFITABILITY AND GROSS MARGIN AT SWINE - COMPARATIVE ANALYSIS

Lidia Iurchevici [1], *Rodica Chetroiu* [2]

Abstract

In Romania must pay particular attention to growth and exploitation systems adaptation of pigs for meat to EU requirements. At the same time, it is necessary to protect and foster those characteristics of growing and exploitation pigs that have competitive advantages regarding the quality of the products obtained, and minimum environmental impact technologies. A particularly important goal is to promote and implement production systems that are environmentally friendly. It is important that technological solutions adopted in the growth and exploitation of pigs to meet all the requirements for environmental protection, in order to preserve the natural area of Romania. The main objective of this paper is to provide a technical and economic solution for pig breeding for meat in intensive system, in two variants: with acquisition of biological material and a variant with material produced by the own farm. Our researches reveal that the growing system of pigs in version with biological material produced on the own farm is more profitable, yielding considerable profit per animal.

Keywords: *profitability, gross margin, swine, analysis, costs*

Introduction

Swine growth in our country is a tradition, the Romanians are great consumers of pork. Swine growth is a profitable business when done properly and provides 47-48% of the total meat production.

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As livestock importance, the swine ranks 2 after cattle. In addition to pig meat, other products are obtained which are very valuable such as fat, skin, hair, manure.

On the market there is an increasing demand of animal protein and thus of pig meat. For this reason, it is necessary to increase livestock, while diversifying breeds of pigs.

In the last years, consumers have opted for a pig meat getting weaker (non-fat). To meet the consumers demand, the races of pigs had to be improved, implicitly it had to be also improved the breeding technology.

Material and method

This paper is based on a comparative study on intensively pig for meat growth. The methodology for determining the production costs of the two variants of growth is based on a series of technological features such as: average daily gain of 700 - 800g/day, specific consumption of 3.5 respectively 2.8 kg of feed / kg gain, delivery weight of 100 kg.

The particular importance to determine the real costs of production is demonstrated by the need to ensure recovering economically justified production costs as well as to obtain profit.

Results and discussion

Due to its characteristics, swine species presents many advantages, both economic and social:

- This species adapts very well to all environmental conditions, not demanding special food or climate. For this reason pigs can be raised in all areas of the country;

- Pigs, as an omnivorous species, they exploit very well a wide range of food (cereals, vegetables, melons, roots, debris of food industry), all these being used with maximum economic efficiency;

- Pigs have a high precocity, both as meat production and reproduction;

- Is great prolificity in this species (8-12 piglets, even more at specialized breeds);

- Gestation lasts very few, 114-115 days;

- Sows have a high fecundity, the only difference is only in exploitation system;

- Swine exploit feed more economical than other species, have a higher slaughter yield between 72-82%, energy value of meat is very high;

- In case of pigs are used both secondary products and by-products.

The production costs were determined based on the production technologies, each item of expense is based on the gain, specific consumption, exploitation period in the two farming systems.

Pig technology is a set of processes, methods and technical and organizational measures taking place in a technological flow, seeking to meet the animals needs, achieving high yields in terms of economic efficiency.

Organizational- technical processes and measures from a breeding technology, depending on the features and purpose, are grouped in the following subsystems:

- Subsystem reproduction;
- Subsystem growth and development;
- Maintenance subsystem;
- Subsystem feeding;
- Subsystem health ensuring;
- Subsystem productions and marketing;
- Subsystem organization of work.

The growth and exploitation activity of animals requires economic and organizational optimization of fundamental technological issues, considered in animal fattening units:

• breed
• the entrance age and weight of animals
• age and weight at delivery
• average daily gain
• duration of fattening

• animal density per unit of area.

In determining of production costs at the main animal products, start from the size and structure of direct allocation of material and human resources required for the smooth production processes.

Calculation of total expenditures

Total expenses include:

• Variable costs
• Fixed costs

The main variable costs are:

1. Feeding costs;
2. Biological material costs;
3. Energy costs;
4. Costs of drugs and medical supplies;
5. Other materials;
6. Supply costs.

The feeding costs are calculated based on average daily rations, respectively of forage varieties included in the ration, maintenance duration, delivery prices for each variety of the ration.

Biological material costs are determined taking into account the initial life weight per youth for fattening, the average purchase price per kg of live weight, the number of animals needed for fattening to deliver one unit of product, the losses that occur in the production process.

In determining the electric power consumption per unit of product or animal is taken into account: type and number of consumers, the installed capacity of each, performance of aggregates and, respectively, the number of operating hours.

Any technology of growth and exploitation of animals is accompanied by a sanitary-veterinary technology, where treatments include mandatory and necessary treatments against diseases that may adversely affect production.

Other materials expenses results from addition of maintenance and repair of machinery, protective equipment expenses, medical-veterinary instruments etc.

The main fixed costs are:

permanent labor costs;
general expenses;
interest on loans;
depreciation expenses.

Table 1. *The main economic indicators*

Specification	**M.U.**	**Variant with biologic material bought V_1**	**Variant with biologic material produced in the own farm V_2**
Variable costs	lei/kg	5.766	4.669
Fixed costs	lei/kg	0.470	0.498
Total costs (cost of production)	lei/kg	6.236	5.167
Acquizition price	lei/kg	7.200	7.200
Rate of profit	%	15.46	39.35

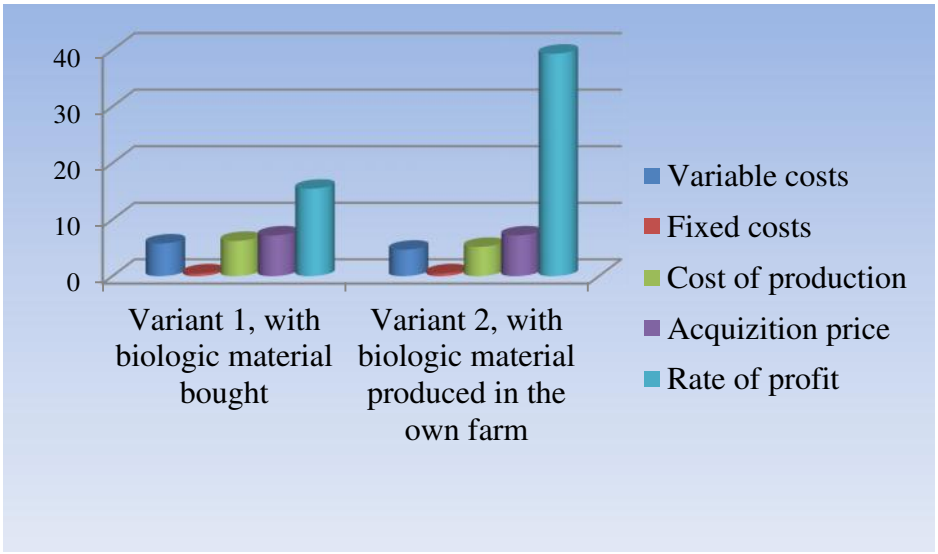
Source: *Own calculations.*

Following the table with the main economic indicators, it can see big differences between the two variants. Thus, the first variant, the costs are higher by almost 18% compared to the second one.

Although the average daily gain is higher and consumption of feed / kg gain is smaller, does not equivalent the expense with biological material and this leads to a 24% profit rate higher in the variant when the farm produces its biological material.

In Chart 1, we present a graphical form of the main economic indicators described above, especially the rate of profit, that shows clearly a better profitability for the variant with biologic material produced in the own farm.

Chart 1. *Comparison between economic indicators*



Source: *Own calculations.*

The profits we have shown above is one of the quality indicators that underlie any economic activity. Therefore, taking into account the profit structure, it is necessary to properly sizing the expenses and revenues. An activity is effective when it compensates (cover) expenses and get a profit.

The meat production includes:

- The total weight gain (is necessary to be programmed early on fattening phases, depending on the number of days fed and on the average daily gain);

- The live weight meat production (includes weight of animals at the beginning of the year, the weight of the animals entered during the year and total weight gain scheduled);

- The production of meat for market (is determined by the number of animals delivered for meat and their average weight at delivery).

Technological estimate is a tool that shows the structure of fixed costs and variable costs. In the structure of variable costs for fattening pigs we find: feeding costs; biologic material costs; energy and fuels costs;

medicines and sanitary-veterinary materials costs; other materials costs; purchasing quota; animals insurance costs. The fixed costs for fattening costs are represented by labor costs, general expenditures, interest on loans and depreciation expenses.

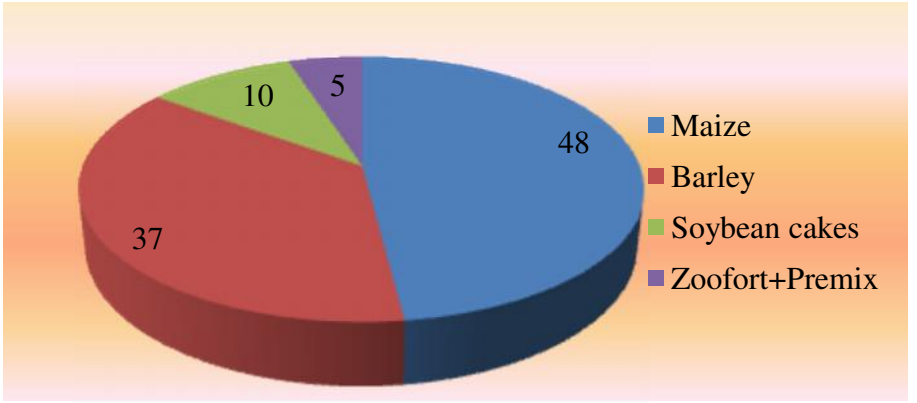
Table 1. *Technological estimate for pig meat – Variant 1*

SPECIFICATION	**Quantity**	**Price**	**Average production 800 g/day**	
	kg fodder	**lei/kg fodder**	**lei/to fodder**	
Maize	480	0.95	456.0	
Barley	370	0.80	296.0	
Soybean cakes	100	2.50	250.0	
Zoofort+Premix	50	4.00	200.0	
Total fodder	1000		1202.0	
Specific consumption kg fodder/kg daily gain (2.8)			3.366	
SPECIFICATION	QUANTITY			EXPENDITURES
	M.U.	M.U./head		Lei/head
		Quantity	Price lei/M.U.	
1.Feeding costs				336.56
2.Biologic material	kg			200.00
3.Energy and fuels	kW/period	17.5	0.600	10.50
4.Medicines and sanitary-veterinary materials	lei			4.00
5.Other material costs	lei			1.00
6. Purchasing quota	lei			8.51
7. Insurances	lei			16.00
TOTAL VARIABLE COSTS	lei			576.57
8. Labor costs	lei			13.00
9. General expenditures	lei			11.04
10. Interest on loans	lei			21.00
11. Depreciation expenses	lei			2.00
TOTAL FIXED COSTS	lei			47.04
TOTAL EXPENDITURES	lei			623.62

Source: *Own calculations.*

In the Chart 2, is presented graphicaly the structure of the combined fodder for fattening pigs and it shows that the major share (48%) in this structure belongs to maize, that is the most energetic fodder, followed by barley (37%), and then the proteic fodder – soybean cakes (10%) and the suplimentary mixture of proteins, vitamins and minerals.

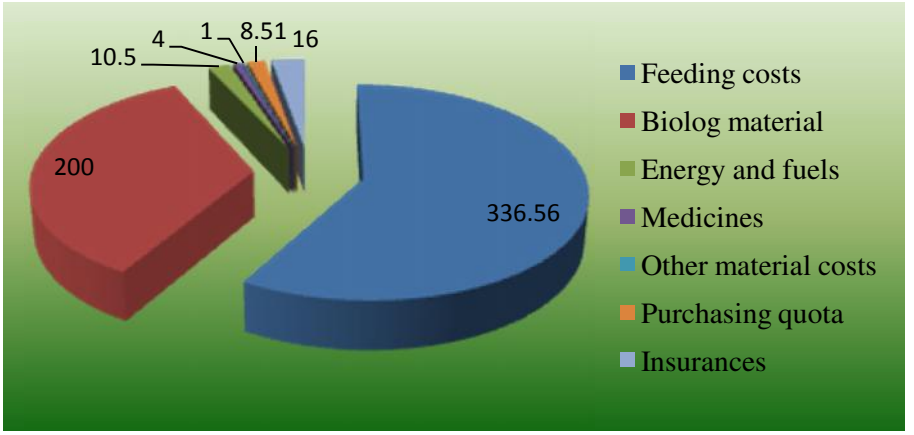
Chart 2. *Structure of combined fodder*



Source: *Own calculations.*

Because the feeding costs represent over 58% of the total variable costs, it is necessary to ensure a more varied assortment of fodder, protein-rich crops expanding and paying attention to the rational feeding of animals, through balanced rations.

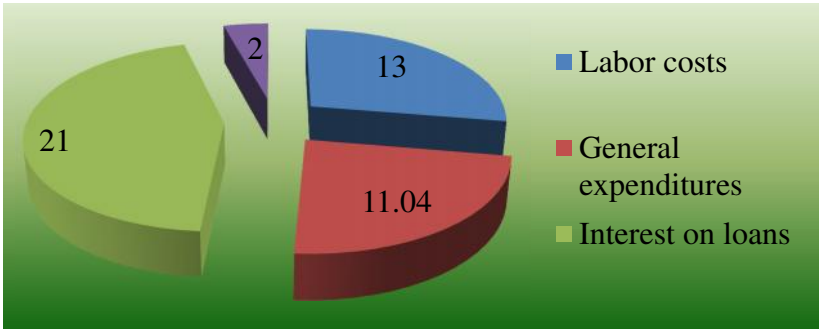
Chart 3. *Structure of variable costs*



Source: *Own calculations.*

The Chart 4 shows that of the total structure of fixed expenditures, the biggest share is of interest on loans (44.64%), so there is necessary the management team of the farm to find solutions for self-financing of the activities.

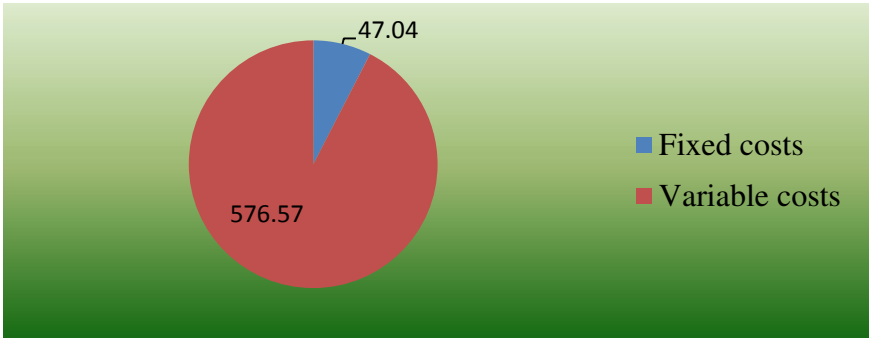
Chart 4. *Structure of fixed costs*



Source: *Own calculations.*

The fixed and variable costs structure represented in Chart 5 shows that variable expenditures are the large majority of total costs (92.45%). In order to obtain a satisfying economic efficiency, there is necessary to reduce these expenditures and especially to apply very well balanced fodder rations, in the different stages of the fattening.

Chart 5. *Fixed and variable costs share*



Source: *Own calculations.*

To plan, to provide the necessary funding and capital mobilized possible, it is essential for the farm activities. The budget is the allocation of resources and responsibilities on specific activities, in order to achieve the most efficient strategic objectives of the farm. The budget process is

designed to guide the work of all departments for the same goal: profitability, liquidity, risk diminishing, etc. The budget shows the value of production, variable costs, fixed costs, net income, cost of production and the predictable market price that can be obtained. It reflects the elements from the technological estimate.(Table 2)

Table 2. *Budget of pig meat – Variant 1*

INDICATORS	Average production	
	800 g/day	
	Lei/head	Lei/kg
A. VALUE OF PRODUCTION	720.00	7.200
A_1. Of which, main production	720.00	7.200
B. SUBSIDIES	140.00	1.400
C. RAW PRODUCT	860.00	8.600
D. TOTAL EXPENDITURES	623.62	6.236
D_1Of which, for main production	623.62	6.236
I. VARIABLE COSTS	**576.57**	5.766
1.Feeding costs	336.56	3.366
2.Biologic material	200.00	2.000
3.Energy and fuels	10.50	0.105
4.Medicines and sanitary-veterinary materials	4.00	0.040
5.Other material costs	1.00	0.010
6.Purchasing quota	8.51	0.085
7.Insurances	16.00	0.160
II. FIXED COSTS	**47.04**	0.470
-Labor costs	13.00	0.130
-General expenditures	11.04	0.110
-Interest on loans	21.00	0.210
-Depreciation expenditures	2.00	0.020
E.TAXABLE INCOME	96.38	0.964
Taxes and duties	0.00	0.000
F. NET INCOME+ subsidies	236.38	2.364
G.TAXABLE INCOME RATE(%)	15.46	15.46
H. NET INCOME RATE+ subsidies(%)	37.91	37.91
COST OF PRODUCTION	623.62	6.236
PREDICTABLE INTERNAL MARKET PRICE	720.00	7.200

Source: *Own calculations.*

In Table 3, is calculated the standard unitary gross margin for the first variant and shows the raw product value per head and per kg life weight (including subsidies) and the structure of the direct variable costs. The

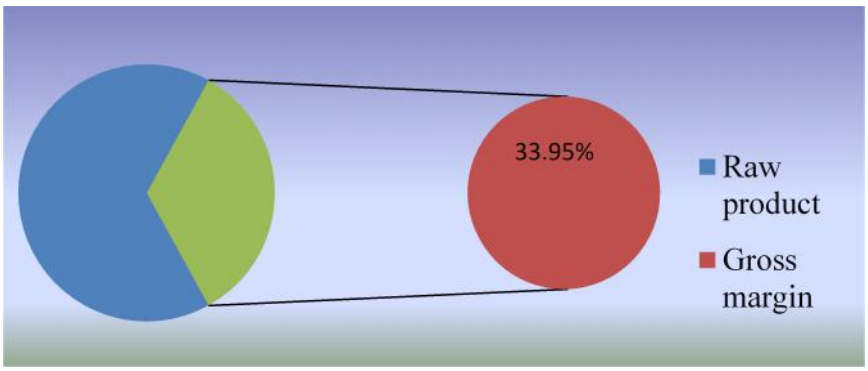
difference between raw product and variable costs results in gross margin (66.35 Euro/head, 0.66 Euro/kg life weight). The gross margin share in raw product is 33.95%.

Table 3. *Standard unitary-gross margin for pig meat – V1*

1Euro=4,4 lei				
SPECIFICATION	**Kg life weight/head**	**Delivery price lei/kg**	**Lei**	**Euro**
Average production - 800 g/head/day	100	7.20	720.00	163.64
Secondary production			0.00	0.00
Raw product lei	**Per head**	**Per kg**	**euro/head**	**euro/kg**
	860.00	8.60	195.45	1.95
Subsidies lei	140.00	1.40	31.82	0.32
Variable costs lei	568.06	5.68	129.10	1.29
Gross margin lei	291.94	2.92	66.35	0.66
Gross margin share in raw product%	**33.95**			
Variable costs	Total lei RON		Euro	
Fodder	336.56		76.49	
Biologic material	200.00		45.45	
Energy and fuel	10.50		2.39	
Medicines and sanitary-veterinary materials	4.00		0.91	
Other materials	1.00		0.23	
Insurances	16.00		3.64	
Total variable costs	568.06		129.11	

Source: *Own calculations.*

Chart 6. *Gross margin share in raw product*



Source: *Own calculations.*

The technological estimate for the second variant – with the biologic material produced in the own farm (Table 4) shows a total cost with 17.14% less than the first variant. This thing will result in a higher economic efficiency and is also important for the traceability management of the farm.

Table 4. *Technological estimate for pig meat – Variant 2*

SPECIFICATION	**Quantity**	**Price**	**Average production 700 g/day**
			Value
	kg fodder	**lei/kg fodder**	**lei/to fodder**
Maize	480	0.95	456.0
Barley	370	0.80	296.0
Soybean cakes	100	2.50	250.0
Zoofort +Premix	50	4.00	200.0
Total fodder	1000		1202.0
Specific consumption kg fodder/kg daily gain (3.5)			4.207

SPECIFICATION	QUANTITY			EXPENDITURES
	M.U.	M.U./head		M.U.
		Quantity	Price lei/M.U.	
1.Feeding costs				420.70
2.Biologic material	kg			0.00
3.Energy and fuels	kW/an	20	0.600	12.00
4.Medicines and sanitary-veterinary materials	lei			6.00
5.Other material costs	lei			1.50
6. Purchasing quota	lei			10.67
7. Insurances	lei			16.00
TOTAL VARIABLE COSTS	lei			466.87
8. Labor costs	lei			18.00
9. General expenditures	lei			8.80
10. Interest on loans	lei			21.00
11. Depreciation expenses	lei			2.00
TOTAL FIXED COSTS	lei			49.80
TOTAL EXPENDITURES	lei			516.67

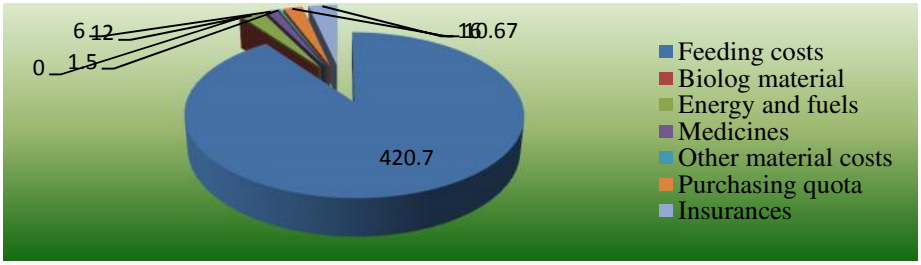
Source: *Own calculations.*

In this variant, as shown in Chart 7, the most majority of expenditures in the variable costs are represented by the fodder costs – 90%. The profitability in swine fattening is firstly determinated by the rational feeding. From here results the special attention to the maximum use of fodder and the necesity to relate the content in nourishing substances to the physiological requirements of animals. A correct nutrition offer the optimal quantity of amino acids, carbohydrates, vitamins, minerals and water.

The economic efficiency also requires:

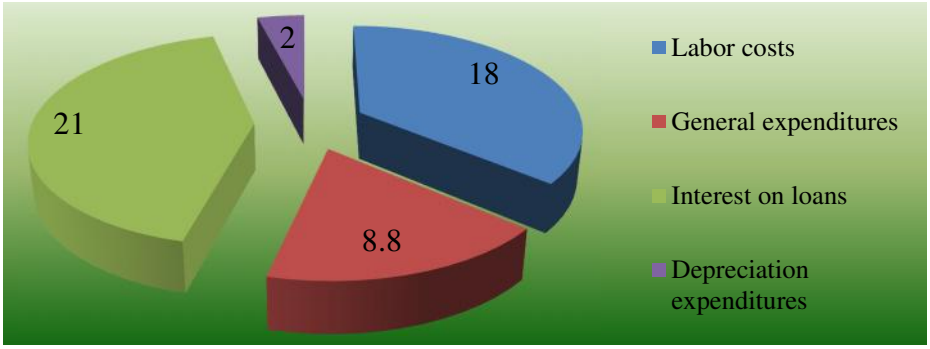
- a good information on the development potential of pigs;
- periodically evaluation of growing rate in order to ensure an efficient conversion of food in meat;
- to feed pigs depending on the fattening stage;
- to verify periodically the health stage of the animals.

Chart 7. *Structure of variable costs*



Source: *Own calculations.*

Chart 8. *Structure of fixed costs*



Source: *Own calculations.*

The budget for the second variant (Table 5) has the same elements as the first variant, but the value of biologic material is zero, being produced in the own farm. The technological expenditures for piglets are undertaken by sows technological estimate. Maintaining the same estimate of market price, the profit rate increases at 39.35%.

These results will influence the obtaining of a higher gross margin – 51.15%, as shown in Table 6.

Table 5. *Budget of pig meat – Variant 2*

INDICATORS	**Average production 700 g/zi**	
	Lei/head	**Lei/kg**
A. VALUE OF PRODUCTION	720.00	7.200
$A_{1.}$ Of which, main production	720.00	7.200
B. SUBSIDIES	140.00	1.400
C. RAW PRODUCT	860.00	8.600
D. TOTAL EXPENDITURES	516.67	5.167
D_1Of which, for main production	516.67	5.167
I. VARIABLE COSTS	466.87	4.669
1.Feeding costs	420.70	4.207
2.Biologic material	0.00	0.000
3.Energy and fuels	12.00	0.120
4.Medicines and sanitary-veterinary materials	6.00	0.060
5.Other material costs	1.50	0.015
6.Purchasing quota	10.67	0.107
7.Insurances	16.00	0.160
II. FIXED COSTS	49.80	0.498
-Labor costs	18.00	0.180
-General expenditures	8.80	0.088
-Interest on loans	21.00	0.210
-Depreciation expenditures	2.00	0.020
E.TAXABLE INCOME	203.33	2.033
Taxes and duties	0.00	0.000
F. NET INCOME+ subsidies	343.33	3.433
G.TAXABLE INCOME RATE(%)	39.35	39.35
H. NET INCOME RATE+ subsidies(%)	66.45	66.45
COST OF PRODUCTION	516.67	5.167
PREDICTABLE INTERNAL MARKET PRICE	720.00	7.200

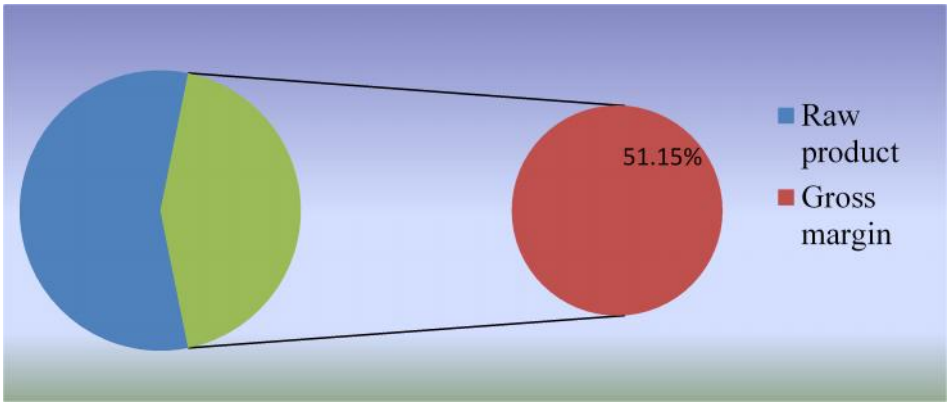
Source: *Own calculations.*

Table 6. *Standard unitary-gross margin for pig meat – V2*

				1Euro=4,4 lei
SPECIFICATION	**Kg life weight/head**	**Delivery price lei/kg**	**Lei**	**Euro**
Average production - 700 g/head/day	100	7.20	720.00	163.64
Secondary production			0.00	0.00
Raw product lei	**Per head**	**Per kg**	**euro/head**	**euro/kg**
	860.00	8.60	195.45	1.95
Subsidies lei	140.00	1.40	31.82	0.32
Variable costs lei	420.14	4.20	95.49	0.95
Gross margin lei	439.86	4.40	99.96	1.00
Gross margin share in raw product%	**51.15**			
Variable costs	Total lei RON		Euro	
Fodder	420.70		95.61	
Biologic material	0.00		0.00	
Energy and fuel	12.00		2.73	
Medicines and sanitary-veterinary materials	6.00		1.36	
Other materials	1.50		0.34	
Insurances	16.00		3.64	
Total variable costs	420.14		95.49	

Source: *Own calculations.*

Chart 9. *Gross margin share in raw product*



Source: *Own calculations.*

Conclusions

The main conclusions of present paper are:

- a total cost in variant 2 with 17.14% less than the first variant;
- feeding costs represent over 58% of the total variable costs in the first variant and over 90% in the second variant;
- 24% profit rate higher in the variant when the farm produces its biological material, compared with the situation when farm purchase the piglets from other farms;
- obtaining a gross margin of 66.35 Euro/head, 0.66 Euro/kg life weight and a gross margin share in raw product of 33.95% at the first variant and a higher gross margin – 51.15% for the second variant.

Profitability in pig farming also depends on several factors, as: seasonal meat consumption, programming of births, obtain piglets from own farm, the purchase price of cereals. Research conducted reveal that farmers who produce the own animals for pigs fattening, get an important decrease of expenses. The profit earned is influenced by the number of farmed animals, which is why currently the trend is to build large farms.

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COOPERATIVES – FACTORS IN ORGANIZING THE AGRICULTURAL ACTIVITIES

Mariana Eftimie[1]

Abstract

Given the current conditions of uncertainty regarding the realization of profitable farms with reliable markets, resistant to competition with high power for attracting various types of funds, farmers worldwide must decide what strategy to adopt. One viable alternative is that farmers realize various forms of cooperative association.

Key words: *cooperatives, farmers, cooperative members, Romanian agriculture*

Introduction

Cooperatives are set up in areas where the shortage of financial resources may not be covered due to reasons related to the business reduced profitability, the lack of attractiveness to invest capital or high degree of difficulty in resources' exploitation which requires entrepreneurs to become associates.

According to a recent FAO document, 'cooperatives and producer organizations are central in building small producers' skills, providing them with appropriate information and knowledge, helping them to innovate and adapt to changing markets'.(FAO,2012). They may be found in the activities whose aims are superior processing of the raw materials or where the needed investment to start the business is high.

The cooperative company is according to Romanian regulation (Law no.1/20052005 on the organization and functioning of the cooperatives in Romania) "an autonomous association of private and/or legal individuals, as the case may be, constituted on the basis of their freely expressed consent, in order to promote economic, social and cultural cooperative

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members' interests, and is owned jointly and democratically controlled by its members, in accordance with the cooperative principles".(Law No. 1/2005 on the organization and functioning of the cooperatives in Romania).

Co-operatives play an important role in the EU economy and represent major economic growth factor. During the years the co-operatives sector has increased and now is a high competitive component of European SME sector. Referring to the EU, co-operatives holds a high place in almost economic sectors as agriculture, forestry, banking, retailing, pharmaceutical and health care, information technologies, or housing and craft production.

According to European statistics.(European Commission, Enterprise and Industry, 2012), co-operatives hold a very substantial market shares in agriculture (79% in Italy, 50% in France), forestry (60% market share in Sweden and 31% in Finland) banking (50% in France, 31% in Austria and 21% in Germany) retailing (consumer cooperatives hold a market share of 36% in Finland and 20% in Sweden), pharmaceutical and health care (21% in Spain and 18% in Belgium) and information technologies, housing and craft production.(European Commission, Enterprise and Industry, 2012).

In table no.1 is presented a short historical synopsis regarding the cooperative's evolution in some important states.

Table 1. *A time line in cooperative's evolution, in some EU country*

Country	**First co-operative**	**First co-operative law**	**Membership (% of population)**
Romania	1852	1903	28.5
Austria	1794	1873	47.4
France	1750	1887	30.1
Germany	1845	1867	27.9
Italy	1806	1886	13.3
Russia	1825	1907	9.5
Turkey	1863	1867	12.9
U.K	1750	1852	16.6
USA	1752	1865	56.7
Yugoslavia	1870	1925	6.5

Source: *author adaptation from Zeuli and Cropp, 2004, p.12.*

In small Romanian agricultural holdings, agricultural works are covered from the local possibilities (sometimes rudimentary), but the worst is that small-scale producers are abandoned in marketing (large quantities of products are not introduced into commercial circuit in small parts) or are victims of big traders, in a market economy.

Activities carried out by agricultural cooperatives are mainly commercial ones, aiming at producing goods and services for their members. As (Shermain et al.2004) argues ,cooperatives operate differently from IOFs because of the three basic cooperative principles that define the essence of a cooperative enterprise: user-owned, user-benefit and user-contro'l.' (Shermain et al.2004, p.4)

Among the objectives of agricultural cooperatives the following may be included:

- all of the members should obtain economic benefits;
- the obtained plant, animal or fish production shall be in conformity with market standards;
- economic and social development of rural areas;
- processing the obtained production and selling it to the market etc.

Cooperative members' rights and obligations are equal within the cooperative; each member shall be entitled to one vote, regardless of the capital participation share.

Bringing farmers together in associative forms ensures opportunities for economic development through the use of collective power in order to increase the members' prosperity as well as that of the communities to which they belong.

In recent work, regarding the Romanian agriculture movement, when comes to the cooperative association they refer to the historical determination and it is argued that 'in the totalitarian period, communists inversed the natural order of things: in agriculture, they imposed the production cooperation, with absolute title, and in the rural they maintained, under a different formula, the consumption cooperation and the credit cooperation; the other traditional types of cooperatives were eliminated.(Popescu and Constantin, 2007, p.44).

The main economic and social considerations which may cause the association are mainly:

- principles based on which these forms associative may be constituted and operate have a democratic character and act unitary for all the members;
- the values and cultural traditions of the members can permanently be promoted and improved;
- the rights of associative form members are democratically established;

Incursion in the history of cooperative occurrence

Cooperative movement meets at global level over 230 organizations with approximately 800 million members in over 100 countries and ensures over 100 million jobs. Milk production in countries like Norway, New Zealand and the United States of America is ensured in proportion of 80% within the cooperatives. In the Brazilian agriculture the cooperatives share is 40 %, and of the total fish production of the Republic of Korea, 70% is ensured by the cooperatives.

The first viable cooperative in the world was set up by the Rochdale Pioneers in 1844, in England. Later, national cooperative movements united as an international institution, The International Cooperative Alliance (ICA) established in 1895, the Romania cooperative being its founding member.

The International Cooperative Alliance (ICA) was the second non-governmental organization which was set up in the world, after the International Red Cross.

After a period of 100 years of its establishment, in 1995, on the occasion of the anniversary Congress that took place in Manchester it adopted "The Declaration of Cooperative Identity". The document contains a definition of the cooperatives, the basic values of the cooperative movement and a set of revised basic principles regarding the activity of its organizations.

According to the Declaration in 1995, the values underlying the activity of cooperatives are: helping each other, democracy, equality, fairness and solidarity. Ethical values observed by cooperative members are: openness, honesty, social responsibility and care of the fellow members.

When comes to benefits of the cooperative in economy, a 'powerful contribution of cooperatives and producer organizations is their ability to

help small producers voice their concerns and interests – and ultimately increase their negotiating power and influence policy-making processes'. (FAO,2012)

In Romania, the first forms of association in the rural areas appeared in between 1850-1870. The modern cooperative principles and the main known types of associations were exhibited in the major publications of the time, "The Romanian Peasant" and "The Courier of Village Cooperative of Romania" (photo1).

Photo 1. *A page form the monthly publication Curierul cooperatiei satesti din Romania, nr.1-2/1924*


CURIERUL
COOPERAȚIEI-SĂTEȘTI
DIN
ROMÂNIA
ANUL XVII—No. 1-2 Ianuarie—Februarie 1924
APARE ODATĂ PE LUNĂ
Abonamentul anual 50 lei.
1924—1925 PRINSUL:
Partea I
Anul 1923 și Cooperația . . . T. C. I.-Pagcanu
Ce este cooperația . . . . . G. P.
O zi de sărbătoare . . . . . Const. Gădei
Cultură cooperatistă . . . . . Luca Paul
Cum stăm cu industrializarea fructelor . . . . . N. M. Adamescu
Ioane din Basarabia . . . . Const. Gădei
Proba cu noua . . . . . Al. I. Baicu
Vânzarea în comun a cerealelor . . .
Legiuiri agrare . . . . . .
Partea II
Centrala Băncilor Populare. Comunicate. — Lămuriri. — Chestiuni fiscale.
Centrala Cooperativelor Sătești. Informațiuni comerciale.
ADMINISTRAȚIA ȘI REDACȚIA:
CENTRALA BANCILOR POPULARE
S. CHIROVICI

Source: *author's own caption form Internet source.*

The first associative forms were of the type "economy, credit and mutual aid", and were set up in: Bistrita, Braila, Brad, Rasinari, and Bucharest.

In between 1890-1905 more credit cooperatives under the name of "popular village banks" were opened. One of the most famous politicians of the time, famous scientist, sociologist, mathematician and pedagogue, Spiru Haret supported the cooperative movement, being the main author of its enlargement idea in Romania.
As a result of the support of the activity organization of the credit cooperatives and the fact that he was the initiator of the first law on cooperative, Spiru Haret was called "the founder of popular cooperative banks".

The cooperative companies' extension has continued between the two world wars; thus, between 1920-1922 approx. 300 cooperatives were set up, having over 92.500 members and a capital of over 1300 mil lei.

The biggest momentum was registered by the cooperative movement in between 1925-1928, when more than 11,000 cooperatives in all categories were set up, being supported by major political figures who promoted laws governing the organization of the conduct of their activity.

Types of cooperative companies in Romania

Grouping of farmers and the setting up of associative forms represent an opportunity for the economic development of rural areas, contributing to the growth of the prosperity of their members, families and communities they belong to.

Activities carried out by agricultural cooperatives are mainly commercial ones, aiming at producing goods and services for their members. Among the objectives of agricultural cooperatives the following may be included:

- all of the members should obtain economic benefits;
- the obtained plant, animal or fish production shall be in conformity with market standards;
- economic and social development of rural areas;
- processing the obtained production and selling it to the market etc.

Cooperative members' rights and obligations are equal within the cooperative, each member shall be entitled to one vote, regardless of the capital participation share.

In the Romanian agriculture approximately 37% of the active population is involved, lands are dispersed and there are about 3 million plots which have an average surface of 1.5 ha.

In table no.2 is show the dynamics of the land held by the main types of Romanian operators. One can notice that after a spectacular evolution from 2002 to 2007 (from 2,365 ha, to over 15,000 ha), on the background effects of the economic depression, the area held by cooperative units decreased in 2010, reaching 8176.

To make the sector more profitable, the following should be done: associative forms of farmers' organization should be extended, subsistence agriculture should be given up, transition to high productivity agriculture and, implicitly, increasing the areas covered by these organizations.

Table 2. *Evolution of the main types of economic agents, in Romania, during 2002-2010*

Types of economic agents	2002	2005	2007	2010
Societies/ agricultural associations	975.564	742.065	615.897	556.786
Companies	2.168.792	1.780.788	1.951.115	3.172.972
Units of public administration/ public institutions	2.867.368	2.124.737	1.872.194	1.598.810
Cooperative units	2.365	3.246	15.088	8.176
Other types (foundations, religious institutions, schools, administrations, research institutes etc.)	207.863	153.847	332.445	516.110
Total agricultural surface (hectares)	6.221.952	4.804.683	4.786.738	5.852.854

Source: *author own processing based on The General Agricultural Census, 2010.*

Conditions for a person to become a member of the cooperative association are: to be of minimum 16 years old, to submit a request and to subscribe to the capital of the cooperative company.

Cooperative societies may:

- of degree 1, legal persons constituted from individuals;
- of degree 2, legal persons mostly constituted from cooperative societies of degree 1, and other individual or legal persons, with the purpose of horizontally or vertically integrating their economic activity.

In relation to the character of the need to be satisfied, in the Romanian agricultural sector, the cooperatives may operate under the following forms (in accordance with the Law of Agricultural Cooperation, no. 566 of 9 December 2004, Article 16):

1. Cooperatives of purchases and sales. Their role is to be constituted in suppliers for farmers, but also to provide agricultural production sale.

They identify the most advantageous sources of inputs, ensure a regular supply, can contribute to reduce costs by increased volume controls and avoid ruptures of stock. They ensure supply of: machinery and agriculture tools, fuels, fertilizers, pesticides, planting material, construction materials and so on.

In terms of sales, they are in charge of collecting information about various products specific to a certain area, obtaining the best prices, the most advantageous opportunities for transport and storage, the establishment of common marketing and promotion policies, so that the volume of the benefits from selling agricultural products to be maximum.

This type of cooperative can be considered as the basic agricultural cooperative, being the most frequent in Europe, which has existed since the beginning of the cooperative movement.

Within this framework, the following types were set up: on the vertical axis the cooperative associations, and on the horizontal one, depending on specific types, the collecting and processing cooperatives (meat, milk etc), services, etc. These cooperatives have modern networks and are backed up by large shops where they market part of their products.

Fig. 1. *Examples of international cooperative logos*

Source: *author's own caption form http//www.orange.ifas.ufl.edu*

2. cooperatives for processing agricultural products. They concentrate the capital of several agricultural producers their purpose being to build and operate processing units of local resources that ensure goods with great added value and implicitly, increased profits.

Fig. 2. *Examples of international cooperative logos*

Source: *author's own caption form http//www.trademakia.com*

They are likely to be encountered in Europe in both the plant products, and livestock products. For example, producers of vegetables and fruit, in addition to wrapping and storage spaces, have vertically extended their activity with capacities for producing juices, cans, dried vegetables and fruit, etc.

Milk producers developed their own cooperative processing factories Meat producers have made their own butchery units, so that most of the final profit margin to return to the cooperative.

The concern for a superior processing of the products provided to the market is permanently in the attention of cooperatives; both in the field of plant products as well as livestock, cooperatives created known national and international brands.

3. cooperatives of services. Their objectives relate to the provision of services to small producers in various areas, such as: operation, maintenance and repair of agricultural machinery and equipment, performing specialized agricultural work, information and promotion, research and development centers for new technologies, farmers' education, agricultural management, irrigation and so on.

4. cooperatives for the exploitation and management of agricultural land, forestry, fisheries and livestock. Members of this type of cooperative cumulate more qualities: members of the cooperative, workers in the cooperative, owners of the land leased to the cooperative.

Fig. 3. *Logo of one of the cooperatives for the exploitation and management of agricultural land*

Source: *author's own caption form* http://organicclusters.com

5. manufacturing and small industry in agriculture cooperatives;

Fig.4. *Logo of one of the small industry in agriculture cooperative*

Source: *author's own caption form http//www.madein-romania.com*

6. Cooperatives for financing, mutual assistance and agricultural insurance.

Fig. 5. *Logo for the financing cooperatives*

Source: *author's own caption form http://www.sometinter2012.com*

To ensure coordination of common policies and to obtain economies of scale, in many countries, the cooperatives established set up regional cooperatives. There are regulatory bodies and professional organizations and to represent the cooperatives established at national level.

The success chances are greater if the newly-set cooperatives start by specializing in the supply/purchasing/offer a range of restricted goods or services for a limited geographic area. As the cooperative experience in administration and operation gets better, new products and services can be added and the geographical area of action may be extended.

Several agricultural cooperatives (minimum 5) of the same area may be associated in branch unions in the purpose of developing the activity specialization and concentration and increasing economic efficiency.

Branch unions have the following attributions:

- to support agricultural cooperatives in the economic, legal, technical, banking areas etc.;
- to represent their members' interests in relation with public power components, courts, other domestic and international organizations;
- to support collaboration with domestic and international economic agents;
- to coordinate studies and research in agriculture for the production development and improvement ;

Branch unions, in their turn, may be grouped into two main types of regional federations with non-patrimonial purpose:

- marketing, dealing with exploiting agricultural products;
- mutual insurance.

Voluntary association of branch unions leads to the creation, at national level, of the Central Union of Agricultural Cooperatives in Romania, professional, non-profit organization, to protect its members' rights and interests and represent them in relation with operators and domestic and international organizations.

The association in agricultural cooperatives has a series of benefits for cooperative members and for the society.
Among the commercial benefits it can be mentioned:

- the number of intermediate links in the distribution channel is reduced;
- enhances the position and negotiating force in relations with the clients;
- facilitates access to market opportunities;
- improves the quality of products and offered services;

- enhances the producer's role in relation with the beneficiary in establishing the price;
- enables supply on time of highly qualitative raw materials at reasonable prices;
- reduces the risk of not being able to sell products;
- provides a safe source of income in good time.

Technical benefits:

- economic and technical consultancy;
- allows access to the latest technologies and changing from traditional practices to the high-productivity ones;
- providing outlets;
- possibility of becoming associates for people having low share capital;

Financial benefits:

- access to grants and other forms of public nature support;
- financial support given by the European Fund for Agriculture and Rural Development; acquisitions costs are reduced and revenues increase;
- exemption from the payment of customs' duties in the case of imports of agricultural machinery and equipment;

Social benefits:

- groups of associated producers are recognized by the Ministry of Agriculture, Forestry and Rural Development, and benefit from all the rights provided by the legislation; they contribute to the area development and to the opening of new jobs; the basic principles of agricultural cooperatives are inspired by the principles set out by The International Alliance of the Cooperatives.

The International Alliance of the Cooperatives principles refers mainly to (1995):

- open combining based on the freely expressed will states that they are open to all people (without any kind of discrimination) who want to benefit from the advantages of the association, and who agree to undertake the membership responsibility;
- equality in organizational decision-making, according to which, establishing strategies shall be carried out by elected representatives, who shall be responsible to cooperative members;

- total freedom in managing their own activities implies that these operators are autonomous and independently decide commercial policy;
- economic participation of cooperative members, according to which, the members' contribution in the formation of ownership and work control should be done in a fair way and based on democratic principles;
- education, training and information of cooperative members involves taking part in programs, so that, after graduating them, the members can contribute to the development of the cooperatives they belong to;
- collaboration between cooperative societies is necessary because each company carries out its activities within the regional, national and international structures;
- sustainable development of the communities constitutes the cooperatives' continuous preoccupation and their development programs main objective. (IAC, 2005, or Gabriel and Florentina, 2007)

In agricultural cooperatives farmers practically help each other when they need it. "what is important in cooperative is that the members are the companies' owners. (IAC, 2005)

The cooperative only helps them if they pay a commission, and the purpose is the profit increase for each member. For example, when purchasing fodder it will be possible to get a 10 to 20% discount, out of which the cooperative retains a commission to ensure its expenditure, and the rest is the owner's profit.

When selling the products, the same mechanism is at work: "when one of the members has a problem, he would be helped to reach the others' level. Technical support is very important as it helps to obtain homogeneous production and as a result of that it can better capitalize its goods.

In addition, the cooperative may employ technical staff, with European wages, which, for a farm, means a lot, but if employed by the cooperative, then they get paid by all the members and the amount is very small for each member." (Radu, 2008, p.12)

Farmers group into cooperatives in order to consolidate their market position, to increase revenues and to achieve other objectives which

would be impossible to fulfill individually. This type of economic agents offer, many times, products or services that are not offered by other private businessmen, but are required on the market. 'Co-operatives are a reminder to the international community that it is possible to pursue both economic viability and social responsibility.'

Agricultural cooperative is viable as it responds to cooperative members' social and economic needs.

As Edgar Parnell remarks in an early study in 1992, 'the existence of *'cooperatives'* which have been deployed as the instruments of command economies in many parts of the world has devalued an important mechanism; as have the idealists who have peddled the view that cooperatives are only of value if they are small and embrace an absolutely pure democratic structure.'(Parnell, 1992)

The repositioning of domestic products on the market and of the traditional ones obtained in the cooperative system, the increase in revenue from selling their own products could result in increasing the small producers' interest in the agricultural activity and a different perspective of the rural area development.

As Valentinov, (2005) summarizes, 'the benefits provided by agricultural cooperatives are mainly those benefits that the hierarchical organization would have provided if it could function effectively in agriculture'.(Valentinov, 2005, p.146)

Conclusions

The General Assembly of the United Nations declared 2012 as the International Year of Cooperatives, emphasizing their contribution to the socio-economic development. By adopting the 18 December resolution in 2011, the assembly pointed out that these cooperatives significantly help to stop poverty, produce jobs and contribute to social inclusion.

The United Nations decides to designate certain international years to draw attention on certain topics of great interest and to encourage action to be taken in the concerned areas. The declaration of 2012 being the Year of Cooperatives was accompanied by regional conferences and other events.

The UN General Assembly has established that starting from 1995, the first Saturday of the month of July is to be entered in the calendar of the UN official actions as the International Day of Cooperatives. At the same time, the UN General Assembly, by Resolution No. 49/155 of 4 February 1995, on "The role of cooperatives in the light of economic and social new trends", encourages governments to:

"- take into account the potential cooperatives can contribute with for the solving of the economic, social and environmental issues when drawing up national development strategies";

"- review the limits of legal and administrative activities that hinder cooperatives with the purpose of eliminating constraints that other which commercial activities are not subject to".

This year (2012), the topic of The International Day of Nutrition (Oct 16) is the "Agricultural cooperatives feed the world" and was called like this to emphasize the fundamental role of agricultural cooperatives in improving food safety and eliminating hunger and food insecurity in the world. As Ban Ki-moon, UN Secretary General argued in one of his public speech that' co-operatives is a reminder to the international community that it is possible to pursue both economic viability and social responsibility.'(Cooperative review, 2012). In fig no.6 is represented the official logo for the international year of cooperation.

Fig. 6. *The official logo for the International Year of Cooperatives, 2012*

Source: author own capitation form the official site of ICA, http://2012.coop/welcome

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COMPARATIVE ADVANTAGES OF SERBIA'S AGRARIAN EXPORT IN EX-YU AND OTHER NEIGHBORING MARKETS[1]

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Abstract

The agro-complex and potentials of agrarian export in Serbia have for long been considered to be the comparative advantages and development "chief supports" of the export-oriented economy. The soundness of such an attitude can only be checked by means of an appropriate comparative analysis, in the context of the market structure and the agrarian potentials of the narrower and broader environments. For that reason, the potential comparative advantages of Serbia's agrarian export are analyzed on two levels: (1) in the narrower environment of the ex-YU uniform market countries and (2) in a broader, however geographically close, environment of the neighboring, for the most part Danube-basin countries. Actually, comparisons are made with ten countries, half of which are the EU member countries and the other half of which are on their way to achieving that goal. Gaining an insight into the structural significance of the agro-food sector in foreign trade and the overall economy, the paper analyzes the fundamental features of and changes in the volume and structure of the total export and import, in particular the agrarian ones. On that basis, by a target comparative analysis of the series of data collected through years, and using the specific methods of carrying out the analysis (by calculating the coefficient and by ranking), comparative advantages are determined and the export potentials of the Serbian agrarian foreign trade are gained an insight into.

Key words: *agrarian export, comparative advantages, relative coverage, coefficients, ranking.*

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Introduction

Agro-complex can be defined as a big subsystem of the overall economy, encompassing (a) the industry of means for production in agriculture and the food industry; (b) primary agricultural production; (c) the agricultural produce processing industry (into finished industrial food and non-food products); (d) the trade of agricultural-food products, and (e) final food consumption.

Agriculture and the agro-industry have for years been referenced as the "chief support" of the Serbian economy in the international market. Apart from the degree of the competitiveness of domestic products, the key proviso in the achievement of such determinations is the always present (either directly or indirectly) agrarian protectionism and interventionism of developed countries in the agrarian market, where those countries unstintingly subsidized both the producers and the exporters of agrarian products in order to protect their own production. For a long time, the state interventionism programs had not been model-formalized; however, as time was passing, their analysis evolved towards the economic effects of the distribution of incomes and costs amongst different interested groups (Lovre, 2011).

Taking into consideration the export potential of the agro-complex and its position in the economic structure is most frequently reduced to the analysis of the movement of the volume and structure of export and import, i.e. the account-balance of the foreign trade of the agrarian products, categorized according to the Standard International Classification (sectors, divisions, groups, subgroups). The specificities of agrarian production as well as the commodities classification, are related to the difficulties accompanying the separation of agricultural products (as unprocessed raw materials) from food (agro-industrial) products, as the final products of processing, i.e. products ready for direct consumption. Here, the subject matter of the comparative analysis of agrarian export and import are groups of agricultural and food products coded with one or two digits, and only from within the *0 Sector*-food and live animals. However, in order to carry out a more complete analysis of the agro-food sector, certain other commodity sectors or at least certain divisions in which raw and final products of an agricultural origin or yet industrial products whose consumption is intended for agriculture should

be included[4]. In that manner, the analysis of the competitive advantages, competitiveness and potentials of the Serbian agrarian foreign trade would include all the three key segments: (1) pre-farming activities (industrial inputs for the agrarian sector); (2) primary agriculture (agrarian raw materials for food processing and production) and (3) post-farming activities (processing, trade and consumption of final food stuffs). For such a complex analysis to be made, however, we need to dedicate more time and space than it was the case in the framework of this paper.

Significance of the agro-food sector in total foreign-trade exchange – a comparative insight

In the first decade of this century, the Serbian agriculture and its agrarian market were characterized by stagnation, declining trends, instability as well as regional differences in the volume and structure of production. Such movements, given the observed period and the general circumstances of privatization, liberalization and deregulation in which the same were taking place, can be referred to as the transitional distortion of agriculture and the agrarian market (Milanović and Djorović, 2011, p. 143). Namely, the long-term dynamics of overall agricultural production in Serbia even in the last twenty years or so, have shown an exceptional cyclical instability, stagnation or a rather slowed down growth, with significant differences between (a slight growth of) crop production and (continually declining) cattle production. That is unavoidably reflected on the foreign-trade exchange of the agro-food sector, which, even apart from increasing, generally has the characteristics of extensification, which means that, contrary to expectations and proclamations, it has the features of a continuous increase in the share of primary products against those of high-finalization. The dynamic increase in agrarian export around the end of the past decade (Tab.1) importantly influenced the overall Serbian foreign-trade exchange with foreign countries, which has generally been

[4] They are: *Sector 1*-beverages and tobacco; certain divisions from *Sector 2*-raw matters (21 raw leather and furs unprocessed; 22 oil seeds and fruits and 29 animal and vegetal matters, other); *Sector 4*-animal and vegetable oils and fats. On the other hand, a more complete analysis would include agrarian inputs as well, primarily equipment (agricultural machines, tractors, food-production machines), pesticides (insecticides, fungicides and herbicides) and mineral fertilizers, which, in SMTK, can be identified as divisions, groups or subgroups of industrial products whose consumption is intended for agriculture

characterized by a big shortfall, i.e. negative balance, lasting for many years, which reached the amount exceeding 12 billion USD (2008) in the years preceding the so-called "world economic crisis". The depth of the issue of the economic exchange with foreign countries as well as, accordingly, the overall Serbian economy is illustrated by a fact that, at the same time, the overall negative foreign-trade balance exceeds the value of the overall agrarian export as the development "chief supporter" of the export-oriented economy severalfold.

Table 1. *Overall and agrarian export, per countries, in 000 $*

No.	Country		2006	2007	2008	2009
1	Serbia	a)	6427892	8824701	10972082	8345076
		b)	1062050	1350859	1476811	1503974
2	B and H	a)	3427782	4151965	5021083	3953920
		b)	125154	168802	224878	221182
3	Montenegro	a)	556459	626289	616616	387540
		b)	5586	7113	10151	24166
4	Macedonia	a)	2400715	3356248	3920000	2691528
		b)	183106	205294	295784	250034
5	Croatia	a)	10376964	12360222	14123675	10491836
		b)	792330	867871	903164	870397
6	Slovenia	a)	20982713	26551122	29252924	22292955
		b)	776496	1073290	1324103	1295598
I	Ex-YU 1-6	a)	44172525	55870547	63906380	48162855
		b)	2944722	3673229	4234891	4165351
7	Bulgaria	a)	15101457	18575129	22485509	16502520
		b)	978712	1006156	1796480	1649462
8	Romania	a)	32336030	40264716	49538878	40620890
		b)	786417	875114	1749268	1773304
9	Hungary	a)	74055483	94590870	108211166	82571847
		b)	3591164	5088785	6217040	5296685
10	Greece	a)	20942762	23504156	25509362	20052541
		b)	2404254	2846129	3295644	3115031
11	Albania	a)	792623	1077690	1354922	1087915
		b)	9092	14521	20069	24983
II	Subtotal 7-11	a)	143228355	178012561	207099837	160835713
		b)	7769639	9830705	13078501	11859465
III	Total I+II	a)	187400880	233883108	271006217	208998568
		b)	10714361	13503934	17313392	16024816

a) total (all SMTK sectors); b) Sector 0-food and live animals.
Source: *FAOSTAT, FAO statistical database: www.fao.org*

Serbia's agrarian export viewed as Sector 0-food and living animals was continually increasing in the analyzed period, reaching its record of 1.5 billion USD, i.e. nearly one-fifth of the overall export. However, including the balance of agrarian input exchange – equipment, pesticides and fertilizers (whose total annual import reaches over one half billion USD) in the agrarian foreign-trade balance significantly changes the picture offered only on the basis of the volume of export.

Table 2. *Overall and agrarian import, per countries, in 000 $*

No.	Country		2006	2007	2008	2009
1	Serbia	a)	13172330	18553606	22875304	16047433
		b)	579701	746446	1000446	670688
2	B and H	a)	7559256	9720056	12188609	8363714
		b)	906362	1108595	1390411	1203861
3	Montenegro	a)	1841505	2867310	3731168	2313139
		b)	112289	117629	181175	423322
4	Macedonia	a)	3762715	5227576	6851673	5043115
		b)	348553	661848	590642	531086
5	Croatia	a)	21502494	25829461	30726987	21204851
		b)	1442169	1670174	2032648	1767299
6	Slovenia	a)	23013428	29476190	33985544	23844257
		b)	1345931	1843457	2210892	2156715
I	Ex-YU 1-6	a)	70851728	91674199	110359285	76816509
		b)	4735005	6148149	7406214	6752971
7	Bulgaria	a)	23268729	30085388	37015366	23340812
		b)	916211	1304056	1878505	1763804
8	Romania	a)	51106039	69946195	82964979	54256269
		b)	2211299	3407218	4566762	3927312
9	Hungary	a)	76978582	94659727	108784724	77272443
		b)	2413449	3030654	3833387	3246644
10	Greece	a)	63738964	76099246	89301635	67191964
		b)	4938922	6100447	6896613	5989573
11	Albania	a)	3057408	4200864	5250490	4548288
		b)	386581	479779	600161	537491
II	Subtotal 7-11	a)	218149722	274991420	323317194	226609776
		b)	10866462	14322154	17775428	15464824
III	Total I+II	a)	289001450	366665619	433676479	303426285
		b)	15601467	20470303	25181642	22217795

a) total (all SMTK sectors); b) Sector 0-food and live animals.
Source: *FAOSTAT, FAO statistical database: www.fao.org*

Serbia's agrarian foreign trade, making one-fifth of the overall export and with a rather high coverage of import with export and the respective positive balance, together with a dynamical increase in the value of the export of certain more significant commodity groups, undoubtedly accounts for a serious potential for development, balance-sheet alignments and an overall macroeconomic and social stability.

Table 3. *Share of agrarian export and import in overall foreign-trade exchange, per countries*

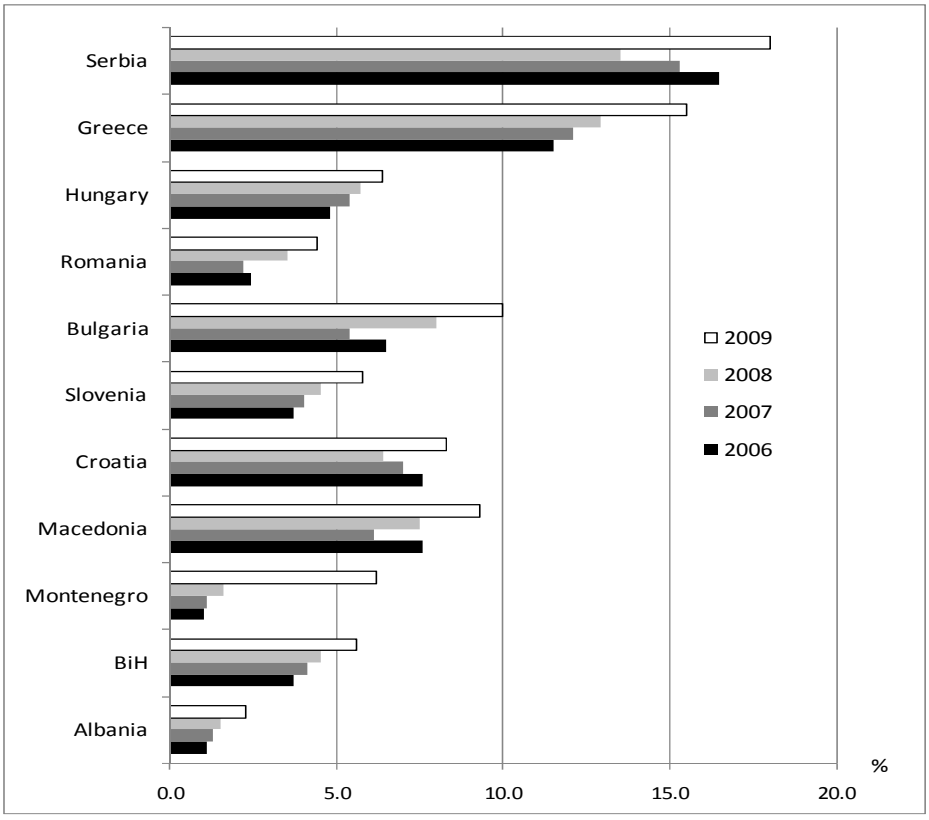
	Country	**2006**	**2007**	**2008**	**2009**
Agrarian export (%)					
1	Serbia	16.5	15.3	13.5	18.0
2	B and H	3.7	4.1	4.5	5.6
3	Montenegro	1.0	1.1	1.6	6.2
4	Macedonia	7.6	6.1	7.5	9.3
5	Croatia	7.6	7.0	6.4	8.3
6	Slovenia	3.7	4.0	4.5	5.8
I	Ex-YU, 1-6	6.7	6.6	6.6	8.6
7	Bulgaria	6.5	5.4	8.0	10.0
8	Romania	2.4	2.2	3.5	4.4
9	Hungary	4.8	5.4	5.7	6.4
10	Greece	11.5	12.1	12.9	15.5
11	Albania	1.1	1.3	1.5	2.3
II	Subtotal, 7-11	5.4	5.5	6.3	7.4
III	Total I+II	5.7	5.8	6.4	7.7
Agraria import (%)					
1	Serbia	4.4	4.0	4.4	4.2
2	B and H	12.0	11.4	11.4	14.4
3	Montenegro	6.1	4.1	4.9	18.3
4	Macedonia	9.3	12.7	8.6	10.5
5	Croatia	6.7	6.5	6.6	8.3
6	Slovenia	5.8	6.3	6.5	9.0
I	Ex-YU, 1-6	6.7	6.7	6.7	8.8
7	Bulgaria	3.9	4.3	5.1	7.6
8	Romania	4.3	4.9	5.5	7.2
9	Hungary	3.1	3.2	3.5	4.2
10	Greece	7.7	8.0	7.7	8.9
11	Albania	12.6	11.4	11.4	11.8
II	Subtotal, 7-11	5.0	5.2	5.5	6.8
III	Total I+II	5.4	5.6	5.8	7.3

Source: *See Tables 1. and 2.; prepared by the authors.*

The relative significance of the agro-food sector in the overall foreign-trade exchange of particular countries can be observed through gaining a comparative insight into the share of the agrarian sector's export and import in the overall exchange.

The comparative overview of the share of agrarian export and import in the overall foreign-trade exchange (Table 3.) accounts for the fact that the Serbian total export is the one relatively the most organized according to the agrarian pattern in the region (18%), which is significantly more than in any other ex-YU country; only Greece has an approximate however slightly smaller share (15%), whereas all other countries have a share in the overall export below 10%.

Graph 1. *Share of agrarian export in overall foreign-trade exchange, per countries*



Source: *Prepared by the authors.*

On the other hand, Serbia has relatively the smallest agrarian import (around 4%), similarly to Hungary, while in the majority of the observed

countries, *the* share ranges around 7-9%. Albania, Macedonia and B&H have substantially better export, whereas in Montenegro, almost one-fifth (18%) of the value of the overall import makes agrarian import. A significant indicator of the export potential and comparative advantage of the Serbian agrarian export as compared with the ex-YU countries' markets and a broader environment is certainly reflected in the share in the structure of the value of the overall agrarian export realized in those countries' markets.

Table 4. *Geographical structure of agrarian export of ex-YU market (%)*

Country		**2006**	**2007**	**2008**	**2009**
1	Serbia	36.07	36.78	34.87	36.11
2	B and H	4.25	4.60	5.31	5.31
3	Montenegro	0.19	0.19	0.24	0.58
4	Macedonia	6.22	5.59	6.98	6.00
5	Croatia	26.91	23.63	21.33	20.90
6	Slovenia	26.37	29.22	31.27	31.10
	Total Ex-YU, 1-6	100.00	100.00	100.00	100.00

Source: *See Tables 1. and 2.; prepared by the authors.*

If the ex-YU territory only is observed (Table 4), it is obvious that the Serbian share dominates at a stable level (around 36%); the Slovenian share is showing a relative increase and is approaching to one-third, while the Croatian share is declining to around 20%; the other three countries have a significantly smaller share or a marginal one.

Graph 2. *Structure of agrarian export of the ex-YU market*

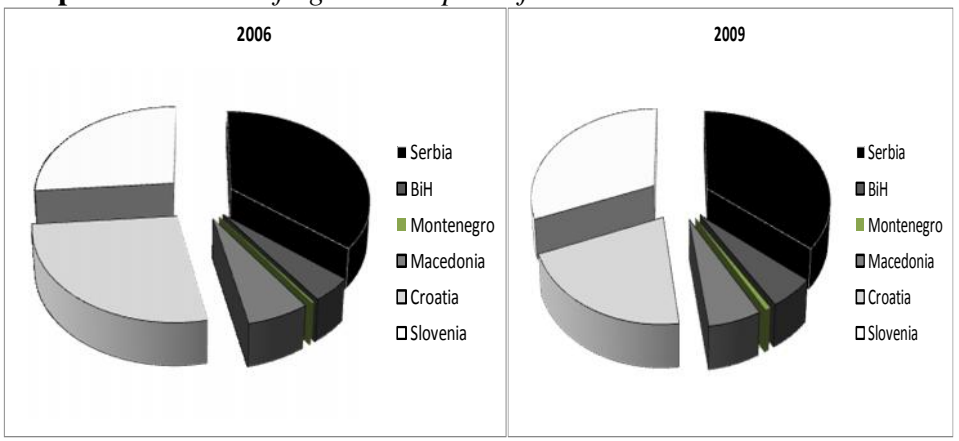


Table 5. *Regional structure of agrarian export of the ex-YU and neighbor countries' markets*

		2006	2007	2008	2009
1	Serbia	9.91	10.00	8.53	9.39
2	B and H	1.17	1.25	1.30	1.38
3	Montenegro	0.05	0.05	0.06	0.15
4	Macedonia	1.71	1.52	1.71	1.56
5	Croatia	7.40	6.43	5.22	5.43
6	Slovenia	7.25	7.95	7.65	8.08
I	Total Ex-YU, 1-6	**27.48**	**27.20**	**24.46**	**25.99**
7	Bulgaria	9.13	7.45	10.38	10.29
8	Romania	7.34	6.48	10.10	11.07
9	Hungary	33.52	37.68	35.91	33.05
10	Greece	22.44	21.08	19.04	19.44
11	Albania	0.08	0.11	0.12	0.16
II	Subtotal, 7-11	**72.52**	**72.80**	**75.54**	**74.01**
III	Total I+II	100.00	100.00	100.00	100.00

Source: *See Tables 1. and 2.; prepared by the authors*.

A more complete assessment of the Serbian agrarian export-oriented potential is derived if the whole region is comparatively observed (Table 5), where the market of the ex-YU countries merely makes one-fourth of agrarian export. In that context, the Serbian agrarian export covers around one-tenth of *the* market, which is at the level of the share held by Bulgaria and Romania; however, it is twice as small as the share of Greece and even three times as small as the relative share of Hungary.

Measuring comparative advantages of agrarian export

The quantitative demonstration and/or measuring of the competitiveness and comparative advantages of the export of a certain country in the world market can be carried out via several different indicators. In literature, the most frequently referenced ones are as follows: the coverage of import with export; the relative foreign-trade balance; the index of the revealed comparative advantage (RCA); the Grubel-Lloyd index of intra-industrial trade, and so on (Pelević, 2004). The last two stated indicators are mostly used for international comparisons. For the needs of this paper, and given our basic intention to determine the export potentials and comparative advantages of the Serbian agrarian export in comparison with the market of the ex-YU countries and their new

neighborhood, the Balkan, Danube-basin and a wider environment, we shall refer to two indicators in this paper: (a) the rate of the rate of the coverage of the total import and the agrarian one with export, and (b) the coefficient of the comparative advantage of agrarian export (as the adapted revealed comparative advantage index – the RCA index). By using the models of these indicators, the potential comparative advantages of the agrarian export of Serbia are analyzed in two levels: (1) in the narrower environment of the countries belonging to the ex-YU uniform market, and (2) in the broader, however geographically close environment of the neighbor countries, for the most part of those belonging to the Danube basin countries. Actually, comparisons are made with ten countries, half of which are the EU member countries and the other half of them aspire to achieve *the* goal.

(a) Degree of coverage of import with export. This indicator of competitiveness and comparative advantages, as the relation of the export of a product of a certain sector of a certain country towards the import of the product of *the* sector of the same country in the observed year, is derived from the following algebraic expression:

$$PU_{ij}^{t} = \left(\frac{I_{ij}^{t}}{U_{ij}^{t}}\right) * 100 \qquad (1)$$

in which:

$ПУ_{ij}^{t}$ - the coverage of import with export in the *t* year

$И_{ij}^{t}$ - the export of the *i* sector of the *j* country in the *t* year

$У_{ij}^{t}$ - the import of the *i* sector of the *j* country in the *t* year

t – years (2006-2009).

It is understood that, amongst the observed countries, those with a high degree of the coverage of import with export (Table 6) can be identified as countries characterized by comparative advantages, i.e. as those bearing the regional agrarian export potential. Comparatively, in relation to certain countries and the derived magnitudes for the ex-YU market, the new environment and the whole region, there is an evident superiority of the Serbian agro-food export (differently from the total coverage of export with import, which is around 50%), which in all the observed years not only far exceed import but also so much convincingly (224.2%) exceed the degree of the coverage of the import with the export of all the observed countries.

Table 6. *Coverage of the total and agrarian imports with export (PU, %)*

Country			**2006**	**2007**	**2008**	**2009**
1	Serbia	a)	48.8	47.6	48.0	52.0
		b)	**183.2**	**181.0**	**147.6**	**224.2**
2	B and H	a)	45.3	42.7	41.2	47.3
		b)	13.8	15.2	16.2	18.4
3	Montenegro	a)	30.2	21.8	16.5	16.8
		b)	5.0	6.0	5.6	5.7
4	Macedonia	a)	63.8	64.2	57.2	53.4
		b)	52.5	31.0	50.1	47.1
5	Croatia	a)	48.3	47.9	46.0	49.5
		b)	54.9	52.0	44.4	49.3
6	Slovenia	a)	91.2	90.1	86.1	93.5
		b)	57.7	58.2	59.9	60.1
I	Ex-YU 1-6	a)	62.3	60.9	57.9	62.7
		b)	**62.2**	**59.7**	**57.2**	**61.7**
7	Bulgaria	a)	64.9	61.7	60.7	70.7
		b)	106.8	77.2	95.6	93.5
8	Romania	a)	63.3	57.6	59.7	74.9
		b)	35.6	25.7	38.3	45.2
9	Hungary	a)	96.2	99.9	99.5	106.9
		b)	148.8	167.9	162.2	163.1
10	Greece	a)	32.9	30.9	28.6	29.8
		b)	48.7	46.7	47.8	52.0
11	Albania	a)	25.9	25.7	25.8	23.9
		b)	2.4	3.0	3.3	4.6
II	Subtotal 7-11	a)	65.7	64.7	64.1	71.0
		b)	**71.5**	**68.6**	**73.6**	**76.7**
III	Total I+II	a)	64.8	63.8	62.5	68.9
		b)	**68.7**	**66.0**	**68.8**	**72.1**

Source: *See Tables 1. and 2.; prepared by the authors.*

In the ex-YU market (except for Slovenia, with around 60%), this rate is below 50% with all the countries; in the region, Hungary is the only one to have a high rate (160%), whereas all the other countries have a negative agrarian balance. Thus, the Serbian rate of coverage of agrarian export with export is by around three times as high as the average rate in the region.

(b) The coefficient of the comparative advantage of agrarian export. Since the previous indicator of coverage of import with export only

expresses the internal agrarian competitiveness (within one national economy), a much more objective and more complex expression of the agrarian comparative advantages can be obtained through the inclusion of several internal and external parameters and their interrelations in the analysis. For that reason, it is obligatory that we should calculate the indicator which, on the one hand, analyzes the sectoral (herein agrarian) export of one country in the context of the export of *the* sector of all the observed countries, while – on the other hand, in the context of the total export of that particular country and the total exports of all observed countries. In that sense, the coefficient of the relative coverage of import with export, which we calculate and use in this analysis, represents the adapted RCA index (the index of the *revealed comparative advantage*) (Balassa, 1965), given the fact that the comparisons are not performed in relation to the total world export but only in relation to the total export of the selected countries. The main pattern for the calculation of the coefficients of the comparative advantage of agrarian export is accounted for by the relation as follows:

$$KPAI_{iz}^{t} = \left[\frac{\frac{I_{ij}^{t}}{I_{iz}^{t}}}{\frac{\sum_{i=1}^{n} I_{ij}^{t}}{\sum_{i=1}^{n} I_{iz}^{t}}} \right] \qquad (2)$$

in which:

$РПУ_{ij}^{t}$ - the coefficient of the comparative advantage of agrarian export in the *t* year

$И_{ij}^{t}$ - the export of the *i* sector of the *j* country in the *t* year

$У_{ij}^{t}$- the export of the *i* sectors of all the countries in the *t* year

$\sum_{i(n-1)} И_{ij}^{t}$ - the total export of all the sectors of the *j* country in the *t* year

$\sum_{i(n-1)} У_{ij}^{t}$ - the total export of all the sectors of all the countries in the *t* year

t – years (2006-2009).

On the basis of the above presented analytical tables, and by using the algebraic expression (2), the coefficients of the comparative advantage of agrarian export are calculated. In order to gain a more complete picture of the comparative advantages of the Serbian agrarian export, this indicator is derived in two variants, namely as: (a) *the coefficient of the narrower comparative advantage of agrarian*

export ($KPAI_1$), which measures the advantages of the agrarian export of the observed countries in relation to the once uniform and historically closer ex-YU market, and (b) *the coefficient of the broader comparative advantage of agrarian export ($KPAI_2$),* which is an expression of the interrelated agrarian export competitiveness of the observed countries in relation to the wider agro-food market potential of the regional environment which, apart from the ex-YU market, encompasses all the other Serbia's neighbor countries, and therefore the geographically closer market, as well.

(b-1) The coefficient of the narrower comparative advantage of agrarian export ($KPAI_1$). A higher degree of the sectoral coverage as compared with the total coverage of import with export results in a relatively higher value of the KPAI coefficient. So, as we can see in Table 7, the countries with the highest $KPAI_1$ values (those having the most favorable relation between their export and import) also have the highest comparative advantages and can be considered to be the bearers of the export-oriented potential in a certain market.

Table 7. *Coefficients of the narrower comparative advantage of agrarian export in the ex-YU market ($KPAI_1$)*

Country		2006	2007	2008	2009
1	Serbia	247.85	232.83	203.11	208.39
2	B and H	54.77	61.84	67.59	64.68
3	Montenegro	15.06	17.27	24.84	72.10
4	Macedonia	114.41	93.04	113.87	107.41
5	Croatia	114.54	106.80	96.50	95.92
6	Slovenia	55.51	61.48	68.31	67.20
	Total Ex-YU, 1-6	100.00	100.00	100.00	100.00

Source: *prepared by the authors.*

One of the most important conclusions results from this comparative outline: the average export competitiveness of the Serbian agrarian sector is at least two times (and more than this) as high as the average competitiveness of the whole until recently uniform ex-YU market observed in this manner. This is very clearly indicated by the executed ranking of the countries according to the values of the $KPAI_1$ coefficients (Table 8), and even more illustratively by Graph 3.

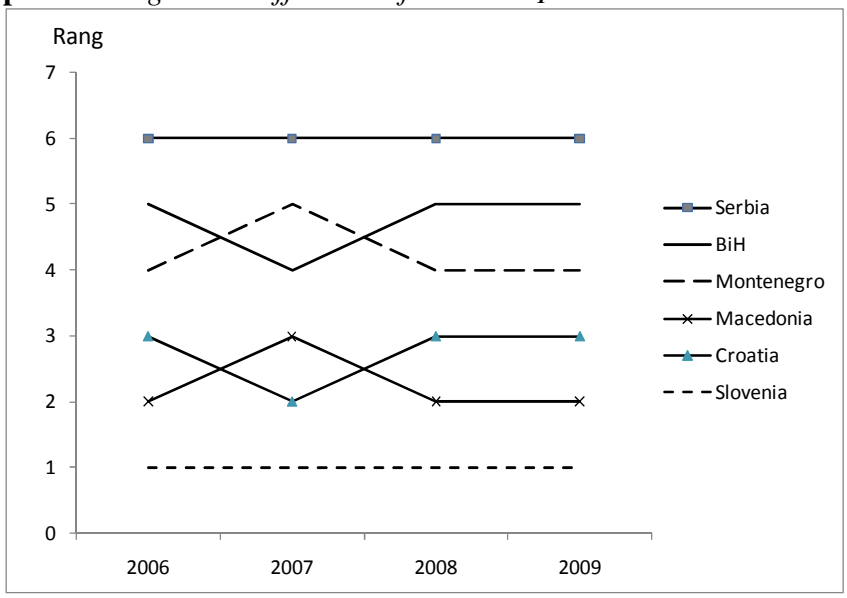
Table 8. *Ranking the ex-YU countries according to the values of the $KPAI_1$ coefficients*

Country	2006	2007	2008	2009
Serbia	1	1	1	1
B and H	5	4	5	5
Montenegro	6	6	6	6
Macedonia	2/3	3	2	2
Croatia	2/3	2	3	3
Slovenia	4	5	4	4

Source: *prepared by the authors*.

The agrarian export of Serbia if first-ranked compared with all the countries of the ex-YU market and for the duration of the whole of the observed period. The other countries' ranks have not essentially changed, either; at the same time, Macedonia and Croatia share the second and the third ranks, whereas Slovenia is only the fourth.

Graph 3. *Changes in coefficients of the $KPAI_1$*



Source: *prepared by the authors.*

(b-2) Coefficients of the broader comparative advantage of agrarian export ($KPAI_2$). If we direct the focus of the analysis from considering the narrower relative coverage of import with export (in the ex-YU uniform market) onto gaining an insight into the advantages of the Serbian agro-food sector in the whole observed region, i.e. by calculating

the coefficients of the broader comparative advantage of agrarian export ($KPAI_2$), a yet more precise identification (Table 9) of the countries which have a certain agro-food export potential, i.e. which can have agrarian advantages in the region, is obtained.

Table 9. *Coefficients of the broader agrarian advantage in the region ($KPAI_2$)*

Country		**2006**	**2007**	**2008**	**2009**
1	Serbia	288.99	265.12	210.68	235.05
2	B and H	63.86	70.41	70.10	72.96
3	Montenegro	17.56	19.67	25.77	81.33
4	Macedonia	133.40	105.94	118.11	121.16
5	Croatia	133.55	121.61	100.10	108.20
6	Slovenia	64.73	70.01	70.85	75.80
7	Bulgaria	113.36	93.81	125.06	130.36
8	Romania	42.54	37.64	55.27	56.94
9	Hungary	84.82	93.18	89.93	83.66
10	Greece	200.79	209.72	202.23	202.60
11	Albania	20.06	23.34	23.19	29.95

Source: *prepared by the authors.*

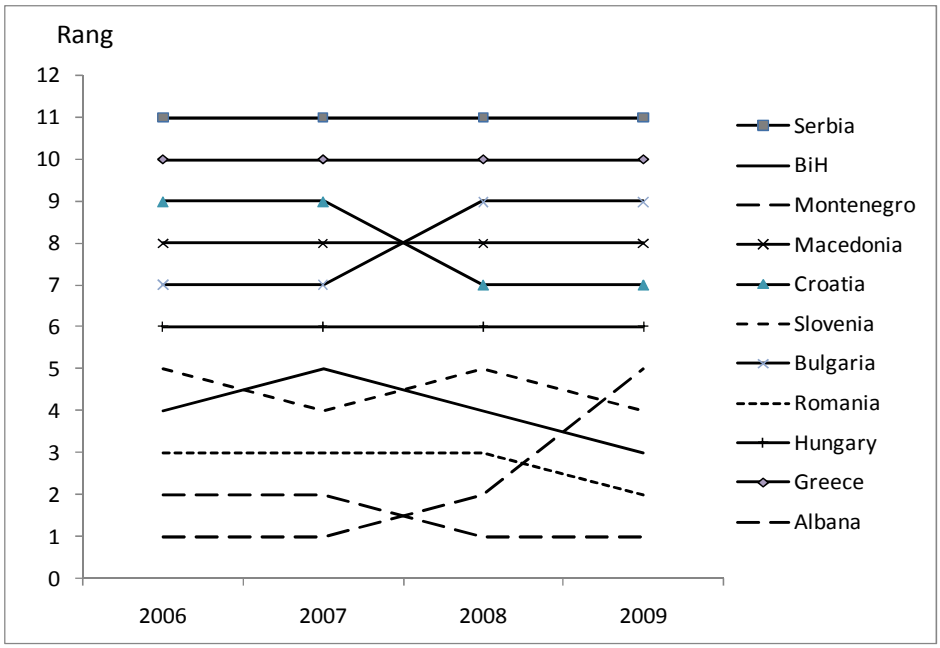
Although the very coefficients of the broader relative coverage of import with export, i.e. the comparative agrarian advantage in the region, are clearly indicative of the advantages of the Serbian agrarian export, their ranking (Table 10) offers a more obvious picture.

Table 10. *Ranking of the countries in the region according to the values of the $KPAI_2$ coefficients*

Country	**2006**	**2007**	**2008**	**2009**
Serbia	1	1	1	1
B and H	8	7	8	9
Montenegro	11	11	10	7
Macedonia	4	4	4	4
Croatia	3	3	5	5
Slovenia	7	8	7	8
Bulgaria	5	5	3	3
Romania	9	9	9	10
Hungary	6	6	6	6
Greece	2	2	2	2
Albania	10	10	11	11

Serbia as the first-ranked, Greece as the second-ranked for agrarian export, Macedonia as the fourth- and Hungary as the sixth-ranked country have not changed their respective relative positions, whereas the other countries' ranks have varied, which is very convincingly accounted for by the graph representation of the changes in the coefficients of the broader relative coverage (Graph 4), as a convincing expression of the comparative advantages of the Serbian agrarian export in the region.

Graph 4. *Changes in the coefficient of the broader relative coverage of* $KPAI_2$



Source: *prepared by the authors.*

All the analyses presented in this paper have been carried out with an aim to test the hypothesis that agriculture and agro-complex in Serbia have "natural" comparative advantages and that, for that reason, they do represent the developmental "chief support" of the export-oriented economy. The soundness of such an attitude has been tested by an appropriate comparative analysis (using the specific method for ranking) in the context of the market structure and agrarian potentials of the narrower and broader environments, so, appropriate conclusions have been reached on that basis.

Conclusions

1. Having a one-fourth share in the total export, with the very high coverage of import with export and a constantly positive balance, Serbia's agrarian foreign trade undoubtedly represents a credible potential of development, balance-sheet harmonization and the total macroeconomic and social stability.

2. The comparative analysis of the competitiveness of agrarian export, derived by means of the two specific indicators (the coefficient of the narrower and the coefficient of the broader comparative advantage of agrarian export) as well as the ranking of the generated results show that the Serbian agrarian export has convincing relative comparative advantages not only on the historically and economically-systemically close territory of the countries of the ex-YU uniform market but also in relation to the geographically close, however significantly broader, market as well, the one covering all the other countries in Serbia's neighborhood, too.

3. According to the results of the ranking of the comparative advantages, the most significant rivals to the export-oriented potentials of the Serbian agrarian foreign-trade in the observed markets in the region (amongst the ten observed countries, half of which are the EU member countries and the other half of which aspire to achieve that goal) will be the agrarian export of Greece, then come Bulgaria, Croatia and Macedonia, while the other countries (because of the different structure of their total export and the share of agrarian export) have no rather significant relative agrarian-export-oriented competitiveness.

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COMPARATIVE ANALYSIS AND IMPORTANCE OF SELECTED CROP INSURANCE SYSTEMS

Milenka Jezdimirovic[1], Rajko Tepavac[2]

Abstract

The aim of this paper is to explore the advantages and disadvantages of the analysed crop insurance models together with the possibilities for their application in different conditions of agricultural production. In this paper, the authors point out to the importance of the general economic position of agriculture for growth and development of crop insurance as well as for insurance of other branches of agriculture. In addition to the aforementioned, the authors stress the impact of insurance not only on agricultural community but also on the entire value chain within the production of agro food products. Current global climate changes imply that insurance of agriculture is going to become one of the important factors of sustainable agricultural production i.e. the means to protect investments and continuity of production.

Key words: *crop insurance, insurance models, subsidising insurance*

Introduction

The plant cultivation is full of uncertainty, as people can only partly influence the conditions under which it is carried out. The influence of different factors can result in large-scale losses and interrupt production. Namely, such losses can prevent the production to continue in the future. For the said reason, it is important for the agricultural community to be informed about the benefits they can derive from the insurance of agriculture.

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Insurance is a form of risk management used to hedge against contingent loss. Namely, it represents the transfer of a risk of loss from one entity to another in exchange for a premium or guaranteed and quantifiable small loss to prevent a large and possibly devastating loss (*Iturioz, 2009).*

It takes an important place in the economic protection and improvement of economic production. In the event that risk against which the agricultural production is insured is actuated, the value of the damaged or destroyed goods is compensated through the payment of indemnity.

Insurance of agriculture is important not only for the farmer but also for the supply chain within the agro food products – from input suppliers to the end consumers, that is to say - the occurred loss, in different ways, impacts the other chain participants, as well.

Characteristics of crop insurance

In many regions there is a risk of catastrophic losses caused by drought, flood, hail, pests or other natural disasters. Losses which may occur as the acts of god and other occurrences can have devastating consequences for the agricultural estates. In addition, large-scale occurrences can force the agricultural producers to sell their agricultural assets and thus prevent recovery and long-term growth.

In agricultural production, there are different ways to avoid the risk. According to *Iturioz (2009)*, the risk can be avoided by choosing to select particular crops which are considered to be of low risk for the area in which soil for agricultural production is located. Additionally, the risk can be avoided by production being carried out only in optimum conditions or by further developing infrastructure to improve irrigation or minimize the effects of frost. And lastly, all or part of the risks can be transferred to an insurer through an insurance contract.

According to the modern concept, insurance protects the insureds, as interested subjects, against occurred losses, providing them with economic security. *Miloradić (2001)* argues that insurance is an organised association of individuals, companies and other subjects which are exposed to the same perils, with the aim to jointly carry the loss for which they know in advance that, according to the probability theory and the law of large numbers, will occur to only some of them.

In the area of agriculture and food industry, insurance takes a considerable place in the economic protection and improvement of company production. Indemnity payments compensate for the value of damaged or destroyed goods after the occurrence as well as for the other types of losses and damages.

Risks affecting the agricultural output can be insurable and uninsurable. Insurable are the risks for which there are technical conditions to define their size and thus the possibility for them to be covered. Uninsurable are the risks for which the underwriter does not have an actual basis to determine the premium or does not have the possibility to diversify the risk.

Characteristics of the risk against which crops can be insured are as follows:

- risk must be a random future event, independent of the will of the insured,
- there must be a large number of similar exposure units,
- risk must be homogenous,
- risk must have a repetitive character,
- risk must be defined or definable and quantifiable,
- risk must be evenly spread over space and time,
- for such risk there must be an economically acceptable premium,
- insured risk must be in accordance with the law and social and ethical principles,
- potential losses must be financially significant.

There are different types of uninsurable risks, and the most common are the following:

Market risks – this is the group of risks arising from the change in consumer taste and their lack of information, influence of competition on the market and the like.

Political risks – this is the group of risks arising from the political changes in the country, restrictions on trade and currency convertibility, high tax burdens etc.

Production risks - are the risks occurring due to the use of obsolete technology, unsolved technical problems in production, exhaustion of natural resources, strikes, etc.

Personal risks – are the risks such as loss of earnings due to unemployment and other factors such as, for example, inadequate education which may lead to the loss of financial security.

The subject of insurance in this branch are annual and perennial cultures. All arable and vegetable crops are insured as well as orchards, vineyards, planting materials, flowers and ornamental plants, particular forest plants and even the plant species which should be specially cultivated as they grow freely such as, for example, reed or poplar. Regardless of whether the plants are annual or perennial, their annual yield is insured. Normally, the insurance protection is provided for the yield, however, the other parts of the plant (flower, tree, leaf, bark) are also insured *(Miloradić, 2005).*

As a rule, in the Republic of Serbia, underwriters indemnify only for the loss of yield quantity but not for the loss of quality. According to *Labudović, Stanković and Todorović (2011),* exceptions to this rule are: hemp and flax; broomcorn; fruit, grape and forest planting material and ornamental planting material; willow for basketry. In these cases, indemnity is provided for the loss of quality, as well. In addition, the loss of quality will be indemnified for the crops and fruit for seed production only when additional insurance is written and additional premium is paid. As a general rule, additional risks can be insured only if standard risks are previously covered. Exception to this rule is the situation when the insured crop i.e. plantation is protected with anti hail net.

To insure the production, the farmer needs to conclude the insurance contract with the selected insurer, based on which the premium will be paid. The insurance premium is the amount of money which insured is obliged to pay to the insurer in consideration of the insurer's obligation to indemnify the insured's loss under the insurance contract, should the loss occur as the result of actuation of contracted risks.

In Europe, there are different levels of premium rates. They range from 0.7% in Denmark, 0.89% in the Netherlands, 1.12% in Germany, 1.4% in Greece, 2.14% in France, 3.3% in Austria, 5.4% in Spain to 7.9% in Portugal and 8.1% in Italy *(Diaz-Caneja et al, 2008)*

Premium rate depends on the insurance class of hazard and class of sensitivity of the particular agricultural line of production. Insurance premium is determined depending on:

- risk
- type of crops i.e. plantations
- value of insured crop i.e. plantation
- area on which insured crops i.e. plantations are located
- contracted insurance period
- scope of insured lines of production
- method of effected insurance
- method of payment
- insurance results in the current insurance period
- participation of insured in the loss etc.

Standard risks insured against are hail, fire and lightning while additional are storm, flood and spring frost i.e. autumn frost for seed corn. The development degree of crop and fruit insurance is measured through the insured risks, different types of policies and Government assistance through subsidies *(Labudović, Stanković and Todorović, 2011).*

According to *Marković and Jovanović (2009)* in particular countries of Northern Europe and Baltics (Norway, Sweden, Estonia) the crop insurance is poorly developed or is in the beginning of its development (Latvia, Lithuania and Poland). In Finland, the insurance of crops and fruit is also underdeveloped, however, the Government has provided a Crop Compensation Scheme to cover the yield losses after natural disasters. On the other hand, in Greece and Cyprus, the Government prescribes mandatory insurance of crops and fruit. The insurance covers the risk of hail and a slight number of additional perils. However, this is not the comprehensive protection such as, for example, the insurance package which covers a larger number of risks.

Characteristics and importance of selected systems for insurance of crops

All systems for insurance of crops and fruit can be divided based on the number of risks (single-risk insurance, multi-risk crop insurance, all-risk crop insurance) or according to the methods of risk compensation (insurance against losses to crops and fruit, yield guarantee insurance and index-based insurance) *(Herbold, 2007).*

The most common crop insurance system in Europe is the insurance against hail. Policies specifying these risks which, at the same time, represent the single-risk insurance , are predominant in the majority of European countries. According to *Marković and Jovanović (2008)* there are several countries in which producers can be insured solely against hail, such as Belgium, the United Kingdom, Ireland, Denmark and France, whereas the use of other insurance types is almost irrelevant. In the said countries, Government subsidies are either non-existent or have a token representation.

According to its representation, combined risk insurance takes the second place and covers two or more risks, as a rule, always including the risk of hail as the standard risk. According to *Labudović, Stanković and Todorović (2011)* combined risk insurance is applied in Bulgaria, Hungary, Poland, Portugal, Slovakia, Slovenia, the Check Republic and Sweden. This insurance covers the following risks: hail, fire, rain, frost and wind. Insurance against drought which, at present, presents the agricultural community with lot of difficulties, most often is not included in the combined insurance. As drought can cover a large territory, it has the character of a systemic risk which results in simultaneous filing of claims by a large number of insureds. Thus, instead of being included in combined insurance, it is included in yield insurance.

Yield insurance covers the losses of yield for particular crops and fruit which occurred under the influence of different adverse weather conditions. According to *Marković (2008),* in such case the term multi-risk crop insurance is not used because it sometimes relates to the combined insurance whereas sometimes it denotes the yield insurance. Two insurance systems can be singled out. Regarding the yield insurance in Europe, which is present in several European countries (Portugal, Austria, Luxembourg, Greece, Cyprus, France, Italy), the loss occurred as the consequence of adverse weather must be assessed.

On the other hand, in Spain, the USA and Canada, multiple peril crop insurance includes the loss of yield as the consequence of occurrence i.e. natural disaster which is calculated as the difference between the guaranteed and achieved yield. In the United States of America and Canada, multiple peril crop insurance is widely spread and covers a large number of risks which may influence the production process and output: drought, excessive moisture, hail, wind, frost, insects and different diseases *(Rejda, 2003).*

Under this type of insurance, the sum insured is defined in terms of the expected yield to the production. According to *Iturioz (2009),* cover is set in the range of 50 percent to 70 percent of the expected yield. In turn, the expected yield is determined on the basis of the actual production history of the producer or the area in which producer operates.

The sum insured can be based on the future market price of the guaranteed yield, if the producer has an insurable interest or alternatively, if the producer has taken a loan to finance the crop, the sum insured may be based on the amount of the loan if the financier has an insurable interest in the crop.

This insurance model offers comprehensive cover to the producers, but comes at significantly higher cost compared to the other models. Rates for multiple peril crop insurance contracts offered to individual producers range between 5% and 20% of the sum insured, depending on the crop, the region where the crop is located and the level of coverage. High premium price reflects the costs of minimizing the chances of adverse selection and moral hazard through risk inspections, overall monitoring of the insureds and the like. The cost generally makes this form of cover unattractive to marginal or small producers. The geographical dispersion of agriculture production makes the operational and administrative costs of delivering insurance high in comparison with other types of insurance.

Asymmetries of information lead to the possibility of adverse selection and moral hazard. Without adequate technical expertise, underwriters are unable to distinguish between high-risk and low-risk producers and, if they set premiums on the basis of averages, they may attract only high-risk producers.

Additionally, the existence of this type of insurance may motivate producers to take additional risks such as using less fertilizer, planting out of season or planting in less fertile areas. The consequences of asymmetries of information can lead to increases in premiums which will further increase the possibility of adverse selection by discouraging low-risk producers from taking insurance. The problems associated with asymmetries can only be addressed through ensuring that underwriters have the technical expertise to assess the risks properly *(Iturioz, 2009).*

Based on above said it can be inferred that the European system entails greater compensation expenses but the possibility of moral hazard, which in the United States of America is one of the greatest problems in crop insurance, is avoided.

Furthermore, deductibles, i.e. the insured's participation in premium, and the bonus- malus system, can be introduced in order to reduce moral hazard. According to *Hajd and Verkamen (1997)* more serious risks are accompanied by deductibles of higher value. If deductibles were not contracted, i.e. if farmers did not partly participate in the loss, then they would not be stimulated to undertake prevention measures. Higher deductibles are applied to new insurance products where previous loss experience is very limited or there is none. Bonus-malus system is implemented in Austria, Bulgaria, Estonia, Lithuania, Luxemburg, Hungary, Germany, Romania, Finland, the Netherlands and Spain.

All-risk crop insurance provides farmers with coverage against all perils that could cause damage to their crops. This insurance system is used in the United States of America and in Spain.

Revenue insurance is a combination of yield and price insurance, i.e. it provides the insured with protection against the consequences of low yields, low prices or both combined. In this particular case compensation is effected when total value of production is lower than a corresponding value.

According to *Iturioz (2009),* this system offers great advantages to producers who rely on short term financing of production, which is paid off from agricultural income and also on funds granted by financiers and allocated to production. This makes the producer and the financier certain that the estimated revenue, on the basis of which loans are granted, will be generally realized. The indispensable precondition for the application of this insurance system is a developed market of goods and derivatives which enables the insurer to protect himself from drop in prices and transfer all or only part of the price risk, to other carriers of risk. This kind of insurance is very much present in the insurance of soya bean and corn production in the United States of America that has a very developed market of these products. Index insurance is based on data relating to a given area or administrative unit. *(Marković and Jovanović, 2008).*

According to Labudović, Stanković and Todorović (2011) index insurance is based on an index resulting from measurements by authorized government agencies, and it is not based on the agricultural community's experience. Greater risk diversification may be ensured through trade in policies of this insurance on the derived security market. There are two types of index insurance – index insurance of an area (the index is a directly defined area of average yield or revenue) and indirect index insurance. Indirect-index insurance was introduced in Spain in 2001 and in Austria in 2007. In Great Britain it has been in use since 1998.

Indirect-index insurance does not refer to the average yield of a given area but to corresponding meteorological parameters. In this case indemnity is paid if the given limit value (e.g. of quantity of precipitations or average temperature) is exceeded or has not been attained. Time derivatives may be assigned to this insurance category. Time derivatives originated in the United States of America in the mid-90s and in recent times they have also been applied in developed countries of Western Europe *(Marković and Jovanović, 2008).*

Index based insurance is paid out based on the value of an „index" and not on the basis of loss assessment on site. The index is a variable associated with loss and the insured has no influence in this respect. Indexes may include precipitations, temperature, area yield etc. For example, the index of a yield of a crop in a given area is created based on the expected yield in the area. The insurer will indemnify the insured whose regional average yield is less than the established threshold *(Iturioz, 2009).*

The precondition for a successful implementation of this insurance system is the contracting parties' trust in the objectivity and transparency of the given index. Sufficient data, high correlation between the index and loss on producer level, non interference from insurer or insured are instrumental to attaining an adequate degree of objectivity and transparency.

This insurance model has a number of advantages, the most important ones being:

Minimized adverse selection risk – adverse selection may be incurred in agricultural insurance because producers will more readily buy insurance if the risk is great. Basically, this is information asymmetry, which

constitutes a risk for the insurer (they should manage risk through detailed and individual risk assessments). The advantage of index based insurance is equal conditions and same payment scale for the whole agricultural community in a defined area, which makes it possible to practically eliminate the adverse selection problem.

Minimized moral hazard – in traditional insurance, the behaviour of agricultural producers can affect the level of loss (by deteriorating the physical loss) and this phenomenon is called moral hazard. By applying index based insurance, the agricultural community is not given the possibility or the stimulus to exert its influence, because payments are based on independent and official time parameters, irrespectively of the behaviour of the agricultural community.

No need to assess loss in the field of production - loss assessment is a challenge for any traditional insurance system as it involves a large number of qualified assessors with required skills and knowledge in the field of agricultural production. In this respect, the advantage of index based insurance consists in payment of damages without assessment on site which reduces administrative costs and makes redundant the involvement of professional assessors.

Reduced informational requirements and number of office workers- traditional insurance systems imply considerable data gathering activity in order to classify producers based on their individual level of exposure. By applying the index, such detailed information or differentiation of producers are no longer needed. The implementation of this insurance system might be particularly significant in countries where access to detailed data is restricted.

Transparency – the assessment procedure in traditional insurance systems frequently results in conflicts between farmers and the assessors due to the subjective nature of the loss assessment process. Weather index based crop insurance is based on weather measurements conducted at determined meteorological stations whose data are objective and theoretically disputes are less likely to occur.

Individual producers using this kind of insurance account for only a small part of the large community of producers whose output is index defined. This is the reason why payment of damages is based on deviations from the index, instead of on individual loss, i.e. there is no loss assessment on

the individual insured level. Indemnification is a rapid and inexpensive process in terms of administration. Finally, thanks to the objectiveness in setting the index, it is easier for the insurers to get reinsurance.

Despite the said advantages, according to *Iturioz (2009)* only a small portion of insureds uses this product. This may be explained if we analyze some of the limitations. From the perspective of the insured, irrespective of the fact that loss is based on area index deviations, individual producers are still facing some standard risks (standard risk may be defined as deviation from the loss on individual producer‘ s level from the area average). As regards the insurer, the collecting and elaboration of corresponding indexes can be an expensive and time consuming task.

However, once the indexes are set, further operational costs are low and as a result the premium rates to be paid by the insureds are lower. This results in a gradual drawing of smaller producers who, under other conditions, would not insure their production.

Another advantage of this kind of insurance is that premium and indemnity are not dependent upon the farmer‘ s individual experience, i.e. the index can be based on objective, easily available data than can be independently proved, and thus there is no adverse selection and moral hazard. *(Labudović, Stanković and Todorović, 2011).*

As above mentioned, index insurance is based on data relating to a specific area o administrative unit. *Marković and Jovanović (2008)* describe various insurance models based on these data. Area yield based insurance is based on the difference between the previously determined, average yield in a given area and the actually realized average yield. This means that compensation is paid irrespectively of the actual damage sustained by individual farms. In this kind of insurance, the insurer determines the index based on the guaranteed yield from the insured‘ s given area unit, and it usually ranges from 50% to 90% of the anticipated yield.

Area-revenue insurance is based on the product of the average yield and price for a given area. If such amount is lower than the previously defined average value of production for such area, indemnity will be paid to all insured agricultural producers in that area.

In terms of promotion and costs cutting, the role of the government is also important because through subsidies it lessens the premium financial load while stimulating the agricultural community to provide continuous insurance cover for their production.

Marković and Jovanović (2009) point out that when it comes to state subsidies share in insurance premium for agricultural production, there are huge differences between the European countries. The largest state subsidies are granted in Portugal (68%) and Italy (67%). In a large number of countries, farmers are obliged to pay only half of the insurance premium while the state compensates the other half (Cyprus, Latvia, Lithuania, Luxembourg, Romania and Slovakia). Considerable state subsidies are granted in Austria (46 %), Slovenia (45%) and Spain (41%). In a large number of countries there are no government subsidies and in such countries there is only insurance against one risk or it is extended to combined insurance.

Subsidies applicable in Serbia are at mid-scale level if compared to value of subsidies generally granted in other European countries.

In 2011 the insurance premium subsidy in Serbia was 40% and it only applied to registered farms. Agricultural insurance subsidies are important as they stimulate producers to insure their production under much favourable terms which will impact the final cost of production.

In the Republic of Serbia, the rate of agricultural production insurance is only about 10% which is very low if compared to some European countries with rates over 70%. This indicates a significant difference.

The problem of agricultural insurance in general but also of crop insurance lies in insufficiently developed awareness among producers about the necessity of implementing this measure to protect investments. On the other hand, the main feature of crop insurance is that loss is regularly incurred.

From results analysis it can be observed that farmers in all countries can insure their crops against hail, as standard risk, whereas in Greece and Cyprus crop insurance is mandatory. In the Republic of Serbia, agricultural insurance is on voluntary basis and it is based on the economic calculus of the individual producer, as already stated, and partly on government aid.

Various factors influence the decision of the agricultural producer to insure its production. *Rejesus et al. (2009)* state that the farmer's decision to purchase insurance is influenced by aversion to risk but it also depends on the size of the farm (estimated on the basis total crop acreage, annual revenue and invested capital), age, gender, education, and on whether the farmer cultivates land by himself or in cooperation with other farmers etc. Furthermore, they point out that areas with smaller risks are characterized by greater elasticity of demand for crop insurance than areas of great risk where there is inelasticity of demand for insurance. Farmers with more cultivable land, greater yield, but also with high exposure, like those whose only source of income is agriculture and the younger population expect much more from the government i.e. government aid programmes than those who do not fall into these categories.

In almost all countries- except for Belgium, Denmark, Finland, Ireland and Great Britain- there is a wide range of other risks against which farmers can insure their crops. *Marković (2009)* states that insurance against drought, which nowadays creates great problems to farmers, is generally present in developed European countries and in the United States of America, whereas in former socialist countries (Bulgaria, Czech Republic, Romania, Slovakia and Slovenia) in most cases it is not included in the insurance package. Insurance against various diseases and pests, which constitutes a significant cause of instability in crop production, is sold in several countries (Austria, Japan, Canada, USA and Spain). For many years, in Germany was only sold hail insurance and only from 2007 some insurance companies included in their offer insurance against storm, flood and frost.

In the Republic of Serbia the percent of hail risk share in crop insurance is very high, which is evidence of its devastating effects. Hail is considered as standard risk and it is precondition for insurance of crops against additional perils such as flood, frost, etc.

In order to determine whether a given insurance model is suitable for a concrete producer, the location of the farm has to be studied and also the prospective hazards i.e. hazards that are most likely to impact the production process, category of producer i.e. size of the area where production is conducted, technological level of production and production results in the previous seasons.

The presented models of crop insurance have their advantages and disadvantages. The model that will be chosen by the producer depends on a number of factors. The analyzed insurance models are optimal under appropriate conditions, i.e. they provide best protection if they are chosen based on a detailed analysis of factors relevant for crop production.

Conclusion

In view of present global climate changes, insurance constitutes an efficient way to protect investments in agricultural production. The demand for insurance is expected to rise in the forthcoming period, i.e. the number of mainly small agricultural producers insuring their products will increase and insurance will become an indispensable protective mechanism that will considerably impact the economic stability of producers and production continuity.

Insurance in agriculture is important not only for the producer but also for the whole supply chain in agricultural and food production, from the input supplier to end consumers. The risk is transferred to the whole chain and minimization of risk, in terms of transferring it, in part or in whole, to the insurance company under an insurance contract, is in the interest of all the participants.

When selecting an insurance model it is very important to recognize all the factors impacting production and to choose an optimal solution that will bring satisfaction to the insured in the event of loss occurrence.

It can be expected that once the economic situation of the agricultural sector in Serbia has improved, the insurance in agriculture will get a boost, i.e. the growth and development of crop insurance but also of insurance related to other branches of production is directly dependent upon the development of agriculture in the country.

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INSURANCE IN FUNCTION OF DEVELOPMENT OF AGRICULTURE

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Abstract

Agriculture as a sector of the economy has a great importance for the overall social and economic development of a country. Agricultural sector has a very special position as the holder of Rural Development. Agriculture contributes a significant share of the national wealth in the creation of GDP and total employment population. Global warming leads to numerous natural disasters that have in the past made a lot of damage to agricultural holdings. In future it is even more unpredictable disasters that man, very often, it cannot influence, but it can protect their crops by the insurance policy. In many countries, efforts have been made to encourage the development of crop insurance through a variety of programs subsidized by the state.

Keywords: *agriculture, crop insurance, subsidies, rural development*

Introduction

Sustainable development of local and rural communities is a key priority of the European Union member states, and all other countries in the stabilization and association process. The European Union strongly supports this development, as evidenced by a number of established support programs and partnerships, and various funds to finance local and rural development. About 40% of the budget of the European Union scheduled for Rural Development. Modern information technology and new knowledge must be used to create conditions for increasing competitiveness and sustainable development in the long run. This is particularly important for countries that still did not complete the transition process, and have found their clear position on the global stage.

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The concept of sustainable development

One of the main characteristics of the economics of natural resources and the environment is sustainable, ie, sustainable development. In the previous literature on sustainable development there is a big difference in the approach to sustainable development and explanation. However, occupies a central position in the elaboration of long-term prospects for survival and development of mankind. Sustainable development is emerging as an indispensable prerequisite, but it is ultimate goal, the effective organization of many human activities.

Encounter with the concept of sustainability is still in the works of classical economics, when we are trying to find answers to the many dilemmas about the prospects of development of human society. Economic classics like Smith, Ricardo and Malthus, tried to find answers to questions about limited natural resources, diminishing returns in production and population growth. In the early stages of economic thought, the idea emerged of the necessity of long-term status quo, without the economic and demographic growth - suggesting a zero rate of growth of the economy and society, as the only possible and stable.

Such a theory of development was later denied by a number of schools and economic trends. Technical advances and new scientific discovery, at the end of the nineteenth century offered more optimistic vision of the future of humanity. Then in the scientific community about the need to analyze the optimal use of resources which small.

In the twentieth century created a neo - classical growth theory, which radically denies the zero growth of the economy and society, and the issue of natural resource limits, loses its significance. It is believed that the technical - technological progress underlying factor in the development of economy and society. This belief has contributed to the growth of many economies decades after World War II.

The seventies of the twentieth century refute such beliefs and beliefs. Coming up to the first oil crisis that followed the rise in world prices of many raw materials and energy inputs. Now again prompts questions limits, resources and growth. Worldwide scientific and political community becomes preoccupied with these issues, so the concept of sustainable development is our top priorities in a number of international companies.

Many activities of government and non-governmental organizations around the world, were leading in 1992. to maintenance of the United Nations Conference on Environment and Development - UNCED in Rio de Janeiro, where they adopted a number of documents on environment and sustainable development. There is no doubt that today the concept of sustainable development has become widely accepted as an essential condition for the survival and development of mankind. There are numerous reasons why that determine economic activity must be sustainable. Following are some in our view, the most important.

Logical and just to make a moral demand that the current generation leave to future generations nothing less opportunities for the development of those she has them now. Right of the present generation to use resources may not jeopardize the same rights of future generations.

Another relevant reason for the necessity of sustainable development is the ecological nature. Nature have your valuation and human is part of nature, it appears that he has the exclusive right to irrevocably change. So, today's human is not only an obligation to future generations of people, more to other living beings and nature as a whole.

The third important reason or economic argument, according to which sustainable development is more efficient. The absence of the concept of sustainable development leads to inefficient, in terms of irrational use of resources and energy, which creates a long-term imbalance of inputs and outputs on a global scale.

Sustainable development in the world

The concept of sustainable development is a serious turning point in the global approach to development and environmental protection. It is a concept that requires solidarity with the needs of the present generation of future generations, respecting the environment and development goals. Observation highlights the sustainable development of three aspects:

Economic aspect - economically sustainable system must be capable of continuous production of goods and / or services while maintaining the required level of governance at the national and international scenes. It requires the necessary balance of sector development, in order to avoid some problems in sensitive sector, such as industry and agriculture.

Aspect of the environment - Environmentally sustainable system must have the ability to maintain stable resources (renewable resources are not over-exploited and non-renewable in accordance with the possibility of finding a proper replacement) without compromising their vital functions. This requirement implies the maintenance of biodiversity, atmospheric stability, and other ecosystem functions, which are not economic resources.

The social aspect - Sustainable Society has made the distribution of capital in a manner to provide adequate service delivery in all spheres of social life. This includes social aspects, health, education, culture, gender, political action and all forms of liability.

Natural environment is more vulnerable in developing countries because developed countries their dirty technologies, under pressure from local authorities for compliance with environmental standards and requirements of sustainable development, moving exactly in underdeveloped countries.

Sustainable development in the region

Few countries in the region are serious about sustainable development issues. This is confirmed by the fact that some countries have not adopted their own development strategies, and certainly not the strategy of sustainable development. For the analysis of sustainable development we will represent situation and the situation in the former Yugoslavia before its breakup today. Industrial enterprises of the former Yugoslavia have used the maximum installed capacity. Production is done in two, and often in three shifts.

Production programs have been mainly export-oriented, approximately equal to the western and the eastern market. Production programs were licensed - it was licensed from well-known companies in the world, and there are companies established on the model of Joint Venture (Joint Ventures). There are also direct the purchase and transfer of technology in our company. So some of the world's leading companies have had become partners of local companies. Production facilities were able to, using their own and foreign technologies, products and a very complex and demanding products for discerning international market. At that time they lived up strong and finishing process, in which the foreign partner supplied

the key materials or semi-finished products, which are in our production plants assembled using cheap local labor and available technology. Through various modalities of business cooperation, our companies have recorded significant technical - technological development. This development was accompanied by employment growth, productivity growth, which has created better competitive position.

There has been mixed progress of domestic companies, the fact that some of the technical - technological terms followed international companies, to the fact that some firms remained at a rudimentary level of knowledge and skills. True, competition is maintained with the low incomes of the employed, poor safety, poor working conditions and general, however, slowed technical - technological development. With this situation which we cannot be satisfied last twenty years. Poorly conducted privatization, lack of quality financial resources, lack of modern technology, they are not conducive to creating conditions for sustainable development.

The current state of sustainable development are characterized by low investment capacity, lack of strategic planning, poor attitude towards the environment, rational use of available resources and the lack of generational solidarity. It is necessary to change this situation, a key prerequisite for the adoption of a development strategy, and then the strategy of sustainable development, which would be followed by a comprehensive analysis of the current situation and identify the necessary steps define specific sectorial projects.

Innovative and competitive capacity

If we compare the data of some countries on innovation and competitiveness, we can see clearly that the country's most competitive and innovative at the same time. According to the Global Competitiveness Report in 2010 - 2011, WEF, the top ten most competitive countries in the world by the WEF GCI method, Switzerland in 2010. ranked number one spot, and innovation elsewhere. The most innovative country was Japan, which has been their ability to compete in the sixth. Comparative review of competition and innovation is shown in the following table.

Table 1. *Summary of competitiveness and innovation*

State/ Economy	GCI 2010		Innovation	
	Range	**Resultant**	**Range**	**Resultant**
Switzerland	***1***	***5,63***	***2***	***5,71***
Sweden	***2***	***5,56***	***3***	***5.67***
Singapore	***3***	***5.48***	***10***	***5.07***
USA	***4***	***5,43***	***4***	***5,53***
Germany	***5***	***5.39***	***5***	***5,51***
Japan	***6***	***5,37***	***1***	***5.72***
Finland	***7***	***5,37***	***6***	***5,43***
Netherland	***8***	***5,33***	***8***	***5,16***
Denmark	***9***	***5,32***	***9***	***5,15***
Canada	***10***	***5,30***	***14***	***4,95***

Source: *Global Competitiveness Report 2010 - 2011, WEF (downloaded from: www.inicijativa.com.hr / publications).*

From the presented review we can see that the Nordic countries have occupied a high position and competitiveness and innovation. If a deeper analysis of the situation in these countries, then we can conclude that the country well for many years politically driven, have developed market institutions, sound macroeconomic policies, rational and higher education, professional training and education, the rule of law, efficiency of judicial institutions, an efficient public administration and developed infrastructure. Such performance enables them high productivity, which in mutual dependence with the use of modern technology and innovation.

Social awareness in the local community is constantly growing. Citizens are becoming increasingly interested in the community in which they live and work, developing an awareness of the need for environmental protection, rational use of natural resources and the need to improve the general conditions of life and work of the local community.

Certainly there is no universal recipe for success in the development of local communities, but it is indisputable that there is a need of rational, scientifically-based balancing of available financial, technical and human resources, as well as their own, and those that the various development programs and agents (Promotion Agency Foreign Investment, Export Council, Agency for development of small and medium enterprises, regional and local development agencies), and a number of civil society associations. Responsible attitude towards the environment and non-

renewable resources is an issue in every community deserves special attention. And renewable and non-renewable resources must be used with full respect of intergenerational solidarity.

The projections of the strategic development plans in the future, local communities must take into account a number of factors, which may act as an incentive, but also can slow or completely prevent development aspirations and plans. This is particularly important, given the hint of a new wave of financial crisis and the crisis in food production. There are numerous reasons for the interest of the local community for sustainable development.

The first reason can be related to the fact that all local development projects require an organized and coordinated action by different levels of local administration and local governments with the national administrations. The realization of any local program includes precise time synchronization of different entities, with a clear definition of roles, which must be done in due time. To achieve this, it is necessary to have an applicable strategic plan and community development, particularly in stimulating agricultural development. The key assumption of the existence of quality strategic plan is the existence of certain urban and spatial documents, settle the property - legal issues, the existence of a partner for the regional component of the project (inter-municipal and cross-border co-operation), quality utilities, minimum funding for the start of the project, and the like. Many local communities have missed opportunities to realize a very important project precisely because it did not address the previously listed above questions and you did not know where and how they want to go further.

Another reason lies in accessing EU pre-accession funds (IPA) through the European Commission Delegation in countries that are in the process of stabilization and association process, managing the entire process, but the process involved in all levels of government, with the aim to strengthen local administrative capacity to absorb all components of IPA support. These funds are great when it comes to encouraging the development of agriculture.

The third reason concerns the fact that the preparation and implementation of multi-annual strategic programs, plans and projects in process that can, and must include the general public, citizens and also their associations, representatives of industry and business associations,

as well as formally marginalized social groups that can make a significant contribution to the general social consensus on local development, which certainly includes the local and sustainable rural development. Participatory strategic planning creates significant social and social cohesion, and thus easier to implement and the realization of strategic goals local development.

Sustainable local - Rural development takes place through continuous development activities, programs and projects, particularly in the following areas:
• Preservation and development integration environment, and the natural, cultural and traditional heritage, which consists of local capital and local community development perspective;
• Development of community and social infrastructure, and the establishment of favorable development and the social environment;
• Economic development - restructuring and the development of sustainable agriculture, handicrafts and small businesses, business diversification and job creation;
• Improving the standard and quality of life through the development of competitiveness and recognition.

Natural, cultural and traditional heritage is a local capital – capital of community. The most valuable resources are the basis of development potential, but also the identity and distinctiveness of each local community, from whose conservation and sustainable use of dependent development prospects and possibilities of local development. The main interest of every community is protect its local capital, to promptly identify and put into operation for sustainable development in the best possible way. In order to achieve this objective it is necessary to:
• Identification, systematization and evaluation of local heritage value;
• Protect, enhance and put into operation all the valuable elements of local heritage, to facilitate their integration in terms of sustainable community development as an element of its recognition;
• Cultivating the environment and prevent the devastation of valuable destinations in the local community.

Insurance as a support rural development

The creation of economic policy and development focus is on those areas and indicators that are more conducive to international competitiveness. One of the significant rural development support is the support of the

insurance sector in terms of ensuring agricultural production. There are also programs in which the governments of some countries subsidize crop insurance as one of the security measures of investment in agricultural production. Government becomes public partner farmer and assumes the risk in the event of natural disasters in the domestic insurance and reinsurance in the international level. In some cases, the governments of some countries make joint using support packages such as Bank Insurance support. The point is that bank financing of small and medium farmers, under favorable conditions, where there is security and disaster risk for crops, and the state subsidized loans and insurance. In this way, it encourages the development of the agricultural sector, especially food production on the one hand, and on the other hand provides the security for investors in this production, especially at a time when natural disasters on a large scale impact of the crisis in food production. For example, Switzerland is one of the countries which joined the UN program called "Global Partnership for Agriculture, Food Security and Nutrition," which helps encourage subsidized programs in financing the development of agricultural production in developing countries, through finding donors and investors. Special incentive public partnership in agricultural production the given in developing countries because the agricultural sector has the largest share in the total gross domestic product.

Due to the large natural disasters over the last two years, it is necessary to manage risk in agricultural insurance, especially in regions that are mainly engaged in agriculture. The data indicate that agricultural production has a smaller share in the gross domestic product, and that is a large part of the population employed in this sector, as indicated by the data in the following table:

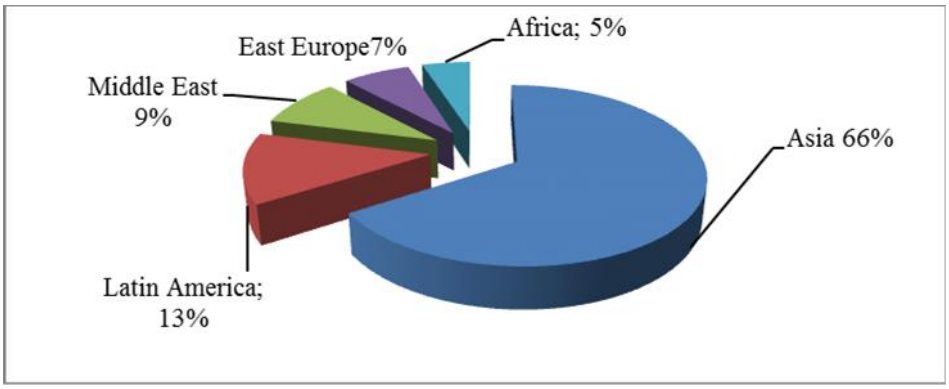
Table 2. *The share of agriculture in macroeconomic indicators*

	Share of agriculture in		
REGION	**GDP**	**Employment**	**Cultivated land**
Asia	12,70%	58,70%	53,10%
Latin America	6,10%	15,10%	40%
East Europe	4,80%	11,40%	16,10%
Middle East	8,90%	31,10%	59,70%
Africa	9,10%	24%	35,30%

Source: *www.swissre.com, Insurance in emerging maket, br.1.*

Since the population is growing faster than agricultural production it is necessary to encourage agricultural production and thus increase the% of production on arable land. The Asian region has a large share of the total agricultural production, the share of agriculture in GDP was 12.7%, and 58% of the population is employed in agriculture, and 53.10% of arable land is used for agriculture.

Figure 1. *Total volume of products produced agriculture by region in 2010.*



Source: *Swiss Re Research Economy 2010.*

Low of the World Trade Organization (WTO) also supports the growth of agricultural production of food. For example, subsidized crop insurance programs are cost-effective solutions in the management of natural disasters in agriculture, because the WTO has certain advantages for subsidies for agricultural insurance from their free trade agreements.

As one of the newspapers in order to manage risk and ensure food production is to move from ex post to ex-ante risk management. Natural disasters and climate impacts could have a devastating impact on the agricultural sector. In such conditions, farmers seek government assistance in the form of emergency grants, tax incentives and other means. This is why ex ante approach is favorable to stabilize earnings for small agricultural production, and for the investor.

Good analysis of this type of insurance they gave Markovic and Jovanovic (2009) and that, "Securing yield (yield insurance) developed late thirties in the United States and in the second half of the last century and spread to some countries in Europe. This insurance system is the most developed in Spain, where farmers able to make their crop insurance from a number of risks that pose a potential threat to crop production. In

Germany, for many years there were only traditional insurance from the city, that in recent years insurers have offered the possibility of covering a limited number of other risks (storms, floods, frost and freezing). Combined Insurance (combined risk insurance) is present in Portugal, Sweden and the former socialist countries (Bulgaria, Hungary, Romania, Slovakia, Slovenia, Serbia, Czech Republic). The insurance covers the risk of the city and a small number of additional risks, but this is not a comprehensive protection.[3] "When it comes to insurance subsidies for agriculture in Europe data indicates the following:

Table 3. *Agriculture Insurance in EU on 2010.*

State	Penetration of market	Cover of risk	Premium subsidies
Austria	78%	individually	50%
		combined	50%
Italy	8%	individually	54%
		combined	59-64%
Cyiprus	100%	combined	50%
Portugal	22%	combined	50%
Poland	7%	combined	68%
Russia	28%	combined	50%
Spain	26%	combined	37-54%
Bulgaria	52%	individually	0%
		combined	
Greece	100%	combined	0%
Finland	90%	combined	0%
Denmark	90%	combined	0%
Sweden	60%	individually	0%

Sourse: *www.worldbank.com, Report 2010.*

Based on the table above, we can conclude that the degree of development of agricultural insurance in a national economy is not dependent on subsidies for agricultural insurance premiums by state. At this point our data to Bulgaria, Denmark and Sweden have a high penetration rate of insurance market agriculture, and public subsidies for this type of insurance does not exist. Data shows that in Denmark

[3] Marković T., Jovanović J., (2009), *Insurance of crop and fruit, existing EU model, No* .41-42, Verzal, Novi Sad, str. 37-45,

provided 85% of the total acres of farmland. The state does not subsidize agricultural insurance policies, but in the case of catastrophic losses for a Fund catastrophic damage, with participants from all insured. In Poland, Bulgaria, similar to the model, for use in farm subsidies from the EU, farmers are also conditional on the conclusion of insurance. Unlike other countries in transition to developed countries in Europe, such as Austria and Sweden for example, shows how highly developed awareness of the necessity of the insured insurance in agriculture. So in Austria secured even 78%, in Sweden 60% of the total arable land.

One of the insurance models of agriculture, which is very popular in the EU's Spanish form of insurance. This model "is a collaboration of private and public sector participation through the agency of the Ministry of Agriculture" enes ", then the association of private insurance companies" AGROSECURO "and, finally, the state company" CSS "under the control of the Ministry of Economy, which provides reinsurance. The main tasks of these institutions are:

• "Anas" - brings the annual plan of insurance in agriculture, to participate in decisions on the amount of premium subsidies, coordinate cooperation with associations of farmers, provides general insurance conditions, cooperate with the association of insurance companies on plans for the implementation of insurance.

• "AGROSECURO" - lays down specific conditions and rates of insurance, control the sales channels, premium collection and claims handling.

• "CSS" (Concorsio de Seguros de Compensacion) - is the capital of reinsurers, each participant in the fund and control the processed waste.

• This model is characterized by the fact that insurance companies manage risk with the help of the fund, which is based on the principle of co-insurance. The Fund is controlled by the "AGROSECURO" while reinsured by the "CSS". [4]

In addition to incentives different model development of agriculture insurance, EU programs to encourage rural development are very important for the strengthening and development of agricultural production.

[4] http://www.ecinst.org.rs/sites/default/files/prezentacije/poljoprivredni/Drugi-poljoprivredni-forum-Prezentacija-govornika-Vladan-Manic.pdf, (25.10.2012.)

Crop insurance in Serbia

Crop insurance in Serbia is still at a low level of development, this type of insurance used by large agricultural companies and farmers. On the other hand, the low awareness of the importance of insurance, lack of information of small farmers leading to a small number of these insurance group farmers.

In a number of our insurance companies provide all kinds of crops and fruits, with the loss of species covered by insurance - yields as a result of damage - destruction of the culture of the insured risk. Plan of security defines the purpose of breeding, grain (seed), roots, tubers, fruit grafts, cuttings, seedlings, and other forage mass. In addition to cereal grains (seeds) can be especially secure and tree (straw - corn), and the fruit tree and grape vines and. Yield losses in crop production is ensured by the following risks:

• Principal risks: hail, fire and lightning.
• Additional risks: floods, storms, spring frost, the fruit and grapes and the risk of frost. Additional risks are provided only with basic risks as supplemental coverage.

In addition to loss of yield (quantity), in particular the loss can ensure quality code:

• Crop for seed production,
• Fruit and table grapes.[5]

Crop to provide to the value determined by the insured, based on the actual value of the expected crop yield. The actual value of the expected yield determined by the expected yield (kg-mc / ha) and the wholesale market price, which is formed at the time of harvest - the harvest. Contractual value of yield and price may be adjusted to their actual values during the insurance period - the growing season. In addition to the market price of the wholesale, crop insurance can be arranged or guaranteed by the contract price of a particular culture. Do not provide a crop that had previously been damaged due to the risk is to ensure, regardless of the intensity of the damage.

[5] www.dunavosiguranje.rs

The premium amount depends on the biological effects of culture on the sensitivity of the insured risk and the degree of hail areas where the crop is grown - the fruit. If we take the wheat culture as the most frequently in the structure of crop production, and the average level of hail (IV class of danger), the insurance premium for 1 ha, with an average yield of 30 Mc, will be approximately 110 kg.

One of the serious flaws in the design of crop insurance policy in Serbia is the lack of data on insured farms. The only information that is available is that there are 450,000 registered farms, and about 2 million people live from agriculture.

Agricultural producers have to offer insurance companies crop insurance policies that do not cover all types of risk. High costs of cultivation, low cost agriculture products, and consequently, low yields lead to the fact that today in Serbia provided only 5-10% of small farms. In terms of insured property data indicate that the insurance company has provided only 8% of the land in Serbia. Poor awareness of farmers, low pay and high cost are main reasons for the low rate of insurance in agriculture. If the various government programs to support the development of agricultural production, increased production, and yields will rise, and thus the farmers need for insurance.

We have witnessed in the last year of drought and the city caused severe damage to crops in Serbia. Thus, for example, last year the city was hit Arilje whole municipality, where products are a significant percentage of the total production of raspberries in Serbia. One of the insurance companies on the basis of crop insurance in Arilje because the city had about 40 million for the damage caused in one night, and at the worst possible time: a few days before picking raspberries On the other hand, this year's drought affected the entire regions and has led to a significant decline in yields of agricultural crops, which resulted in the reduction of the total food production in the region, and thus the growth rate. Therefore, it is essential that insurance companies in Serbia put attention in the development of insurance products in agriculture. Some insurance companies have provided in their offer cover for the risk of drought and the city. Taking all this into account insurance will find their "natural place" to protect the income statement of each farmer, as the cost of insurance, especially for crops that become actual, at the level of 1.5 to two per cent of the average value of production.

Risks in agriculture, covering insurance policies in the more developed parts of the world, such as variations in income and price have not yet been covered by the insurance policies of agriculture in Serbia. The reason can be found in the lack of data and statistics, which must be the basis for the charges of this type of insurance. Therefore, it is necessary to greater state involvement in the process of forming bid for this type of insurance, as well as access to adequate and accurate data on the realized agricultural production. In addition to these risks, there are risks associated with property insurance farms and companies engaged in agricultural production, provide the facilities, equipment, machinery - Risk of fire and other hazards, machine breakdown.

Based on the data of insurance companies in Serbia, in 2011., the subsidy to the insurance premium was 40 percent, and referred only to registered farms. While the state has introduced a policy of insurance premium subsidies in order to stimulate the development of agriculture there is some distrust agriculture OEMs insurance under these conditions. However, in 2011., although this regulation appears only at the end of June, the insurers had previously had a number of inquiries from farmers whether they want to or not, which proves the important role of state aid.

Conclusion

Sustainable development of local and rural communities is a key priority for the EU member states, but also other countries in the stabilization and association process. The European Union strongly supports the sustainable development of singling out about 40% of the budget for rural development as an important component of sustainable development. By European standards, sustainable development is the responsibility of the local community, and this practice is accepted by most countries in the region;

The paper highlights the importance of insurance; endorse rural development, particularly in development of agriculture production. High commodity prices and increased demand for crops have a major impact on society and the economy. Consequently, issues of food at the top of the topic list of all governments around the world. The possible impact of climate change contributes to additional volatility in the production of agricultural products. With that in mind, it becomes even more important to engage the governments of the stabilization of the agricultural sector and examine the possibility of financing losses due to disasters. What

proved to be a good step in stimulating agricultural production is involvement of the state through a variety of programs subsidizing agricultural insurance.

Taking into consideration all the above, it is deduced that in order to boost agricultural production and the development of agricultural insurance in Serbia, it is necessary to provide the following requirements:
• An appropriate system of subsidies from the state,
• Development of insurance products, which will be adapted to the needs of the insured
• Increase awareness of small farmers on the importance of
• Diversification of risk.

States together with the insurance companies provide adequate support to farmers, using models that gave positive results in the developed countries. This would encourage the development of agricultural insurance products, thereby agricultural producers protect their earnings, and state subsidies provided.

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MEASURING THE SME'S EFFICIENCY IN AGRIBUSINESS BY DEA TECHNIQUE

Radojka Maletic, Blazenka Popovic[1]

Abstract

Modern economic growth is based on a harmonious combination of economic and technological advantages of large and small commercial units where the main criteria for commitment to one or the other based on economical efficiency. Improving the competitiveness of SMEs implies the active knowledge application, improving the knowledge productivity, as well as application of modern management techniques. In these circumstances, management has primary function especially when it comes to the management of an agricultural production, which has significant characteristics in comparison to the management of other productions that originate from position and importance of agro-industrial complex of Serbia's economy, but also from the specificity of agriculture itself. For the application of modern management methods and techniques, as a way of efficient management of a company and its activities, there is a need for adequate knowledge from various scientific fields. For this purpose the significant place belongs to some mathematical and statistical techniques, such as DEA analysis whose importance and application method is shown in this paper on a data of a dairy business in Serbia.

Key words: *Management, SME, agribusiness, DEA analysis, business efficiency.*

Introduction

Management is probably the term that is mostly used in theory and practice of organizing the business processes and business activities. The individuals and institutions are deal with it, but also science and

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profession, theory and practice. The importance of management in small and medium-sized enterprises is reflected in a fact that it has a duty to initiate and direct the company activities, in order to achieve planned goals. This is not an activity from day to day; it is a long-term direction that is achieving through establishing the mission, strategic planning, preparation, organization and decision making. Every manager in the absence of clearly defined vision should withdraw from commenced work.

Managerial concept of organization, professionalism of management team, the application of methods and techniques of modern management is necessary since the commencement of the operation of small and medium-sized enterprise. So far, the practice shows that the concept of modern management, as well as efficient technology of managing business activities, hardly find the path of the application in small and medium-sized enterprises (*see Drucker, 1995*).

It is a great delusion that individuals advocate that there's no need for strategic planning in small and medium-sized enterprises. The specificity of management in small business is that entrepreneur-manager integrates all work phases of a company, whether is strategic, planning, organization or implementation. Therefore, he must have more knowledge, skills and experience. That is the only way to implement the good business decisions until the end. The entire manager activity includes several functions which are grouped into three groups:

- function of human relations area,
- function of an information area, and
- function of decision making area.

It should be noted that even when the company business well and when it's in crises, it is necessary to develop the efficient and effective management, but, the first one is called the management of development, and the second one – the crisis management. For small and medium-sized enterprises are usually flexible in relation to the influence of the environment. Just because of this flexibility and frequent changes in the production and business orientation, the need for planning and continual management development is even more pronounced.

0is collecting the relevant information to improve the business performance, which is often defined as a quality standard that is used for

comparison to the best. Given that benchmarking allows identification of the best business practice, and thereby defining the key pointes and directions for improving their own business, the modern top management in the services sector increasingly uses the benchmarking as a guide for business excellence. This technique also allows the successful realization of contractual relations, especially in terms of defining the precise level of the users' satisfaction.

The benchmarking process is relatively easy for use, and the fact is that almost every company can use benchmarking without previously formal external training. The benchmarking concept which has a big influence on a company's progress, so it is necessary to determine what is and what isn't benchmarking, what should do to be properly implemented.

Benchmarking is a continuous process that is not time-limited event; it is a researching process that provides valuable information, and not simple answers; it is a learning process and pragmatic searching for ideas, and not copying and imitating; it is a process that requires time-consuming labor and discipline, and not a quick and easy process; it is a valuable tool that provides useful information, and not a useless time wasting (more *Andersen and Petersen, 1993*).

A successful business, in modern conditions of a highly competitive and global market, implies a business management that is creative – innovative, market-oriented, oriented on a growth and development of an enterprise, but also oriented on a satisfying customer's needs. The company's managing of a small business means, among everything else, disposition the necessary knowledge and skills, but also their continuous modernization and innovation. The success of a company largely depends on the owner's personality–manager (*Drucker, 1995*; and *Ceranic, 2007*).

Economic importance of SMEs in the agribusiness of Serbia: Myth or reality

In most of developing countries, micro and small-sized enterprises constitute the most of the entire number of companies and constitute the most of total employment. In Ecuador, for example, firms with less of a 50 employees counted 99 percents of all firms and 55 percents of total employment in 1980; in Bangladesh, firms with less of 100 employees counted 99 percents of all firms and 58 percents of employment in 1986. In European Union there are 20 million enterprises, of which about 99%

of small and medium-sized enterprises (SMEs) and even 93% of SMEs has less than 10 employees. SMEs are a main source of employment and wealth creation in European Union.

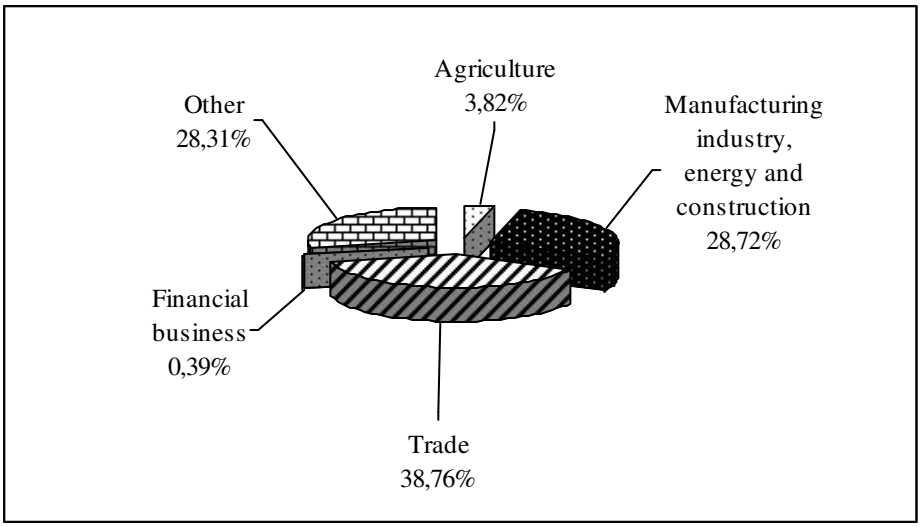
Development of SMEs' sector is one of the basic factors in process of European integrations of the Republic of Serbia. Analysis of development level of small and medium-sized enterprises and entrepreneurship shows that this economy sector represents the most vital and economically most efficient part and that it has the most important role in the implementation of structural reforms, especially in a function of opening the new jobs and reviving growth of overall economy. SMEs are the main source of business relations with other European countries and significantly help the process of integration of the Republic of Serbia into wider European economic framework. The EU pays special attention to development of SMEs, so the European Commission has adopted the special document called the „Small Business Act" for Europe in June 2008, which establishes the principles and actions for the operation in SMEs' sector in countries of EU (*Popovic et al., 2011*). Managing the production (as a primal material process), the management function of business systems in agribusiness and agro-industry should direct activities of business system though processes of planning, organization and control, in order to achieve its goals. The dominating role now and in the future will have management of small and medium-sized enterprises.

The main goal of SMEs development is that our country gets a developed, strong, internationally competitive and export-oriented SMEs sector. Achieving this goal will have a result of important economical and social advantages for Serbia through higher life standard, significant employment growth, stronger and balanced regional development, acceleration of integration process of Serbia into EU, the greater possibility of investing in education, health care, social security and more. Small and medium-sized enterprises are the main source of employment and driving force behind the most developed countries in the world such importance and role should have also in developing of the agribusiness, especially of rural areas of the Serbia. Their importance is especially reflected in important flexibility, and in increasing the efficiency level of input utilization. In other words, Beck and Demirguc - Kunt (2006) noted that it is very important to determine which factors influence on a success and performance of the same enterprises, because these are mostly financed from their income, with a little help from the state.

Ceranic and others (*2005*) point out that the agribusiness is a particularly interesting area for SMEs, because it is a very wide field that includes production and processing agricultural and food products, as well as a number of inputs for agricultural production. Small and medium-sized enterprises in the Republic of Serbia are still confronting to a number of problems with job starting, daily business as well as in a job termination. That way, it is completely confirmed the importance of small enterprises and entrepreneurs for development, competitiveness and employment in the European Union (more *Maletic et al., 2011*). Economic development of Serbia must be based on an affirmation of private ownership and market economy, from the standpoint of more favorable and efficient ambient for direct foreign investments and development of SMEs in agriculture (more *Ceranic et al., 2006; Ceranic and Maletic,. 2009*). There is no need to emphasize how much is the influence of agriculture for the Republic of Serbia, because it accounts for 20% in GDP. From this state seems perfectly clear the view that SMEs should be the important factor of agribusiness development.

If we consider the number of enterprises by economic activities in 2009, of the total number there were mostly those enterprises that are engaged in trade (38.76%). The enterprises that are involved in agricultural production are represented by only 3.82% (Figure 1).

Figure 1. *Participation of economic activities in a total number of enterprises in 2009*

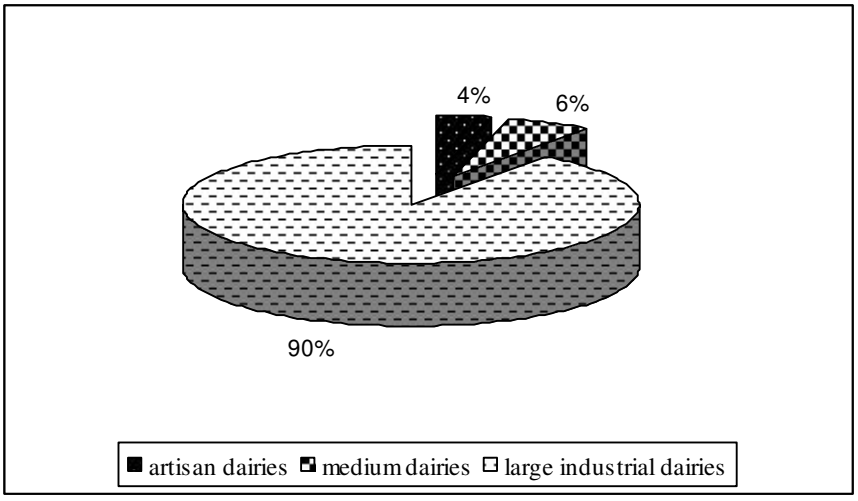


So, the optimal utilization of agricultural resources, increasing the production volume, making a stable food market, increasing the export of production and food products and the realization of integrated agricultural, rural and regional development are strategic goals of agricultural development of the Republic of Serbia (*Maletic et al,. 2011*). Achieving the set goals highly depends on the development level of small and medium-sized enterprises in agribusiness. To encourage the development of small and medium-sized enterprises in agribusiness it is necessary to provide appropriate preconditions that will stimulative affect on a development of this economy sector (*Popovic et al., 2011*).

Position of dairies as SME in Serbia

With a share of 11% in the value of agriculture output, milk production is one of the most important branches of agriculture in Serbia. Today there are about 230 dairies in Serbia that annually purchase and process more than 900 million liters of milk. Otherwise, in the country is produced about 1.8 billion liters of milk, so the most of it is spent naturally. Currently, there are less than million cattle in Serbia, of which about 700.000 cows and heifers. That level of livestock Serbia had also in 1910. Simultaneously with reduction of cattle fund, the number of mini dairies increased, especially in last few years, when the privatization of dairies in Serbia performed. Condition in manufacturing industry is such that a few dairies process 80% of milk, while the rest of the amount process nearly two hundred small dairies. Capacity usage for milk processing is 60%.

Figure 2. *Installed processing facilities in dairy industry of Serbia*



Small dairies will remain the future providers of local market of milk, yogurt and their products. Small number, about 5-10% of them will have a chance to apply for the license to export to the EU market. The inability to upgrade the whole chain, from production to processing, will force them to turn to domestic market or market of the countries of CEFTA. With their production of pasteurized milk and yogurt (that prevails), they cannot compete on the EU market, but the geography ***specialization for specific products*** could let enable them to enter the market of specialized products within the EU. It is necessary to develop quality products that would be competitive in the EU market and to make the entering strategy to the EU market, to examine the opportunities and needs of the EU population, to define domestic opportunities and desires and based on that to start with preparations.

This is the only way to penetrate the EU market with scope of production that have. However, it is necessary to invest more in the entire production system and processing, and to work together with manufacturers to improve materials for the product. Some large dairies have already made the selection and they do not purchase milk from the farmers who sell less than 50 liters per day. This way they reject small manufacturers or force them to enlarge their production that will have fulfilled certain standards of production.

Manufacturing industry in the new states members before joining was in a similar situation as it is today in Serbia. There are many small dairies, mostly in remote parts of the country, which process smaller amounts of milk and which do not fulfill all the necessary standards, and among larger industry dairies there are a number of those that are export-oriented. Association with the aim to establish a common brand or common work on the setting up system of products with protected geographic origin which is a very important component and practically a condition of survival for smaller dairies and primal producers.

There by smaller producers would improve their market potential, in order to be capable for supplying the large chains or even for the export of certain types of products. Unfortunately, these initiatives haven't been started, given that it is necessary to have a clear strategy and vision which should share multiple participants in process. Such initiative is hardly doable since the dairies that have a potential for this kind of association, because of the possession the local market and purchasing the cheap milk but not quality enough that would enable them high profit rates, are

convinced that they can independently survive in the future. Beside the free will of the participants, such an organization would require a lot of investment funds, working capital, as well as the time that is necessary for standardization of specific types of products, which is in this moment, also nonrealistic option. Given that large dairies are already the ownership of strategic partners or investment funds, there is a risk that small dairies parish at some point, and the small producers of milk become with no surrender, that would open up additional problems that leads to closing the small farms.

In this regard, the main aim of work is to show how management of SME cannot comprehensively realize its role unless they don't use and rely on some techniques of mathematical and statistical methodology (e.g. technique of DEA analysis) as a successful instrument in efficient decision making. DEA method has proved to be one of the excellent techniques for determination the efficiency of multiple entities from homogeneous field.

Beside the efficiency evaluation and determination causes of them, as well as the reasons of inefficiency and the way for their elimination, DEA has a model that offers an option for decision maker to perform also ranking the observed entities. That model (*Andersen-Petersen*) will be used in this paper for ranking the dairies (SMEs) in Serbia based on business performance of their enterprises. These ranks were used for sensitivity analysis of DEA technique.

The concept of DEA technique

DEA (*Data Development Analysis*) is a method which has a number of models that measure the efficiency of complex business entities. Development of new models caused the extension of the application this technique on profit organizations, although the originally purpose referred to measuring the efficiency exclusively nonprofit organizations.

Considering the diverse inputs and outputs, DEA measures efficiency of so called decision making units - DMU (*Decision Making Unit*), which are dairies in this paper. DEA measures the relative efficiency, which means that the units compare to each other, because there is no theoretic maximum.

Application of DEA methodology in ranking and evaluation the efficiency in agribusiness area has already been considered by several authors, so some of them used DEA for determination the influence of labor, fertilizers, irrigation, capital and seed on yield of different crops *(Lilienfeld and Asmild. 2007*). Others have fortified the efficiency of meat and grains based on inputs such as mechanization, labor, fertilizers, sown area *(Monchuk et al., 2010*). Author whose data and work that is maximally conductive to the analysis in this paper is carried out by Vennesland (2005). In his paper, he tested the efficiency of agricultural sector in Norway which was generally in trouble. As new way of examination the efficiency he introduces the new DEA model. Its introduction and implementation the conclusion was enacted that even 13 out of 18 areas inefficient and that is possible promotion its business. The efficient and inefficient areas were separated, and it was noted where there were losses and why.

The model which is used in this research is AP (*Andersen Petersen*), which measures the superefficiency, i.e. it is extremely suitable for ranking DMUs.

$$(Max)h_k = \sum_{r=1}^{s} \mu_r y_{rk} \tag{1}$$

If the constraints:

$$\sum_{i=1}^{m} \nu_i x_{ik} = 1$$

$$\sum_{r=1}^{s} \mu_r y_{rj} - \sum_{i=1}^{m} \nu_i x_{ij} \le 0, \quad j = 1, 2, ..., n \quad j \ne k$$

$$\mu_r \ge \varepsilon, \quad r = 1, 2, ..., s$$

$$\nu_i \ge \varepsilon, \quad i = 1, 2, ..., m$$

By applying this model is determined which unit can impair its performance and how much, but to still stay efficient. When it comes to AP model, it introduces the term of superefficiency, and these are all the units with score higher than 100% and they represent exemplary units (benchmarks) to the inefficient units.

Based on selected indicators that follows development of dairies in Serbia it has been performed their ranking based on the efficiency of indicators using the software EMS (*Efficiency Measurement System*).

Measuring the efficiency and ranking of dairies in Serbia

The aim of these researches is ranking of 17 dairies in Serbia observing the level of their development and ranks comparison obtained for dairies using the DEA method. Indicators of SMEs that is monitored are total assets, total capital, basic capital, operating income, net income, number of employees. Initial database is taken from the website of Business Registers Agency.

Table 1 point to very high values of coefficient of variation for all indicators, which means that these are very inhomogeneous data series. The explanation for these high values of coefficient of variation is found in a fact that the observed dairies are different sizes. Net income is a hallmark which includes the biggest data dispersion that is followed by: basic capital, total capital etc.

Table 1. *Descriptive statistics of inputs*

Indicators	Arithmetic mean	Minimum value	Maximum value	Standard deviation	Coefficient of variation (%)
Total assets	213296.94	17189	670294	217759.28	102.09
Total capital	88662.00	1677	349456	97512.20	109.98
Basic capital	46244.41	24	181213	54337.86	117.50
Operating income	340678.18	7855	1060183	326850.80	95.94
Net income	8718.00	244	61385	16261.98	186.53
Employees	56.94	3	156	43.73	76.79

Source: *http://www.apr.gov.rs*

DEA technique

Data analysis in this paper assumes that the revenue and earnings are the most important indicators for ranking (which are considered as DEA outputs) and total assets, total capital, basic capital and number of employees, are considered as inputs. Each DMU, in this dairies case, will assign deferent weights to each factor in order to approach to the efficiency frontier. Therefore, if it's necessary to do an objective ranking, where DMUs are compared to the efficiency border and exemplary units, it is recommendable to use the DEA method.

Based on the results of the model the scores of superefficiency of dairies performance in Serbia are obtained and they are presented in the Table 2 and based on them the ranking of results is done and it is illustrated in Table 3.

Using the AP (*Andersen-Petersen*) model and passing the initial data trough the software EMS (*Efficiency Measurement System*) of 17 tested dairies, the following results are obtained.

On the first place there is a dairy Melinta Dobanovci with efficiency coefficient 345.28%. This dairy represents the exemplary unit to Kikinda milk industry, Sremska dairy and to dairy AS Golubinci. When it comes to observed inputs and outputs of this unit (dairy), it is obvious that the second input (total capital) gives significance of 56%, and the third input (number of employees) 44%.

As for the outputs the highest significance has net income which is concurrently crucial in high ranking of this dairy. The second highest ranking is Borska dairy. Its efficiency coefficient is 307.13%. This result makes it a benchmark (exemplary unit) of others 11 dairies.

In this case, the most significant input is total capital (98%), and then basic capital (2%), and when it comes to outputs, the income is the most important one. In other words, this dairy is highly ranked because of the good combination of relatively low inputs and relatively high outputs.

Table 2. *Results of DEA analyis*

DMU	Score (%)	Total assets {I}{V}	Total capital {I}{V}	Number of employees {I}{V}	Basic capital {I}{V}	Income {O}{V}	Profit {O}{V}	Benchmarks	{S} Total assets {I}	{S} Total capital {I}	{S} Number of employees {I}	{S} Basic capital {I}	{S} Income {O}	{S} Profit {O}
ENTERPRISE KUC-COMPANY DOO KRAGUJEVAC	63.56	0	0	0.99	0.01	0.67	0	2(0.06) 15(5.82)	195060.64	41952.59	0	0.01	0	5393.93
DAIRY MLADOST DOO KRAGUJEVAC - MEGGLE	116.74	0	0	1	0	1.17	0	5						
KIKINDA MILK INDUSTRY	90.67	0	0.14	0.86	0	0.63	0.27	4(0.52) 9(1.19) 15(2.47)	98991.32	0	0	114025.10	0	0
GRANICE	211.74	0.66	0	0	0.34	0	2.12	4						
DAIRY AD LOZNICA	71.42	1	0	0	0	0.71	0	15(2.38)	0	27504.58	18.98	61643.12	0	2477.61
VALLETTA DOO	42.99	0	0.12	0.88	0	0.33	0.10	2(0.06) 4(0.14) 15(0.34)	143352.08	0.01	0	33377.08	0	0
POGLED DAIRY	49.42	1	0	0	0	0.49	0	15 (0.66)	0	1479.96	2.23	2439.82	0	94.51
DAIRY-PLANA AD V. PLANA	67.99	1	0	0	0	0.68	0	15(0.229)	0	46500.58	12.35	49608.7	0	2799.43
DAIRY MELINTA DOO DOBANOVCI	345.28	0	0.56	0.44	0	0	3.45	3						
DAIRY SPASOJEVIC DOO BAJINA BASTA	114.79	1	0	0	0	0.59	0.55	0						
DAIRY MIHAJLOVIC DOO PARACIN	50.06	0	0	0	0	0.50	0	15(0.90)	1579.50	1883.67	2.17	0	0	356.40
DAIRY EKO-MLEK DOO KAONIK	90.62	0.13	0	0.87	0	0.85	0.06	2(0.08) 4(0.01) 15(3.45)	0	7530 5.41	0	10532.96	0	0
DOO DAIRY AS GOLUBINCI	58.86	0	1	0	0	0.30	0.29	9(0.08) 4(0.01) 15(3.45)	570.98	0	2.43	155.83	0	0
SREMSKA DAIRY DOO SREMSKA MITROVICA	43.95	0	0.03	0.97	0	0	0.44	9(0.12) 15(0.19)	2341.42	0	0	26503.43	51902.11	0
BORSKA DAIRY DOO BOR	307.13	0	0.98	0	0.02	2.87	0.20	11						
DAIRY MAESTRO DOO SAKULE	66.70	0	0.1	0.90	0	0.67	0	2(0.11) 15(0.78)	31648.28	0	0	30589.91	0	1570.11
DAIRY-COKA DOO COKA	78.78	0	0	0.96	0.04	0.79	0	2(0.05) 15(0.87)	6054.30	3395.11	0	0	0	935.34

The next ranked dairy is Granice. With its score of 211.74%, this dairy is exemplary unit to others 4 dairies (Kikinda milk industry, Valletta, AS Golubinci and EKO-Mlek DOO Kaonik). To this rank it's positioned by total assets as input with importance of 66% and basic capital whose contribution (importance) is 34%. When it comes to outputs there is only net income which is secluded as crucial parameter of the efficiency.

Table 3. *Ranking results of dairies by business efficiency (measuring the superefficiency)*

SME - Dairies	Score (%)	Rank
DAIRY MELINTA DOO DOBANOVCI	345.28	1
BORSKA DAIRY DOO BOR	307.13	2
GRANICE	211.74	3
DAIRY MLADOST DOO KRAGUJEVA- MEGGLE	116.74	4
DAIRY SPASOJEVIC DOO BAJINA BAŠTA	114.79	5
KIKINDA MILK INDUSTRY	90.67	6
DAIRY EKO-MLEK DOO KAONIK	90.62	7
DAIRY-COKA DOO COKA	78.78	8
DAIRY AD LOZNICA	71.42	9
DAIRY-PLANA AD VELIKA PLANA	67.99	10
DAIRY MAESTRO DOO SAKULE	66.70	11
ENTERPRISE KUC-COMPANY DOO KRAGUJEVAC	63.56	12
DOO DAIRY AS GOLUBINCI	58.86	13
DAIRY MIHAJLOVIC DOO PARACIN	50.06	14
POGLED DAIRY	49.42	15
SREMSKA DAIRY DOO SREMSKA MITROV.	43.95	16
VALLETTA DOO	42.99	17

Source: *Calculation by authors.*

The dairy Mladost from Kragujevac has the efficiency coefficient 116.74%, which ranks it on the fourth place. It is an exemplary unit to others 5 dairies (Kuc, Valletta, EKO-Mlek, Maestro DOO Sakule and DOO Coka). DEA marked the number of employees as the only significant input that positions this unit at such high point. The business income is the most significant output, which is expected given that this dairy has the largest income compared to others observed dairies in Serbia (1.060.183 dinars).

The last efficient unit is dairy Spasojevic from Bajina Basta. Its score is 114.79%. This is the only one of all mentioned superefficient units that doesn't influence on the efficiency of the remaining (inefficient) units. Total asset is an input that has all significance. The business income and net profit have approximately equal impact on the business efficiency of this dairy.

The first dairy that is below the efficiency border is Kikinda milk industry. Its efficiency is 90.67% and to become efficient, it is necessary to emulate on these three dairies: Granica, Mellitte and Borska dairy. The main reasons of the inefficiency are inputs (total assets, total capital, basic capital, number of employees) which are significantly higher comparing to other dairies. Efficiency will be achieved by reducing the total assets for 98.991.320 dinars and basic capital for 114.025.100 dinars.

When it comes to the most inefficient units, on sixteenth and seventeenth rank there are Sremska dairy from Sremska Mitrovica with score 43.95% and Valletta with score 42.99% respectively. In order to impove its efficiency, Sremska dairy should emulate its business on dairies Granice and Melinta, and Valletta should emulate on dairies Meggle, Granica and Borska dairy. I other words, Sremska dairy should change its inputs and outputs as follows: to reduce the total capital for 2.341.420 dinars, to reduce the basic capital for 2.6503.430 dinars, and to increase the total income for 26.503.430 dinars. Dairy Valletta should reduce total assets (143.352.080 dinars), total capital (10 dinars) and basic capital (33.377.080 dinars).

Conclusion

If Republic of Serbia wants strong, competitive and efficient enterprises, they have to be managed by efficient and well trained managers. The development of management skills and abilities represent a priority of development strategy of SMEs. Advancement of management work has to be a continuous process, to constantly monitor new scientific achievements and implement them in their environment. The education of the managers of small and medium-sized enterprises in agribusiness should be a significant factor in increasing the competitiveness of these enterprises, both on domestic and foreign market.

The important question in educational sphere is need to change the content, and putting the accent to solving the concrete (practical), and not theoretical problems. So, using the DEA technique shows how, among other things, using the mathematical models can direct management activities of SMEs in order to achieve maximum results with efficient application of input factors. In other words, how to ensure the efficient application of input indicators. Following the obtained results by DEA technique, manager gets directions to focus further business of an enterprise (dairy), in order to maximum utilize the input indicators and to improve the outputs that are usually related to increasing the income or profit and so the observed unit (enterprise) should be better positioned (ranked). Also, DEA provides the information of how

much the improvement or deterioration of a superefficient unit can affect the certain DMUs which are emulate to the mentioned superefficient unit.

Having regarded to that all analyzed dairies, it can be said that a third of them belong to group of superefficient units and they are used as directions for the rest of dairies to improve their results and to increase the business efficiency. Given that the efficiency is measured by principle "reduce input in order to get greater output", it is logical why relation of their input and output indicators represent exemplary units for the future performance of inefficient dairies. For all the efficient dairies the indicators are defined that make them superefficient, and for all the inefficient units which of indicators they should increase or reduce in order to improve their efficiency. So, the use of DEA technique has found its place also in a function of control management of every enterprise, and dairies.

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EFFECT OF DROUGHT ON PRODUCTION AND MARKET RISK IN CROP PRODUCTION[1]

Sanjin Ivanović[2], Saša Todorović[3]

Abstract

In the paper, the model of family farm that deals exclusively with crop production on the area of 15 ha is formed. Then it is assumed that in global drought conditions that occurred in 2012, certain risks (in this case, the change in yields and prices of field crops) will arise. The aim of this paper is to examine the change of the effects of family farm business operations (gross margin and profit for the whole farm, per working hour and per hectare) under drought conditions. The analysis has shown that under certain assumptions in drought conditions the rise in gross margin and profit can be achieved as well as that these indicators are more influenced by the change in market prices than by the change in yield of field crops.

Key words: *crop production, family farms, drought, risk, gross margin, profit.*

Introduction

Agricultural production is significantly influenced by natural conditions; therefore it is prone to a great number of various risks. In addition, plant production is particularly susceptible to risks, since it takes place in the open air.

[1]The paper is a result of the research conducted within the project of the Ministry of Education, Science and Technological Development of the Republic of Serbia No. 179028, entitled "Rural labor market and rural economy of Serbia - income diversification as a tool to overcome rural poverty".

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While comprehensively addressing the issue of risks in the agricultural production, Barry (1984) lists a number of the major sources of risk for farmers of which the following are identified for the purpose of this study:

- Production and technical risk - the risk of bad weather conditions, disease, pests, fire, wind, theft, etc.
- Market risk and price risk - the possibility of change in prices of raw materials and finished products, problem of availability of certain inputs, risk that in the long run it will lead to the changes in interest rates and inflation rates.

Similarly, a significant number of other authors analyze the different kinds of risks that arise in economic activities, and for the purposes of this study the following were selected as relevant:

- The risks of large-scale natural disasters (droughts, floods, fires) and the impossibility to precisely forecast weather situations, disease, insects, weeds, etc.
- Risks to achieving planned yields.
- Risks of changes in market prices and possible severe market distortions, variability of prices of agricultural inputs and outputs which an individual producer cannot influence.

The problem of risk management is one of the most significant problems both in the analysis of investment projects and in the whole science of economics. As stated by Krasulja and Ivanisevic (2006) "riskiness of assets that is project on capital investment depends primarily on the variability of the expected yield from its future use."

Distinction between risk and uncertainty is more comprehensively explained by Hincy (2002): "While making the decisions in a situation full of uncertainty, the one who makes decisions does not have any knowledge at all even of event probability of any state of nature. In such circumstances, the behavior of the decision maker is completely based on his attitude towards the unknown. "On the other hand, "Whenever a person who makes decisions has some knowledge about the state of nature, he might be able to assign subjective probability for event of each state of nature. Then the problem is classified as a decision-making under risky circumstances."

Defining the difference between risk and uncertainty Drury (2007) lists the following definitions: "The risk is applied to the situation where there are several possible outcomes, and there is considerable experience to enable the creation of statistical evidentiary material for the purposes of predicting possible outcomes. Uncertainty exists when there are several possible outcomes, but there is little previous statistical material to enable prediction of possible outcomes."

Accordingly, risk and uncertainty include the potential variability of operating results that will occur in the future, that is because at the moment of making a business decision we do not know what will happen in the future or future events cannot be precisely predicted. This is primarily caused by the time difference between the moment of decision-making and the moment when the results of decisions made occur.

When speaking of the production risks and market risks, then what is mainly examined is what farmers see as the cause of the risk, but what is little examined is how to confront risk and how the risk affects business decisions.

Bearing this in mind, the aim of this study is to investigate the potential variability of operating results (gross margin and profit of field crop operation) that will occur as a consequence of drought in 2012 (decrease of yield and rise in prices of crop products in 2012).

Material and method

Estimation of probability of the favorable events, that is, unfavorable events in the future, is conducted on the basis of available data as well as of individual experience and evaluation. Material for this study was collected through the method of interview, which was carried out with 20 chosen holders of family farms in lowland regions of the Republic of Serbia directed exclusively at crop production during the production year of 2011/2012 (from October 2011 to August 2012). Based on the collected data by interview, the model of field crop operations is formed for the purpose of investigating the variability of indicators of economic effects of operations which will occur as a consequence of drought in 2012.

This model of field crop operations has the following main characteristics:

- farm is situated in the lowland region and has available 15 ha of arable land of uniform quality and optimum plot size,
- deals with intensive crop production,
- arable area is used for growing cereals (corn and wheat) and industrial crops (sunflower and soya bean) with respect to crop rotation restrictions,
- production technology is typical for the given crops and region in which the farm is located,
- the whole crop production is market-oriented, that is, there is not any form of internal use of the obtained products,
- one family member is constantly engaged on the farm and
- the farm has at its disposal necessary mechanization (except for combine harvester for small grains) for implementation of the designed production technology (10 kN tractor and proper attaching devices for field implements).

As a basis for the study, the height of variable costs per enterprises and total for the whole farm as well as calculation of height of fixed costs at the level of whole farm are used. Based on these elements the indicators of economic effects of family farm business operations were determined, and these are gross margin of the whole farm (as a difference between the total production value and variable costs) and profit which is made on the farm (as a difference between the total production value and the sum of total fixed and variable costs).

Apart from the aforementioned calculation methods, the method of sensitivity analysis was used in the paper for the purpose of determining changes in gross margin and family farm profit depending on the change in yield (decrease of yield) and depending on the change in the sale price of crop products (rise in prices).

In the paper, when performing sensitive analysis, the following assumptions were used as the starting point:

- The yield of the observed crops decreases as a result of drought (in different per cent for different crops). It is a consequence of a different resistance of some crops to drought and accordingly a decrease in yield is different (Table 1).

Table 1. *The decrease in average yields of crops in the Republic of Serbia in 2012 compared to 2011*

Crops	Yield (kg/ha)		Decrease in yield in 2012.	
	2011 *	**2012 ****	**(kg/ha)*****	**(%)*****
Corn	5,149.00	3,118.00	-2,031.00	-39.44%
Wheat	4,211.00	3,996.00	-215.00	-5.11%
Sunflower	2,479.00	1,959.00	-520.00	-20.98%
Soya bean	2,668.00	1,739.00	-929.00	-34.82%

**Data obtained from the Statistical Office of the Republic of Serbia.*
***Authors' calculation based on the data from the publication of the Statistical Office of the Republic of Serbia ''Realized yields of wheat, and expected production of corn, sugar beet and sunflower in the Republic of Serbia, 2012'' number 229 - year LXII, 20/08/2012*
****Source:** *Authors' calculation.*

- The preceding table shows the real average yields of field crops in 2011 in the Republic of Serbia, as well as the expected average yields in 2012. As for the farms-models on which the analysis was conducted, it was presumed that the usual yields of field crops are at some higher level than the average yields in the Republic of Serbia (Table 2). This assumption was a starting point because the farm is considered to be situated in a lowland region, and that it is specialized in crop production, and is expected to produce yields that are slightly higher than average ones (from 4.84% to 16.50%).

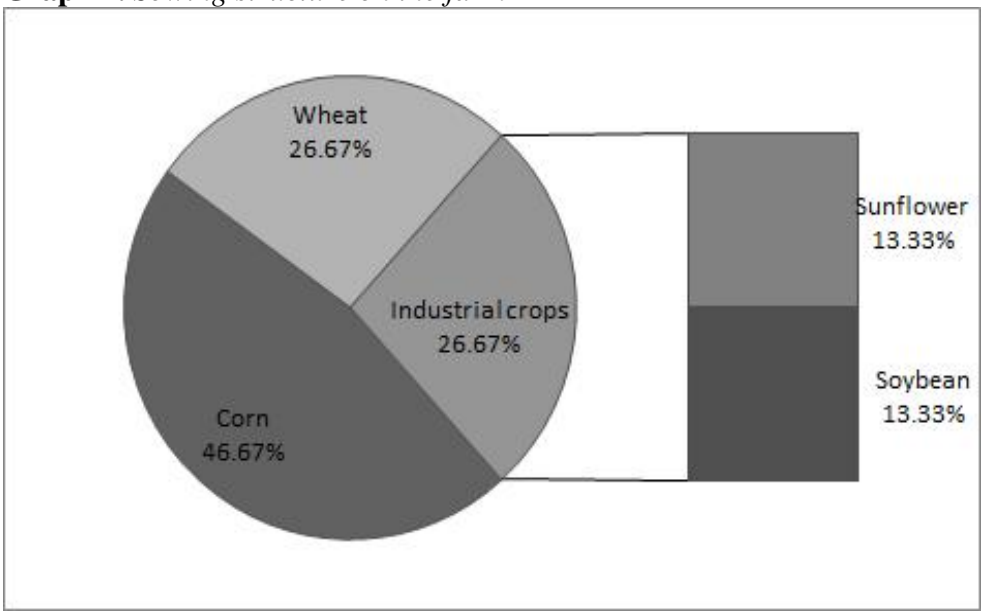
Table 2. *Average yield of field crops*

Crops	Yield (t/ha)		Difference	
	Farm	**Republic of Serbia***	**(t/ha)**	**(%)**
Corn	6.00	5.15	0.85	16.50%
Wheat	4.50	4.21	0.29	6.89%
Sunflower	2.60	2.48	0.12	4.84%
Soya bean	2.80	2.67	0.13	4.87%

**Average yield in 2011*
Source: *Authors' calculation based on the data obtained from the Statistical Office of the Republic of Serbia (average yields in 2011) and field data.*

- Of great importance for calculations of the impact of drought on the economic effects of business operations of field crop operations is the sowing structure on the farm (Graph 1). In the model, it is assumed that the sowing structure is dominated by mercantile corn, the second most important is wheat, followed by industrial plants (that is, sunflower and soya bean, which are equally distributed). Such sowing structure is based on a realistic sowing structure that exists on the field crop operations, located in the lowland regions.

Graph 1. *Sowing structure on the farm*



Source: *Authors' calculation.*

- Assumption that the prices of the observed crops rise as a result of drought in different per cent for different crops, which is a consequence of a different relation between demand and supply of some field crops on the market. Accordingly, a rise in prices is different (Table 3).

Table 3. *Rise in prices of crops in 2012 compared to 2011*

Crops	Price (RSD/t)		Rise in prices in 2012	
	2011 *	**2012 ****	**(RSD/t)*****	**(%)*****
Corn	17,050.00	27,500.00	10,450.00	61.29%
Wheat	18,050.00	28,000.00	9,950.00	55.12%
Sunflower	30,660.00	56,000.00	25,340.00	82.65%
Soya bean	33,170.00	70,000.00	36,830.00	111.03%

**Average prices*

***Prices in September of 2012*

****Source:** *Authors' calculation based on the data obtained from the Statistical Office of the Republic of Serbia (average prices in 2011) and field data (prices in September 2012).*

Therefore, analysis started from realistic assumptions about the variation of yield and price of crop products under drought conditions. In doing so, the tables show that the percentage increase in prices of the observed crops as a rule is much greater than the percentage of the decline in yields.

At this point, it should be borne in mind that the increase in prices of crop products is not only caused by a drop in yields that occurred due to drought in the Republic of Serbia, but also by the fact that the worldwide drought led to a decline in yields of the observed crops, thus it caused an increase in their prices at a global level.

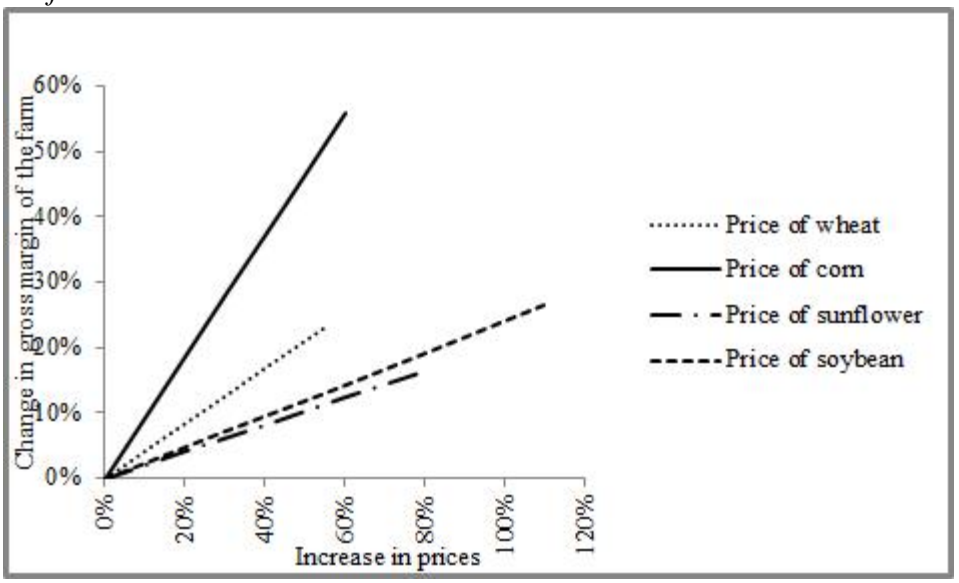
Results and discussion

The first indicator that should be considered is the height of gross margin of the entire household, that is, its change that occurs due to a rise in prices and decrease in yields of the observed crops (as a result of drought in 2012). Obviously, the increase in prices of grown crops will lead to an increase in gross margin of farm, while the decline in yields will reduce gross margin.

It may be noted that the highest rise in gross margin is caused by an increase in price of mercantile corn (Graph 2). The reason for this phenomenon is the highest share of corn in sowing structure of family farms, which is common in our practice. The next most important change is the change in the price of soya bean. Although soya bean does not have a wide distribution in sowing structure, the percentage change in its

market price due to drought is the biggest. Afterward, the price of wheat and sunflower does not have such influence on gross margin.

Graph 2. *Impact of an increase in prices on change in gross margin of the farm*



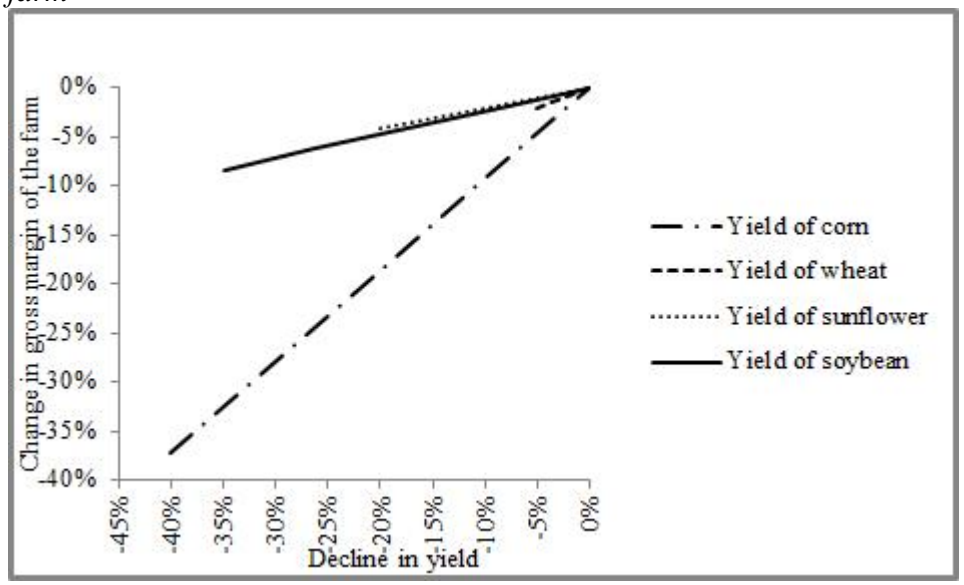
Source: *Authors' calculation.*

On the other hand, the largest share in the decline of gross margin of the farm due to the decrease in yield caused by drought is still held by mercantile corn production (Graph 3). Not only is corn the most distributed in sowing structure, but the decline in corn yield is higher than the decrease in yield of other crops.

The next crop distinguished by its decrease in yield is soya bean, which is because of that the second as regards the impact on the decline in gross margin of the entire farm. The graph indicates that the lowest impact on the decline in gross margin of the farm is made by the decrease in yield of wheat.

Apart from that, the given graphs show that the change in prices of grown crops has greater influence on gross margin than the change in their yield (which is in accordance with the indicators from Table 1 and Table 3).

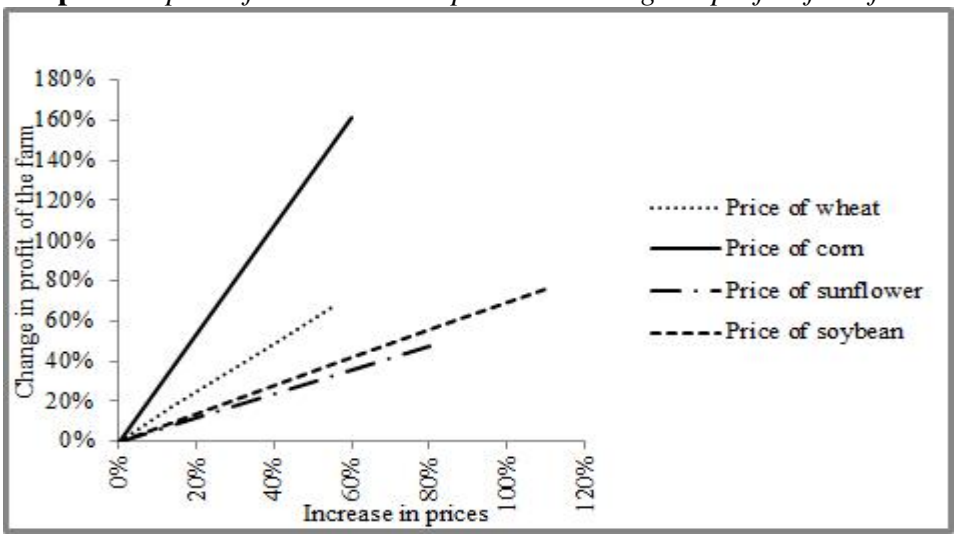
Graph 3. *Impact of decline in yield on change in gross margin of the farm*



Source: *Authors' calculation.*

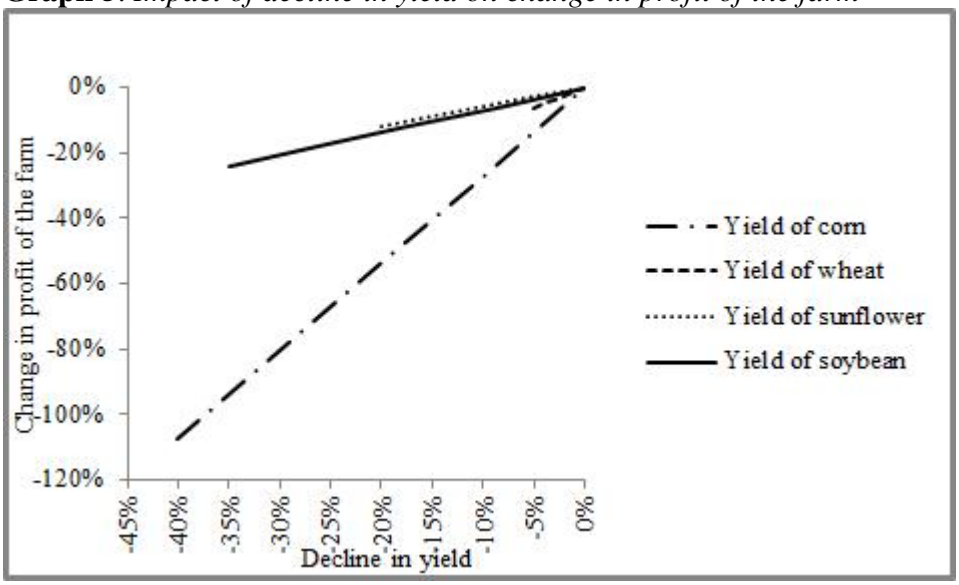
Similarly to the analysis of the impact of rise in price and decline in yield of grown crops on gross margin of field crop operation, it is also possible to determine how the change of the aforementioned factors influences the profit of the farm (Graph 4 and Graph 5).

Graph 4. *Impact of an increase in prices on change in profit of the farm*



Source: *Authors' calculation.*

Graph 5. *Impact of decline in yield on change in profit of the farm*



Source: *Authors' calculation.*

Since the height of gross margin is highly conditioned by price and yield of mercantile corn and soya bean, the same fact applies to the profit of family farm. As the profit is obtained by deducting the fixed costs from gross margin, it is clear that the factors that most affect the fluctuation of gross margin have the greatest impact on the profit of field crop operation.

If it is observed which of the investigated parameters has greater impact on the changes in profit of family farm, then it is change in prices. Namely, the change in price leads to more significant varying not only of gross margin, but of the profit of family farm (than is the case with yield).

On this point, another important fact can be noticed, and it is that the equal percentage change in examined parameters (prices and yield) has much higher influence on varying of profit of family farm, than on the change in its gross margin.

The previous analysis has shown that the change in price and yield of some cultivated crops affects the rise (that is, decline) of gross margin and profit of field crop operation. However, in order to gain a better insight into the actual effects of drought, it is necessary to consider cumulative impact of all mentioned changes in all observed crops on the effects of the

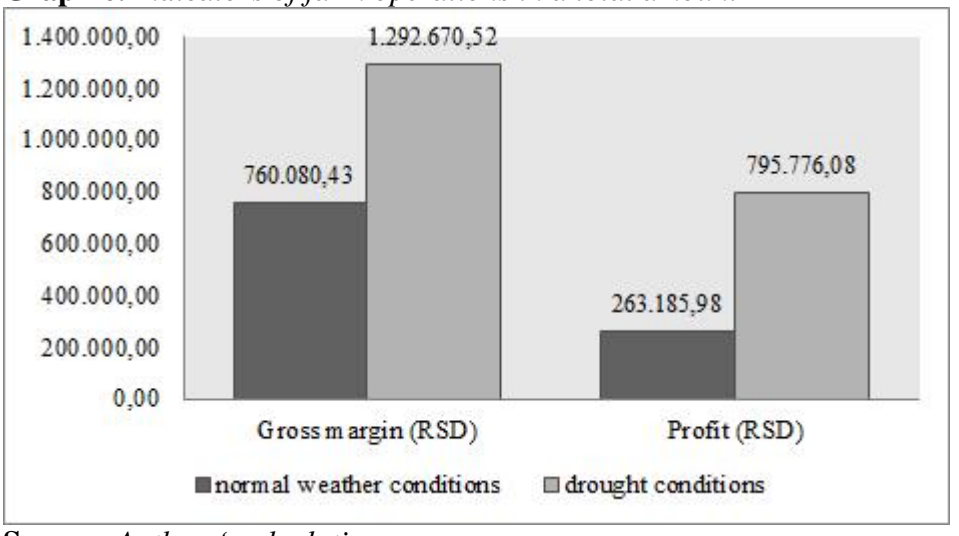
business operations of analyzed model of family farm. Namely, it is necessary to determine what would happen with gross margin and profit if the yield of all crops placed in sowing structure reduced within the predicted limits, and if simultaneously the assumed increase in prices occurred due to drought.

Taking into account the assumptions about an increase in price and decrease in yield, the analysis revealed the following results:

1. The maximum predicted decline in yield and rise in prices of crop products lead to an increase in gross margin of field crop operation for 532,590.09 RSD, which increases its amount from 760,080.43 RSD to 1,292,670.52 RSD.
2. That is, in drought conditions rise in gross margin of field crop operation amounts to 70.07%.
3. The maximum predicted decline in yield and rise in prices of crop products lead to an increase in profit for absolutely same amount for which gross margin also has risen (532,590.09 RSD), which increases its amount from 263,185.98 RSD to 795,776.08 RSD
4. Namely, under the observed assumptions there will be an increase in profit of family farm by 202.36%.

The changes that occur due to drought in the absolute amount of gross margin and profit on the farm can be shown graphically (Graph 6).

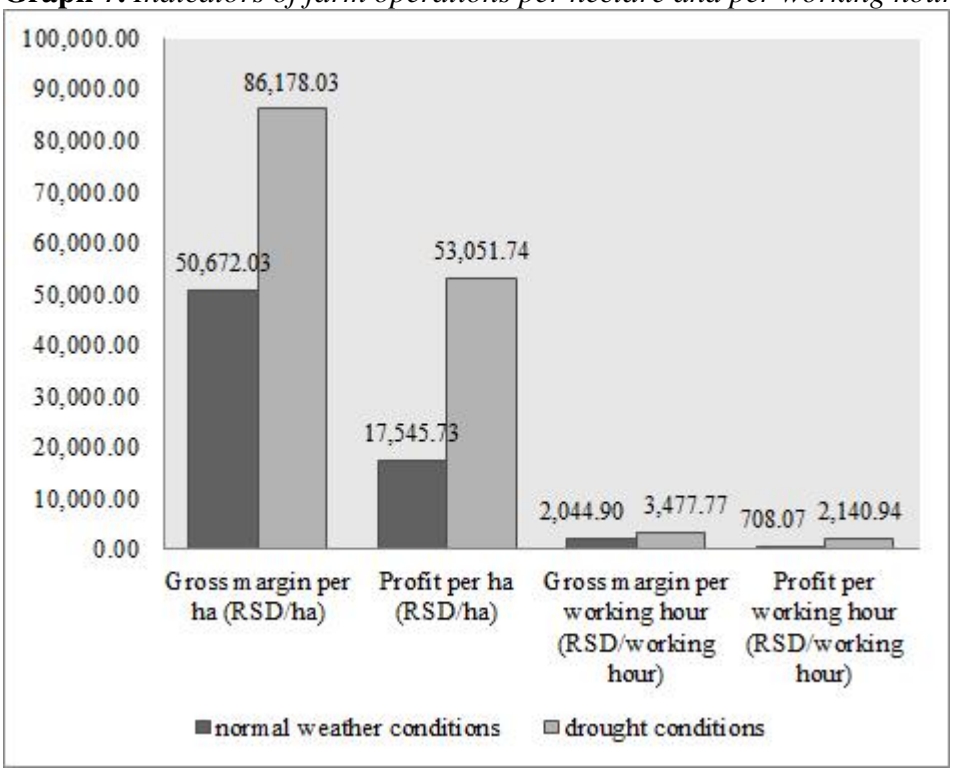
Graph 6. *Indicators of farm operations in a total amount*



Source: *Authors' calculation.*

In addition to presenting a rise of the observed indicators (gross margin and profit of the farm) in a total amount, it is possible to determine the value of the mentioned indicators per hectare as well as per working hour (Graph 7).

Graph 7. *Indicators of farm operations per hectare and per working hour*



Source: *Authors' calculation.*

It may be noted that percentage rise in gross margin per hectare of cultivated land, as well as per working hour will be equal to the percentage increase of the total gross margin (70.07%). The same rule applies to the increase in profit per hectare and per working hour, which will amount to 202.36%.

Though at first glance it seems illogical that the field crop operations in drought conditions generate higher profit than what is possible in the normal course of business operations, the explanation of this phenomenon lies in the fact that there was a greater percentage rise in prices than the percentage decline in yields.

It should be noted that this is a result of drought at the global level, that is, the fact that there was an increase in prices of the observed products in world markets. If there was drought only in the Republic of Serbia, but not on a global level, then the initial rise in prices of agricultural products would be neutralized by import.

Therefore, if it is assumed that the import has resulted in no rise in prices of crop products in 2012 (but there has been a decline in yields), then the effects on the business operations of family farm model would be as follows:

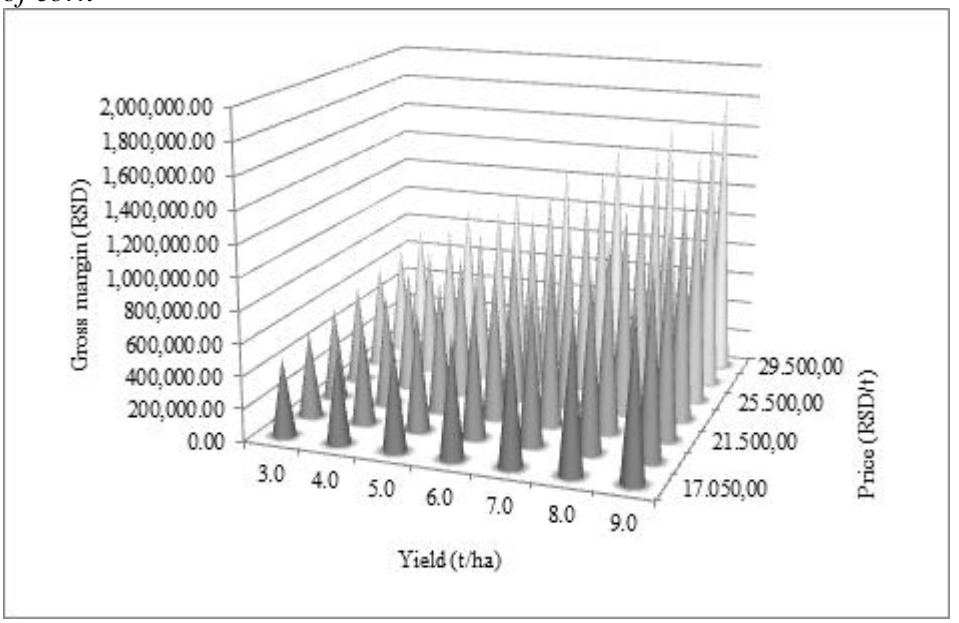
1. Profit of the farm would decrease by 394,111.13 RSD, that is, here would be a loss of 130,925.15 RSD.

2. Since the greatest impact on farm profit is generated by corn (for the largest share in the sowing structure), in the assumed situation it is enough to reduce the yield of corn by 37.22% and accordingly the farm will operate at a loss (excluding a decline in yield of other distributed field crops which would additionally increase the loss).

Because of the importance of corn in the sowing structure and the established fact that yield and price of corn significantly influence the change in profit and gross margin of the farm, it is desirable to determine how the aforementioned indicators of family farm operations will change if we start from the assumption that the yields and prices of other grown crops are fixed, whereas the yield and price of corn can vary (in different combination with one another).

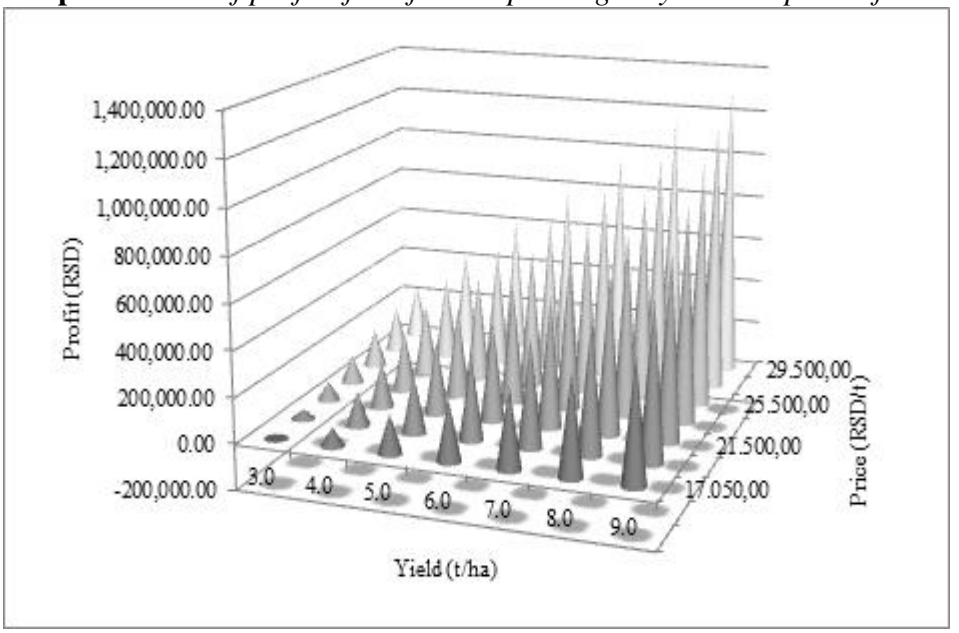
The height of gross margin for field crop operation in the total amount (Graph 8), and the amount of profit of the observed farm in the total amount (Graph 9) were calculated under the assumed (previously mentioned) conditions, while taking into account possible mercantile corn yields in the range of 3 t/ha to 9 t/ha, as well as possible market prices of corn in the range of 17,050.00 to 29.500.00 RSD/ha.The graph shows that when combining the lowest prices and the lowest yield of corn, gross margin is always positive.

Graph 8. *Trend of gross margin of the farm depending on yield and price of corn*



Source: *Authors' calculation.*

Graph 9. *Trend of profit of the farm depending on yield and price of corn*



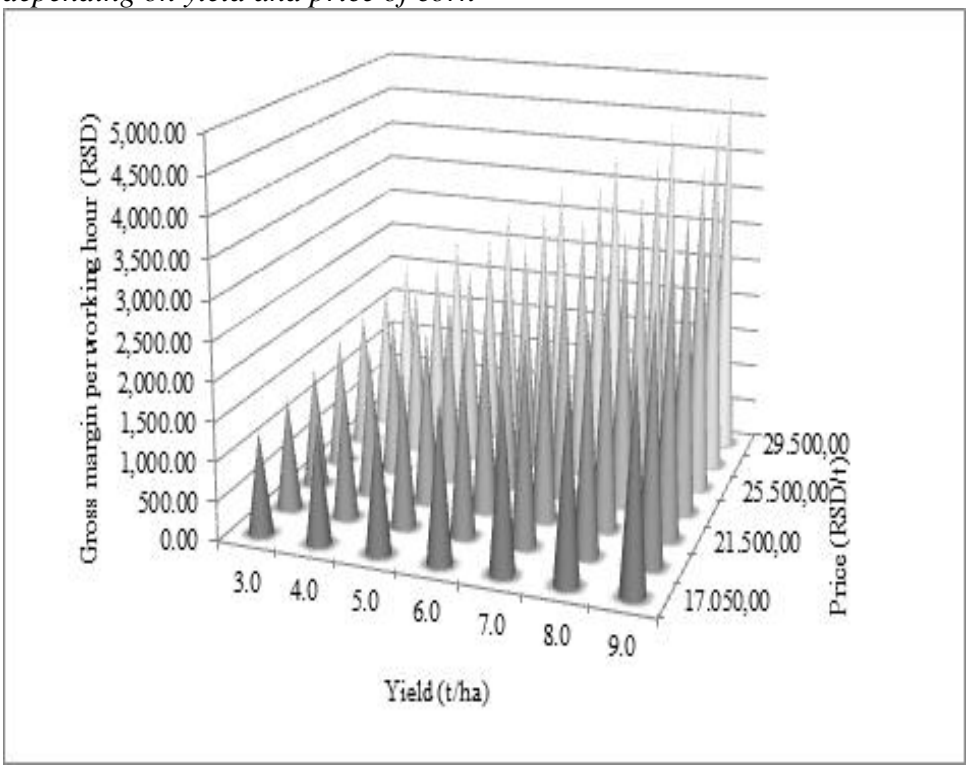
Source: *Authors' calculation.*

On the other hand, this is not the case with the profit. It may still be negative, but only in combination of the lowest possible price and the lowest possible yield of mercantile corn.

It is obvious that in the case when the yields and prices of other crop products are unchanged, it cannot be expected that only the change in yield and price of mercantile corn leads to business operations at a loss, that is, it would be the case only with utterly unrealistic scenario of simultaneous extreme decline in yield and price of this cereal.

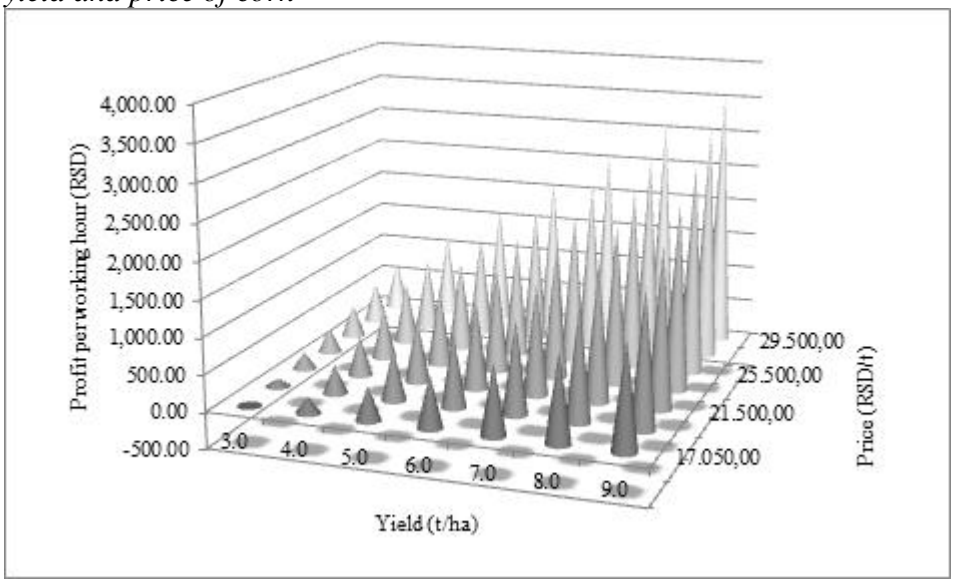
The same conclusion can be drawn when observing corresponding relative indicators of operations (that is, gross margin and profit per working hour) at different combinations of price and yield of mercantile corn (Graph 10 and Graph 11).

Graph 10. *Trend of gross margin per working hour of the farm depending on yield and price of corn*



Source: *Authors' calculation.*

Graph 11. *Trend of profit per working hour of the farm depending on yield and price of corn*



Source: *Authors' calculation.*

In these analyses, it should be borne in mind that gross margin (and thus profit) of the family farm is not exclusively influenced by yield and price of enterprises, but by change in variable costs of their production (while the change in fixed costs rarely occurs). However, the research conducted by Ivanović et al. (2009) for some field and vegetable crops has shown that gross margin in corn production is much more sensitive to the changes in price or yield, than to the changes in variable costs. Bearing in mind that under drought conditions there will not be a significant variation in variable costs (especially as purely field crop operations very rarely have the irrigation systems), the impact of these costs on gross margin and profit will not be subject of analysis.

Variations of yield and prices of the most important field crops will not have consequences only for the business results of field crop operations, but also for the economic effects on farms engaged in animal husbandry. This particularly refers to the price of corn, which is the most important element of the diet for animals in livestock production (mostly as mercantile corn, but also in the form of silage).

Similarly, in livestock production, the change in yields (or prices) in the production of animal feed has a greater impact on the total costs of livestock nutrition, than if there was a change in material costs of the production of animal feed. This situation is presented by Ivanovic et al. (2011) using the example of nutrition costs of milking cows.

Conclusion

The paper shows that on the family farm (growing corn, wheat, sunflower and soya bean on a total area of 15 ha) under drought conditions, gross margin and profit most significantly change because of the change in price and yield of corn (as a crop which is the most distributed in the sowing structure). In addition, the fluctuations of prices of grown crops more significantly affect gross margin and profit of the farm than the change in their yield.

Analysis also showed that a certain percentage change in price and yield of the observed crops has a greater impact on the change in profit than the change in gross margin of the farm. It was determined that under drought conditions (at a predicted decline in yield and rise in prices) gross margin and profit of agricultural farm (model) increased. However, this conclusion is valid only under drought conditions at the global level.

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INVESTMENTS IN AGRICULTURAL MACHINERY FOR CULTIVATION AND SOWING OF HYDROMORPHIC SOILS

Savo Ivančević[1], *Dragan Mitrović*[2]

Abstract

Peculiarities of agricultural production, which refer to an impact of natural factors, existence of biological processes and organic production, as well as a productive and a social character provides basic characteristics of investments in agriculture generally. A base for investing in agricultural machinery is a size of property, a size of parcels, road and canal network on a property, physical characteristics of soil, sowing structure, remoteness of storing and processing capacities, labour education, etc. A system of hydromorphic soils tillage must consider a crop rotation and also a share of crop rotation – unstable crops or a group of related crops should not exceed a certain border line, determined by biological characteristics of grown plants and edaphic-climatic conditions. The tillage of hydromorphic soils obligatorily comprises a minimum of land reclamation processing, and an orientation to a form of regular cultivation, a conventional, conservation or direct sowing is a matter of choice, which mainly depends on capability for investments: for the conventional system is necessary 460 euro/ha, for the conservation system 385 euro/ha and for the direct sowing system 296 euro/ha for an arable area of 1000 ha.

Key words: *investments, cultivation systems, hydromorphic soils.*

Introduction

A difference between a virgin land and those which use intensively has undeniably originated under an anthropogenization impact, which primarily aims to provide more favourable conditions for a growth and development of plants. This is a new approach to the anthropogenization

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concept, regardless that it is only about an arable layer, however there realizes the most intensive microbiological activity, it contains the most of organic matters, there is the biggest part of plants' roots and the greatest absorption of fertilizers and water, the greatest exchange of energy and a beginning of plants life, therefore has been concentrated an entire technology of plants growing on the arable layer. A man's aspiration to create favourable conditions for growth and development of plants is many times linked to „use of force" which temporarily give a positive affect, but on the whole realizes an adverse affect on land.

A land is a renewable natural resource, but its renewal and preservation develops only under specific conditions, so every aberration leads toward consequences that are harder to reclaim later. It means that should return to tested principles of agriculture, to use land, and not to utilize it for satisfaction of the current interests.

A modern technology of plant production, among other things, has a main support in agricultural techniques, by which all technological requirements were realized. However, an application of agricultural techniques affects to changes in land, primarily of land aggregates' structure and increase of compression, which reflects negatively on its water, aerial, thermal and biological regime.

When it is well-known that the most fertile soils are structural soils, with small-grained land structure (chernozem), then there should not be strange why is attached the utmost importance to the land structure preservation. *Vucic (*1990) cites Russell: "None of agriculture systems should apply constantly, unless it provides the preservation of adequate land structure; infirmity to preserve the structure is a characteristic symptom of this or that agriculture system. "Not only the tillage harms the land structure, but its share in that have also a climate, fertilization, grown plants, but it is certain that significant part also takes the agricultural techniques. It is well-known that, as more unfavourable the conditions of land moisture are, thereby is more pronounced a destructive impact of mechanization to the structure. Today, a man with the mechanization support is capable to crumble and chop up the soil up to wanted normative, but only naturally the land can be brought back its characteristic structure.

Intensive agricultural production, without its backing on livestock breeding, specialized, without crop rotations, with late-matured sorts and hybrids, with short terms for cultivation, preparation and sowing lead inexorably toward technology, which by puts a pressure by the mechanization on land of inadequate ripeness for cultivation, by which it adheres or disperses. In both cases the structure suffers, which deterioration has been intensified also by negative balance of organic mass and humus in the land, while there exists a strong correlation between the structure deterioration and humus contents decrease.

The plants are susceptible to land compression and they react by weak growth and lower yield. Consequences of land compression are: decreased number of macropores, aeration is weaker and generally, a water-air order of land has been deteriorated. Under the influence of inadequate technology and adequate mechanization occurs the land compression in below-arable layer too, so called plow sole, which in physical sense disables development of root system, water flowing away, i.e. making a water logging.

A complexity of land cultivation problems in plant production was noticed by *Todorovic (1955*), who told that "the land does not need tractor drivers, but ploughmen", and under the ploughmen he considered agronomists – mechanists who think, project and program the technology of plants growing. It should be an essence of a relation between a man, agricultural technique and land, because on every inadequate link can crack the agriculture chain.

Land areas

As long as a man does not seize a production of human nutrition basic components (proteins, carbohydrates and fats) in a synthetic way, the land stays the only production resource of human and animal nutrition, i.e. the only sustainer of mankind.

The arable land of Banat, Backa and Srem, edged by nowadays borders of Vojvodina, amounts 1.640.661 ha. There are abnormal soils in Vojvodina, including also alluvium, 414.130 ha or 27.685 of total agricultural areas, i.e. in Banat 302.100 ha, in Backa 74.130 ha and in Srem 37.900 ha.

Table 1. *Economically significant types of hydromorphic soils in ha (Molnar2002)*

Land type	Banat	Bačka	Srem	Vojvodina
Marshy black soil, carbonated	64.000	37.000	21.700	122.700
Marsh black soil, non-carbonated	85.200	13.600	16.200	115.000
Marshy vertisol	78.770	23.230	-	102.000

In these land types, the yields are lower: wheat for 19.7%, maize for 20.5%, sugar beat for 23.8% and soy for 21.9% in regard to average yields in Vojvodina. Those are several-decades-lasting data, quotes *Molnar (2002).* There considers that, in this areas, the yields can be increased for 20%. A half of increased yields can be realized by mixed hydro and agro-land reclamations and by appliance of adequate system of plant production in these areas.

Agro-technical aspect of land cultivation

Complex and unfavourable physical characteristics, and especially heavy mechanic contents, weak water-permeability, small air capacity, an aptitude toward compression, significantly affect, as on a selection of ameliorated measures aiming to increase production, as well as on the selection of all land types' cultivation system.

A system of regular cultivation of hydromorphic lands is very specific, and its role is stabilization and a preservation of improved land characteristics. The hydromorphic lands, when moist, are very sensitive to trudging and compressing and are yet called „minute lands", and therefore is necessary that all measures of the regular cultivation (peeling), the primary cultivation, top soil cultivation and pre-sowing preparation, sowing, as well as the cultivation during a vegetation, to carry out in moderately moist soil, i.e. in the state of physical ripeness for the cultivation. During tillage should avoid that tractor's wheel trudges on furrows bottom, because it leads to a secondary compression of subarable layer. Important is also a care of the primary cultivation, i.e. a crude preparation of top soil layer, while it ensures the pre-sowing preparation

in lesser crossings of agricultural machines. Each system of the regular cultivation, the conventional, some of the conservation system types and the direct sowing have their advantages and disadvantages. Which of the systems should apply – depends on concrete edaphic-climatic conditions.

Investment aspects of land cultivation

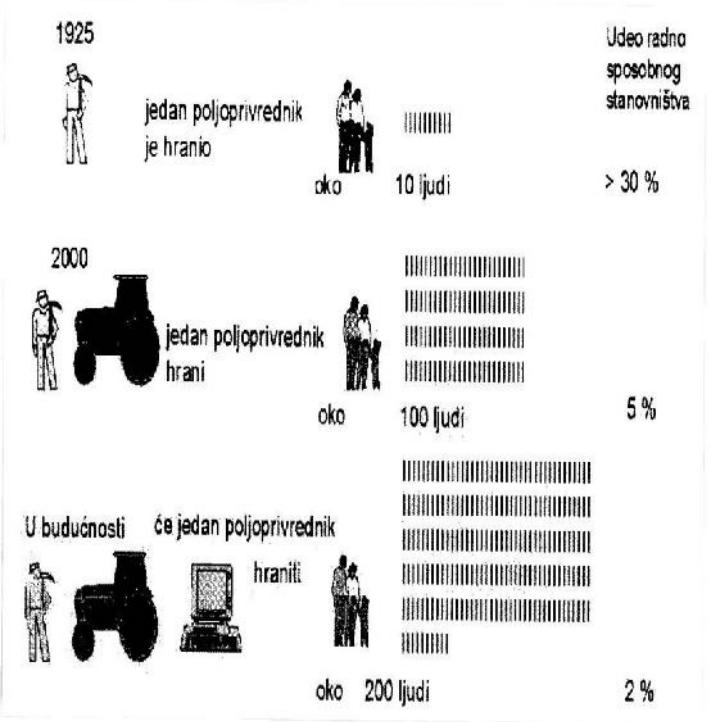
Although among economists is no unique attitude after the investments definition issue, *Mitrovic (2001*) considers that it is advisable to accept Mass definition – the investments represent a sacrifice and giving up of an consumption in present times in order to increase a benefit, i.e. the consumption in the future. The investments have a decisive role in realization of goals and agriculture development priorities, while they have been a driving instrument of quality and quantity growth of the total production factors, and thereby also making better conditions for all those who have been directly or indirectly dependable on agriculture.

According to Subic (2010), without an adequate size and thought-out structure of investments, cannot be provided a growth of fixed assets and working capital, increase of work places number, increase of working tools efficiency, better productivity of work, diversity of production in husbandries, municipalities, regions and the republic.

In developed countries has been present an idea that technical progress in economy and agriculture has been a decisive factor of production and productivity growth, as quotes *Mitrovic (2001*). After all, that is a regular historical process of improving old and finding out new methods and production means, which result is the increase of work productivity. Nice example in the picture 1 is given by *Schon (2003)* and he cites that, in European agriculture, during the XX Century, had happened one of the greatest technical revolutions in the mankind history, with sweeping structural and social consequences. From the productivity point of view can be concluded that the productivity in agriculture had increased over 20 times in past 70-80 years, primarily thanks to overall mechanization of agriculture and, in last ten years, increasing application of information technologies. Besides development of bio-technical sciences and pesticides, there considers that in development of agricultural production, the greatest contribution gave the agricultural techniques, so it has been a generator of plant and livestock production development. Often the modern technical solutions have imposed the changes in production technology (an agricultural diggers – cultivation without tumbling of

plastica, a seeder for the direct sowing – production without land cultivation, silage harvesters – high-quality preparation of fodder, etc.).

Picture 1. *How many people in Germany one agricultural producer feeds*

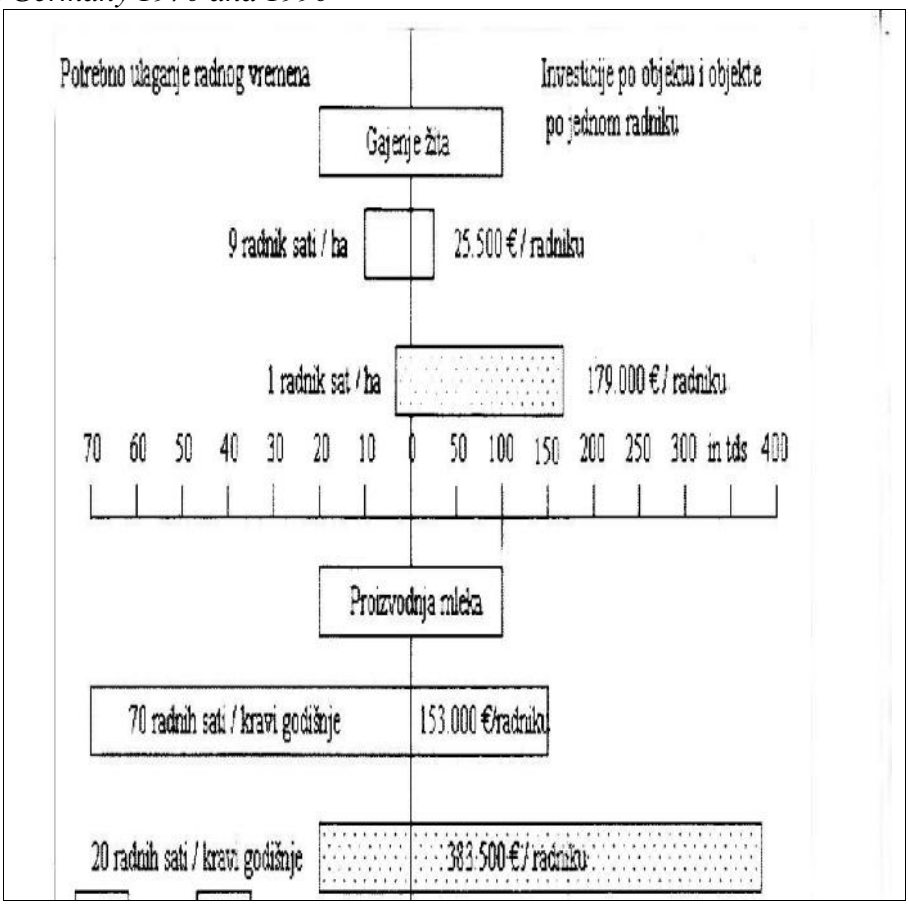


Source: *Schon H., Tešić M. (2003): Informacion tehnologije i trendovi u modernoj poljoprivredi; Naučno – stručni časopis " Revija – agronomska saznanja", br. 1–2 ; Jugoslovensko naučno društvo za poljoprivrednu tehniku; Novi Sad.*

There is no technical progress without investments, while they ensure, as simple and expanded reproduction, as well as the increase of productivity, economic efficiency and profitability of agricultural production, creating new products, solving ecological problems etc. In the picture 2 was given a parallel review of workers′ number, necessary working hours and necessary investments per a worker in production of grain and milk in Germany, and therefore was concluded that, by decreasing of workers and working hours' number in production of grain and milk, increase the investments in agricultural machinery, equipment and facilities. The technical progress and rationalization of agricultural production have significantly affected on decrease of engaged workers, from 9 to 1, along

with parallel increase of capital investments for labour from 25.599 € to 179.000 € per a worker in plant production, and in livestock breeding the investments are much higher. German data show that the costs of machinery and facilities significantly affect a liquidity of the agricultural husbandries. The production costs are also high, and agricultural products are not competitive on international market, however, high subsidies which German agriculture gets, and other EU countries support their agriculture, provide the competitiveness of their agricultural products.

Picture 2. *Needed workers, working hours and investments per 1 worker in Germany 1970 and 1990*



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Investments in machinery for cultivation of hydromorphic soils

The base for investments in agricultural machinery is a property size, parcels size, road and canal network on the property, physical characteristics of land, sowing structure, remoteness of storing and processing facilities, education of labour etc. In Vojvodina, the arable land is mostly complex, in a way that around 35% or 575.000 ha of 1.640.661 ha is in parcels of ex-social (public) properties and cooperatives. The most (around 40%) of those properties had around 1.000 ha of area. The parcels' size on those properties, while in past was applied a land consolidation and a land re-allocation/regrouping, mostly from 10 to 30 ha. In past ten years has not been unusual that some small agricultural husbandries, by purchase and lease of land, enlarge the property they cultivate on several hundreds, even thousand of hectares. Therefore is advisable to take as a base a **property of 1.000 ha** in the investments example. A share of hydromorphic lands on estates is, in average, over 30%, although there are estates, especially in Banat, which properties consist of land, even up to 80% hydromorphic.

A system of hydromorphic lands cultivation must take into consideration a crop rotation, and also a share of crop rotation unstable crops or a group of related crops should not exceed a certain limit, determined by biologic characteristics of grown plants and edaphic-climatic circumstances. Carefully selected crop rotation can have a multiple positive effect on land and yield. Thereby in the sowing structure on hydromorphic lands should rely on existing experiences (*Molnar, 1990*) and to sow cereals and soy 25 – 50 %, maize 25 – 33 %, sugar beat 8 – 16 %, sunflower 0 – 16 %. The results of several-years-lasting experiments and a wider practice show that winter wheat and soy in these lands, in comparison with other crops, provide higher and more stable yields and is favourable to preservation of land fertility. Owing to the example for investments in necessary machinery for land cultivation proposes a regular sowing structure (table 2), present in many agricultural husbandries, which take care on land fertility preservation, and are not burdened by the current commercial effects. There should emphasize that it took care of pre-crop and a specific land resistance, which is kept within the bounds from 0,75 to 1,0 daN/cm^2. In the same way should emphasize that most of agricultural estates dispose with combines (harvesters), which, besides harvesting a basic crop, granulate and spread plants residues on the parcel. Technological operations comprise, in this case, only what is correlated to the land cultivation, which represents this paper's subject,

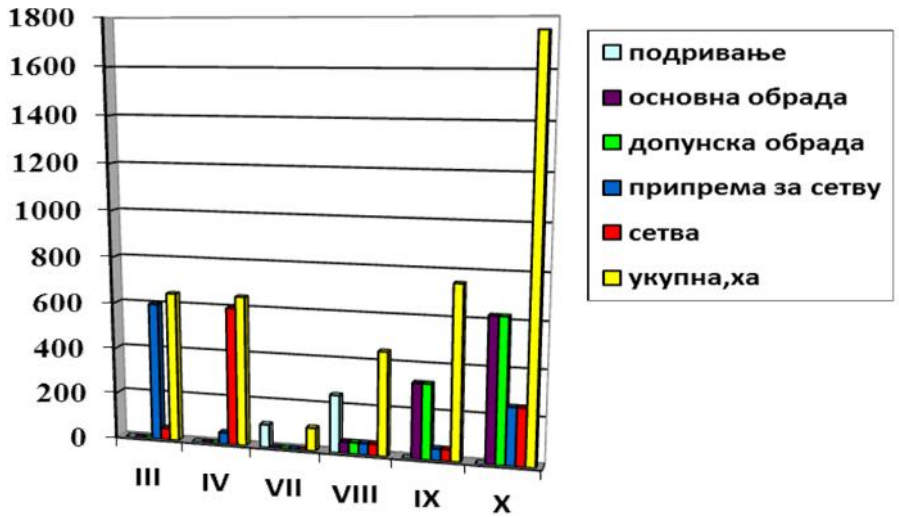
and do not comprise the other technological operations, as an integral part of the regular production (fertilizers and seeds transport, fertilizing, spraying, etc.). In the picture 3 was given a review of activities which should be done in agro-technical terms and has been noticeable a month October with threshing loading in land cultivation and sowing.

Table 2. *Sowing structure (proposal)*

Culture	% of proportion
Winter cultures	***35***
- Colza	5
- Winter wheat	25
- Winter barley	5
Summer cultures	***65***
- Sugar rape	10
- Sunflower	10
- Soy	10
- Maize	35

Source: *Ivančević S., Mitrović D. (2012): „Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicija po hektaru i održivih eko sistema“, monografija, Institut za ekonomiku poljoprivrede, Beograd.*

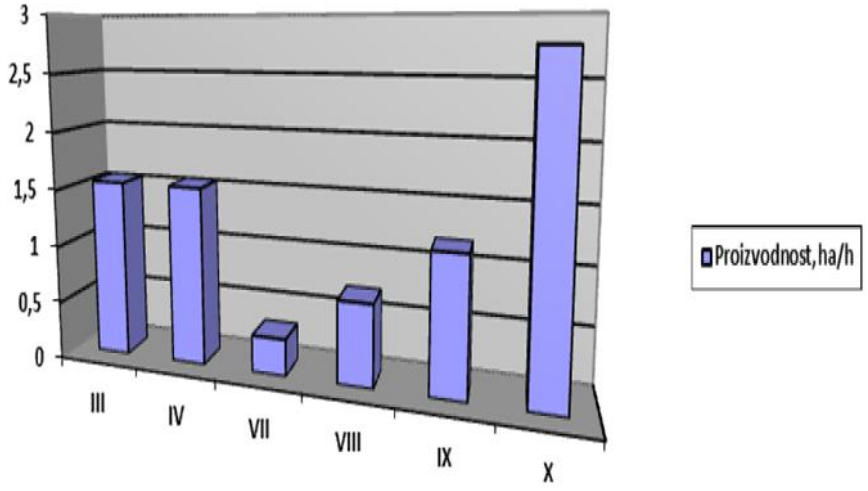
Picture 3. *Size of activities per months in agro-technical terms*



Source: *Ivančević S., Mitrović D. (2012): „Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicija po hektaru i održivih eko sistema“, monografija, Institut za ekonomiku poljoprivrede, Beograd.*

A reality is more complex in regard that, in that period, there is more picking and transport of autumnal crops, as well as series of other technological operations, without which there is no serious production. In order to understand the activities volume in agro-technical terms, in the picture 4 was given a description of productivity per months and working hours, out of which can see that in October should cultivate, prepare and sow almost 3 ha per a working hour, which direct us to a selection of necessary agricultural technique. Regarding to weather conditions in time of these activities should take into consideration that agro-technical term is from 0.635 to 0.705, and so to increase the capacities in mechanization.
A recapitulation of tractors power engaged, a selection of agricultural technique and investments for marshy lands cultivation, through examples of selected production technologies, shows a diversity which reflects in direct production costs, a number of needed agricultural techniques and necessary investments.

Picture 4. *Production per months of agro-technical terms*



Source: *Ivančević S., Mitrović D. (2012): „Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicija po hektaru i održivih eko sistema“, monografija, Institut za ekonomiku poljoprivrede, Beograd.*

In the table 3 was described tractors' engagement for some systems of land cultivation, taking into consideration that marshy lands must be subsoiled at least every third year.

The conventional cultivation system requires full annual working hours, and which has been, after experienced exploitation indicators, for tractors of power ≤200 kW from 1.500 to 2.000 hours annually. The conventional cultivation system requires full annual fund of working hours, and which has been, after experienced exploitation indicators, for tractors of power ≤ 200 kW from 1.500 to 2.000 hours annually.

Table 3. *Engaging tractors in working hours/systems of cultivation and marshy land sowing*

Systems of land cultivation				
Conventional		Conservation		Direct sowing
A	B	A	B	A
Subsoil tillage				
174	-	174	-	174
Primary and supplemental cultivation and preparation for sowing				
1.657	-	610	-	-
Sowing				
-	289	-	289	216
Total hours				
1.831	289	784	289	390

A) Tractor's power ≤ 200 kW B) Tractor's power 100 - 120 kW

Source: *Ivančević S., Mitrović D. (2012): „Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicija po hektaru i održivih eko sistema", monografija, Institut za ekonomiku poljoprivrede, Beograd*

Taking into consideration the sowing structure, which has been in accordance to grown crops biology and an imperative in land fertility preservation and profit making, and thereat having in mind a changeability of edaphic-climatic conditions in time of carrying out some agro-technical operations, the estate should be equipped in a way to mainly satisfy the agro-technical requirements, in function of successful crop production.

In most of years, the hydromorphic lands in summer and autumn months, under a drought influence, are very unfavourable for carrying out the primary and the supplemental cultivation, preparation for sowing and sowing its self. Lumps expel on land surface by the tillage and they cannot granulate by disc harrows even in 2 or more crossings of agricultural machines, and therefore seedbed tillers are not capable to prepare a quality sown layer.

Rotational tools with power of tractor driving axle (rotational harrow, roto-tiller...) granulate the lumps in powder structure and in that way the land looses its natural aggregates. Numerous crossings in preparation of land for sowing cancel the effects of the primary cultivation, i.e. the land compresses, in a way that it is common that classical seeder for cereals are not capable to place in seeds on set depth.

The problem of harvest residues is expressed regarding sunflower and maize, and it solves the most simple by using heavy disc harrow (cross-disc harrowing). Gathering of late maize hybrids disables timely land cultivation for wheat, especially if the land has increased moisture content. The lands with increased moisture contents are not suitable for cultivation with turn up digging tools and therefore should use a plough. A strategy for using all three cultivation systems is reasonable from safety in carrying out the subject activities point of view.

A recommendation in equipping the seeders for the direct sowing finds its justification in a fact that in lands of heavier mechanical contents hardly realizes the basic agro-technical requirement – placing in seeds in set depth, and that for this operation are necessary the seeders capable to satisfy this requirement.

Financial investments in agricultural techniques are only payable through working effects realized in production. Which production system should be selected depends on many production factors, knowledge, habits, but also on prejudices as an integral part of a man who makes a decision.

One is well-known, and that is: a selection (type, capacities, etc.) of agricultural techniques must base on determined sowing structure for several years ahead (at least 5 years) and a respect of agro-technical terms. In the tables 4 and 5 are shown that the highest investments in agricultural techniques are in the conventional production system, and the lowest in the direct sowing, while agriculture must realize a profit regardless to production costs (investments, too).

Using German experiences and data on the inevitable investments in agricultural machinery for cultivation and sowing, *Kekic (2003*) for different sizes of agricultural estates, from the table 4 can conclude that, with enlargement of estates area decrease investments per a hectare, as well as that the conventional cultivation system is the most expensive.

A protective treatment (sowing under plants residues), as a sub-group of the conservation cultivation system, is increasingly present in developed countries, and also on our fields.

A philosophy of land preservation, as natural resource, is more and more actual, while new acknowledgements provide land cultivation in a different way (without overturn of plastica) which contributes to land preservation, and thereat do not decrease yields but stay at the same level or increase.

Table 4. *Needed capital for new investments for supply of equipment for cultivation and sowing*

Size of a husbandry (ha)	**Investments, in euro**		
	Conventional cultivation system	**Conservation cultivation system**	**Direct sowing**
75	111.037	77.117	70.034
Euro/ha	*1.480,50*	*1.028,23*	*933,79*
150	155.208	107.001	89.639
Euro/ha	*1.034,72*	*713,34*	*597,59*
500	406.458	269.082	218.404
Euro/ha	*812,92*	*538,16*	*436,81*
2.000	1.278.160	858.434	627.837
Euro/ha	*639,08*	*429,21*	*313,92*

Source: *Kekić M. (2003): Kako proširiti konzervacijske sisteme obrade; Naučno – stručni časopis " Revija – agronomska saznanja", br. 1-2 ; Jugoslovensko naučno društvo za poljoprivrednu tehniku; Novi Sad.*

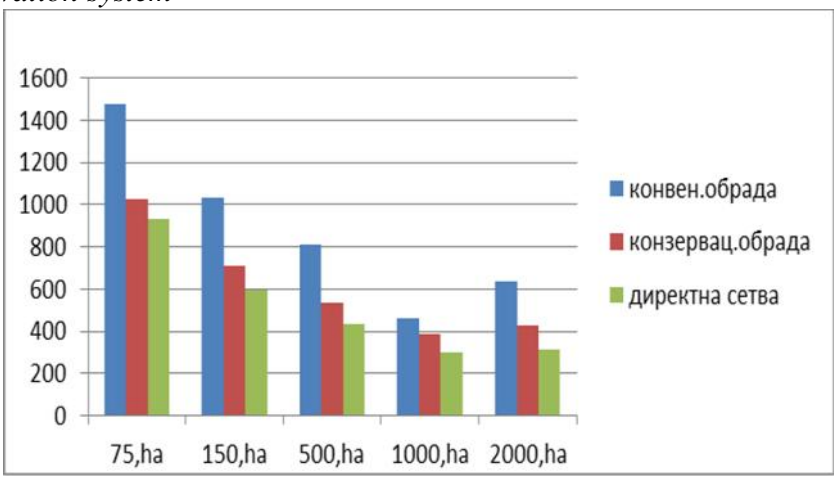
Observing the edaphic-climatic conditions of some area, there imposes a conclusion that it is preferable to apply the conventional cultivation 25%, the conservation 40% and the direct sowing 35%, and in that context should consider the investments in machines for cultivation and sowing. A recommendation is to use obligatorily seeders for the direct sowing in every cultivation system.

Table 5. *Necessary capital for new investments for supply of equipment for cultivation and sowing of 1.000 ha land*

Agricultural machine	Purchase price, euro *	Investments, euro		
		Conventional cultivation system	Conservation cultivation system	Direct sowing
Tractor's power ≤200 kW	180.000	Yes	Yes	Yes
Tractor's power 100 - 120 kW	90.000	Yes	Yes	No
Subsoiler, 4 working bodies	3.000	Yes	Yes	No
Mouldboard plough, 6	21.000	Yes	No	No
Mouldboard plough, 4	14.000	Yes	No	No
Disc harrow, w.grasp 5 m	30.000	Yes	No	No
Disc harrow, w.grasp 6.5 m	36.000	Yes	No	No
Seedbed tiller, w.grasp 8 m	16.000	Yes	No	No
Seeder, narrow-row drill, w.grasp 6 m	35.000	Yes	Yes	No
Seeder, wide-row drill, 12/8 rows	38.000	Yes	Yes	No
Turning up-digger, 3,5 m	7.000	No	Yes	No
Combined tools, w.grasp 6 m	35.000	No	Yes	No
Seeder for direct sowing, narrow-row drill, w.grasp 4 m	52.000	No	No	No
Seeder for direct sowing, wide-row drill, 12 rows	64.000	No	No	Yes
		TOTAL	460.000	385.000	296.000
		Euro/ha	*460*	*385*	*296*

*Purchase price of agricultural machinery depends on a level of equipment and producers. These are average prices downloaded from the web-site *www.mascas.rs*

Picture 5. *Investments euro/ha in terms of property size and selection of cultivation system*



Source: *Ivančević S., Mitrović D. (2012): „Sistemi za obradu ritskih zemljišta sa aspekta potrošnje goriva, investicija po hektaru i održivih eko sistema", monografija, Institut za ekonomiku poljoprivrede, Beograd.*

Conclusion

Taking into consideration the optimal agro-technical terms for some working operations (sub soiling, primary cultivation, supplemental cultivation, preparation for sowing and sowing), productivity of selected tractor's generating units, and also the average price of some standard equipped agricultural machines, there came to the investment load per a hectare, which was 460 euro/ha for the conventional cultivation, 385 euro/ha for the conservation cultivation and 296 euro/ha for the direct sowing.

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DEVELOPMENT OF TOURISM IN WESTERN SERBIA[1]

Slavoljub Vujović[2], Zoran Jovanović[3]

Abstract

The essence of the work is to explore the possibilities of tourism development in western Serbia, in the future, based on entrepreneurial intentions and desires of students, as part of the population from which further depend on the social and economic mainstream. Given the importance: that mental creativity (science and art) exists since the foundation of the common people, the overall progress of mankind was created thanks to the great creative mind of former civilizations, and the fact that Western Serbia has exceptional natural and anthropogenic values suitable for evaluation in order to develop Tourism, research questions are formulated and approached the above-mentioned research. So, and autors have an indicator, not only economic, but social development the total number of students at one hundred thousand inhabitants (known to the developed world, compared to the underdeveloped, is incomparably more students) in a way encouraged this research. The methods: analysis, synthesis, correlation, deduction and induction. Primary field studies were based on questionnaires, interviews and in-depth interview. Ontological method-in particular the principle of sufficient reason and the results of the study provide support for the hypothesis (confirmed)-that tourism can and should be a leading economic activity in the future of Western Serbia.

Keywords: *tourism development, tourism industry, research*

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[1] The work is part of the research project: "Development and application of new and traditional technologies in the production of competitive food products with added value for the domestic and world markets create wealth-wealth of Serbia" (Ministry of Education and Science of Serbia, no. 046 001).

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Introduction

Over the past six decades, tourism has experienced expansion and diversification, thus becoming one of the largest and fastest growing sectors of the economy. This is supported by the data of the World Tourism Organisation and the International Monetary Fund[4], which show that tourism is one of the five leading export activities 83% of the countries of the world and a major source of foreign exchange earnings for at least 38% of the countries. World Tourism accounts for 10% of the world's gross domestic product, with annual revenue of 980 billion U.S. dollar and employs 200 million people[5].

Despite the negative economic trends and political turbulence, the number of international tourist arrivals is continuously growing. The global economic crisis has also affected tourism, but the global tourism industry, already in 2010. the recovered. That is 2010. year saw an increase in foreign tourist arrivals to 7% in 2011. year, the number of international tourist arrivals grew by 4.6%. Revenues from tourism in 2011. year, estimated at 1030 billion U.S. dollar as compared to the previous year, an increase of 3.9%.

According to the World Tourism Organization, in the first quarter of 2012. the total number of international arrivals rose by 5% compared to the same quarter last year. With current annual growth rate of international tourist arrivals (average annual growth rate of 4.4% from 1990.), it is expected that by 2020. year will be about $ 1.6 billion foreign tourists in the world (Premović and others, 2012).

Given the physical geographic location and natural and anthropogenic value available to Western Serbia, the previously mentioned paper the performance of tourist traffic globally, have been singled out to certain incentives and goals of the development of tourism in the future.

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[4] *WTO's Tourism Economic Report,* 1998.
[5] http://www.unwto.org

Theoretical and methodological basis of research

The relationship of production and consumption units, market mechanisms (market function) and the behavior of economic agents in the market are the aspects that allow the knowledge of tourism in the economic process.

Two basic factors of tourism "free time and free money" that on the one hand the aim of human creativity in order to meet the need for luxury, leisure, recreation and recovery, are directly related to the basic economic relationship, the relationship between limited resources and unlimited needs. Furthermore this relationship leads to a fundamental relationship of man and the conditions of survival, and it is the relationship and the nature of man.

"One must first earn money, i.e. produce a variety of goods, order, consuming these goods could satisfy different needs. Unlike almost all of its production capabilities limited resources because the resources are limited, as opposed to the needs that are generally above the production capacity" (Dulčić, 2001:49).

Given the socio-economic developments at the state and broader level, implicitly all economic activities and sectors, in the context of further economic developments, they are now able to present the research in the future development of tourism in terms of entrepreneurial intentions and desires of students. The methods: analysis, synthesis, correlation, deduction and induction. Primary field studies were based on questionnaires, interviews and in-depth interview.

The authors, considering the responses and opinions of the respondents included in the sample, and given the economic problems on a global scale, consider that further development should be sought through the analysis of the relationship, or rather interdependence techno-economic and socio-economic sphere (Frolov, 2011) in the context of the overall economy. Techno-economic and socio-economic sphere are linked by cause-effect model. Frolov (Daniil Petrovich Frolov, 2011:41) by analyzing the problems of the world "financial" crisis, rejecting the views and opinions of various world theorists noting that solutions should be sought in the techno-economic and socio-economic sphere of analyzing economic trends in the short and long term, so short and long waves.

Accepting the findings of the Frolov, however, (the authors) all movements in both of the sphere, are conditioned by institutional and evolutionary economics, institutions and institutes of the system. Tourism can not transformational and transactional technology, whose importance in the business trend and economic development within the context indicates Frolov technological determinism. How Frolov said *"technology in general are interrelated manner of use of the method of increasing the efficiency of certain activities to be carried out which character their classification. Therefore, it is methodologically correct distinction between transformational and transactional technology" (Frolov, 2011:51).*

However, despite all the economic problems and disorders and what the research confirms, the only economic activity (or a model of economic development) that, regardless of all the disturbances in the economy and at all levels going forward is tourism. In what specific destination, zone or region has inorganic quality, organic and man-made elements, tourism is definitely an activity that provides economic development and integration into the international division of labor (Vujovic, 2012: 42).

Tourism is incorporated directly in three out of four (extractive industries, agriculture, manufacturing industries and transportation) core areas of material production-transportation, manufacturing and agriculture. "In extractive industries, agriculture and manufacturing industry there is a fourth area of material production, which also passes through different stages, craft, Manufacturer's and mechanical work-it's transport industry (Lokomotions industrie) was to transport people or goods" (K. Marx , 1978: 387).

In accordance with the previously quoted statement, tourism can be said that the first (or one) of the five primary areas of material production. Since there is a direct link between multiple tourism and transport, agriculture and manufacturing industry, and if we exclude extractive industries, tourism, then one of the four basic areas of material production. Countries with developed tourism can be due to tourism revenues, offset needed good extractive industries, so tourism can be regarded as the first of the four main areas of material production (tourism, agriculture, transportation, and manufacturing). It listed four areas form the basis of material production and upgrading of further

economic development of Western Serbia. Benefits aspects of tourism development are reflected in the reliance on tourism and techno-economic and socio-economic sphere, constantly evaluating the firm and the natural and cultural values of the environment inevitably respecting the laws and principles of institutional and evolutionary economics (Frolov, 2011:60).

In accordance with the previously mentioned, accepting the same general conditions as inevitable, a research of entrepreneurial intentions and desires of students as part of polpulacije which depends on tourism.

Analysis and evaluation of research results

The main hypothesis of this paper is, *that tourism can and should be, the leading economic activity in western Serbia.* As the main issues during the research in order to confirm or not confirm the basic hypothesis, they (and requested answers, opinions and attitudes) following four questions[6]:

- **students' attitudes to the most promising areas for starting a business;**
- **put the entrepreneurial environment;**
- **determinations related to entrepreneurship and**
- **who, in your opinion, was promising entrepreneurial ventures these days.**

Within each of the main issues of the framework-provides more specific issues or sub-issues.

The paper is based on research conducted in the field by means of questionnaires, interviews and in-depth interviews, the student population aged 1993, 1992, 1991, 1990, 1989 and older, born in Uzice and space environments, radius of up to 100 kilometers. The study authors have worked and a select group of students of the Business and technical high schools in Uzice.

[6] Complete questions with sub-questions are attached to the end of the paper in the form of contributions

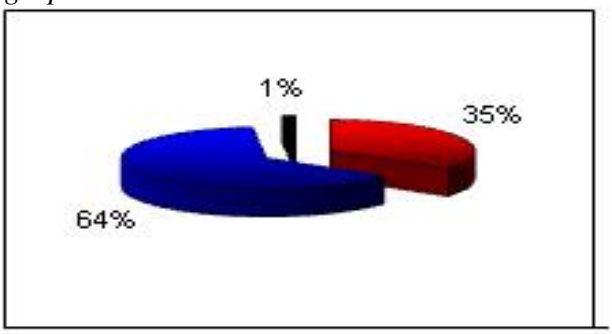
Respondents, and interviews conducted with a total of 1500 students (primarily Business and technical high schools and Teachers College in Uzice and students from other institutions OF higher education present in Uzice (private and public). However, for this particular work, testing initial hypotheses dealt with the sample of 320 respondents. In geographical terms, the study area included locations of municipalities: Ivanjica, Sjenica, Prijepolje, Priboj, Rudo, Čajniče, Višegrad, Bajina Bašta, Ljubovija, Požega, Zlatibor, Užice and Čajetina.

Table 1. *Demographic data*

Sex	**Results**	**%**
male	115	35,94
female	200	62,50
unspecified	5	1,56
total	320	100

Source: *Authors' research.*

Graph 1. *Demographic data*



Source*: Authors' research.*

In the first question[7]-**student attitudes about the most promising areas for starting a business,** offered a seventeen-field activities to start a business where the students through a written questionnaire outlining their views and opinions. Later, in depth interviews, talks, media-dilemma

[7] See appendix no. first

subjects or tourism, referred to the significance of the media in terms of media power and great wealth of individuals or very narrow circle of people, while the dominant view that tourism promotes economic development at a broad level. The first question involved a total of 517 respondents, and the most promising area of 11.22% by the respondents is that the media in the first place (but as indicated above, in-depth interview, it was explained that the attitude of the media towards relations of power and enrichment of individuals), and 9.86% of the respondents through a questionnaire and in-depth interview later considered the best prospects for tourism activities.

As promising entrepreneurial venture[8] in today's student-respondents citation tourism 8.75% response, and in this issue, a number of respondents was no answer.

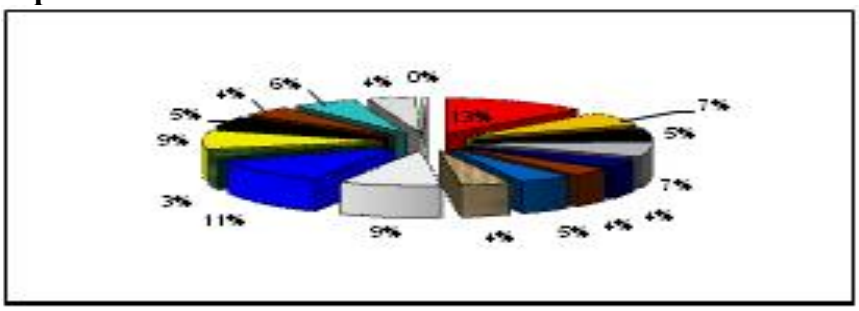
Table 2. *Attitudes towards the most promising areas for starting a business*

Business	Results	%
Media	**58**	**11,22**
IT technologies	29	5,61
hospitality	22	4,25
medicine	30	5,80
insurance	18	3,48
agronomy	16	3,09
craftsmanship	21	4,06
transport and forwarding	20	3,87
education	41	7,93
Tourism	**51**	**9,86**
Trade	12	2,32
Banking sector	38	7,35
production	22	4,25
services	20	3,87
Building industry	26	5,03
Hotel industry	19	3,67
Other	2	0,39
With no answer	72	13,93

Source*: Authors' research.*

[8] See appendix no. four

Graph 2.



Source: *Authors' research.*

The results of the second question-student attitudes about entrepreneurial environment, split into eight sub-questions, show that the chance to start their own businesses in the tourism industry in general and the poor, the existing infrastructure is poor and the support of the government, while aspects of the foreign students' personal characteristics of entrepreneurs as positive, as can be seen from the results presented in eight options (a, b, c, d, i, j, k, l) table number three and graphs. All tables, graphs and drawings are the result of the tests.

Table 3 with question (a). *Chances for development of private business*

a) Numerous chances for development of private business are present in surrounding

Marks	Results	%
One	81	25,31
Two	79	24,69
Three	61	19,06
Four	33	10,31
Five	17	5,31
Without answer	49	15,31

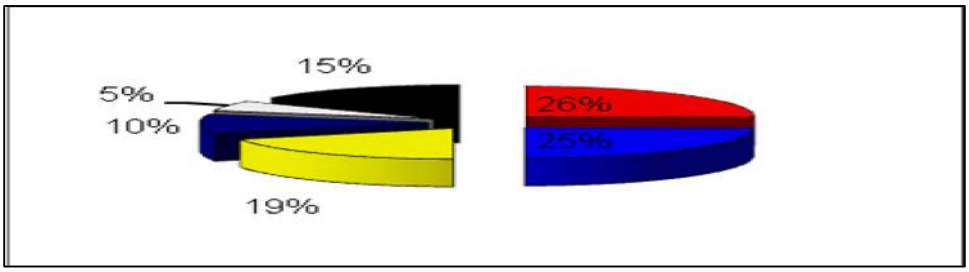


Table 3b. *Social infrastructure for development of private business*

b) Social infrastructure is adequate for development of private business

Marks	Results	%
One	77	24,06
Two	83	25,94
Three	75	23,44
Four	26	8,12
Five	6	1,87
Without answer	53	16,56

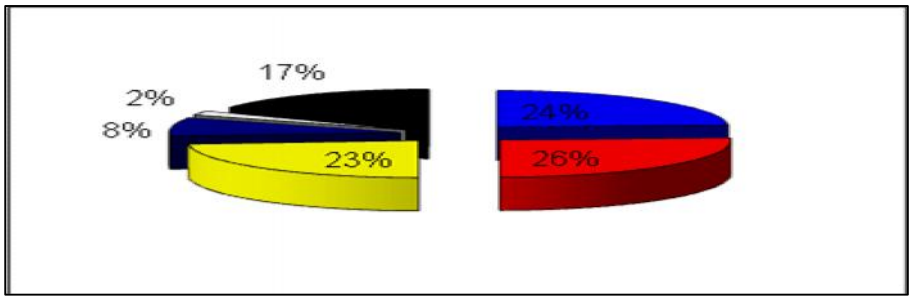


Table 3c. *Supporting entrepreneurship by government*

c) Entrepreneurship is well backed up by government

Marks	Results	%
One	76	23,75
Two	89	27,81
Three	67	20,93
Four	19	5,94
Five	7	2,19
Without answer	62	19,37

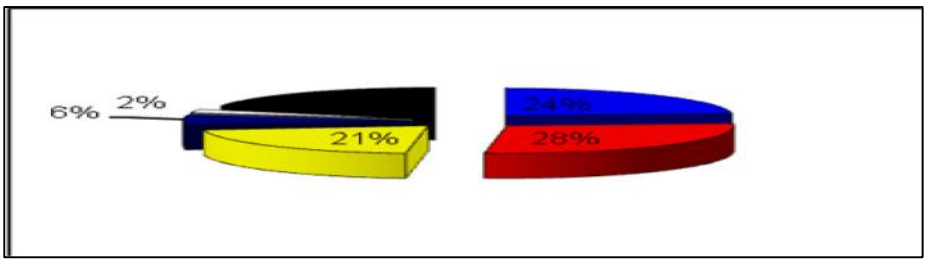


Table 3d. *Opportunities for start my own business*

d)I have good opportunities to start my own business

Marks	Results	%
One	83	25,94
Two	68	21,25
Three	64	20,00
Four	34	10,62
Five	17	5,31
Without answer	54	16,87

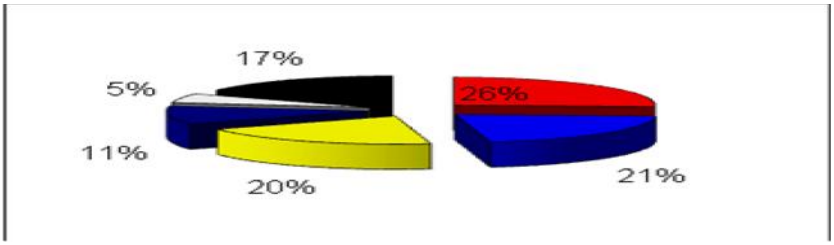


Table 3i. *Control of business success and career*

i) I can control my business success and career

Marks	Results	%
One	29	9,06
Two	38	11,87
Three	83	25,94
Four	70	21,87
Five	45	14,06
Without answer	55	17,19

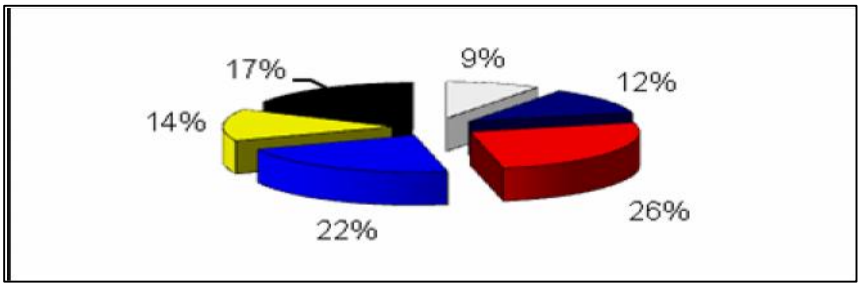


Table 3j. *Propensity to innovation*

j) I tend to be more innovative than others

Marks	Results	%
One	18	5,62
Two	48	15,00
Three	83	25,94
Four	72	22,50
Five	40	12,50
Without answer	59	18,44

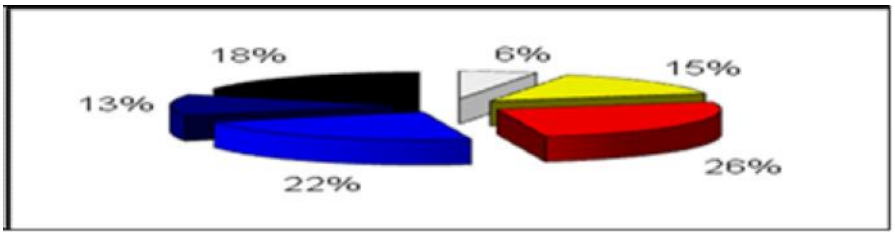


Table 3k. *Family attitudes toward entrepreneurship*

k) My family thinks that it is good for me to become an entrepreneur

Marks	Results	%
One	29	9,06
Two	35	10,94
Three	87	27,19
Four	60	18,75
Five	55	17,18
Without answer	54	16,87

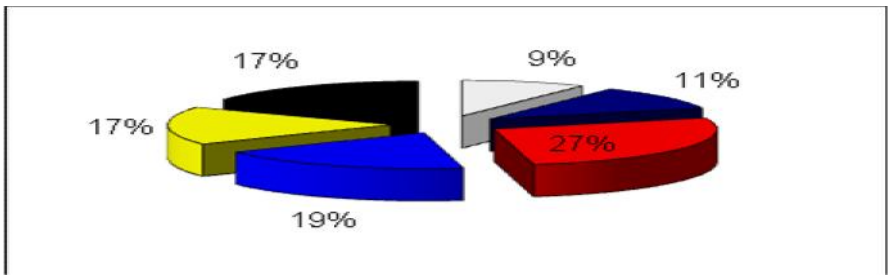
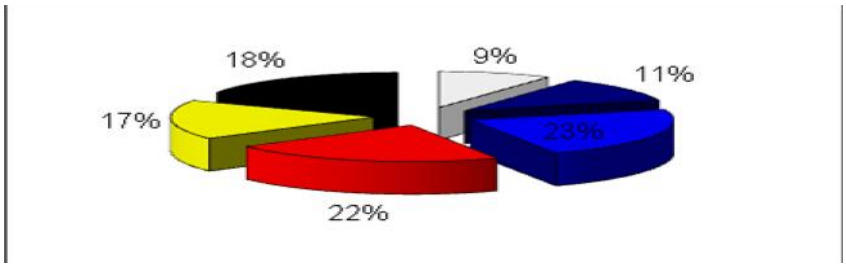


Table 3l. *Thoughts on entrepreneurship friend*

l) My friends think that it is good for me to become an entrepreneur

Marks	Results	%
One	29	9,06
Two	36	11,25
Three	73	22,81
Four	70	21,87
Five	56	17,50
Without answer	56	17,50



The results of the third question[9]-**determination related to entrepreneurship**, the sub-question under *a)-I do not want to run the initial (start-up) in the area where the competition is high*, most of the respondents 81 respondents or 25.31% of the total, expressed a reluctance by the competition and achievement-achievement results, while 63 or 19.69%, however, has a positive attitude towards business and competitive bidding. To question *b)-be entrepreneur gives me more pleasure than to be employed in a large company*, 84 or 26.25% of the respondents were undecided, while 16.56% disagreed.

For questions under *c) I am eager to compete and achieve achievements*, 83 or 25.94% of the students expressed a willingness to compete in entrepreneurship. Answers to questions under *d)-I am ready for high risks, with the majority of respondents said that it is prepared at high risk,* 72 or 22.50%, and the question by *e)- I want to do a job that I love,* where

[9] See appendix no. three

86 or 26 , 87% of respondents said they wanted to do their jobs, according to the no. 4, where students are considered as the most promising tourism activity, confirming the main hypothesis of this paper that tourism can be a leading economic activity in western Serbia. The results of the third question presented in the five options (a, b, c, d, e) in the table and graphs of four.

Table 4a. *I dont want to strart up in area with strong competition*

Marks	Results	%
One	63	19,69
Two	38	11,87
Three	81	25,31
Four	50	15,62
Five	28	8,75
Without answer	60	18,75

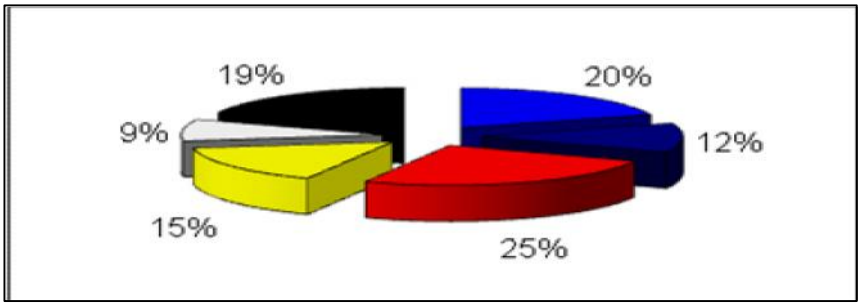


Table 4b. *I have more satisfaction in being an entrepreneur than to work for big company*

Marks	Results	%
One	29	9,06
Two	53	16,56
Three	84	26,25
Four	48	15,00
Five	46	14,37
Without answer	60	18,75

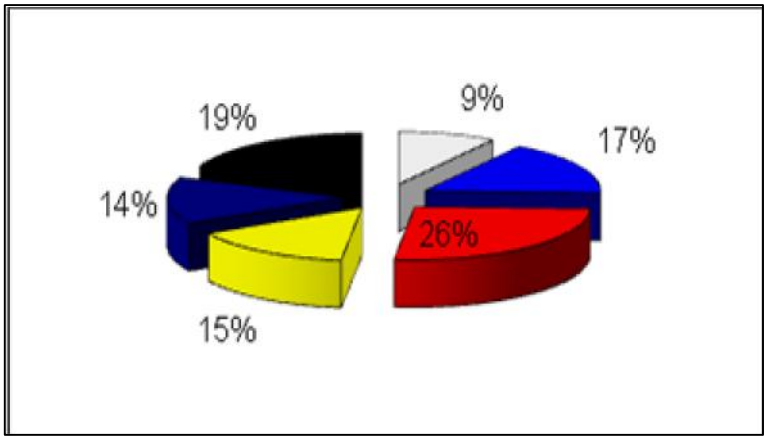


Table 4c. *I am anxious to compete and achieve results*

Marks	Results	%
One	25	7,81
Two	47	14,69
Three	83	25,94
Four	58	18,12

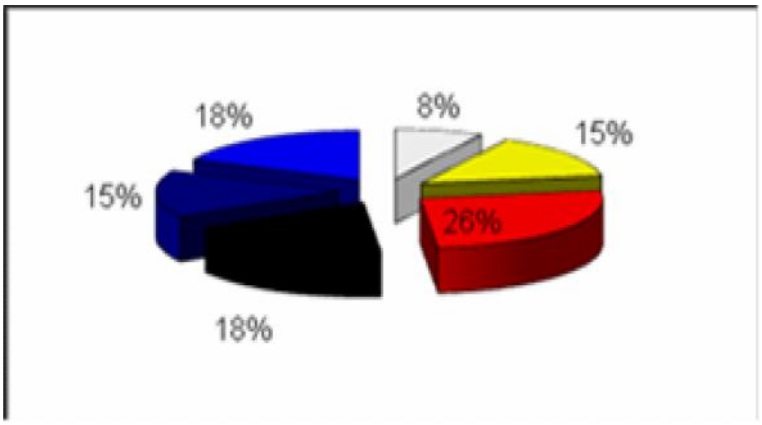


Table 4d. *I am ready for high risks*

Marks	Results	%
One	28	8,75
Two	45	14,06
Three	66	**20,62**
Four	**72**	**22,50**
Five	53	16,56
Without answer	56	17,50

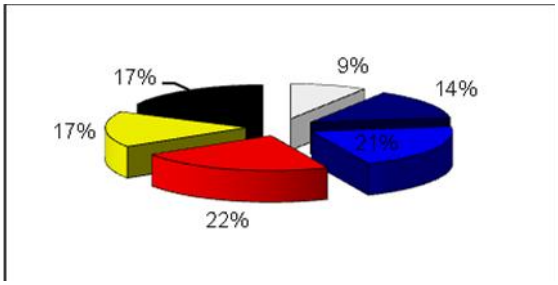
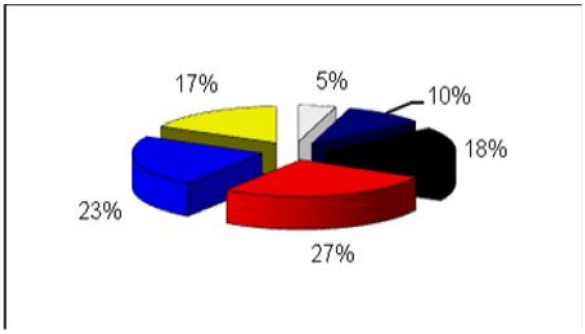


Table 4e. *I want a job that I like*

Marks	Results	%
One	15	4,69
Two	32	10,00
Three	58	18,12
Four	86	26,87
Five	73	22,81
Without answer	56	17,50



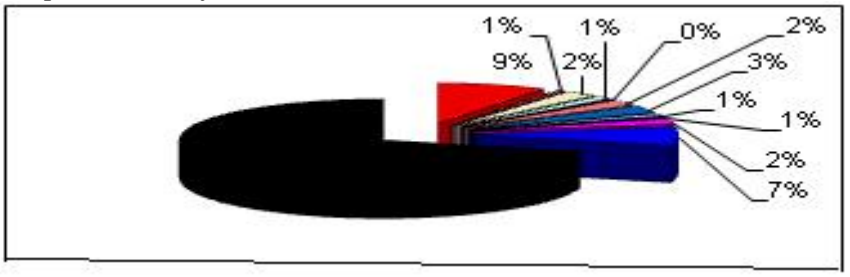
The views and opinions of the students in fourth question[10]*: What, in your opinion, was promising entrepreneurial venture in today's time,* no doubt tourism in first place of 8.75%. In this issue are interesting item-no answer to the question of 70.62%, and no, I do not know 7.19%.

Table 5. *Student responses to the question-which, in your opinion, was promising entrepreneurial ventures today*?

Business	**Results**	**%**
Tourism (hospitality, travel agencies, rural tourism)	**28**	**8,75**
Medicine (opening private hospital)	2	0,62
Food production	8	2,50
Insurance	4	1,25
Florist	1	0,31
Construction	7	2,19
Ecology (recycling of waste material)	9	2,81
Membership in political party	3	0,94
Connection with other cultures	2	0,62
IT technology, media	7	2,19
None of the above	23	7,19
Without answer	**226**	**70,62**

Source: *Authors' research.*

Graphs number five



Source: *Authors' research.*

Conclusion

The expansion of economic problems reflected through the prism of finance, in developed economies, it is getting wider and wider. If all the

[10] See appendix no. four

financial power centers, financial institutions and the latest technology in the developed economies of the world, the question is what is the cause of the economic crisis and why the emerging financial problems.

All powerful alliances and bloc division of the world (referring primarily to the EU and NATO) on a planetary scale collapse is euphemistically expressed or seek the solution of economic problems at any cost (opening up new wars). Large corporations have imposed a completely new design concept of socio-economic relations, so-called. "korporatokratija". However, korporatokratija in trouble.

In accordance with the previously mentioned, one of the specific role of tourism in the context of the economy is that some of the serious problems of planetary economy, linked to demographic factors (population size, unequal population, birth rate, the level and quality of education), natural resources (quantity, relation of man to resources and exploitation), energy and food, to the basic flow of the economic process, specifically amortized and absorbed.

In what specific destination, zone or region has anoraganske quality, organic and man-made elements, the logistics of the state, technosphere systems and institutions, tourism is definitely an activity that provides economic development and integration into the international division of labor. Growth and development of tourism at the global level is not possible without new technologies, on the one hand, while on the other hand, the consumer (or economic) component encourages the development of tourism economy (development of economic processes). In short, knowledge is the most important factor, not only for tourism, but the overall development and progress of society.

Financial centers of power dictating changes in international economic relations, tourism is converted into a specific world movement, not allowing more individual countries to independently create policies for tourism development. The reality, however, is that the industrialized world race for profits at any cost (destroying and polluting the basic natural elements: air, water, soil, climate, etc.). Sent to underdeveloped (those countries that have healthy elements previously mentioned) gives some chances undeveloped in the future.

Countries that have the conditions for the development of tourism (with the natural elements and conditions) and professional staff, with money from international financial institutions can finance the development of their tourism. It is clear that the "centers of power" to decide on the distribution of the profit, but not developed to avoid the fate of nuclear waste dumps and other waste, avoid wars, epidemics, experimenting with various diseases, and so on.

Tourism development is related to the spatial context in which the resource is located, and is therefore much more connected to the local and regional, rather than global level. Tourist activity is part of the economic system and therefore is influenced by global processes, but its specificity is primarily reflected in said lower attachment to the space frame.

Tourism product delivers exactly the local and regional environment in which refract global impacts. In this context, the aim of the research is partly shown in this paper is to contribute to all entities (public and private) in terms of what are, and what opportunities for tourism development in western Serbia in the future.

Analysis and research in the theory of multilpkatora tourism, show that money from the sale of travel services to foreign tourists, circulates in the economy of the host country, creating additional effects to the economy, even in the 13 to 14 transactions, before disappearing through the import of goods or services from that country (Clement, 1961). Theoretical aspects of the "multiplier" that is. the multiplier effects of tourism on the economy, Clement was analyzed on the example of seventeen Pacific countries and the Middle East. This author has been empirically determined that achived income by selling goods and services to foreign tourists, a year passed 5-6 transactions and to reverse the 3 to 3.5 times. Multiple or multuplikativni effects of tourism on economic development in Western Serbia, can be seen through tourist spending.

Multiplication coefficient, which indicates the number of trades revenues from foreign tourists a year, directly depends on several factors such as the level of development of the domestic economy, the availability of local products to meet the needs of foreign tourists, the volume of expenditures for local residents traveling abroad as and the money supply, which is extracted from the circulation and deposited as personal savings

of citizens. This last feature is typical for tourism. The point is that private households (participating in meeting the needs of foreign tourists) a share of the revenue from foreign tourists (unauthorized charge in foreign currency) pulled from the market and keep the home in the form of savings. Therefore, in determining the multiplier effects of income from foreign tourists in particular the analysis, should take into account only the total amount of expenditures (for imported goods and paid services) that are used directly to meet the needs of foreign tourists, because on that basis there is an outflow of foreign currency from the country, as well as the withdrawal of foreign funds from the market by the locals in the form of personal savings or currency of making them overseas.

Tourism is one of the most sensitive sector in economic structure and initially respond to market turbulence in the world or some other phenomena (political instability, conflicts, terrorism, etc.)., but tourist arrivals and tourism receipts are not reduced, only a change of direction travel movement and redistribution of income from tourism. However, looking at the dynamics of the flow and growth of international tourism in the last few decades, none of these negative impacts is drastically disrupted the international tourism market, which indicates that tourism can be a model of economic development and economic growth. Thus, the results of the research confirm that tourism can be a western Serbia leading economic activity.

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MUNICIPAL BONDS AS AN INSTRUMENT FOR FINANCING RURAL DEVELOPMENT

Snežana Krstić[1], Milan Mihajlović[2]

Abstract

The bonds which issue the local authorities represent a special category of securities. In some developed countries, like the USA, the municipal bonds have a long tradition of funding the local infrastructure construction, electrification, road construction, environment arrangement and similar. The purpose of the municipal bonds can be very wide, especially if they use for financing the rural development. This type of bonds gets its significance, while it provides to the local population a possibility for self-finance of own city or municipality. Our neighbors in the region, as well as many developed countries, develop more and more the market of debt securities. In Serbia, municipalities do not issue the municipal bonds, although there are no legal obstacles. In cases when a faith in financial institutions has been weaken, and insecurity on financial markets leads to interest rates increase, there opens favourable opportunity of our local communities' contraction of debts, by the municipal bonds issue after significantly lower rate of interest.

Key words*: rural development, municipal bonds, local authorities, rate of interes, market.*

Introduction

Globalization and transition have an effect on those states which have started to develop market economy, while development of the market economy and democracy had instigated development and use of new financial instruments on financial market, like the municipal bonds. Serbia, unlike the other transitional states, still does not apply the municipal bonds as the financial instrument. The municipal bonds

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represent a debtor instrument of funding, issued by the local authorities. Issuing these bonds, the local authorities borrow the money from municipal buyers and guarantee them a refund of principal and interests in specific time period. The municipal bonds are one of the most applied instruments of funding the local character projects in developed countries and in the countries in our region.

This paper aims to recognize, by analysis of developed countries' experience, on one, and the countries in transition, on the other side, a purpose and a need for applying the municipal bonds on the capital market in the Republic of Serbia. There will perceive and analyze legal regulatory rules, as well as obstructions and limitations the state can be faced with during the municipal bonds placement.

Bonds as funding resource

A bond represents a financial instrument by which a debtor, i.e. an issuer (debtor) obliges to pay lent sum of money (principal and interest) in maturity period to a creditor, i.e. an investor (buyer). On the capital market are in demand the bonds with the maturity period of 1 year, as well as the bonds with the maturity period of one to thirty years. „The bond, in formal sense, must have at least two elements: fixed date when the lent sum must be returned (maturity period) and fixed amount of interest. The investor therefore (excluding a credit risk) has safe cash flow, if he has in his possession the bond to its maturity period".[3]

The bond consists of a mantle and interest coupons. On the mantle are data on the issuer, on the buyer, mark on who the bond is made out to, who is a warrantor of the bond, as well as a nominal value of the bond. It defines the value which the issuer must pay to the investor in the maturity period (regardless to the price after which the bond was really bought). The bond's mantle also contains information on annual interest rate, on date and place of the interest payment. The bonds which are made out to the bearer, besides the mantle, have the interest coupons, too. The bond's owner bears to the issuer the coupons in time of the interest payment.

The nominal amount is named a principal. The debtor pays the interest (coupon) on the lent sum of money, while the interest rate in time till the bond's maturity is coupon rate of interest (nominal rate of interest). On

[3] Vasiljević Branko (2002), *Osnovi finansijskog tržišta*, Zavet, Beograd, , str. 167-168

long-term bonds, the interest pays the most often two times a year, and unusually – once a year. „A special form are those bonds with deferred interest payment (in English - Deferred Coupon Bonds), where the interest is paid either in indefinite term (depending on enterprise's business results), or is paid in other bonds"[4]. The higher is rate of interest – the bonds' prices are less determined by vacillating in market rates of interest. On the bond market the investors are facing risks. The risk analysis has been especially represented regarding the long-term bonds. On the bond's price have an effect its issuer's rights. If the market interest rates decrease, the issuer will do it in order to refinance the debt after the lower interest rate.

Types of bonds

There are more criteria for the bonds classification, while some of the most important are:

- According to a way of the right realization: a) registered bonds and b) bonds which are made out to bearer,
- According to a currency they are made out to: a) dinar bonds and b) foreign currency bonds,
- According to the maturity period: a) short-term bonds and b) long-term bonds,
- According to the way of ensuring the right: a) guaranteed bonds, b) non-guaranteed bonds and c) mortgage contracts;
- According to a way of setting off the interest to advantage: a) non-coupon bonds (interest pays off at once, when due) and b) coupon bonds (interest pays off periodically),
- According to a yield: a) fixed-coupon bonds, and b) floating rate bonds,
- According to the way of the principal payment: a) non-repeat bonds and b) bonds with the principal payment in installments, i.e. annuities, and
- According to the special rights: participative bonds and b) convertible bonds.[5]

The registered bonds indicate that on its mantle is the owner's, i.e. creditor's name. The owner can raise an interest when he submits an

[4] Vasiljević Branko (2002), *Osnovi finansijskog tržišta*, Zavet, Beograd, , str. 168-169.
[5] Jovanović Predrag (1995), Obveznice, Tržište novca, Beograd, , str. 9-10.

interest coupon to the issuer, and for the principal, he must submit the mantle. The bond made out to bearer is characterized by interest payment in a way that the interest coupon (specific date) submits to the issuer, and the principal can payoff in a way that the bond's mantle submits to the issuer, when due. The foreign exchange bonds can sell and buy on Serbian market, of course, only for dinars (RSD). In developed countries, the long-term bonds' market is more represented than the short-term bonds' market.

The bond secured by the mortgage is called the mortgage contract, which means that, if the issuer cannot cover his debts, he mortgages his property and thereby satisfies the requests of these bonds' owner. The floating rate bonds is a type of bond in which the interest rate of the bond is connected to the interest rate of the short-term bond, i.e. notes, and in that way decreases a risk from the market interest rate's growth. The indexed bonds represent a special type of bonds in which the principal repayment is corrected by a retail price index. When we say the bond is convertible, it means that it gives the right to investor to exchange it for common stocks. The revocable bonds are those which give the right to the issuer to repurchase them from the investor before maturity period (according to in advance determined price). The income bond is a type of bond in which the interest pays off only from net profit.

A procedure of bonds issuance has been defined by the Law on Securities. Decision on issuance contains: a firm, name and location of an issuer, a bond's nominal value, issue size and placement method, an issue purpose, payment terms of nominal value and interest, method of calculation and interest payment, amount of issuer's capital and percentage of issue share in that capital. The bond gives a right to principal and interest to the owner, which should be paid off in the future, and therefore the owner is willing to pay for the bond as much sum of money as amounts the current money value he will get. The current value of money he should get in the future period is less than its nominal value. For example, 1.000 RSD which should be got in *n* years today is worth less than 1.000 RSD.

The USA experiences in issuance of the municipal bonds

The local authorities issue a special category of bonds, long-term bonds, due to the capital projects funding or the budgetary deficit cover. The municipal bonds have a long tradition, and indicate a method how the local authorities collect resources for financing: building a water system,

roads, schools, arrangement of the environment, infrastructure, and generally, rural regional development.

Concrete purpose of collected financial resources the most often refers on investments in long-term capital projects construction:

- primary facilities for production of thermal energy and installation of gas into distributive systems,
- facilities for water supply, sewage network and waste waters processing,
- facilities for waste recycling,
- traffic infrastructure at the local community level,
- reconstruction of communal facilities,
- modernization of historical buildings and monuments,
- construction and reconstruction of schools and sports-recreation centres,
- realization of projects meant for support to rural tourism development etc.[6]

The municipal bonds can have some tax relieves, so they are very attractive regarding some specific tax allowances. However, there is a possibility of these financial instruments' lower solvency level, which the investors must take into account, in regard to the municipal bonds' plentifulness, which affect their market efficiency. The municipal bonds are mostly present in the USA, with over a million municipal issues, as the financial instruments. In the USA are around 90% of all municipal issues free of federal tax, which is compensated by lower rate of interest, so many people do not consider this financial instrument as much payable investment, especially for the investor category, which prefers high yields. There are different segmentations of bonds which issue the local authorities, like, for example is division into: general bonds, income bonds, hybrid bonds and notes (short-term municipal bonds with the maturity period of 1 year; are of use for overcoming the current insolvency).

In abundance of the municipal bonds division, two basic types have taken more definite shapes: general obligations and revenue bonds. The general obligations mean lower risk to the investors, because the local authorities

[6] Momirović Dragan (2009), Municipalne obveznice – novina ili finansijska inovacija na tržištu kapitala Srbije, Finansije, br. 1-6, , Beograd, str.228-229.

oblige to payoff the taken obligations (e.g. by consumption limitation, measures for local taxes increase, the local budget decrease etc.). The revenue bonds mean more risk, while the local authorities' responsibility depends on implementation of the concrete project. Regarding this type of the municipal, payments of principal and interests to the investors are linked to the revenue of the specific project, for example, water system, shopping centres etc. Within the revenue bonds we run into a series of bonds, e.g.: RANs (revenue anticipation notes), TRANs (tax and revenue anticipation notes), industrial development bonds, etc.

The best arguments for issuing the local authorities' bonds are the following facts: flexible burden of costs; by issuing these bonds makes an optimal allocation of resources; accelerated local development exceeds the issuing costs, stabilization of the budget, etc. The municipal bonds represent very attractive financing instrument, while they are inexpensive funding source, unlike the contraction of debts in banks. There is present a great control of public opinion, fixed rate of interest does not fall under a brunt of market oscillations, there comes to the local population's life standard improvement, financing costs are lower in relation to the classic credit lines, and there are some other advantages of these bonds application. The municipals have great possibility of insurance, while decreases the investor's risk. High solvency level and high profit, as well as a predictable income flow, affect their use in different countries.

The municipals, as well as the other securities, mean the risk for the investors. The risk reflects primarily in non-payment, i.e. the opportunity of the bond's issuer not to pay it after already determined price. On the financial market, increase of interest rates will lead to the bonds' prices fall. There happens that the investors must sell the bonds in time when the rates of interest increase, and then will have a loss. The methods of the municipal bonds sale are: competitive bidding, negotiate sale and private placement. Investing in the municipal bonds carries an inflation risk, and it manifests through the investor's purchasing power decrease.

The investors in the municipal bonds can be: citizens (individual investors), commercial banks, insurance companies and institutional investors. Evaluation of the municipal bonds is an opinion of independent experts on price the investors are ready to pay for the specific security. The evaluation can be done before or after issuing. The experts, who evaluate, use the following methods: internal yield curve, interest tree, analysis of issuer's rating, analysis of price trends, discounting the future

monetary flow and evaluating the bonds with "call" or "put" options. As regards the municipal payment, these bonds can be issued in two types of debt repayment: serial maturity structure and standard maturity structure. The revenues of the issued bonds use according to purpose and aim of the municipal issuing and for income refunding (new funding, refunding and with a combination of these two modes). The municipal bonds market keeps expanding latterly. Generally observed, this market considers less risky than other markets. It is characterized by numerous issued bonds (USA), non-existence of organized market, but trades off-market, then much asymmetrical information, i.e. presence of many individual investors who do not have the most accurate information, like regarding the institutional investors.

The municipal bonds market of some countries in transition and in the region

REPUBLIC OF SRPSKA way and a procedure of debiting and issuing the securities in the Republic of Srpska have been arranged by the Law on Debiting, Debt and Guarantees of the Republic of Srpska. "This law also arranges the following: ensuring the resources for debt payoff, keeping the record on debt, guarantees and securities in the Republic of Srpska. According to the mentioned Law, the municipality, i.e. the city could indebt only if in the period of creating the debt, total amount when due for payment after the total unpaid current debt and in any following year, does not exceed 18% of regular income amounts realized in a previous fiscal year. The short-term debt in any moment cannot exceed 5% of regular incomes realized in a previous fiscal year."[7] Decision on issuing the municipal submits to the Ministry of Finances of the Republic of Srpska within 10 days.

Characteristic of the securities in the RS is small number of bonds. Development of the security market is limited, first of all, by the market size, then, uncertainty of investments, less openness toward investors, less of institutional investors, poor solvency of the financial instruments. The risk of investments in the municipals can classify in several groups: political risk (political instability), interest risk (adjustment of the municipal bonds' interest rates to the interest rates in the entity (BH), currency risk (convertible mark to the euro pegged currency), credit risk

[7] Mandić Boško, Grublješić Željko (2009), Municipalne obveznice – finansijska pomoć razvoju lokalnih zajednica", Banjalučka berza, str. 102-103.

(influence of BH credit rating change to the municipals), operational risk (everyday business risk), risk of inland revenues and force majeure (extraordinary events which negatively function on the region's business.

The municipal bonds in the Republic of Srpska issue in 5 municipalities: Banja Luka, Laktasi, Gradiska, Bijeljina and Samac. The local communities have interest in issuing the municipal bonds due to their infrastructure development and more liberal investment policy-making at lower levels, localities. The interest also lies in finding inexpensive assets from bank credits. A motive of the local population to place own saving for buying the bonds (by which invests in the local infrastructure) is recognizing a right attitude toward own surroundings and represents one form of more liberal investment policy at the lower authority level.

In the Republic of Srpska, five localities had realized a significance of the municipals issuing. We can see an upward line of issuing the municipals in the RS. As a buyer of great number of the municipal bonds, shows up the Investment-Development Bank of the Republic of Srpska. The issue of non-fiscal instruments like the municipal bonds can lead to significant development of the local communities and provide a fundraising from these "non-fiscal financial resources", whereby increase efficiency and effectiveness of business. The issuance of these bonds considers successful if in term of 90 days have been inscribed and paid off 60% of the total sum of issued bonds.

REPUBLIC OF CROATIA. In Croatia, in last years, has noticed a funding trend with support of the capital market in regard to the traditional funding trend by banking system. On Croatian capital market were issued eight issues of the municipal bonds. The municipal bonds market includes the following markets: The city of Zadar, the city of Koprivnica, the city of Rijeka, the city of Split, the city of Vinkovci, the city of Osijek, Istrian County and Opatija. Issuing the municipals uses for funding the local infrastructure. What represents a characteristic of the municipal bonds issuing in the RH is that the issued municipal bonds are uninsured, the maturity period is from 7 to 10 years, and they do not have a credit rating. The Law on Realizing the State Calculation and the Law on Public Acquisition define that the total annual obligation of the local community's units can amount maximum up to 20% of realized incomes in a previous year in regard to a year in which they indebt. The total annual obligation includes also the amount of annual amortization after

credits, provided warrants from the previous year and obligations after the issued securities.

SLOVAKIA. The Law on Bonds and the Law on Issuing Municipal Bonds regulate the conditions of the municipal bonds issue in Slovakia. The National Bank of Slovakia and the Ministry of Finances authorize the bonds' issuers. The Ministry checks the financial data submitted by the issuers. Slovakian municipals have been insured. The bonds' issuers, by the stock news, announce terms seven days before the issuance starts. The evaluation of the bonds risk does three agencies: Slovakian Rating Agency, European Rating Agency and Moody's Central Europe. The investors might be both individual and institutional. The local authorities issue the bonds with fixed and flexible rate of interest. "Only local authorities with more than 5000 inhabitants had issued bonds. According to the data, half of the cities, engaged in bonds' issuing, fall into a category from 10000 to 40000 inhabitants. The municipalities with over 80000 inhabitants have the highest share in total size of issued bonds."[8]

POLAND. The localities in Poland can issue the municipal bonds only if payment is guaranteed by the total issuer's property (local authorities and local corporations). Over 200 local authorities had issued the municipals, and the first issue was at the end of 2005. Mostly the municipalities were issued in small amounts. The banks (76%) are ahead of in investors' structure. "The legal regulatory rules in Poland classify the municipal bonds into a company's investment, i.e. potential investors. The most important potential investors in the municipal bonds are pension funds and insurance companies. However, the potential investors point out to a problem of small issuance amounts on the capital market. Therefore, open pension funds would be interested for investing in the municipal bonds, if the issuance should surpass PLN 20 million."[9]

CZECH REPUBLIC. Development of bonds market in Czech has realized in more phases. Great changes have ensued after 1993, when the exchange market was established. The mortgage bonds have appeared in the second half of 1996. There can be said that Czech market of bonds has become a benchmark for other bonds markets in Central and East Europe.

[8] Momirović Dragan (2009), Municipalne obveznice – novina ili finansijska inovacija na tržištu kapitala Srbije, Finansije br 1-6, Beograd,. str. 245-246
[9] Isto kao 8.

Later recession had stopped this market's swing. The capital market was renewed in 1993. However, until 1999 was dominated the state ownership, as well as foreign investors. Until 1996, the state was present on the bonds market with 30%, banks with 40%, energetics and Telecom with 10%, municipals with 18%, and the others with 2%. The Czech banks were rather fast accepted the bonds market, as one of the most significant sources of long-term capital funds.

HUNGARY. This transitional country today has one of the most developed financial markets in post-communistic Central and East Europe. Almost entire banking system was privatized, and there is a significant share of foreign capital. There are two key reasons for a reform of banking system: firstly, by banks rehabilitation and depreciation of bad credits, and by replacement of mono-banking system and by privatization of banking system. Budapest Exchange Market, as well as Hungarian bond market, has been the most solvent market in the region since 1998. On debt securities market, the most dominant is the state, i.e. the Ministry of Finances. Hence, Hungary has today the most solvent market of short-term (state) securities in the region. The banks have not been until now, but start to be active subjects on the bonds market. Nevertheless, the municipal bonds issue in small amounts, and their market until now have not been developed.

Legal assumptions for existence of efficient municipal market in the Republic of Serbia

"Law on Funding the Local Authority ("Official Gazette of RS", no. 62/2006), which has came into force since 1st January 2007, adjusted to the European Charter on the Local Authorities and the Recommendation of the Committee of Ministers. It considers improvement of the local authorities' funding system, decentralization and regulation of public debt problem. Basic changes this law brings imply the next:

- Establishment of the local tax administration, i.e. overtaking the authority by the Serbian Tax Administration in the field of taxes on property collection, as well as a right that municipalities and towns individually determine the amount of tax on property up to a level of rate, which was determined by the Property Taxes Law,
- Introducing a criteria for transfer assets determination, which were allocated until now according to the Law on Transfer

Assets Allocation, which will provide the municipalities to plan precisely their budgets for the next year,

- Forming a Commission for Funding the Local Authority, which should contribute to improvement of financing system, at the local level.[10]

According to the legal regulatory rules in Serbia, the procedure of the municipal issuance starts with decision of the local authority, which should indebt through issuing of the municipal securities. After an approval of the Ministry, the local authority opens issue account in the Central Registry of Securities. Then follows the ratification procedure of a handbill for distribution, at the Commission for Securities. When the Commission ratifies the handbill, then follow a public call for subscription and payment. At the end follows listing of the municipals on stock exchange market. As in case of our neighbours′ issue, here would also job with the municipals at the Belgrade Stock Exchange, secondarily (A and B listing of the Belgrade Stock Exchange).

So, according to an official opinion of the Ministry of Finances, in Serbia the municipals issue in accordance with the Law on Securities and Public Debt Law. The Public Debt Law (par.33) anticipates that the decision on the local authorities′ contraction of debts makes a specific body of the local authority, after procured opinion of the authorized ministry. With the law decrees was anticipated the procedure of the municipal bonds issuance, adjusted to developed countries′ practice.

"When it is about the municipal bonds, there should emphasize that the local authorities cannot get into long-term debt, except for financing or refinancing capital investment expenditures, anticipated by the local authority budget. The Public Debt Law in paragraph 36 anticipates that the amount of outstanding long-term debit for investment expenditures cannot be higher than 50% of totally realized current income of the local authority budget in previous year, while the amount of principal and interest which due every year for all outstanding long-term receivables for financing the capital investment expenditures cannot surpass 15% of totally realized current incomes of the local authorities′ budget".[11]

[10]. Isto p. 247

[11] Jovanić Tatjana (2008), Pravne pretpostavke tržišta dužničkih hartija od vrednosti i uloga banaka – II deo, Bankarstvo 9/10, Beograd,., str. 86-87.

Most of the local authorities here have problems regarding the resources provision for financing the local infrastructure. It is well-known that financing, at the locality level, is done from own sources, by bank credits and by issuing the municipal bonds. The advantage of the local communities′ debiting through the issue of municipal is lower capital price, in regard to classic bank crediting. The local authorities cannot guarantee for issuance of the municipal, and consent can be got by the Ministry of Finances and the Republic of Serbia Government. Considering that in our case, the local authorities have no property, and none of investors would repurchase the municipal bonds without the property guarantee, the consent of the state bodies must exist. The guarantees are provided in accordance to the law, which regulates the Serbian budget for the current year.

The local authorities can get into debt up to 50% of budgetary incomes from the previous year. The sources of the local community incomes are: tax on property, local administrative taxes, donations, self-contributions, assigned incomes and transfers, which the local communities get from the republic. The assigned incomes are those incomes, which rate and basis have been determined by the law, and the income which realize on area of specific local authority assigns, partially or completely, to the concrete unit of the local authority.

Possibilities of applying the municipal in Serbia

In accordance to the Law on Securities, the Public Debt Law[12], and according to the official interpretation of the Ministry of Finances of the Republic of Serbia, there are no obstacles for issuance of the municipal bonds. However, in our country, until now, none of authority had issued the municipals for financing the public needs. The only reasons for that can be, firstly –ignorance, and secondly - indifference of the local authorities. If we would search deeper for the reasons of the municipal bonds′ non-existence on our financial market, the risks of issuing these bonds could classify in several groups:

[12] Public Debt Law, paragraph 2 determines that the municipality could indebt only for exceedingly limited needs, with the government guarantee, and the paragraph 33 includes a clause that the minister of finances has excess discrectionary right for approving debiting to the municipalities.

- Local demographical-economic risk, number and structure of population,
- Local political and managerial risk,
- Macro-economic risks (inflation risk, changes of interest rate and foreign exchange rate, tax on property, etc.),
- Risk of budgetary efficiency, contraction of debts, structure of incomes and expenditures,
- Risk of credit burden (relation between debt repayment rate and net current result).

There are different normative and institutional restrictions in Serbia, which make problems regarding the existence of the municipal bonds. Within the normative restrictions we will state the following: firstly, the Constitution of the Republic of Serbia, which represents a legal framework and gives a possibility of giving back the property to the local communities; secondly, the Public Debt Law, which has a restriction for the local authorities to sell the municipals exclusively to the professional investors (the state, and financial institutions), not to citizens (individual investors); thirdly, the Public Property Law, should arrange the property of the state and localities; fourthly, there should introduce tax relieves, opposite to the existing tax burdens in order to invest in the municipal bonds; fifthly, to eliminate the possibility of restrictions for pension funds, in order to increase the share in buying the bonds; sixthly, to modernize the Law on Securities regarding the private placements.

In the field of institutional restrictions should define the role of a fiduciary regarding private and public issue; to define long-term capital projects, which can fund by the municipal issue; to strengthen the financial capacity of the authorities by decentralization and defiscalization; to introduce announcing of at least annual reports on issuing; to develop rating agencies; publicly to make the promotion of the municipals′ issue advantages by debiting of the local authorities; to decrease the possibility of moral hazard, more and more present in less developed countries; to give the opportunity to the localities for self-decision-making on the municipal bonds′ issue; to educate the municipal office-workers regarding the securities market.

In cases when credit price is equal to interest rate which pays to the municipal owners, there is no problem. However, when the trust in financial institutions has been weaken, which has resulted with interest

rates′ increase due to the risk increase which must be taken into consideration on creditor's request, the municipality has to pay the higher annual interest rate, which decreases investments in the local infrastructure. Instead of that, the local authorities could indebt by the municipal securities′ issue after much lower rate of interest.

The municipal securities, as the financial instruments, still do not exist in our practice. There considers that the main reason is non-existence of demand and supply. There can look for their non-existence explanations, like, for example, unsolved issues of the local authority, consequences of war background, lack of legal regulatory rules, previous isolation and sanctions, ignorance on their significance etc. There considers that around five local authorities should be engaged, as soon as possible, in „test pilot"of the municipal issue in our country.

There is money, and these bonds market, denominated in RSD, should considerably help in development of financial market of Serbia, exactly due to surplus of dinar solvency and shortage of long-term dinar instruments. The National Bank of Serbia could, in accordance to the bonds issue, to grant refinancing to the municipalities (the municipality would get RSD before the maturity period). The solvency surplus should invest in quality securities, naturally dinar, along with adequate rate of interest. For investments in the municipal bonds have been interested voluntary pension funds, insurance companies, banks and individual investors.

Conclusion

The economic courses transition and reforms, which they should be followed by, represent a base for successful modelling of new economic system, necessary for the countries like the Republic of Serbia in terms of the global economic crisis. Results of these processes should be visible especially in financial sphere and primarily on the securities market. The municipal bonds, as a type of securities, have not still found their place on the securities market of the Republic of Serbia, although they have long tradition in many developed countries. Issuing the municipal securities, the local authorities' units would easier obtain the assets, and investors could invest their capital in quality securities, which are missing on our financial market. Population of the local communities' units, unlike a self-contribution, where is just common interest, in issuance of the municipal bonds, besides the common sense, finds also a personal profit. Occurrence

of the municipal securities at the Belgrade Stock Exchange would be a great stimulus for development of our financial market, regarding that there are insufficient quality securities on domestic capital market, and they would represent real refreshment.

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RURAL AREAS OF THE DANUBE RIVER BASIN – THE FUTURE OF QUALITY TOURISM DEVELOPMENT IN SERBIA EXAMPLE OF FARMSTEADS

Snežana Štetić[1], Sara Stanić[2]

Abstract

Developing tourism, we must predominantly take into account its influence on resources and their sustainable development. The baselines for this research were global tourism development and possibilities of Serbia to find its place on the market through developing some niche products like tourism on the farmsteads in Vojvodina part of Danube basin. Changes in the development of tourism in the Danube region countries and wider surroundings of the Republic of Serbia put our country in very low profile position as we do not recognized very important tourist attractions. These changes have imposed the need to investigate the position of tourism in Serbia in the new conditions.Extremely valuable natural resources in Serbia with attractive relief, diverse flora and fauna, a favorable climate and hydrological conditions, rich cultural heritage and national tradition provide numerous development opportunities, particularly in tourism. Despite these facts, unfavorable migration trends continue, villages grow old and die, there are traffic isolation, poor infrastructure and other living conditions. The development of rural tourism, along with primary agricultural production, with an emphasis on preserving and improving the environment, is one of the solutions to reconcile the aforementioned contradictions applying economic, infrastructural, organizational and educational stimulating measures which will allow multiple positive effects.

Key words: *rural areas, Danube river basin, Tourism, farmsteads, quality*

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Introduction

Tourism is an indicator of overall economic development, standard and cultural development of a country. It is important to note that all countries seek to develop tourism activity, and that tourism has proved to be an unstoppable process. In the world the significant place belongs to the development of tourism in rural areas and rural tourism as a form of active participation in the events and in overall life of rural areas is becoming increasingly important.

The development of tourism on farmsteads depends primarily on the degree of the entire Vojvodina economy development. The tourism industry development is interdependent with other sectors. Therefore, a number of economic and non-economic factors and the development of economic and non-economic activities affect the level of tourism development. The factor of traffic infrastructure, which is not at an enviable level, is also significant but modernization and expansive development will be two parallel directions that will enable the development of tourism to the deserving extent. Accommodation facilities are not strongly influenced by seasonality, which is an important issue. However, any improvement and further investment in accommodation facilities will affect the tourism offer and demand.

Besides its sojourn character, tourist movements to the village can be recreational, picnic, or a particular event, but what determines them are just the above mentioned values of rural community favoring a different lifestyle than usual.

Thus, what makes a village "touristic" is: agricultural production as the main economic activity[3]; rural architecture consistent with the surrounding environment; rural way of life with customs, culture of nutrition, housing etc.; life of tourists and hosts under the same roof where there is no isolation of local population.[4]

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[3] Hamović Vladana, Cvijanović D., Bošković D., (2009): *Repozicioniranje Srbije kao turističke destinacije*, časopis Ekonomika poljoprivrede, br.3, Beograd, 2009, YU ISSN 0352-3462, UDK 338.43.63, str. 367-376.

[4] S. Štetić (2012), *The impacts of Crisis on the Developement of Tourism Destination*, ICOT 2011,Cambridge Scholar Publishin House

Unlike alpine countries in Europe (France, Austria, Germany, Switzerland), where rural tourism has been developing for a long time, tourist activity in the villages of Serbia does not have a long tradition, since more organized tourist traffic began from the end of the 1970's. Dedicated work of tourist societies in some hilly and mountainous villages and municipal tourism associations, tourism in the country has become more massive in the 1980's. Because of the economic and political crisis and international isolation of the nineties, the number of villages and households providing tourist services were drastically reduced. In the future, we should expect more intense, more organized and better development of this type of tourism based on long-term goals of development and arrangement of rural areas contained in the Spatial Plan of the Republic of Serbia.

Methodology

In this paper we applied researches based on the accepted knowledge[5] that rural tourism is very important for the development of tourism all over the world. Unfortunately we found that it is not the case in Serbia although it is predominantly rural country. Because of that we respected the development trends of tourism and we made research in one part of Serbia, along the Danube River concentrating to farmsteads.

International tourist traffic along the Corridor VII affects the affirmation of the Danube region in Serbia, particularly of some tourist locations. It is therefore very important to consider all the opportunities for tourism development in this part of Serbia and possibilities of linking tourism offer.

Our aim was to see the possibilities and define a way for development tourism on the farmsteads for improving life of local people and to include this tourist products in the positioning of the tourist destination of Serbia in the region and globally, if it is possible. In addition, the appropriate measures of revitalization and protection of the Danube area in Serbia, and its part in Vojvodina is of great importance for further development prospects of the region.

[5] Butler, R, Hall, CM, Jenkins, J (eds), (1998) Tourism and Recreation in Rural Areas. Chichester: John Wiley & Sons.

The wealth of potential for tourism development of Vojvodina in the Danube region

The area of the Danube in Serbia, i.e. its shores along with the hinterland, has attractive facilities for domestic and foreign visitors. Numerous cultural and historical monuments, archaeological sites, exceptional attractiveness of natural sites, rich hunting grounds, events, represent a promising framework for the prospecting development of tourism. Owing to this wealth and historical heritage, globally the number of tourists attracted to the area of the Danube is constantly increasing. The Danube region in Serbia is a heterogeneous area in economic, environmental and cultural aspects.

The Danube represents exceptionally strong tourism potential, and to be better positioned in the international market, it is necessary to implement a development model that would provide a competitive advantage compared to other rivers. This model is based on tourists' satisfaction, the satisfaction of local communities, the environment protection and sustainable tourism development. How attractive the Danube is, and what pleasure it could offer its visitors is indicated by the fact that this mighty river is on the 11th place as one of the best destinations that we should not miss in 2011. The Danube connects more than 80 million people who live in ten countries, speak more than a dozen languages, belong to different religions, and cherish their historical memories, traditions, art, myths and legends. Therefore the Danube River Basin should not be viewed as a narrow area between the river banks, but all the opportunities and resources that may be included in the development of tourism should be considered. We have to recognize this opportunities and to include tourism development of our part of tourism with more knowledge about specialized tourist products. The examples of these are numerous farmsteads[6] in Vojvodina, whose revitalization greatly improves the quality of tourist offer in Serbia.

The development of rural tourism, which is still in its infancy, has a significant economic potential for Danube region in Serbia. A special segment of rural tourism represents tourism offer of farmsteads, as a typical Vojvodina "product". Farmsteads provide very good opportunities

[6]Term " salaš" has many different translations (farmsteads, bowers, boweries, messuages, farms). In this paper we will use the term "farmsteads"

for the development of eco-tourism, as well as for rest and recreation. The development and promotion of farmstead tourism offer can be especially attractive as an export offer. Farmsteads that are used for tourism purposes have been modernized, but not at the expense of their authenticity. The best known are those around Sombor, Subotica, Srborbran, Bečej and Čenej. The development of rural tourism has significant potential from the standpoint of promoting authentic ancient crafts and enjoying the local gastronomic specialties (slow-food). Tourist offer of rural tourism has its unique values that should be used. The specific tourism product of these destinations must emphasize authenticity, uniqueness, the role of local factors ... Therefore, the offer for this segment of tourism demand has to be researched and studied, and the tourism product should be designed according to the requirements of specific customers.[7] The main advantages of Vojvodina region that should be used as a potential for the development of rural tourism and tourism on farmsteads would be:

• *Culture* - is multi-ethnical, which enhances the level of attractiveness of the product, due to the possibility of introducing folk heritage of different ethnic groups (Serbs, Croats, Hungarians, Romanians, Russians, Slovaks, Bunjevci, Šokci…).

• *The attractiveness of the ambience* – the whole area and Vojvodina landscape is geographically distinctive enough (plain, viticulture and fruit growing district, shadoofs, straight-street villages with its Baroque church towers, the architectural style of village houses, farmsteads, ethnic diversity of the population).

• *The integration into the remaining tourism ambience* – is extremely favorable, since most of the villages with a strong and distinctive internal resources are located in the immediate vicinity of important natural resources such as Fruška Gora Mountain, Deliblato Sand, the Danube River Basin (Special Nature Reserve "the Upper Danube River Basin"), Palić and Ludoš Lake .... etc.

• *Geographic position* – generally favorable since the Eastern Mediterranean route passes through the potential destination, which is an important origination of tourists towards Greece and Bulgaria (the Mediterranean). Even more important is the closeness and connection

[7] Štetić, S., Šimičević, D., (2008): *How to develop a sustainable rural tourism in Serbia*, the Serbian Geographical Society Bulletin, no. 4, p. 28

with Hungary. In the time of tourism globalization, tourists from distant regions can simultaneously visit Hungary and Vojvodina.

• *Traffic connection* – is good among the Vojvodina villages and among towns and villages, and the distances are not too long.

• *Individual attractiveness* – that should be emphasized and which should be based not only on events, short encounters and entertainment, short visits, but also tourists' stay, without any pretensions to mention all of them would be:

- •specificity of folklore (music, dance, costumes);
- • old crafts: pottery, beekeeping, local embroidery and lace;
- • rural architecture - a house and infield shape, farmsteads and traditional methods of household chores;
- • Naive paintings and other forms of Naive Art;
- • Manufacture of products (souvenirs) from straw, dried herbs...[8]

The development of Vojvodina farmsteads as tourist products

Vojvodina with all it natural and anthropological resources represent a good basis for the development of tourism. It is necessary to make a selection and valorization of values as well as to begin an adequate representation of the particular Vojvodina regions in the tourism industry. Parts that are not used for tourism should be developed, upgraded and cherished. It should be emphasized that farmsteads, in addition to the above mentioned values, provide conditions for the development of science, economy, culture and sports. There are many traditional events and cultural and historical monuments that should be protected, revitalized and adequately included in the offer.

Intensification of farmstead development implies large changes not only in their interiors, but also in their surroundings. The most complicated stage in planning tourism development is the evaluation of tourism resources. The valuation includes: the degree of farmstead motif attractiveness, traffic conditions, the degree of tourism facilities' development, the level of farmsteads' equipment, the volume of realized turnover.

[8] Marketing strategy for tourism in Vojvodina – research and development project, the Provincial Secretariat for Economy - Government of AP Vojvodina, November 2009

Through the perennial economic crisis and isolation[9], the farmstead tourism found itself overshadowed by all the happenings. That is why today there are large and complex tasks in front of the Vojvodina tourism industry, which need to be resolved so that revitalization process of structural and qualitative innovation of farmsteads should be conducted in the shortest possible time, and on this basis the reaffirmation of farm tourism into international flows should be carried out.

Participation in the world market means primarily the possession of information on all the available elements that make up the resources, then clearly estimated value of the potentials, the availability of information about the events, surroundings and trends and tendencies forecasting. Creating conditions for the development of farmstead tourism is in the function of its positive impact on the tourism not only in Vojvodina but also in Serbia. New products on the tourism market is possibility to promote tourism and to gain new tourists in the destination.

In the particular example of farm tourism, it can be noticed that this type of tourism does not have a seasonal character what is very important. Tourists are visiting them because of various possibilities for recreation and cultural events. They can stay and take a walk in the countryside, helping in the different jobs on the farm, enjoy the tastes and smells of food and drinks or visit because of the tradition and history that accompany them. Various events that are in the tourism offer are often held at the premises. Another important fact is that this type of tourism is not categorized according to age, because farms are literally visited by all generations. There is also a positive impact on the balance of payment positions. To achieve these objectives it is necessary to tailor the tourist offer of farmsteads to foreign demand.

The complementary services development and their participation in rural tourism and on farmsteads

Quality offer should be provided by connecting all links in the chain of tourism product, and expanding the network of small catering facilities, providing a rich assortment and introducing modern forms of trading,

[9] S. Štetić (2012), *Risk management in Tourism*, First Belgrade International Conference, BITCO, Visoka turistička škola, str. 197-213.

regulating water and power supply, transportation development etc. Tourism is a complex phenomenon, the phenomenon that is always in some kind of interaction with other economy branches. The success of tourism is reflected exactly through a positive balance and the development of many other economic and non-economic activities. Tourism and its development also imply this inevitable participation of complementary industries. The destination that offers exclusively tourist services cannot be strictly distinguished.[10]

As regards farmsteads in Vojvodina, the concept of accommodation facilities is aimed at satisfying user needs. The rooms equipped for overnights and stays keep the traditional spirit of the times. It can be said that in most cases authenticity and style are preserved, as evidenced by the inner parts of the room. Old wooden bunks, washbowls, towels and bed linen with embroidery, rugs on the floors are a perfect reflection of the history of the peoples in Vojvodina. However, in some of the previously mentioned farmstead facilities, numerous modern and contemporary elements and devices are introduced for use.[11]

According to some unofficial data of some farmstead hosts, tourists or visitors stay for a relatively short time. They usually spend a weekend or maybe just one day, because this type of tourism is not strictly seasonal, and most of the visitors are the participants in excursion movements. Also, it can be concluded that some farmsteads are not able to accept a large number of tourists at the same time, precisely because of technical reasons. Nevertheless, the tourist character to a place is given by tourists who stay at least a day and night.

Considering the character of tourism-catering farm industry, it can be said that it is two-fold, because it has a service and a production character. The term *production* is taken very conditionally, because it is not a mass production of foods, but a small, controlled production of food according to the guests' requirements.[12] Usually tourists enjoy in the prepared local

[10] Štetić S., Šimičević D., Nicić M. (2009): *Menadžment turističke destinacije*, Monografija,Srpsko geografsko društvo, Beograd, str. 214-221.
[11] The rooms are equipped with air conditioning, modern bathrooms, satellite antennas, spa and wellnes facilities as well as sport facilities
[12] Štetić S. (2009), *Achieving a balance between sustainable development and economic growth throught tourism*, Naučni simpozijum EnE09, Zbornik radova,Beograd.

food, and the foods grown on adjacent fields, from the nature right to the table. It is exactly this temporal unevenness of tourist visits and their unpredictability affect the discontinuous course of food production and preparation. Purchase, service-production and sales functions are present in the domain of hotel and catering industries. Parallel to the development of tourism on farmsteads, the processes of catering character also take place, since the success and development of tourism cannot be measured within its own borders, but its success necessarily pervades a series of other economic activities.

The position of farmsteads in relation to the main traffic routes appears to be an important criterion in tourism. One of the most important characteristics of tourist facilities operation is a good communication link with other economic and non-economic enterprises.[13] However, most of these tourist facilities are in the direction of important traffic routes, such as Novi Sad – Zrenjanin and Novi Sad – Belgrade, and the traffic as an economic activity is in interactive relation with tourism in these areas. As far as traffic controls and affects tourism, tourism also influences the development of traffic to that extent. Exactly, the growth of tourism activity will affect the modernization of the road network in Vojvodina. Inevitably, it should also be mentioned the importance of water transport in increasing the number of visits to farmsteads. The Danube and Tisa are the rivers that could play an important role in the tourism offer of certain facilities that are located along their banks. Of course, we could even talk about the possibilities of organizing tourist tours navigating on the Danube, and the possibilities of overnight stays at the farmsteads or just having a break during the cruise, which would significantly contribute to the increase in traffic from both domestic and foreign visitors.

Another tertiary service that has a solid and unbreakable link with tourism is *trade*[14]**.** Rural areas in Vojvodina and specially farmsteads are known for production of corn, whit, fruit and vegetable and cattle breeding .

[13] Some of the farmsteads possess all the predispositions of the modern road traffic development. Iif we go back in history and if it is understood that at the time the aim was to build a farmstead out of traffic parts, as shelters, it is not surprising that macadam roads still lead to some farmsteads.

[14] Vojnović, B., Cvijanović, D., Stefanović, V. (2012): *Razvojni aspekti turističke delatnosti*, Monografija, Institut za ekonomiku poljoprivrede, Beograd, ISBN 978-86-6269-008-1; CIP 338.48; 005:338.48; COBISS.SR-ID 191950092.

development of tourism in rural areas is brinnging new dimension to trade od food. Invisible export through serving and selling different kind of food to tourists is the best way for economic development of people living on farmsteads. [15]

The continuity of procurement depends on the number of visitors, at the farm, which is in most cases considerably unpredictable. In most cases, seasonal foods or those that have the capacity of long duration under certain climatic conditions are used for human consumption. Deep-frozen food can rarely be found in the offer, but it is usually half-done. Tourists expect local and freshly prepared specialties. Of course, there is often the need to purchase additional drinks and food from the nearby villages or urban centers. We must always be on the alert that all the purchased foods are of high quality, to avoid side effects. This primarily means that there must be a health and hygienic safety of the materials. This safety also refers to the storage, preservation, loading and unloading as well as proper and adequate transportation. The biggest deficiency in the commercial offer at farmsteads is the inability to sale or purchase souvenirs, which would contribute a lot to the presentation of these areas.

Agriculture, which is the most developed economy in Vojvodina, necessarily enters into the chain of linkage with tourism, starting from the basic fact that this sector provides essential foods to catering facilities of a farmstead. It has already been mentioned in previous presentations that most farmsteads offer products from their own small agriculture. Vojvodina has exceptional natural resources and technical and human potentials. Large areas of very high quality and ecologically preserved soil represent very favorable conditions for the organization of modern agricultural production and achievement of high yields. At the most part of these areas corn, wheat, sugar beets, soybeans, vegetables, sunflower, clover and lucerne are cultivated. High-yielded varieties and hybrids are used in plant production. Farming and animal production are developed. The development of the food industry, which is the greatest connection

[15] When such examples as trade activities of a farmstead are listed, the conclusion is derived that it occurs through all the stages of the work process, for example, in a preparatory phase when various products, machines, devices are purchased, then in a service-production stage when materials for consumption are provided (additives, preservatives, materials for hygiene...). Tourists are haveing different kined of activities and food which they consume.

with tourism, will be directed on a higher level of production of high quality products such as healthy and safe food, then medicinal and aromatic herbs. Agriculture is one of the branches and activities which is closely related to and which is realized that relational relationship with tourism of the mutual benefit type. Parallel to the development of the eco trend, the demand and inclusion with the same name is imposed in the tourism-catering offer of farmsteads.

Arhitecture and crafts clearly express their impact on the tourism industry, and vice versa. It is impossible to visit a farmstead not noticing at first glance the style, method of construction, and of course all the small craft details, whatever period they date from. A renovation, restoration, and of course adding new and modern elements are always needed in an offer. These economic activities skillfully reflect construction techniques of accommodation and catering facilities, the construction of additional elements for garden use, and some tools and machines. Even new standards, new and modern appliances are introduced. There is also a presentation of craft works like embroidered linen and handmade rugs, bakeries, and other techniques of the old masters-hosts.[16]

It should be mentioned that in some tourist offers of farmsteads, important traditional cultural events can be found and organized. Sometimes these are wine and folklore festivals[17], sometimes business and congress gatherings are held in the facilities, then filmmaking and similar festivals. Sport- recreational and health-wellness features also emerge at the forefront of the importance of these farmsteads. All of these activities are not part of the offer only for tourists, but are also frequently held for farmstead residents and the surrounding areas as a tradition for many years.

[16] Štetić S., Šimičević D. (2011): *Značaj posebnih oblika turizma u ruralnom razvoju*, Tematski zbornik sa VI međunarodnog naučnog skupa ‚Turizam i ruralni razvoj – Savremene tendencije, problemi i mogućnosti razvoja", str. 54-65.
[17] Šimičević D., Štetić S. (2011): Značaj plasmana lokalne poljoprivrede kroz specijalizovane gastro turističke proizvode, Ekonomika poljoprivrede, Specijalni broj 1, str. 255-264.

How to attract and promote tourism on farmsteads

There is a close relation between tourism and ecology, especially when presenting Danube river, green regions, rural areas. Tourists appreciate farmstead areas and similar protected eco-regions in tourism offer, simply because they are becoming aware of the impact of modern mechanization and urbanization on the quality of life, and tend to return to nature even for a short time. Tourism has and should have a close connection with ecology aimed at protecting the environment. Building awareness among tourists about the value of the natural environment, farmsteads will preserve their quality on tourism market. Cooperation with environmental organizations includes compliance with certain rules of conduct in the nature and the use of particular natural resources, as well as respect for norms, such as monitoring the level of land use, air pollution, waste disposal, etc.

Due to the fact that tourism is an economic activity that offers a potential buyer an intangible service, the measures of marketing activities must be implemented in the promotion and provision of services provided to customers. The process of deciding on the purchase of tourism products is based on tourist's motive and has an unusual effect because of several factors: there is no tangible return on investment in the tourism product as the use of a tourism product results in the experience, not in owning something; subsequently, the expenses are often significantly extensive compared to other consumer goods; purchases are not spontaneous, but planned; and unlike other products, in tourism product tourists visit a place, the product is not transported to them.

When deciding to travel and selecting a tourist destination, tourists mostly rely on the facts presented to them in the agencies, reading tourism literature or on internet. Of course, tourists expect the information to be entirely true, and the objective of travel agencies is to gain trust with potential customers, and fully convince them of the value and quality of the provided services. The better marketing presentation, the better the position of tour-operator on the tourism market, and parallel to this, the greater the suppression of potential competitors in the offer market.

Tourists are often strapped with time, and in selecting a destination rely on what they see and hear in the provided offer. However, the ability of

organizers in presenting tourist places can change this fact. The objective is achieved if the seller obtains the customer's confidence and provides himself permanent consumers he must not betray. Every brochure or some other material must be created taking into account tourists' desires, needs, and demand. Using a variety of eye-catching images of certain destinations and vivid colors and other graphic solutions will have a significant influence on the success of business operations, since otherwise these advertising tools go to the background.

Considering the concept of farm tourism, it can be concluded that there are good predispositions to improve marketing activities. In the publicity material it is extremely important to have pictures of wonderful landscape, interior of traditional ethnic houses, traditional tools and machines. There are also possibilities of introducing a variety of activities, events, and local culinary specialties. The owners should be aimed at the presentation of an agrarian, green or landscape of the protected environment, which tourists are very much interested in.

The success of a farmstead presentation in tourist offer and visitation in general, could be measured primarily by *survey research methods*. There are several ways of conducting surveys, but each of them has to respect strict rules and regulations. The questionnaires can be divided into tourist areas themselves or by mail, the Internet, or even filling out the questionnaire in an interview with potential customers through telephone conversations. This last one reminds on an interview, which could also be crucially important for market research. For example, the visitors at the entrance or exit and in some other parts of the facilities could be interviewed. It is important to say that the interviews should be short, but although concise they must possess essence, which means that in the shortest period of time we get to the crucial facts in observing the visitation to farmsteads and visitors' satisfaction or dissatisfaction. Questionnaires can be written in a longer form, but the general rule should be applied for them that they must stick to the framework of survey essence, and that this test is detailed, i.e. exhaustive, so that we can learn all the important things about the visit and business operations, and interest and demand of tourists.

The key questions formulated in questionnaires or interviews are the questions on destination attractiveness, quality of accommodation

services and overall stay, on destination accessibility, employees training, the purposes for their visit, and even some disadvantages, if any, because the price is usually a negative item in all surveys.

Importance of quality tourism development on farmsteads

Tourism market research has shown that European tourists require a high level of quality in tourism. The search for quality in all aspects of rural tourism product is not different than the same in any other sector of tourism. The high level of competition in tourism contributes at the same time a high quality of services and products. Tourist destinations are becoming more dependent on the quality of its services and products.

The development of tourism in certain destination affects the involvement of a growing number of investors for different products and services. It also increases the investment in infrastructure thus increasing the development of tourist destinations intensity which should be very important for the future of tourism on the farmsteads

Spatial development of tourism shows its complexity and complementarity. Tourist destinations complement each other and they compete with each other[18]. The development of tourist destination affects both, economic trends and changes in the geographical character of the space, as well as changes in the behavior of local population. *Positive and negative impacts* of tourism are intertwined, and their strength and dominance is primarily affected by planning.

The issue of *quality in tourism* is the answer of employees through *quality service, proper price and adequate tourism product* that meets the requirements of the demand should be very important for the farmsteads. Therefore, in establishing quality management in a tourism destination where the farmsteads are in mined first we must:

- Identify tourism products and services, on the farmsteads, and their quality;
- Identify the processes that lead to satisfying the required quality of products and services on farmsteads;

[18] S. Štetić (2010) Risk management in rural Tourism, Economics of agriculture, special issue 2, Vol. LVII, SB/SI-2 (1-372) ,Belgrade

• Identify the method of monitoring levels of quality and customer satisfaction at the farmstead.

Reflections and recommendations on how to manage quality in the observed area are very diverse. Therefore, the authors of this paper does not want to prejudice and suggest specific models as mandatory in determining quality in tourism. The best solutions that lead to quality in all business operation elements and tourism activities in tourism industry should be considered in cooperation with direct participants in providing tourism services at a tourist destination.

Most studies of tourism quality are focused on service quality in the catering industry and in particular on measurement of perceptions of quality by tourists. Unfortunately, the literature has little to say about the *integration* of quality in all aspects of rural areas and farmsteads. Without attention to the integration of quality in all aspects of planning, management and evaluation of rural tourism and farmstead products, it is unlikely that the quality of the tourism experience will be significantly improved.

Conclusion

The role of tourism in the international economy is multiple and its effects are reflected in the presentation of tourist turnover and revenues, but not only within tourism, but the impacts of tourism development to other activities complementary to tourism are perceived.

The development of rural tourism, along with the primary agricultural production, with an emphasis on preserving and improving the environment, is one of the solutions that would reconcile contradictions in order to allow multiple positive effects in rural areas with the appropriate economic, infrastructural, organizational and educational stimulating measures.

The effect achieved in domestic tourism should not to be left out, where the farmsteads could be positioned on a better and more significant position in the near future. Thus, through the export of farmstead based tourism, final products and services of numerous activities would be implemented and a positive impact on the balance of payments of the state would be realized. It is concluded that the sale of goods and services

to foreign and domestic visitors in its own territory is an important opportunity to engage all economic and non-economic activities that provide an assortment of tourism offer in a competitive destination/region. Considering that tourism directly encourages the development of basic activities of the tourism industry, thus it contributes to the increased volume of employment.

The development of tourism in Danube region requires many strategic, tactical and operational measures, because it should be borne in mind that tourism in this region is part of the tourist industry of Serbia, i.e. part of global world tourism. However, Vojvodina possesses all the conditions necessary to effectively develop tourism adjusting its tourism industry to market changes. National Tourism Organization should make an effort to organize a series of marketing programs, which would commercialize a part of activities: training employees, activities in making souvenirs, and other presentation of the area.

The ecological component plays a major role in the global tourist industry. It consists of farms that offer green part of Serbian offer, which would contribute to the development of tourism attracting foreign tourists and foreign investment in Serbia. Work on the development of eco- and green tourism will thus move directly to meet the global demand. It is necessary to create conditions for the full utilization of development opportunities in the mountain, spa, lake, farmstead tourism, but of course with the prioritization strategy and consistent implementation of the principles and norms.

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COMPETITIVE FOOD PRODUCTION AS A STIMULUS TO ECONOMIC DEVELOPEMNT IN SERBIA

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Abstract

A subject of the research is an analysis of a position and a structure of total goods' export, especially of food products, aiming to perceive trends, to measure a level of comparative advantage and improve position on international market. The research has pointed out to limiting factors of food production development. We have established a positive comparative advantage (RCA and LFI indexes) of food industry and intra-industrial character of exchange measured by GL index. We had especially recognized export structure from a factor intensity point of view and we had established a presence of a negative comparative advantage and pronounced non-competitiveness of products Easy – to - imitate research – intensive goods and Difficult – to –imitate research – intensive goods. Conducted research of competitiveness and comparative advantage of food industry points out to a significant contribution to economic development, and especially to rural economy of Serbia.

Key words: *competitiveness, trade structure, comparative advantage.*

Introduction

The competitiveness research of an economy is basically an analysis of macro and micro-economic indicators. Competitive economy is capable to compete, to improve production and productivity through modernization processes and implementation of modern technologies. Ignjatijevic points out that the economy competitiveness is a frame in which a country can have comparative advantages. The author considers that the competitiveness is a group of factors like knowledge, innovations, finances, production

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experience, market assessment and others. The competitive country the most efficiently manages with available resources, i.e. the competitiveness factors (Rutkausk, 2008:89). The competitiveness improvement is a process of production factors improvement, as labour, land and capital. In order to increase economic activity and competitiveness are necessary much bigger investments in economy development and export-oriented production. The competitiveness in international frames expresses by a level of specialization in international trade. As the most important factors we will mention „differences in production costs, demand, production factors mobility, interests, wages, trade balances, income, technological innovativeness and progress“ (Ignjatijević and associates, 2012b: 201).

The authors are engaged in measuring the comparative advantage aiming to define international competitiveness. In this way, Yilmaz and Ergun (2003) were analyzing the export comparative advantage of countries-candidates for membership in the EU. Aiming to improve competitiveness, as Ferto and Hubart point out (2002), there are necessary structural changes of agriculture and food industry along with significant state support. Similar study on the comparative advantages of Turkish agricultural products export was done by Serin and Civan (2008), while Toming (2008) points out to non-price competitiveness factors on modern market. The author points out that quality of a product is of essential significance, so investments in the product development are necessary for achieving the comparative advantage and improvement of competitiveness on the market. In his earlier researches, Ignjatijevic occupies himself with the competitiveness of Serbian food industry and concludes that it is only partly competitive. The negative comparative advantage is a consequence of inefficient transition problem, absence of knowing and researching the market, lack of high-quality raw materials, quality oscillations and quantity of products. The paper is divided into three parts. In the first part was pointed out to macro-economic conditions of economy competitiveness and position of Serbian food industry. In the second part was defined the subject, the research goal and was described a methodology for assessment of the export comparative advantage and specialization in international trade. Later on were, in qualitative and quantitative sense, assessed the empirical results. The conducted research of competitiveness and comparative advantage of agro-food industry provides a possibility to perceive its contribution to economic development, and especially Serbian rural economy. In the conclusive considerations were presented the result up to which was reached during the research.

Macroeconomic environment

The changes of macroeconomic environment in the period after 2000 have been implicit in macroeconomic stability and economic growth, privatization and restructuring, have been initiated tax system reforms, labour market, have been obtained a stability of exchange rate and currency reserves, prices and foreign trade exchange liberalization. In the period 2001-2008 were present positive tendencies and gross domestic product in Serbia was increased after the rate of 5.2%. However, owing to unfavorable economic trends and an impact of the world economic crisis, in 2009 GDP was decreased after the rate of -3.1%, in order to make a growth of 2.3% in 2011. In 2012 have been present negative tendencies.

Service activities, industry, agriculture and food industry have mostly contributed to the GDP increase. The agriculture and food industry have significant role in making the domestic product, employment and export of Serbia. In GDP structure in 2011, the agriculture was participated with 12.3%, industry with 22.5% and services with 65.2%. In regard to constant decrease of industrial production, the agriculture and food industry can contribute to decrease of foreign trade deficit of the country. In the structure of gross value added in Serbia, in 2011, the agriculture was participated with 9%. The share of agriculture in gross value added in the EU countries was 1.9%. In surrounding countries, the share of agriculture is greater in regard to the EU: in Slovenia 2%, Hungary 4%, Croatia 5%, Romania 7%, Bosnia and Herzegovina 9% and Bulgaria 5%.

Table 1. *Basic indicators of macro-economic trends in Serbia*

Indicators	2005	2011
GDP totally (%)	5, 6	2, 3
GDP per capita (USD)	3391, 4	10. 700
Foreign trade deficit (mil.$)	5. 979	8. 082
GDP of agriculture (000 of permanent price 2002)	136. 030	136. 854 (2009)
Share of agriculture GDP in total GDP (%)	11, 9	9
Share of food industry GDP in total GDP (%)	4, 8	4, 2 (2009)
Foreign direct investments (mil.EUR)	1. 244. 6	975. 2 (2008)
Unemployment rate (%)	20, 8	16, 7
Inflation rate (%)	16, 5	11, 3

Source: *SORS and Ministry of Finances, Bulletin Public Finances, 2009 and 2012.*

Serbia was struck by the world economic crisis in 2009 and there was significantly decreased industrial production, foreign trade and GDP. Unemployment rate in Serbia, at the end of 2008, was amounted 15%, in 2009 16.1%, and in 2011 16.7%, with tendency of unemployment increase. In food industry were decreased salaries for -13.6%, which was more than all sectors' average (-8.4%). The salaries of employees in the primary agriculture were decreased for -6.3%. In regard to other economic activities, a number of employees in agriculture and fishery were significantly decreased. The agriculture, from salaries and employment point of view, was the most hit by the world economic crisis.

If we discuss about agriculture, it is clear that decrease of young agricultural producers and their lack of education, as well as high unemployment (as a consequence of inefficient transition), along with great property fragmentizing, is a reason of unfavourable and extensive crop production. There was also improved energy and energy substances' supply, while water supply (and waste waters taking away) is problematic and unadjusted to the EU regulations. In fruit growing are necessary long-term credits for plantations development, use of certified and health planting material, and in livestock breeding is connected to unfavourable financing conditions, bad organization of production, inadequate economic policy for livestock breeding, as well as a low level of cattle breeding technology.

In Serbia, budgetary costs for agriculture are decreased for -42.2% in regard to 2008. The share of agrarian budget in total Serbian budget was decreased from 5.4% in 2004 to 3.4% in 2010 and was far under an average in regard to the surrounding countries. "Assets meant for agriculture are, in regard to the previous years, at the lowest level and at the lower level in regard to the EU and surrounding countries. The decrease of agrarian budget is a consequence of economic crisis and has been constant in past years. Due to great inflation, lack of assets, great public consumption, scarce budgetary income, measures for alleviation of economic crisis' consequences have been directed to the budget decrease and increase of the budget deficit" (Raičević, Ignjatijević, 2012: 420). Aiming to develop the agriculture, it is necessary to increase resources for rural and scientific-technological development, along with further subsidizing of inputs, development of extension service, education and organizing agricultural producers and improvement of rural infrastructure and rural husbandries.

International trade of agro-food products is the only trade segment in which Serbia realizes a surplus. In transition period, the agriculture records a deficit in foreign trade exchange, due to influence of international sanctions, customs barriers and the state's collapse and non-adjusted export structure to foreign markets needs. In the period 2001-2009 was realized the increase of export after the rate 24.8% and import after the rate 14.1% annually. The average value of agro-food products export was 1.116 million USD. Positive results of international trade with agricultural and food products were achieved thanks to preferential status on the EU market, trade liberalization with West Balkan countries, cancellation of customs duties on agro-food products from Serbia, i.e. the cancellation of customs burdens during the placement on the EU market.

Today, Serbia is facing a shortage of domestic and foreign capital, although in past years has been formed numerous financial institutions and developmental funds, crediting conditions in agriculture are still unfavourable, while the capital has been a limiting factor of agriculture competitiveness. Decrease of credit activity in agriculture is more significant than in other economy sectors. Banking sector offered less credits, was more selective chosen users and has been decreased a demand for credits by agricultural producers. The credits in agriculture were decreased, delaying of credit debts was increased and a number of newly-approved credits were decreased. In the period 2001-2009, foreign direct investments were directed primarily in financial sector and trade. A lack of investments in export-oriented production and technological development were reflected negatively on domestic products competitiveness on foreign market.

Subject, goal and method of research

This paper analyzes the status and structure of exports of food industry in Serbia and the products classified in five groups. Careful attention was given exporting products classified in the group Fresh food, Processed food according to the methodology ITC (International Trade Centre), in order to measure the comparative advantage in exports of agricultural and food products and improve the position in the international market. The paper used data from ITC, World Bank and SBS for the relevant year. Data on exports and imports are taken from the Serbian Statistical Office. Product classification are performed on the model of Erlat and Erlat (2003), and Erlat Erlat (2006)). Hence we classify:In the paper was

analyzed a position and goods export structure of Serbian processing industry and products classified in five groups. There was especially perceived the export of products classified in the groups Fresh Food, Processed Food according to ITC methodology (International trade centre), aiming to measure a comparative advantage of agro-food products export and improve the position on international market. In the paper were used data of ITC, the World Bank and the SORS for adequate years. The data on export and import of Serbia was taken over from the SORS. The products classification was done in accordance to Erlat and Erlat (2003), Erlat and Erlat (2006). Hence we classify:

- SITC 0, 2 (without 26), 3 (without 35), 4, 56 are *Raw material intensive goods*
- SITC 26, 6 (without 62, 67, 68), 8 (without 87, 88) as *Labour intensive goods (LIG)*
- SITC 1, 35, 53, 55, 62, 67, 68, 78 as *Capital-intensive goods (CIG)*
- SITC 51, 52, 54 , 58, 59, 75, 76 as *Easy-to-imitate research-intensive goods (EIRG).*
- SITC 57, 7 (without 75,76,78), 87, 88 as *Difficult-to-imitate research-intensive goods (DIRG).*

The export comparative advantage was done by **Balassa index** appliance in the period 2005-2009. The Balassa formula for calculation of expressed comparative advantage (Balassa, 1965):

$$RCA = \ln\left[\frac{X_i}{M_i}\right] \times \left(\frac{\sum_{i=1}^{n} X_i}{\sum_{i=1}^{n} M_i}\right) \times 100$$

In this formula X represents the export value, and M the import value. Index *i* represents an industry sector of each of Danube region countries. In case that the country is specialized in production of those products which it produces less expensive than the rest of the world, the export value is surplus and RCA index has a positive value.

The analysis of specialization level in intra-industrial exchange (export and import) was done by **Grubel Lloyd's** index. Higher values of GL index point out to intra-industrial exchange, and lower values of index

point out that the foreign trade exchange is of inter-industrial character. The GL index calculates by the formula (Grubel, H., Lloyd, P., 1975):

$$GL_i^t = ((\sum_{i=1}^{n}\left(X_i^t + M_i^t\right) - \sum_{i=1}^{n}\left|X_i^t - M_i^t\right|) / \sum_{i=1}^{n}\left(X_i^t + M_i^t\right)$$

In this formula GL_i^t - index of intra-industrial trade of sector *i* in year *t*, X_i^t - export of goods group *i* in a year *t*, *a* M_i^t - import of goods group *i* in a year *t*.

In analysis of the comparative advantage was used Lafay's index (Lafay, 1992):

$$LFI^i{}_j = 100\left(\frac{x^i{}_j - m^i{}_j}{x^i{}_j + m^i{}_j} - \frac{\sum_{j=1}^{N}\left(x^i{}_j - m^i{}_j\right)}{\sum_{j=1}^{N}\left(x^i{}_j + m^i{}_j\right)}\right)\frac{x^i{}_j + m^i{}_j}{\sum_{j=1}^{N}\left(x^i{}_j + m^i{}_j\right)}$$

where are *x* – export values and *m* – import of products. The Lafay's index can be used for ranking different sectors regarding their comparative advantage status. The Lafay's index is trying to surpass some imperfections of the Balassa index, taking into consideration intra-commercial courses and GDP.

Position of food industry of Serbia

If we analyze the industrial production in Serbia in the period 2002-2009, we can see that it has not followed changes in the world economy and that the industry has a tendency of decreasing its share in GDP. The greatest contribution gives food products and beverages production, as well as a chemical industry. It is understood that the goal of industrial production is increase of productivity and therefore achieving high-quality assortment, competitive on foreign market.

There is a series of factors which affect unfavourably on competitiveness of products in export. If we start from bad technical equipment, low utilization of capacities – which are often oversized and irrationally used in processing, to lack of raw materials, it is clear that is necessary a faster

modernization of technological procedures and much faster adjustment to foreign market requirements.

Table 2. *Increase rate of Serbian food industry production in accordance to activities classification in the period 2002-2009 (%)*

	r_g
Processing industry	-2,86
Food products and beverages	-2,04

Source*: SORS and calculation of the authors.*

The conducted analysis of data points out to decrease of processing industry production after a rate of -2.86% in the analyzed period. The production increase is present in production of clothing, furs, leather and footwear, and the production decrease in motor vehicle production, trailers, basic metals, furniture, cokes and petroleum products production.

In order for Serbian processing industry to achieve faster competitiveness on foreign markets is necessary to use more technical-technological engineering, along with possibility of knowledge and technology transfer, especially if we posses own technologies, technical solutions and creative experts. It implies a placement of technologies and complete plants for specific production.

Table 3. *Share of food products and beverages sector in export and import of processing industry (%)*

	2002		**2009**	
	Export	Import	Export	Import
Food products and beverage	21,34	7,32	17,89	5,29

Source*: SORS and calculation of the authors.*

We conclude by the processing industry analysis that, in structure of processing industry, in 2009, four sectors made 49.9% of export (food products and beverages (17,89%), basic metals (15,28%), chemicals (8,08%), other machines and devices, jackets (8,62%).

There notices that high technologies sluggishly increase their share and low technologies significantly take part in the total structure of processing industry. Along with a problem of obsolete equipment, worn-out and overcome technological solutions are also present insufficient investments in development of new assortment and new scientific

researches. All that, as well as mostly a proportion of lower-processing-phases products leads to bad and unfavourable business and placement of products on the foreign market.

In international trade with the primary products, Serbia realizes a surplus. Increase of comparative advantage and improvement of competitiveness point out to increase of trade volume and liberalization in international trade. The realized export increase of labour and capital-intensive products point out to acceleration of lower-processing-phases-products export, and reduced foreign currency inflow, which will have an adverse negative affect on macro-economic trends.

Table 4. *Structure and increase of goods export and import of Serbia in period 2004-2009 (% of the total export and import)*

	Export			**Import**		
	2004 (%)	2009 (%)	Ø2009 / 2004 export	2004 (%)	2009 (%)	Ø2009/ 2004 import
Raw material intensive goods (RMIG)	27,69	25,64	119,28	24,56	26,96	59,09
Labour intensive goods (LIG)	24,23	25,41	148,37	19,62	19,91	47,03
Capital-intensive goods (CIG)	27,57	25,17	107,04	19,88	20,66	48,01
Easy-to-imitate research-intensive goods (EIRG).	7,11	6,82	127,19	13,77	14,14	48,84
Difficult-to-imitate research-intensive goods (DIRG).	12,34	15,45	196,64	21,77	18,21	22,62

Source*: SORS and calculation of the authors.*

The results direct to a conclusion that: products of the sectors LIG, RMIG and CIG participate with over 76% in the total export of Serbia, while the products of the sectors DIRG and EIG participate with small percentage, although is present a positive tendency of increase in the analyzed period.

In Serbian export is present a high share of fresh food and processed food products. “In the structure of the primary products export of those countries, a high share has the export of agricultural products, especially food. It is significant to emphasize that there was realized increase of the agricultural products export in Austria, Slovenia, Bulgaria and

surrounding countries (Montenegro, Croatia and Bosnia and Herzegovina)" (Ignjatijević, Milojević and Ivančević, 2011: 106).

Table 5. *Share of sectors in the total export and import (% average 2005-2009)*

		Fresh food	**Processed food**
Serbia	Export	5,82	14,12
Serbia	Import	3,35	4,11

Source*: ITC and calculation of the authors.*

The basic task in agriculture is productivity increase in production, in order to obtain competitiveness on the world market. The growth of productivity can increase by application of modern knowledge, investments and increased efficiency. The productivity depends on agro-ecological conditions, a level of production capacities use, their size and equipment and obtained yield per a production unit. There is significant organization of producers in all phases of production, a system of long-term measures of agro-economic and foreign trade policy, scientific-research work and transfer of technology, innovations and general stability of economic conditions.

Unfavorable agrarian structure, low yields, disparity of inputs and outputs prices, low investments in development of agriculture and higher phases of food industry, inadequate organization and technical equipment of husbandries, non-functional transition, lack of marketing programs of production and processing, inefficient appliance of quality standards and lack of incentive agro-economic policy, have affected to extension and vacillating of production. There were present oscillations of agrarian products export and low share of final products in export. High agrarian employment is a cause of low efficiency and non-competitiveness of agricultural products in foreign trade. The prices of agricultural products in developed countries are lower than the prices in Serbia, due to high productivity and lower cost price.

Competitiveness and comparative advantage of Serbian agro-food products' export

In addition was measured the comparative advantage of food industry export in the period 2004-2009. The comparative analysis of Serbian processing industry export shows the negative index value of

comparative advantage, while the positive values have the products with more significant export in regard to import, i.e. the products of food sector. Ignjatijević (2012) points out that in production of food products and beverages, tobacco products, clothing and furs, rubber and plastics products is a potential which should be used, aiming to improve the competitive positions on the world market.

The analysis of comparative advantage index (RCA) shows that in 2009 was realized higher level of expressed comparative advantage, which was increase in regard to 2004. Within the processing industry, the highest positive advantage of comparative advantage has the sector Food Products and Beverages (RCA^{2004}=0,13, RCA^{2009}=0,46), which realizes a surplus in international trade. In the analyzed period was realized also increase of processing industry competitiveness and within it – food industry. There are noticeable the oscillations of index value in the analyzed period, which was result of change of commercial exchange volume and export prices level. The problems on micro level, in the field of agriculture and unfavourable business condition, have reflected to the negative competitiveness of Serbian processing industry.

Table 6. *RCA, LAF and GL index of processing industry according to the activities classification*

RCA	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
Processing industry	-0,32	-0,29	-0,27	-0,19	-0,26	-0,17
Food products and beverage	0,13	0,24	0,31	0,48	0,62	0,46
LAF	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
Processing industry	4,31	5,94	6,08	12,10	0,29	11,43
Food products and beverage	5,47	5,14	4,90	5,43	4,90	5,74
GL	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*
Processing industry	0,54	0,67	0,73	0,79	0,82	0,84
Food products and beverage	0,81	0,73	0,69	0,52	0,57	0,58

Source*: SORS and calculation of the authors.*

The comparative advantage of processing and food industry export, measured by Lafay's index (LFI) points out to increase in regard to 2004. Specialization analysis in international trade in 2009, by using Grubel-Lloyd's index points out to intra-industrial character of exchange and an existence of correlations between the comparative advantage and intra-industrial specialization in international trade. We must accentuate that there has come to certain changes in trade structure.

In that way, the intra-industrial character of exchange, at the beginning of the period and the achieved exchange and specialization level in international trade have lost their significance. Within the food industry was present the index increase of export comparative advantage in sugar production industry, mineral water, cooling drinks, ice-creams, oils and fats, mill products, cakes and beers.

The improvement of Serbian export comparative advantage is a result of export increase and realized export prices. Achieving the price competitiveness on international market is correlated to the productivity increase, along with processing costs decrease. „Wheat flour and other mill products have a high value of comparative advantage index.

The comparative advantage of raw oil has been increased due to increased export of high-quality products of this food industry sector. In ten-years-lasting period (200-2009) was decreased the export of baby beef, and export quota in the EU was not utilized. Serbia lost a status of an important exporter of baby beef and becomes an importer of pork, as a consequence of constant decrease of livestock fund.

Beer and confectionery products have been represented in the previous period in export and has been achieved the increase of comparative advantage index. The comparative advantage of mineral and sparkling water with or without added sugar export is positive due to significant increase of export value“ (Raičević, Ignjatijević, 2012b: 215).

The research competitiveness of products in fish industry shows that Serbia has agro-ecological conditions, market needs and possibilities for export. “The focus should be on investments in construction of new fish ponds, using the existing, restocking of rivers, lakes and water accumulations, application of new growing systems in production and nutrition, development of processing and final assortment, professional specialization and education of employees” (Babović, Ignjatijević, Djordjević, 2011: 562).

Table 7. *The empirical results are presented for overall trade and five technologically determined subgroups*

	RCA		LAF		GL	
	2004	**2009**	**2004**	**2009**	**2004**	**2009**
Raw material intensive goods: (RMIG)	-0,33	-0,36	1,16	-0,60	0,54	0,67
Labour intensive goods (LIG)	-0,29	-0,20	1,72	2,50	0,58	0,81
Capital-intensive goods (CIG)	-0,25	-0,22	3,01	2,04	0,63	0,79
Easy-to-imitate research-intensive goods (EIRG).	-0,58	-0,73	-2,48	-3,33	0,29	0.41
Difficult-to-imitate research-intensive goods (DIRG).	-0,55	-0,42	-3,51	-1,25	0,31	0,62

Source*: SORS and calculation of the authors*

The main conclusions that can be drawn from these empirical results are the following:

- We notice the negative comparative advantage RIMG, LIG, CIG, EIRG and DMIG measured by RCA index. The negative values of index are reflected on different scale.
- The results show that the country lost its comparative advantage in regard to export of EIRG and RMIG. As for LOG and CIG, although the negative one, Serbia has favourable position in regard to other sectors of products.
- Despite of fluctuations in the analyzed period, there is obvious that Serbian position in international trade is bad, while the level of products competitiveness is low. We notice that the greatest imperfections are in EIRG and DIRG sector and point out to a strong dependence of Serbia in these sectors.

Table 8. *RCA index of products export according to ITC methodology*

Sectors		**RCA**		**RCA**	**RCA**
Fresh food	2005	-0,14	2009	0	0,14
Processed food	2005	0,16	2009	0,28	0,12

Source*: SORS and calculation of the authors*

The research result of the export comparative advantage in the mentioned sectors shows that products in the sectors Fresh Food and Processed Food were with the positive value of comparative advantage in 2009. The products in the analyzed sectors are differentiated, and a demand for them on international market is present. The mentioned sectors with the comparative advantages in international trade obtain surplus.

Conclusion

The competitiveness research of agricultural and food production shows low level of investments, unfavourable infrastructure, bad organization of producers, insufficient appliance of knowledge and agro-technology. Yields and productivity significantly lag behind the EU countries. Low yields in agriculture appear due to fragmentized properties, growing sorts with poor genetic potential, obsolete mechanization, bad agro-technology, insufficient fertilization and professional protection. The production, turnover, repurchase and processing are unorganized. A supply of agricultural-food products is insufficient and vacillating regarding quantity and quality. Small number of products has the quality certificates. Insufficient contact with distributors, modest design of changeable supply and small production series lead to insecure placement on foreign market and in such business environment is hard to increase the competitiveness.

The research of comparative advantage index (RCA) of food industry shows realized increase of the expressed comparative advantage level, and the most positive value of comparative advantage has the sector Food Products and Beverages, which realizes a surplus in international trade. The changes of index value are consequences of the changes in trade exchange and export prices level volume. The comparative advantage of processing/food industry export, measured by Lafay's index (LFI) determines a positive comparative advantage in the analyzed period. The specialization research in international trade, by Grubel-Lloyd's index, points out to intra-industrial character of exchange and certain changes in commercial structure. The export comparative advantage research of products classified in RIMG, LIG, CIG, EIRG and DMIG, measured by RCA index shows the negative values and points out to unfavourable position of Serbia in international trade. We notice a pronounced non-competitiveness in EIRG and DIRG sector and point out to a high dependence of Serbia in those sectors.

A strategy base for export increase is adjustment of our export structure to import demand needs. Domestic production significantly settles domestic needs, while market surpluses export. It is inevitable to create stimulating agro-economic policy, to increase resources in agrarian budget, to develop organic production and to create assortment and products' brands in accordance to demand. Modernization of production and increase of products finalization level and assortment, along with modern package and design, would affect the export growth, and therefore also the comparative advantage. With improvement of correctness and quality of animal origin products and by introduction of a geographic origin mark would protect some peculiarities of production.

More scientific-research work and managerial-marketing innovations are necessary, in order to direct the production development for providing the competitiveness both on domestic and international market. Although Serbia lags behind the EU and surrounding countries regarding the technological development, there conducts continuously the research of food technologies, as well as some productive sorts were made. Aiming to improve a micro-competitiveness, there is necessary to ensure a sustainable production growth, the quality of products, to increase productivity, efficiency and economic efficiency.

Along with adequate legal framework with the EU regulations is inevitable also a greater cooperation of creative experts, faster introduction of modern marketing, application of the quality standards, far larger assortment of food products along with greater use of raw materials and capacities by introduction of new production lines etc.

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RISK MANAGEMENT IN SOYBEAN PRODUCTION WITH WEATHER DERIVATIVES*

Todor Marković, Christoph Husemann[1]

Abstract

It has been long known that weather conditions are the main factor of uncertainty in plant production. In the past, farmers have bought insurance for protection against fluctuations in crop yields caused by weather risks. Relatively new tools for risk management in plant production are weather derivatives. By using weather derivatives mostly the crops that are distinguished by the amount of yield or that have a significant participation in the sowing structure are being insured. In this paper the mutual interdependence of rainfall and yield of soybean in some municipalities in Vojvodina is analysed by applying the regression and correlation analysis. By analyzing the production of soybean it is evident that the amount of rainfall during the period from April to August has a relatively high impact on yield. This should be kept in mind while we explore the possibilities of application of these new financial tools in our agriculture. Therefore, it is necessary to quantify the effect of risk reduction that can be achieved by using weather derivatives on the example of selected farm in Srem. If the field of production is close to the meteorological station, and if a high correlation between weather indices and yield is assumed, then the effect of risk reduction is significant (up to 40 %).

Key words: *production-related basis risk, rainfall, risk management, soybean, yield, weather derivatives*

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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 plant production is necessary, in order to somewhat compensate for the loss caused by weather risks. Crop insurance is the most frequently used instrument for risk management in plant production.

The research of crop insurance in Europe has been long actualized, while in Serbia only a small number of papers are devoted to this subject. The fact is that always after a flood, drought or a strong storm it comes to intensified discussions about crop insurance which can compensate for the loss in production (Breustedt, 2003). Economic attractiveness of different instruments for risk management, such as insurance, depends on the farmers' exposure to different risks (Berg, 2005). 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). Today, even the actual index-based insurance considers the possibility of using weather derivatives in agriculture (Turvey, 2001; Berg et al., 2005; Mußhoff et al., 2005; Marković et al., 2011).

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. It is significant that the most important aspects of the insurance market in the developed countries can also be applied to the countries in transition. The aim of this paper is to provide the basic theoretical assumptions about the weather derivatives as a new financial instrument in crop insurance and in the case of an individual household in Srem to indicate the hedging-effectiveness of weather put option.

It is necessary to examine the effects of rainfall on soybean yield over a long period of time by using the regression and the correlation analysis. The stronger the mutual interdependence between these two factors becomes (expressed in the correlation coefficients), the production-related basis risk gets smaller, at the same time the effect of risk eliminating by using weather derivatives will increase.

Material and methods

The basic data source is the documentation of the Statistical Office of Serbia about average yields of soybean in the period from 1975 to 2005 in certain municipalities in Vojvodina (Bačka Palanka, Bački Petrovac, Indjija, Irig, Ruma, Temerin, Titel i Žabalj), the information on monthly amounts of rainfall from the meteorological station „Rimski Šančevi" in Novi Sad in the same period of time, as well the documentation of average yields and selling prices of soybean from the selected farm in eastern part of Srem.

The successful application of weather derivatives is assumed by the high degree of correlation between the rainfall amount and the yield of some crops (Vedenov et al., 2004, Marković et al., 2011, Marković, 2011). This paper is based on the total monthly rainfall and average yield of soybean in selected municipalities. The relation between conditions and production results is being determined by using the method of regression and correlation analysis.

It is assumed that soybean yield is directly dependent on rainfall in the vegetation period, so that every millimeter of rain causes yields. It is therefore necessary to eliminate other weather factors, as well as other factors (technical, technological, environmental, economic). Based on this, the yield data is previously being "cleaned" with help of the trend (linear, quadratic and cubic), so that the remaining yield fluctuations depend only on the amount of water sediment (Schmitz, 2007).

The examination of the dependence between the actual average yield ($\hat{y}$) and monthly rainfall (x) is done from the function of first ($\hat{y} = a + bx$), second ($\hat{y} = a + bx + cx^2$) and the third level ($\hat{y} = a + bx + cx^2 + dx^3$). The impact of rainfall on the yield of soybean is being determined by calculating the correlation coefficients. The correlation coefficients are calculated in the following form (Hartung, 1998):

$$r_{XY} = \frac{\Sigma(x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sqrt{\Sigma(x_i - \bar{x})^2 \cdot \Sigma(y_i - \bar{y})^2}} \quad (1)$$

This way the strength of interdependence between the independent and dependent variables is being expressed. All necessary calculations are performed by using computer software (Statistics 8.0) where the data is processed by applying mathematical and statistical instrumentarium.

During the construction of weather put option the key issue is to determine fair premium, which the buyer is willing to pay for the transfer of risk. To determine the premium the burn-rate-method is used, where the fair premium is the expected discounted value of payoff from weather derivatives (Berg et al., 2005). Following the same methodology the other parameters necessary for the construction of weather derivatives (weather index, payoff function, payoff limit) are determined.

Using quantitative methods for risk estimation, it is determined whether the weather risk reduction (hedging) is more successful with or without weather derivatives. The paper applies the methods of stochastic simulation and value-at-risk. Concept of stochastic simulation compares the distribution function (cumulative density funcion) of the soybean revenue with and without weather derivatives (Brandes et al., 1992). On the other hand, the standard deviation as measure of dispersion in statistics and percentile in the revenue distribution is being considered, and based on that the possibility of down side risk reducing with and without weather derivatives are determined (Berg et al., 2005). All necessary calculations are performed using computer software (@ Risk), which was especially developed for the risk management.

Results and discussion

Weather derivatives are new financial instruments for transfer of risk, which occurred in mid-90's of the last century and appear in the form of weather futures, options or forwards. They are the financial instruments that do not consider the base value such as the price of traded goods or any other financial category, but instead they take into account weather variables, such as rainfall (Berg, 2005). When creating weather derivatives it is necessary to determine the following parameters: the type of derivatives, weather index, mathematical payoff function, meteorological station and accumulation period. Mathematical payoff

function is the basis of the weather derivatives and it includes the determination of a fair price, the strike level and the tick-size. A fair price is the expected discounted value of payoff from weather derivatives, the strike level represents the value of index from which the payoff is made, while the amount of payoff is determined with the tick size, which indicates the paid amount per unit index or change of unit index. Weather derivatives can be traded in stock exchange or over the counter - *OTC*. On the market of weather derivatives option trading is dominant (Becker et al., 1999).

The options belong to the group of forward conditional operations and the customer gains the right, but assumes no obligation to buy or sell a contract to expire on a certain day in the future, and in return, he pays a premium (Berg, 2005). So the buyer of a rainfall option is required to pay the optional premium, but he has the right to a payoff, based on the difference between the weather index and strike level. On the other hand, the seller takes the obligation and receives a premium.

There are call option and put option. Call option gives the holder the right to buy, and put option the right to sell contract and it is frequently used in the crop insurance. From the buyer side payoff of weather put option (I_p) arising from differences between the strike level (R) and realized weather index (x), multiplied with tick size (O) (Berg et al., 2005):

$$I_p = O \cdot Max\left[0,(R-x)\right] \tag{2}$$

In the event that the weather index is above the strike level, it does not come to the payment. The buyer of weather put option would this way be protected from too low index level. If the premium (P) is taken away from the payoff, it comes to the profit (D), which the buyer from the put option gets (Berg, 2005):

$$D_P^{DP} = O \cdot Max\left[0,(x-R)\right] - P \tag{3}$$

Based on the previous, the seller profit from the weather put option is calculated opposite from the buyer's gain, that is, the payoff is taken away from the premium (Berg, 2005):

$$D_P^{KP} = P - O \cdot Max\left[0,(x-R)\right] \tag{4}$$

For option pricing the burn-rate-method is used. Fair price (P_f) for the put option can be calculated in the following form (Berg et al., 2005):

$$Pf = \left[(R - E(x|x < R))\varpi(x < R) \cdot O\right] \cdot e^{-r \cdot n} \quad (5)$$

In this example, the expression $E(x|x < R)$ represents the expected value assuming that the weather index is below the strike level. The expression $\varpi(x < R)$ is the probability that the weather index is below the strike level, while ($e^{-r \cdot n}$) is the discount factor.

Weather derivatives are similar to the traditional insurance, but there are significant differences between them. The main advantage of weather derivatives in comparison to the traditional insurance is reflected in the fact that there is no moral hazard, adverse selection or damage estimation (Alaton et al., 2002).

However, weather derivatives have certain disadvantages compared to the traditional insurance, such as geographical and production-related basis risk (Mußhoff et al., 2005). The geographical basis risk refers to the distance between the field of production and the reference weather station, because greater the distance is, greater is the difference in the amount of water sediment or daily temperature achieved at the two locations.

On the other side, the production-related basis risk refers to the correlation coefficient between the yield of a crop and a specific weather parameter. If the correlation coefficient is lower, it will increase the production-related basis risk, thereby reducing the usefulness of weather derivatives. Therefore, this paper pays particular attention to the relation between rainfall index and yield levels of soybean.

Analysis of the interdependence between the weather factor (rainfall) and the achieved yield is only possible if there are available meteorological data for a long period of time, as well as updated monitoring of crop yields over a long period. Below is an overview of the achieved results of the regression and the correlation analysis of soybean in Vojvodina.

Table 1. *The correlation coefficients between the average yield of soybean and the rainfall in the period from 1975 to 2005 in some municipalities in Vojvodina*

	Bačka Palanka	**Bački Petrovac**	**Indjija**	**Irig**	**Ruma**	**Temerin**	**Titel**	**Žabalj**
March	0.12	0.00	-0.01	0.02	0.15	0.16	-0.02	0.01
April	0.41	0.22	0.35	0.06	0.28	0.39	0.12	0.41
May	0.43	0.32	0.21	0.18	0.26	0.32	0.30	0.23
Jyne	0.10	0.07	-0.04	0.06	0.02	0.33	0.21	0.16
July	0.38	0.39	0.65	0.44	0.49	0.36	0.32	0.39
August	0.16	0.30	0.27	0.29	0.33	0.52	0.34	0.50
September	-0.01	0.25	-0.19	-0.09	-0.02	0.11	0.29	0.04
October	-0.09	-0.21	0.08	0.03	0.04	-0.12	-0.12	-0.12
Mar-apr	0.34	0.15	0.23	0.06	0.28	0.36	0.07	0.28
Mar-may	0.50	0.29	0.29	0.15	0.35	0.44	0.22	0.33
Mar-jun	0.39	0.23	0.18	0.13	0.25	0.46	0.25	0.30
Mar-jul	0.53	0.40	0.48	0.33	0.46	0.60	0.38	0.47
Mar-aug	0.52	0.45	0.51	0.38	0.51	0.70	0.45	0.57
Mar-sep	0.45	0.46	0.39	0.31	0.44	0.63	0.46	0.50
Mar-oct	0.43	0.40	0.43	0.32	0.46	0.61	0.44	0.48
Apr-may	0.52	0.34	0.35	0.16	0.34	0.44	0.27	0.39
Apr-jun	0.41	0.27	0.21	0.14	0.24	0.49	0.30	0.35
Apr-jul	0.54	0.43	0.52	0.35	0.46	0.60	0.42	0.50
Apr-aug	0.53	0.48	0.70	0.40	0.51	0.71	0.48	0.61
Apr-sep	0.45	0.48	0.41	0.32	0.43	0.63	0.49	0.53
Apr-oct	0.42	0.41	0.44	0.33	0.44	0.59	0.46	0.49
May-jun	0.34	0.25	0.10	0.16	0.17	0.45	0.34	0.26
May-jul	0.50	0.44	0.50	0.40	0.45	0.58	0.47	0.45
May-aug	0.48	0.48	0.52	0.44	0.50	0.68	0.52	0.57
May-sep	0.39	0.48	0.37	0.34	0.41	0.60	0.52	0.48
May-oct	0.36	0.40	0.39	0.35	0.42	0.55	0.47	0.44
Jun-jul	0.35	0.34	0.46	0.37	0.38	0.49	0.38	0.40
Jun-aug	0.34	0.39	0.47	0.41	0.43	0.61	0.44	0.52
Jun-sep	0.27	0.40	0.32	0.30	0.34	0.53	0.45	0.44
Jun-oct	0.23	0.31	0.33	0.30	0.34	0.46	0.39	0.38
Jul-aug	0.35	0.44	0.61	0.46	0.52	0.53	0.40	0.54
Jul-sep	0.29	0.48	0.43	0.35	0.43	0.50	0.46	0.47
Jul-oct	0.22	0.33	0.41	0.32	0.40	0.39	0.36	0.37
Aug-sep	0.10	0.38	0.06	0.14	0.21	0.44	0.43	0.37
Aug-oct	0.03	0.19	0.10	0.14	0.21	0.30	0.30	0.24
Sep-oct	-0.07	0.01	-0.07	-0.04	0.01	-0.02	0.11	-0.06

The interdependence of monthly rainfall and the achieved yield of soybean is examined at eight sites in the thirty-year period. There is a positive correlation in most cases, which confirms that increased rainfall causes increased soybean yield.

Looking at some months it is evident that the highest correlation coefficients are in Srem and around Novi Sad. The highest positive correlation was recorded in July in Indjija (0.65) and Ruma (0.49). Low correlation is related to the municipality Bački Petrovac and Titel, where there is no high correlation between monthly precipitation and achieved yield of soybean (table 1).

If we observe a period of several months, the largest correlation is achieved between April and August (the vegetation period of soybean), which confirms the thesis that this crop requires more rainfall. Very high correlation coefficients were observed in the municipalities of Temerin (0.71) and Indjija (0.70). The relatively high correlation was recorded in all municipalities, except in Bački Petrovac and Irig, where the correlation coefficients do not exceed the value of 0.50 (table 1).

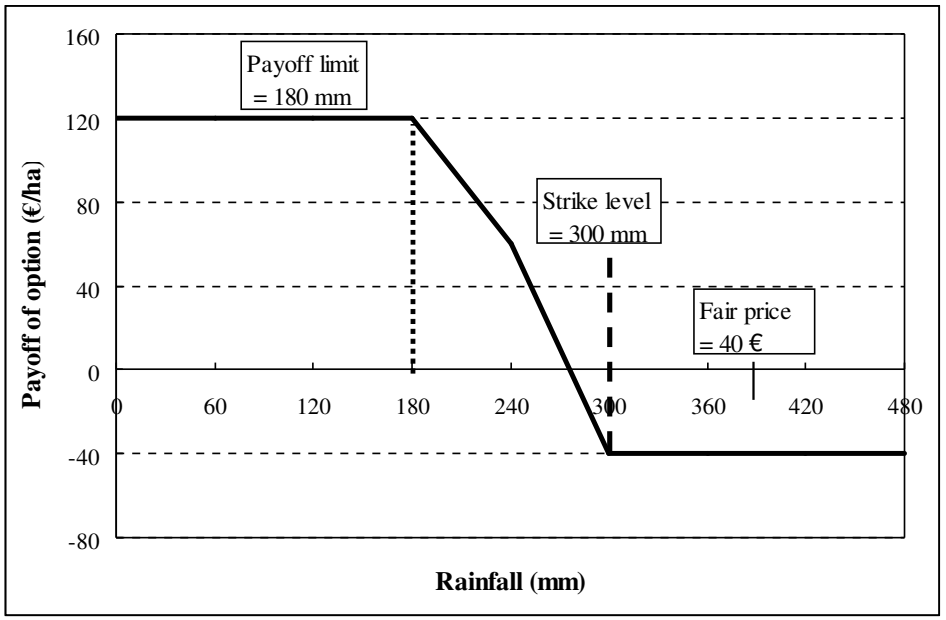
On the example of the soybean production the hedging effectiveness of weather derivatives is estimated. The basic data are taken from an individual farm in the eastern part of Srem. The average yield in the selected time amounted to 2 t/ha.

The average price was 400 €/t, and the revenue 800 €/ha. The analysis was conducted on the farm and it was determined that the amount of rainfall during the period April-August had a decisive influence on the height of soybean yield. In order to prevent yield variability farmer decides to buy rainfall put option on *OTC* market.

Data on rainfall were taken from a reference meteorological station. The weather index based on the monthly amounts of rainfall in the period from April to August is at the level of 300 mm, which is the strike level, while the tick size is 2 €/mm. The payoff is limited to 180 mm, which means that if the rainfall is below this level, it is not going to be paid more, but the payoff remains the same.

The weather contract is valid for two months and the payoff is possible if measured rainfall is below the strike level (chart 1). If in the formula (5) the discount factor ($e^{-r \cdot n}$) includes the interest rate of 5% and as the weather period the five months (April-August) are taken, you get the option price of 40 € (chart 1).

Graph 1. *Fair premium and payoff of put option in soybean production*



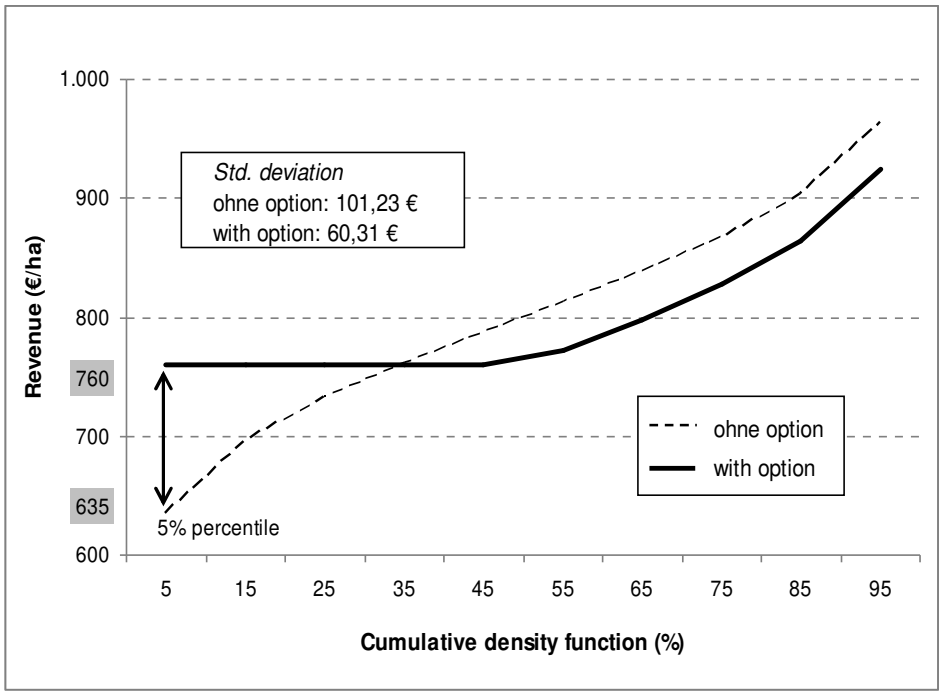
In order to determine the revenue with and without weather derivatives the method of stochastic simulation is used. In case without weather put option the total revenue is equal to the market revenue, while in case with option, the farmer adopts profit from the option according to the formula (3). Rainfall and yield are stochastic size and since there is a strong positive correlation between them, the revenue below 800 €/ha is compensated from the payoff of the put option. When the fair premium of 40 €/ha, is paid, it can be noted that the revenue under 760 €/ha is completely "cut off" and the lower revenue cannot happen (graph 2). The standard deviation is reduced from 101.23 €/ha (without option) to 60.31 €/ha (with option). This way the down side risk is significantly reduced (40.42%) (table 2).

If the percentile are taken as the measure of risk reduction, then the lower part of the distribution, where the lowest revenue is, is taken into account. In the case without option in the 5% years expected revenue is under 635.03 €/ha, while in the case with option it is increased to 759.62 €/ha. In case of option revenue of 759.84 €/ha instead of 5% will be lower in almost 35% of years (graph 2). This way with put option the down side risk is being reduced.

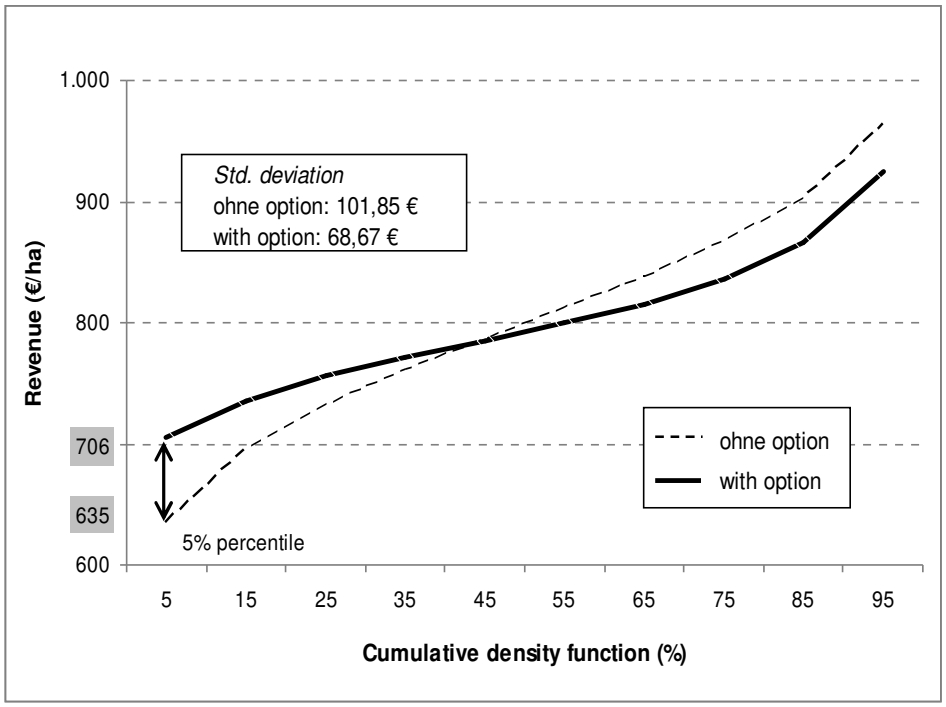
Table 2. *Risk reduction in soybean production with different correlation coefficients between weather index and yeald*

	Revenue without option	**Revenue with option**				
Correlation coefficient	1.0	1.0	0.9	0.8	0.7	0.6
Expected value (€/ha)	800.41	800.39	800.30	800.31	800.40	800.44
Standard deviation (€/ha)	101.23	60.31	68.67	75.06	79.27	82.96
Risk reduction (%)	-	40.42	32.16	25.85	21.69	18.05

Graph 2. *Revenue distribution of soybean with and without option (correlation coefficient +1.0)*



Graph 3. *Revenue distribution of soybean with and without option (correlation coefficient +0.9)*

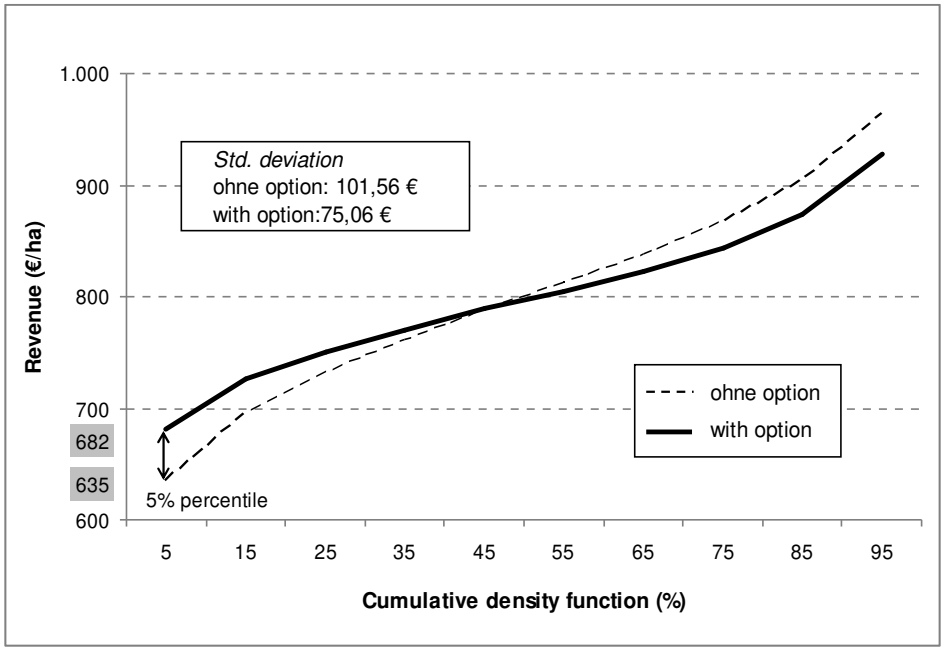


There is lower correlation between weather index and soybean yield (from +1.0 to +0.70) at a distance of 30 km from the farm in the eastern part of Srem to the meteorological station "Rimski Šančevi" in Novi Sad. The effect of efficiency weather put option significantly reduces with the advent of the associated risks (production-related basis risk and geographical basis risk).

At correlation +0.9 can not be ruled out possibility of lower revenue. In the case with option this probability is lower, but still lacks full compensation and risk reduction is 32.16% (table 2).

Looking at percentiles as a measure to risk reducing revenue of 5% percentiles without option (634.68 €/ha) increases to 705.99 €/ha, in case with option (graph 3).

Graph 4. *Revenue distribution of soybean with and without option (correlation coefficient +0,8)*



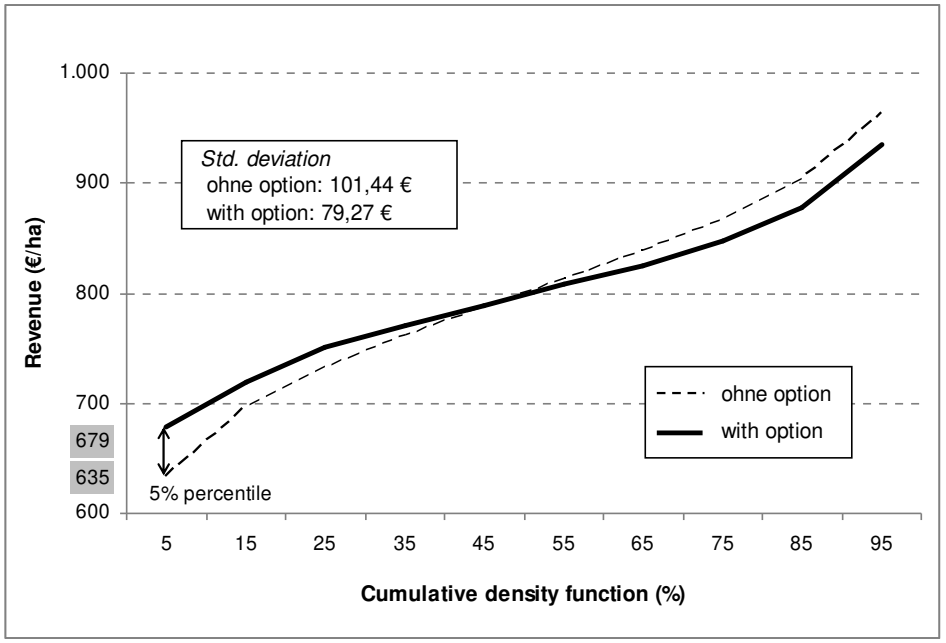
Further reduction of the correlation coefficient reduces the positive effect of weather derivatives. When correlation +0.8 is, standard deviation is reduced from 101.56 €/ha (without option) at 75.06 €/ha (with option). In this way risk reduction is 25.85% (table 2).

If we look the percentile of 5%, the revenue without option (635 €/ha) with correlation coefficient of +0.8, increases to 681.6 €/ha, in case with option (graph 4).

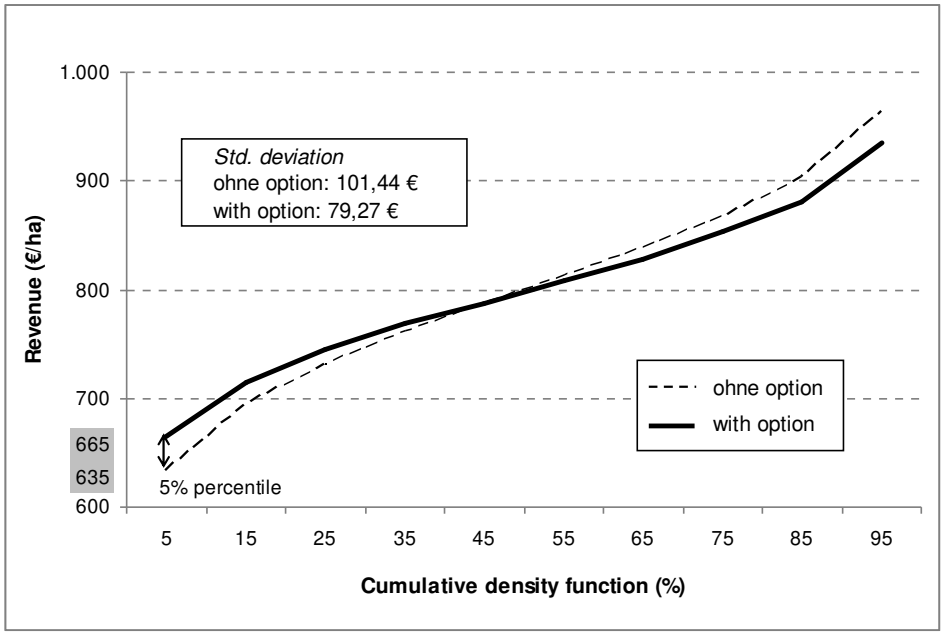
If we correlate +0.7, standard deviation has slight increase compared to previous correlation and in case with option is 79.27 €/ha, and thus the risk is reduced for 21.69% compared to the situation without weather put option (table 2).

When correlation +0.7 is, the revenue of 5% percentile is increased from 634.73 (without option) at 678.99 €/ha (with option) (graph 5).

Graph 5. *Revenue distribution of soybean with and without option (correlation coefficient +0.7)*



Graph 6. *Revenue distribution of soybean with and without option (correlation coefficient +0.6)*



If the correlation coefficient is even lower (+0.6) risk reduction is 18.05%, which is caused by the increase of the standard deviation to 82.96 €/ha (table 2). In this way the positive effect of weather derivatives is wearing and distribution curves (with and without option) almost overlap.

If we look the percentile of 5%, the revenue without option (633.57 €/ha) increases in all 664.75 €/ha (with option) (graph 6).

Conclusion

The presented example of the use of weather derivatives clearly shows that they still indicate the useful tools for weather risk reducing. Special emphasis is placed on reducing the oscillation of economic indicators (for example, revenue), caused by the weather factor.

By using weather derivatives mostly the crops that are distinguished by the amount of yield or that have a significant participation in the sowing structure are being insured. The creation of weather derivatives based on the amount of precipitation depends largely on the results of the correlation analysis of the mutual interdependence between the yield and the amount of water sediment. In order for weather derivatives to be successfully used, it is necessary to take into account specificities related to the impact of rainfall on yields. By analyzing the production of soybean it is evident that the amount of rainfall during the period from April to August has a relatively high impact on yield.

If the place of production is close to the meteorological station, and there is a strong correlation between weather index and yield of soybean, the effectiveness of risk reduction is significant (up to 40%). But if they are in remote locations and there is a lower correlation coefficient that significantly reduces the effect of protection. In practice, it is reasonable that a fair premium is increased with transaction costs and risk premium, which also reduces the positive effect of these instruments.

Based on the previous provisions, it follows that suppliers of weather derivatives should allow denser network of meteorological reference stations, they should offer a mixed-weather-index (for example, by combining the rainfall and average temperature) or weather index with data from several meteorological stations, as well as a wider range of different types of weather derivatives (for example, a combination of put

and call options when the rainfall is insufficient or abundant). 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 derivatives 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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AGRO-SECTOR IN VOJVODINA: FROM THE TRANSITION TO THE GLOBAL ECONOMIC CRISIS[1]

Veljko Vukoje[2], Aleksandra Figurek[3]

Abstract

The focus of this research is determining the success level of companies in the agro-sector (agriculture and food industry) and determining the main transition factors which indicated current financial conditions in this sector. The analysis covers companies in the agro-sector, on the territory of the Autonomous Province of Vojvodina, from 2001 to 2009, that is, the period which coincides with the most intense period of privatization in Serbia until the global economic crisis. Companies from agro-sector recorded negative financial results in six out of nine years of the period examined. Positive trends from the years of 2006 and 2007 were overturned in the last two years, mainly due to the negative impact of the global economic crisis. Recovery of this sector primarily requires considerable long-term funding provided from favourable resources, in combination with appropriate subsidies and other incentive measures.

Keywords: *agro-sector, financial analysis, transition, economic crisis.*

Introduction

The Autonomous Province of Vojvodina is the most developed agriculture region in the Republic of Serbia and, at the same time, a rich raw material base for food industry. Therefore, Vojodina's agro-sector[4] is one of the most important economic domains, which is clearly reflected in its contribution to the economic recovery of the country. Vojvodina has

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[4] In this paper, term „agro-sector" includes agriculture and food industry.

1641067 hectares (ha) of high quality land capacities, or 0.81 ha *per capita*, which is considerably higher than in the most countries of the European Union (EU). Family farms are absolutely dominant, but agricultural enterprises play important role as well. About 521000 ha or 29,3% of total arable land is property of agricultural enterprises, while 57% of total agricultural products sales come from these companies *(Statistical office of the Republic of Serbia, 2009).*

The transition process in the Republic of Serbia coincides with the nine-year period analysed (2001-2009). Although some positive effects were recorded, the privatisation did not bring the expected results. There are still some major problems in business: slow conquest of new markets, presence of domestic market monopoly, insufficient protection from excessive imports, unfavourable terms of trade, lack of own accumulation, expensive borrowing capital, high inflation rate, etc. *(Vukoje and Vukelic, 2010, p. 95)*. Despite these problems, the agro-sector is the only economic area in which Serbia recorded a significant surplus in foreign trade for the last several years. Successful finalising of the privatisation process together with providing additional financial resources (especially foreign direct investments) gives an opportunity for companies in the field of agriculture and food industry to be equally competitive on the EU market.

Similar steps were made towards establishing market conditions in early transition period in Bulgaria, but these measures did not bring the result immediately. Bad economic legacy from the past and insufficient volume of structural changes caused gross domestic product decline, high inflation, weakening of the national currency and high interest rates. It took almost half of a decade to notice the first effects of the economic system reforms in Bulgaria (*Ivanova et al., 2003, p. 818*). It is exactly the intensifying of privatisation process that should solve the problems which arose during the ownership transformation process. Accordingly, the transformation process dynamics represented one of the main factors in attracting foreign direct investments in Poland, as well as in improvement of business efficiency of the agro-industrial complex (*Walkenhorst, 2001, p. 393*).

The model of privatisation can determine economic success. The countries which had the gradual model of privatization reach higher output levels than those countries which had privatization on the principle of mass and fast renunciation of state ownership (*Jugovic et al., 2010, p.*

124). Futhermore, *Basti and Bayyurt* (2008, p. 28) comparing productivity between domestically-owned and foreign-owned firms in Turkey, find that companies which have received higher level of foreign direct investments are more efficient and achieve better financial results. However, *Vissak* warns that it is hard to predict all the effects of foreign direct investments since they can change over time (2009, p. 48). *Skabic and Orlic* emphasise that the majority of foreign direct investment inflows in Croatia has gone to the service sectors (financial intermediation, post and telecommunication) which are oriented to supply the domestic market (consumption) and only small part of foreign capital was invested in domestic production such as: chemical industry, manufacture of coke, manufactures of food products and beverages, etc. (2009, p. 8). Moreover, raising the level of education and market integration of the farms were the most important determinants for solving structural problems and problems in efficiency of the Polish crop and livestock farms during the transition period (*Latruffe et al., 2004, p. 1262*). *Jasinskas and Simanaviciene* conclude that different programmes of education help farmers in Lithuania to achieve better results in production through higher level of professional knowledge (2008, p. 71).

Although companies from agro-sector were leaders in the field of knowledge application and modern technology implementation and had a considerable share in developed foreign markets, perennial crisis in the nineties has led to the loss of leadership position, while a great deal of the companies passed to the group of inefficient economic subjects. Since the privatisation process in Serbia is at the final stage, the research efforts made in this article are aimed at determining the achieved efficiency level of companies from agro-sector, and also perspectives in their future development.

Material and Methods

The focus of the research is the enterprises from agro-sector (ASEs) on the territory of AP Vojvodina. Data from annual accounts is used, as well as data from cumulative balance for the nine-year period (2001-2009), collected and processed by the National Bank of Serbia (NBS). This implies that only companies are included in the research (companies and cooperatives), but not the entrepreneurs and family farms.

It is primarily a balance analysis, which means that appropriate methods for this type of analysis are used (parsing, time and spatial comparison,

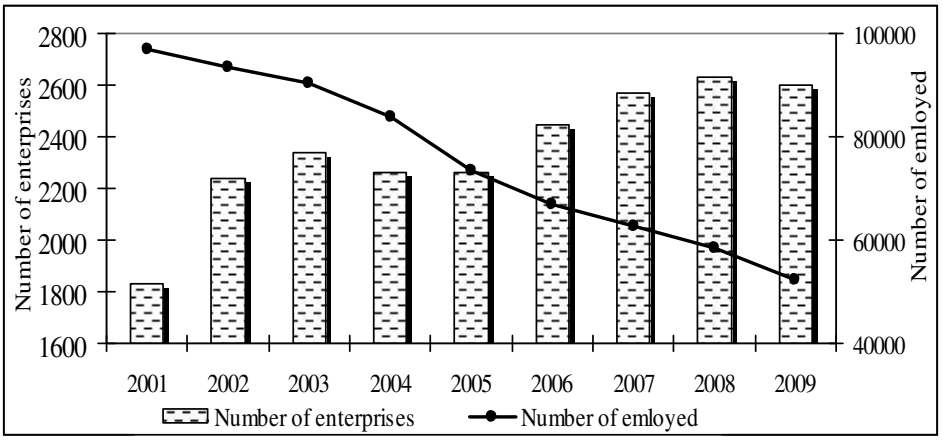
certain mathematical and statistical methods, etc.). The analysed period (2001-2009) allows determining trends in major financial indicators for enterprises from agro-sector during the transition period. Spatial comparison with the results of Vojvodina's overall economy enterprises (ECEs) was done, as well.

Aggregate financial balance values are presented in euros due to significant dinar (the Serbian national currency) devaluation (60.6%) and high inflation (125.7% cumulative) during the nine-year period. In order to obtain as accurate and comparable data as possible, the official euro exchange rate at the end of the (each) year was used for a balance sheet, and the corresponding average annual exchange rate for income statement (*Table 1).*

Results and Discussion

In the analysed period there were between 1828 (2001) and 2597 (2009) enterprises involved in the agro-sector in Vojvodina, which represents an increase of 42.1% (*Figure 1*). Out of the total number of ASEs, small-sized businesses account for 85.8%, medium-sized 10.8% and large business only 3.4% (2009). On the other hand, the number of ECEs in the Province has increased in the analysed period from 16 671 (2001) to 22 740 (2009), or by 36.4%. ASEs account for 11.4% (2009) of the total number of companies in Vojvodina.

Figure 1. *Companies and employees in the agro-sector in Vojvodina*



Source: *Author's calculation based on NBS.*

During this period, the number of employees in agro-sector decreased from 96 872 to 52 384, or by 45.9% (ECEs: from 336 238 to 245 690 or by 26.9%). The agro-sector of Vojvodina employs 21.3% (2009) of the total number of employees in the Province. Despite an evident increase in the number of small-sized and medium-sized enterprises, this did not stop the process of reducing the number of employees in large companies. This can be explained by the fact that more and more of high productivity equipment is being put into use, thus successfully substituting labour force.

The privatisation process also means a labour shift from agriculture to secondary and tertiary industries which are expanding..It is important that the state has taken part in financing the existing labour surplus caused by the new market conditions. In this way, the companies were expected to become more attractive to potential buyers (*Stosic, 2007, p. 40*).

Similar tendencies were recorded in most East European countries during the transition. The outflow of labour from agriculture was caused by productivity growth due to an increased level of technical equipment (*Sarris et al., 1999, p. 314*). Taking into account agricultural farms reconstruction in Bulgaria and Hungary before EU accession, *Mathijis and Vranken (2000, p. 15)* emphasise that family farms were able only to raise efficiency in crop production while corporate farms played crucial role in milk production. Moreover, *Gorton and Davidova (2004, p. 13)* argue that improving the institutional environment for small farms in the Central and Eastern Europe countries could be more beneficial than appeals for farm amalgamation.

ASEs possess assets worth 5652 million euros (*Table 1*), which makes about 24.7% of the total assets of Vojvodina's economy. Agriculture companies have in possession 43.9% of the total agro-sector assets, while the rest belongs to companies from food industry. During the nine-year period, ASEs have increased their assets by 81.8%, significantly less than the overall economy increase of 109.7%.

Table 1. *Assets of ases (in 000.000 €)*

No	P O S I T I O N	2001	2003	2005	2006	2007	2008	2009
1	Non-current assets	1973	2158	2253	2811	3133	2880	2851
2	Current assets	1136	1502	1545	2083	2765	2973	2801
3	Total assets (1+2)	3108	3661	3799	4894	5898	5853	5652
4	1€ = RSD[5]	59.71	68.31	85.5	79.0	79.24	88.6	95.89
5	1€ = RSD[6]	59.78	65.05	82.92	84.16	79.98	81.44	93.95
6	Inflation rate (in%)	38.7	7.8	17.7	6.6	11.0	8.6	6.6

Source: *Author's calculation based on NBS.*

When it comes to aggregate balance sheet, the loss above the value of capital position is also present. Its value in the last year of the observation was about 149.3 million euros, or 2.64% of total assets (ECEs: 984.8 million euros, 4.12%). This means that there are enterprises from agro-sector which have lost their equities bringing themselves in position to have serious problems with setting their liabilities. However, as the privatisation process is getting to the end, the share of the position of loss above the value of capital in balance sheet gradually weakens. This suggests that despite some problems during the ownership transformation process, there are certain positive effects, initially manifested as financial result improvement. *Kominek* (2004, p. 1029) points out that privatisation in East European countries (the Czech Republic and Poland) led to development of the financial market, which is directly linked to economic growth in these countries.

As a result of increased business activity and increased large-scale production and finished products sales, there was an increase in participation of ASEs current assets by 13.1% (ECEs: by 5.8%). Despite the growth of current assets percentage, non-current assets share still dominates in the structure of total assets. This is quite expected, primarily due to the agriculture and substantial proportion of the land value, which otherwise is not amortized. In the period to come, a significant growth of ASEs non-current assets value is expected, primarily because of the necessity for replacing economic and technologically obsolete equipment.

[5] Exchange rate of the Serbian national currency against the euro (at the end of the year)
[6] Exchange rate of the Serbian national currency against the euro (annual average)

Analysis of financial result

ASEs increased the total income during the analysed period by 60.7% (ECEs: by 76.8%) (*Table 2*). However, the total income growth did not have the expected dynamics. As a consequence of the global economic crisis, there was a decline in the total income in 2009 by 18.0% compared to 2008. Although agro-sector has a 22.9% share in the total income of Vojvodina's economy, there is a decrease of its contribution, primarily because of the rapid development of finance and service sectors.

Table 2. *ASEs' income statement (in 000.000 €)*

No	P O S I T I O N	2001	2003	2005	2006	2007	2008	2009
1	Operating income	2364	2611	2717	3247	4023	4643	3835
2	Financial income	17	25	42	105	96	145	90
3	Non-operating income	167	215	149	198	214	201	168
4	Total income (1+2+3)	2547	2851	2908	3550	4333	4990	4093
5	Operating expense	2243	2662	2670	3208	3881	4447	3660
6	Financial expense	91	114	131	125	175	327	243
7	Non-operating expense	201	196	124	140	246	218	232
8	Total expense (5+6+7)	2534	2972	2925	3473	4302	4992	4135
9	Gross financial result (4-8)	12.7	-120.8	-16.7	77.5	30.5	-2.2	-41.1
10	Income tax	5.6	6.2	5.1	4.2	12.8	14.5	12.5
11	**Net financial result (9-10)**	**7.0**	**-127**	**-21.8**	**73.2**	**17.7**	**-16.7**	**-53.7**
12	Profit rate (11/4) x100	0.28	-4.45	-0.75	2.06	0.41	-0.33	-1.31

Source: *Author's calculation based on NBS.*

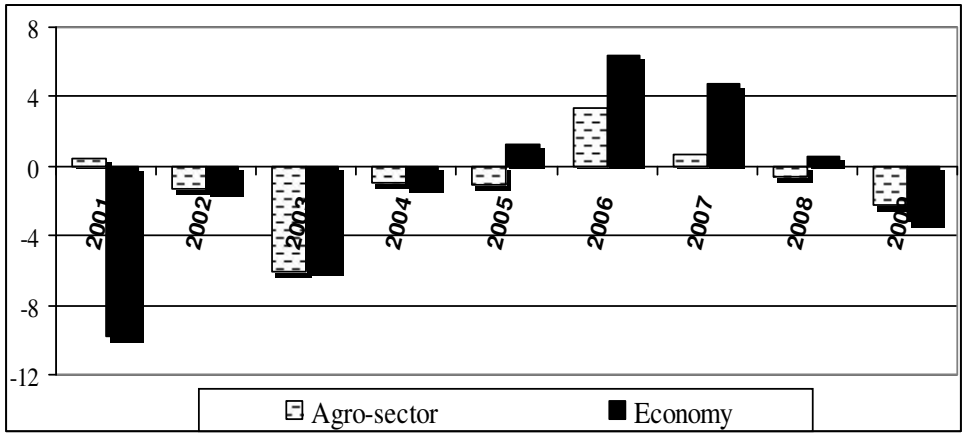
Similar tendencies were recorded in Slovakia during the transition period, where the agriculture lost the primary role in economy due to high disparities in price of agricultural and food products (*Sevcikova, 2003, p. 24*). Participation of ASEs non-operating incomes exceeds the usual level of this balance position in the total income. Non-operating incomes accounted for 5.4% on average, mainly due to unregulated business conditions during the transition.

ASEs spent 4.3% of the total income on average to cover financial expenses. Due to the deterioration of business conditions and the increasing need for borrowing, their load has reached 5.9% (ECEs: 5.8%) during the second half of the examined period. In the period from 1980 to 1983 the financial burden on financial expenses was 2.75% on average (*Duvnjak, 1989, p. 130*). Participation of the total agro-sector financial expenses should not exceed 3.5% even in the more favourable business conditions. Taking into account slow capital turnover in agriculture and generally unstable economic conditions in agro-sector, it is obvious that the additional burden of financial expenses contributes significantly to poor financial result. An unusually high percentage of the total income goes on covering ASEs' non-operating expenses, averaging around 5.5% (ECEs: 6.1%).

ASEs recorded a positive financial net result only in three out of nine years (2001, 2006 and 2007). During the period of 2001-2009, the total net loss of 165.7 million euros was recorded, causing an equity loss of about 6.9%. The overall economy was a bit more successful, and recorded a positive financial result in the period from 2005 to 2008. Considering the whole period of interest, however, the economy has lost about 2.4% of its equity, too.

Agricultural companies contribute decisively to the total agro-sector loss with total net loss of 165.7 million euros, while food industry companies achieved a net gain of 139.8 million euros in the nine-year period (*Vukoje and Vukelic, 2010, p. 98*). Futhermore, agricultural companies have achieved negative financial results since 1997 (*Vukoje and Obrenovic, 2005, p. 284*). In the agro-sector domain, a number of companies recorded a positive net financial result. However, out of the total number of ASEs (1398) that recorded a positive net financial result, even 82.9% are small-sized. It is clear that medium-sized and large-sized enterprises from agro-sector determine the success level of this part of economy. The loss these companies made is much greater than the positive result achieved by the successful ones. One can notice that negative impacts of the global economic crisis have been reflected on ASEs business results. The positive business trend from 2006 and 2007 was interrupted, forcing the companies to cross the border of the loss zone again. The overall economy has also seen similar trends, but passed into the loss zone only in 2009. It is clear from the above that neither the other major success indicators can be good. This is best illustrated on profitability, an indicator that reflects ability of the invested capital to gain some profit *(Figure 2)*. The equity rate was calculated from the ratio between net financial result and equity.

Figure 2. *Profitability rates of equity (in %)*

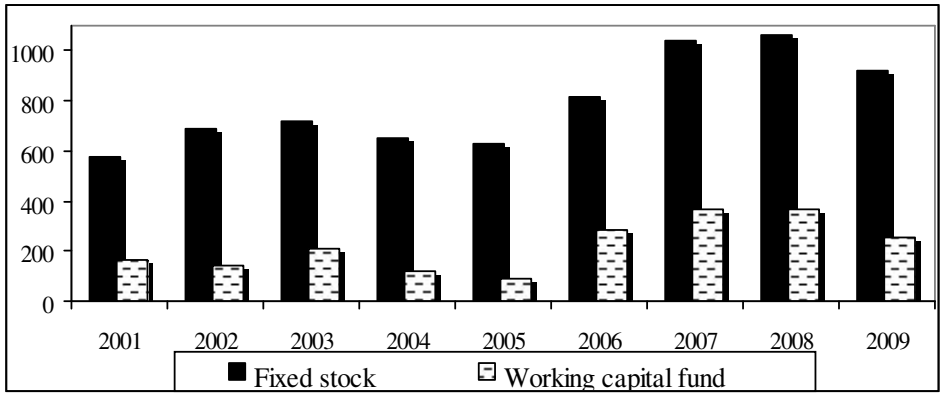


Source: *Author's calculation based on NBS.*

Analysis of financial structure

Analysis of financial balance, in this paper, is based on the net working capital (NWC), and the indebtedness level. NWC is calculated as a difference between long-term finance resources and fixed assets or as a difference between current assets and current liabilities. Financial balance is checked by comparing NWC and fixed stock. If NWC is equal to or greater than fixed stock, then there is a financial balance. ASEs records unfavourable financial structure, confirmed by low level of NWC fixed stock coverage, 28.5% (2001) and 27.5% (2009) *(Figure 3)*. Despite some ASEs financial structure improvement recorded in 2007 and 2008,

Figure 3. *Coverage of the fixed stock of net working capital (in 000.000 €)*



Source: *Author's calculation based on NBS.*

culmination of the global economic crisis in 2009 caused deterioration of this ratio. Companies in this field were forced to rely largely on short-term financing resources, also facing serious problems with liquidity.

Considering the economy as a whole (ECEs), the financial balance is even worse. Moreover, the NWC value was negative in the first five years, while in 2009 NWC covered only 0.50% of fixed stock. Although positive values of this indicator were recorded in the last few years, it was not enough to maintain the liquidity of ECEs. Unfavourable financial structure of ASEs is mainly a result of many years of operating with loss. Additionally, it is important to take into account the fact that length of the production cycle, seasonality and crop rotation requirements in agriculture, as well as seasonal character of input supplying in food industry calls for high level of fixed stock in agro-sector. For these reasons, it is important for the companies in agro-business to ensure as high coverage level of NWC fixed stock as possible. Since this is hardly feasible in current circumstances, ASEs rely more and more on short-term fund sources, which is quite an unfavourable option in Serbia.

Within ASEs current liabilities, it would be more favourable if the funds were provided predominantly from short-term loans rather than from other current liabilities. However, due to fairly unstable conditions and high risk in the financial market in Serbia, companies were forced to take out short-term loans at much (3 to 4 times) higher interest rates compared to the acceptable values.

Analysis of the indebtedness is based on the overview of fund sources structure. According to the general theoretical principle, the ratio between equity and liabilities should be 1:1. However, it is necessary to take into consideration other factors. The nature of business activity determines to a great extent the ratio between equity and liabilities, and in this sense, it is important to have in mind that the agro-sector is characterized by slow capital turnover and low accumulation ability. It would be more beneficial if this ratio were at least 55% : 45% in favour of its own fund resources.

The indebtedness level of ASEs has increased from 31.8% to 58.2% *(Table 3)* (ECEs: from 62.4% to 63.9%). By correlating this with other relevant factors, such as a relatively favourable organic composition of capital (50.4%), high inflation rate (13.9% on average) and low profitability, it is clear that ASEs have unacceptably high indebtedness level.

An additional burden for ASEs is the fact that 77.6% (2009) of the total liabilities are short-term, making the rate of short-term debt reach 45.1% (ECEs: 45.3%).

Table 3. *Indebtedness and solvency of ASEs (in 000.000 €)*

No	P O S I T I O N	2001	2003	2005	2006	2007	2008	2009
1	Equity	1925	2065	1966	2476	2733	2491	2366
2	Non-current liabilities	208	293	374	623	766	754	738
3	Current liabilities	978	1306	1459	1796	2399	2608	2550
4	Equity and total liabilities (1+2+3)	3112	3664	3799	4894	5898	5853	5653
5	**Rate of total indebtedness (2+3) /1x100** (in %)	**38.1**	**43.6**	**48.2**	**49.4**	**53.7**	**57.4**	**58.2**
6	Rate of long-term liabilities (2 /1) x100	6.7	8.0	9.8	12.7	13.0	12.9	13.1
7	Rate of short-term liabilities (3 /1) x100	31.4	35.7	38.4	36.7	40.7	44.6	45.1
8	Organic composition of capital	63.5	59.0	59.3	57.4	53.1	49.2	50.4
9	Inflation rate	38.7	7.8	17.7	6.6	11.0	8.6	6.6
10	Solvency	2.62	2.29	2.07	2.02	1.86	1.74	1.72

Source: *Author's calculation based on NBS.*

In present conditions, ASEs are forced to increase their debt, which further increases the financing cost moving the finance structure towards the liabilities. As a serious problem, there is also a reduction of ASEs solvency ratio from 2.62 to 1.72 (ECEs: from 3.6 to 1.73). In addition, the companies in this field were burdened with financial expenditures, as they took out loans mostly in euros and in the meantime the national currency has weakened considerably. High indebtedness level was affected in a good part by a conceptual mistake in the law on privatisation. New owners are obliged to invest in a company, but there is not a word about sources of the capital to be invested. As a consequence, it is quite common that new owners fulfil their investment obligation, not by relying on own resources, but by increasing the company's debt even further by bank loans.

Possibilities for improving financial result and financial structure

Preceding paragraphs clearly show the major problems in the domain of profitability and financial structure of agriculture enterprises. It was also pointed out to the fundamental causes of such a state and their strong relationship through losses and high finance expenditures. In the following paragraphs, we point out to the basic alternative solutions, those appropriate for this type of analysis based on aggregate balances and which are realistically achievable in our country. The structure of financial result is discussed as well as distribution of business income.

In order to determine the main causes of ASEs unprofitability, it is necessary to analyse gross financial result *(Table 4).* In this way, we determine which incomes and expenditures are responsible for the unfavourable financial results. The result from ASEs financial incomes during the analysed period had negative values, which is understandable since the companies in this field are not primarily engaged in fund lending business. It is also important that only in 2003 ASEs recorded a loss from the ratio between operating incomes and expenses. In the same year extremely unfavourable climatic conditions were recorded, as well. What is encouraging is the fact that in the last four years ASEs achieved positive result from the operating and financial activities. During the transition period when the income and expense values are prone to variations, the result from operating and financial activities is a key factor of success.

Table 4. *Structure of ASEs' financial result (in 000.000 €)*

No	P O S I T I O N	2001	2003	2005	2006	2007	2008	2009
1	Result from operating activity	121.0	-50.5	47.8	39.5	141.9	196.1	175.2
2	Result from financial activity	-74.0	-88.8	-89.1	-19.9	-79.4	-182.0	-152.7
3	**Result from operating and financial activities (1+2)**	**46.9**	**-139.3**	**-41.3**	**19.6**	**62.5**	**14.1**	**22.6**
4	Result from non-operating activity	-34.3	18.5	24.6	57.9	-32.0	-16.3	-63.7
5	Gross financial result (3+4)	12.7	-120.8	-16.7	77.5	30.5	-2.2	-41.1

Source: *Author's calculation based on NBS.*

ECEs recorded a gain from the operating and financial activities only in 2006 and 2007. According to this criterion, agro-sector is more successful than the rest of the economy in Vojvodina. Although ASEs have succeeded in achieving positive results, high financial expense remains the biggest problem. It has led to the fall of the gross financial result and deterioration of liquidity at the same time.

However, the question is why ASEs are forced to borrow, why they do not achieve operating income large enough to cover the loss made from financial and non-current expenses? When analysing causes of business failure, it is necessary to address sub-balance of operating income and expenses *(Table 5).*

Since the official income statement is made according to the "total cost method", for the purpose of this analysis, the effect of inventories variation was excluded from both income and expenses using a special computational procedure. In doing so, the Result from operating activity remained unchanged.

Table 5. *Indicators of distribution of ASEs' operating income (in 000.000 €)*

No	P O S I T I O N	2001	2003	2005	2006	2007	2008	2009
1	Operating income (sales and services)	2247	2570	2676	3209	3925	4568	3845
2	Variable expenses	1655	1981	2025	2485	3048	3578	2990
3	Gross salary costs	206	303	355	401	414	452	379
4	Margin coverage (1-2-3)	386	286	296	323	463	538	476
5	Fixed costs	265	337	249	283	321	342	301
6	Result from operating activity (4-5)	121.0	-50.5	47.8	39.5	141.9	196.1	175.2
7	**Global price parity: purchase prices = 1 (1/2)**	**1.358**	**1.297**	**1.321**	**1.291**	**1.288**	**1.277**	**1.286**

Source: *Author's calculation based on NBS.*

The share of gross salary costs in the distribution of sales income increased slightly in the given period from 9.16% to 9.86% (ECEs: from 8.18% to 10.77%). Significant reduction in the number of employees (by 45.9%) was compensated by salary increasing. However, given that

monthly net income is still quite low (about 325€), further staff reduction should be followed by improving of technical equipment, which in turn would cause an increase in fixed costs (amortization, insurance, interest rates). Thus, there are no significant reserves here for improvement of operating result.

The share of fixed costs has decreased from 11.8% to 7.83% (ECEs: from 12.78% to 8.23%). The achieved level of fixed costs is not too high, but there are certain reserves, primarily in the domain of overhead costs even though they are difficult to quantify precisely.

It is obvious that the major problem in operating income versus variable expense relation can be represented through the coefficient of global parity between sales and purchase prices (*Table 5, row 7*). Of course, this coefficient depends not only on the balance of sales and purchase prices, but also on the cost of physical consumption of major inputs. This indicator records a significant decline from 1.358 to 1.286, particularly in the last four years. Global parity of the overall economy was at lower level on average, but with much less decline in the analysed period (from 1.296 to 1.281).

Agro-food markets have distinct features from industrial sectors that are potentially important in determining trade liberalisation impacts (Tamini *et al.*, 2010, p. 454). Additionally, when analysing the global price parity, it is important to note the difference in the agro-sector between agriculture and food industry. Agriculture has a much worse position in the primary distribution than the food industry. By low purchase prices of primary agriculture products, a part of the accumulation overflows right into the food industry. The similar goes for the industry branches that produce inputs (fertilizer, fuel, pesticides, etc.). While in the preceding socio-economic system capital accumulation overflow from agriculture to industry was a result of planning policy to maintain the social status of the population through low food prices, now it is mainly the result of:

- unregulated relations on domestic market,
- monopolies imposed by processors and buyers of agriculture products,
- difficult access to the markets of developed countries, mainly due to difficulties in meeting quality standards,
- insufficient level of non-tariff protection of domestic market,
- inadequate agriculture policies, etc.

In particular, one should point out the subsidies, which are not only insufficient, but very often incorrectly measured. Agriculture companies are mainly excluded from the basic form of government subsidies given per hectare of cultivated land. These subsidies are granted only to registered farms (private farmers). Although modest in amount (ranged from 80 to 130 €/ha), these subsidies would have a significant effect on financial result of agriculture companies in Vojvodina, and thus on the overall agro-sector. This measure would burden the budget of the Republic of Serbia with about 44.33 million € a year (about 100 €/ha stimulation on 443 342ha of cultivated land on average), which is not a too large amount, especially when we take into account feedback benefits. By applying these measures in the past nine years, along with other unchanged conditions, ASEs would have achieved a positive financial result in all the years of the examined period, except 2003. In turn, this would have had a strong impact to all the parameters of the financial position, especially on the indebtedness level.

Conclusion

ASEs had serious problems with profitability and liquidity during the period between 2001 and 2009. Due to drastically disrupted financial structure and high finance expenditures, companies can hardly get out of loss area. Based on the result of the research, the fundamental guidelines for improving the ASEs financial status should be: reducing the cost of financing by providing more favourable long-term finance sources, export increase, primarily to the EU market, as well as price parity improvement in favour of agriculture.

One of the ways of solving the funding problems and improving financial structure is recapitalization. In addition, the government in cooperation with banking sector should provide conditions for refinancing of one part of the most expensive loans, and converting the short-term loans to long-term ones.

ASEs records large market surpluses of final products, but because of poor absorbing ability of the market, most of these products are sold at prices on the verge of profitability. Due to low demand level in domestic market and large supply of agriculture and food products, companies in this field are forced to turn to the foreign markets. Along with strong support of the state in subsiding production, standardisation of products and marketing of domestic products, it is necessary to increase the

existing level of exports that is far from the real potential of the agro-sector. Additionally, it is necessary to act in the direction of improving terms of trade in agriculture. By preventing monopolies on the market of food and agriculture products and precluding high price fluctuations, the government should take a more active role in improving financial status of agro-economy. Only in this way, the companies in the field of agro-sector can pass into the group of profitable business entities.

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ORGANIZATIONAL LEGAL ASPECTS OF CLUSTERS IN THE REPUBLIC OF SERBIA[1]

Vesna Paraušić[2], Branko Mihailović[3]

Abstract

In theory and in practice, clusters, as specific form of economic entities association, differ significantly. Theoretically defined, a cluster is often hard to recognize in practice, especially in transitional and less developed countries. There are many dilemmas in scientific and professional public about the legal form of clusters. The most frequent perplexities are regarding clusters' legal aspects issues (is it necessary or obligatorily for cluster to be registered or not?), legal forms in which it can function, internal clusters organization (authorities, rights and obligations of members, etc.). This paper will be focused at a discussion of organizational-legal aspects of clusters in the Republic of Serbia. Base for this issue analysis and drawing conclusions will be a case study (analysis of organizational-legal form of a cluster in the field of Serbian food industry), the analysis of legal documents which regulate the issues of establishment and work of clusters in the Republic of Serbia, as well as the analysis of the governmental documents in the field of clusters motivation in domestic economy.

Key words*: clusters, associations, organization, legal form*

Introduction

In theoretical and practical sense, the most frequent perplexities are regarding clusters' organizational-legal functioning. The most common questions of professional and scientific public and especially economic

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entities, which show an intention to join clusters, are in the field of clusters' legal registration, organizational structure and a way of clusters functioning. In this paper, the authors tried to explain the clusters organizational-legal issues and thereby offer a contribution to legal entities, entrepreneurs, as well as scientific-educational institutions (scientific institutes and faculties) and regional/local authorities in concrete activities linked to a foundation and work of clusters.

Research methodology

In accordance to a desk research, i.e. a review of comprehensive world literature on clusters was given, first of all, a definition of a cluster and review of basic characteristics of this form of economic entities networking. The desk research has also served for consideration of an issue if a cluster has to be legally registered or not, as well as which has been the most often legal form of clusters organization, in case it had been registered.

An accent in the paper was put on organizational-legal issues of clusters functioning in economy of the Republic of Serbia. The clusters base in Serbian economy has the Ministry of Economy and Regional Development[4], , but much wider clusters base, used in the paper, was get via the Serbian Business Registers Agency[5], where are immanent all clusters in the republic with legal registration. Over the search base of legal entities and entrepreneurs of the Serbian Business Registers Agency, by typing a word „cluster" in a field „business name" we came to a number of clusters in domestic economy. In this way was get a list of all legal entities and entrepreneurs who have in their name a word cluster, which means that they tend to do business after the cluster principle. Analyzing available data of these economic entities, also via the base of the Serbian Business Registers Agency, has come to the data in which legal form the clusters have been registered. It is necessary to emphasize that the number of registered clusters in the Republic of Serbia's economy is greater for those clusters which tend to function as clusters, and in their

[4] Serbian Clusters have started to develop in the period 2004-2005, along with support of the Ministry of Economy and Privatization, later the Ministry of Economy and Regional development. Internet presentation of Serbian Clusters: http://klasteri.merr.gov.rs/Klasteri-u-Srbiji

[5] http://www.apr.gov.rs/

name they do not contain a word cluster, then for the clusters which have not been registered in the Serbian Business Registers Agency, as well as for the clusters which have no legal registration, while in practice they function on cluster principle.

Regarding that the greatest number of legal entities and entrepreneurs in the Serbian Business Registers Agency, which has no word cluster in their name, is registered as an association, there has been in detailed analyzed the Law on Associations from 2009, in order to present the most significant legal clauses and organizational aspects of clusters functioning. The research was completed by a case study, in which was analyzed a statute of clusters\associations of food products „Polux", with locality in Kikinda.

Concept and basic characteristics of clusters

The clusters are highly complex phenomenon which is not easy to define. While some types of clusters are easy to recognize (classical examples Silicon Valley or Fashion Cluster in Milan, or Swedish Cluster of Cellulose and Paper), in most of cases in practice it is about more or less border situations of cluster existence, i.e. the existence of certain level of enterprises concentration in the same or similar industry with certain level of developed cooperation among actors[6]. In addition are several definitions of clusters:

- Professor Porter defines a cluster as geographic concentration of mutually connected companies and institutions in certain activities field (one business field) or, again, as a critical mass of enterprises and institutions at the same place, of unusual competitive success in certain fields of activity[7].
- According to Innobarometer 2006, the clusters are groups of correlated enterprises, suppliers, service providers and associated institutions in certain field of activity/business, which are geographically, located one close to another[8].

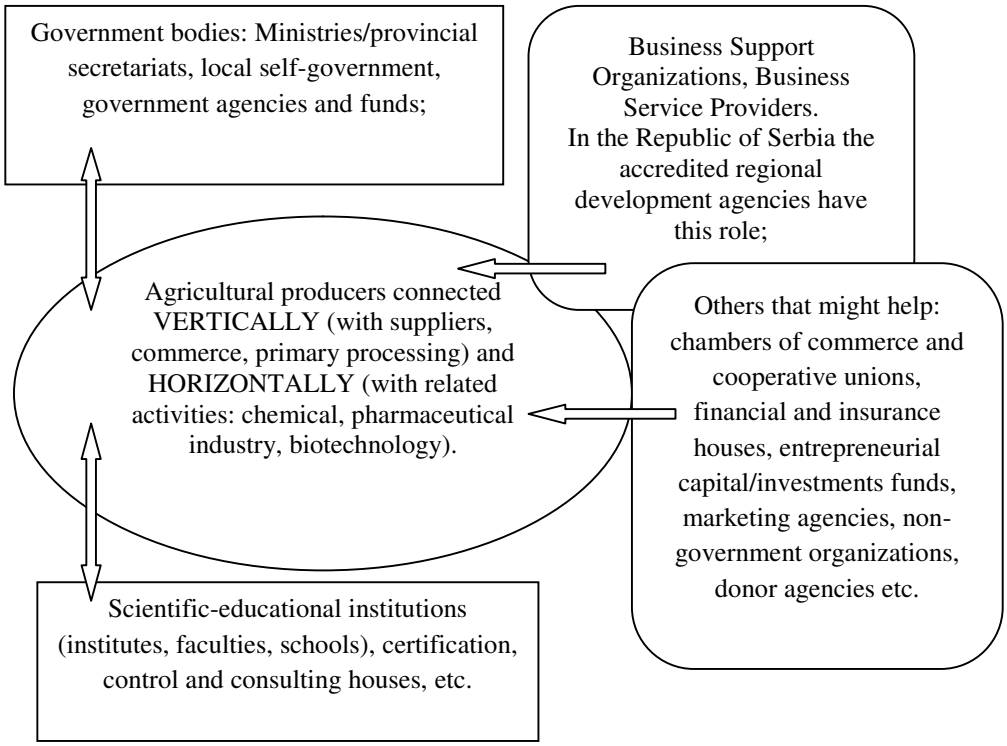
[6] Innobarometer on cluster's role in facilitating innovation in Europe, Analytical Report, July 2006, page 18.

[7] M. E. Porter (1998): Clusters and the New Economics of Competition, Harvard Business Review, November-December 1998, page 78.

[8] Innobarometer on cluster's role in facilitating innovation in Europe Analytical Report, July 2006, page 16.

- Ministry of Economy and Regional Development of RS, authorized for clusters development in the Republic of Serbia, defines clusters as a form of business associations of geographically concentrated enterprises with institutions which provide them support in some field in which they compete, but also cooperate.[9].

Graph 1. *Organizational network of an agricultural cluster in Serbia*



Source*: A review of the autors based on literature: „Clusters for Competitivenes: A Practical Guide and Policy Implications for Developing Cluster Initiatives", International Trade Department, The World Bank, February 2009 i Sölvell, Ö., Ketels, C. and Lindqvist, G. (2003), The Cluster Initiative Greenbook, Ivory Tower AB, Stockholm, page18.*

In this paper, under a concept cluster will consider the next cluster definition, given by the authors based on large-scale research of the world literature on clusters: A cluster is a group/network of connected

[9] The Public call for Cluster Development Support Programme in 2011, Ministry of Economy and Regional Development of the R. of Serbia.

enterprises, educational-scientific institutions and government agencies in certain field of activity/business and in specific geographic region (town, district, and province). The review of clusters functioning network was given in the graph 1.

Based on comprehensive world literature studying on clusters can emphasize that successful cluster association has the following characteristics[10]:

- Geographic vicinity of the companies and the institutions,
- Successful clusters are concentrated in one or more economic sectors within the region (clusters density), they have width (established horizontal connections with the cluster participants) and depth (vertical connections between the members in the cluster),
- Clusters are characterized by an existence of, so called, „social adhesive“: built trust, cooperation and partnership between the companies, government bodies and scientific-educational institutions,
- Cooperation between the cluster members realizes through an intensive cooperation, but also through competitive relation.

Key positive contributions of the cluster, especially in the sector of small and medium enterprises, are[11]:

- Reducing production costs and growth of productivity based on highly specialized production, presence of specialized suppliers, using the government programs of infrastructure and/or technology improvement,
- Increase of enterprises' innovativeness, engaged in the cluster as a result of ideas, information and knowledge exchange,
- Stimulating entrepreneurial ship development, establishing new enterprises and growth of employment in the region in which the cluster function.

[10] (1) M. E. Porter (2008): O konkurenciji, pp. 227-228; (2) M. Enright (2003): Regional Clusters: „What We Know and What We Should Know“, pp. 99-129, 114; (3) "The concept of clusters and cluster policies and their role for competitiveness and innovation“, Commission Staff Working Document SEC, 2008, EC, pp. 09-012.

[11] (1) A Practical Guide to Cluster Development, Englands Regional Development Agencies, 2003; (2) M. E. Porter (1998): „Clusters and the New Economics of Competition“, Harvard Business Review, pp. 80-84; (3) M. E. Porter (2008): „O konkurenciji“, pp. 215-227.

Everything previously mentioned benefits of a cluster lead to building and strengthening of sustainable sources of the members/regions' competitive advantage on domestic, and especially international market.

Basic points of formal-legal registration of clusters

The most often cites in the literature on clusters the following possible legal forms of a cluster [12]:

1. Non-profit organizations (which realized profit do not allocate to the members and which do not realize an interest from income non-taxing),
2. Industrial associations,
3. Corporation (company), when clusters should receive a contribution and invest, when the state financing is involved (then it is usually necessary professional management and formally legal registration of clusters).

However, based on comprehensive world literature on clusters can point out that the formal-legal association in the cluster (registration of a cluster as legal entity) is a phenomenon of bureaucratically-administrative character and the most often is connected to use of donor and/or budgetary stock-in-trade and clusters investments, when is necessary for the cluster to have the legal registration and the professional management. Otherwise, a need for legal registration the clusters participant cannot recognize and it does not represent a precondition for the cluster members to be networked after the cluster principle. Also, becoming a member of a cluster and cluster's legal registration can be opposed to the legal clauses too, which concern protection and strengthening of competition on the market.

In previous context observed, it is important to mention a difference between empirical phenomenon of the cluster, as grouping the economic activities in some location (when the cluster is not obliged to be the legal entity) and the cluster initiatives or the cluster organization. In addition

[12] The Concept of Clusters and Cluster Policies and their role for competitiveness and innovation, Commission Staff Working Document SEC (2008) 2637, EC, p. 010.

will be made a difference between definitions of some concepts closely related to the cluster concept:[13]

- ***Cluster initiatives*** are organized efforts in order to increase growth and competitiveness in the cluster by including firms in the cluster, government/state bodies and/or research institutions.
- ***Cluster organizations*** are often a part of the cluster initiatives and they have an important role in motivation of the cluster development. They define as legal entity for cluster management (public private partnership), which manager usually does business in offices, and takes part in the cluster activities.

Neither one nor the other concept (the cluster initiative/cluster organization) are not related to an essential existence of the cluster (so called natural cluster), and very often, in practice, exactly the cluster initiatives and the cluster organizations call them selves the clusters, as it is the case with all initiatives of that kind in the Republic of Serbia[14].

Although the clusters are not obliged to have the legal registration, and in practice can function as cluster, based on rich experience in this field, there can point out that, so called, „empirical" or „natural" cluster (group and network of businessmen in one production or in specific region), as recognizable on the market, almost cannot be identified in our economy. Maybe the registration/grouping of economic activities in one region, which is primarily similar to a cluster, is raspberry growers in Zlatibor area. The raspberry growers in this area have not been registered as a cluster in the Serbian Business Registers Agency, neither in this area have existed the cluster initiative or the cluster organization. However, in Zlatibor area, major population deals with raspberry production/there is a concentration or a critical mass of producers and cold storage plants, realizes massive production of raspberry from the world production[15] point of view, the Republic of Serbia has been recognizable after this type of production in the world, realizes significant export results, producers have long tradition of production, etc. Nevertheless, what „pulls away" these producers from the cluster approach is: constant conflict of interests

[13] The concept of clusters and cluster policies and their role for competitiveness and innovation, Commission Staff Working Document SEC (2008) 2637, EC, p. 010.

[14] Dragisa Mijacic (2011): State analysis of business infrastructure in the Republic of Serbia, National Agency for Regional development, p 23.

[15] According to FAO statistics data, Serbia is on the third position in the world by raspberry production, after the Russian Federation and Poland. http://faostat.fao.org/site/339/default.aspx

on relation primary agricultural producers – cold storage plants; lack of government programs for this production improvement and making favourable economic environment for bigger investments; insufficient role of science and innovations in production organization, introduction of new sorts, transport etc.

What is important to emphasize is a fact that to developed clusters in the world (clusters with sustainable competitive advantages), which are not obliged to be legally registered, are often available the organizations, as legal entities, for support and help to SMEs in the cluster (BSO-Business Support Organizations and BSP-Business Service Providers).

In the Republic of Serbia, too, functioning of clusters can be significantly supported by exactly those organizations. In our country those are public private partnerships for cooperation and support to SMEs and regional development or accredited regional development agencies[16]. All regional agencies in Serbia have been established with the EU support, have been based on public private partnership and have been organized by legal form of non-profit character shareholding.[17] The agencies have a capacity to attract budgetary resources of the republic and the EU funds and can significantly help enterprises in the cluster to increase their competitiveness on the national and international market.

Legal form of clusters registered as an association in the Republic of Serbia

Taking into consideration remarks on number and registration of clusters in Serbian economy, provided in the item Research Methodology, can be pointed out that in the Serbian Business Registers Agency was registered on the day September 10th 2012:

- 70 clusters in legal form of association (according to the Law on Associations, „Official Gazette of RS“ no. 51/09)

[16] A list of regional development agencies which have been accredited by the National Agencies for Regional Development of the R. of Serbia is available on web site http://narr.gov.rs/index.php

[17] Controlling capital owners of these agencies are local authorities' units. Besides the Republic of Serbia Government, a partnership is made of municipalities/towns, regional chambers of commerce, associations, NGOs, companies, scientific research and educational institutions.

- 9 clusters in legal form of non-profit company (according to the Law on Companies, „Official Gazette of RS“, no. 125/04)[18],
- 3 clusters in legal form of foundation (it is about clusters in the field of tourism).

In accordance to the cluster's legal registration review and empirical experience of the authors, there can point out that the cluster can have more legal registrations (there are no legal obstructions for this). For example, the cluster Somborski salasi was registered in the Serbian Business Registers Agency as: 1) association, 2) company (stock company) and 3) agricultural cooperative[19].

The association as the most common legal form of clusters in economy of the Republic of Serbia. The most of registered clusters in economy of the Republic of Serbia were registered in Business Registers Agency as an ***association***. This legal form seems as the most favourable to the cluster members, especially due to this form is required also by the Ministry of Economy and Regional Development of the Republic of Serbia, which in cooperation with the National Agency for Regional Development and network of the regional agencies/centres, conducts the Program of Innovation Clusters Development in the Republic of Serbia. For example, as an assumption of using irreversible budgetary resources for clusters development, the National Agency for Regional Development in Public Announcement in 2012, states that a right for using the irreversible assets have innovative clusters which are[20]:

- Registered in the Register of Associations of the Serbian Business Registers Agency,
- Have at least 12 active members (9+3): at least nine companies, entrepreneurs and at least three institutions for support (carriers of innovation activity according to the Law on Innovation Activity, educational institutions, research-developmental institutions, business associations, regional agencies etc.),

[18] By the statute, or by the Founding document of the company, emphasizes that a profit which the company gains by its business does not allocate on the company's members, but invests in financing further business of the company.

[19] http://www.apr.gov.rs/

[20] Public call for the support to innovative clusters in 2012, http://klasteri.merr.gov.rs/Konkursi/Javni-poziv-za-dodelu-bespovratnih-sredstava-inovativnim-klasterima.

- Have for members minimum 60% small and medium enterprises and entrepreneurs and at least one scientific-research organization.

Considering that the most of clusters in Serbia have been registered as associations, according to the Law on Associations from 2009, in addition is quoted the most important decrees of this law, which has significantly simplified formal legal registration of clusters in domestic economy:[21]

- Association defines as a voluntary and non-government non-profit organization based on freedom to associate more physical persons or legal entities, established to realize and improve certain mutual or common goal and interest, which are not forbidden by law or the Constitution.
- The law enables that different market actors (physical persons and legal entities) can be founders of new business entity/legal entity.
- Association can be established by at least three founders, in regard that at least one of the founders must have a residence, i.e. to be located on the territory of the Republic of Serbia.
- Every legal entity in private law (for example, company, institution, fund, other association, communion, political party, etc.) can be a founder or a member of the association. If it is about the government bodies as authority carriers, which have a character of legal entity (ministries, municipalities, etc.), the basic rule is that they cannot be founders or members of the association.
- Considering that the association is non-profit organization, it cannot be established in order to do economic and other activity by which gains a profit, neither the association has a right to, its property and eventually realized profit from economic or other activity, allocate to its founders, members, employees or related persons. Incomes of activities can be used only for financing the statutory goals of the association, including also the costs of regular work of the association.
- The association can, under legitimated conditions, to do also economic or other activity by which gains a profit (so called related economic activity), in order to provide additional funds necessary for doing its basic (non-profit) activity, but under the

[21] Law on Associations has come into effect in July 22nd 2009 and has started to apply on October 22nd 2009. The Law on Associations („Official Gazette of RS“, no. 51/09). A Guideline for applying the Law on Associations, Ministry of Public Administration and Local Self-Government, Civic Initiatives, British Embassy in Belgrade, OEBS Mission in Serbia, Belgrade, October 2009

following conditions: that the activity is in compliance with its statutory goals, that the activity is anticipated by the constitution and that the activity is small-scale. However, the law does not determine reliable criterion linked to larger-scale economic activities.

Difference between the registered and unregistered associations. The Law on Associations makes a difference between the formal associations (those which have got a status of legal entity by registering into the Serbian Business Registers Agency) and informal associations (on which apply legal regulations on civil partnership, i.e. for obligations of informal associations are responsible the founders and the members by their entire property). The association gains series of benefits by registering into the associations register:

- It can act independently, as the legal entity, with its mark, logo and other symbols, in transactions, to sign contracts (for example, a contract on office lease) and to undertake other legal activities for itself (it can open a bank account, to make a stamp).
- After legal entity status achieving, the association can enrol the economic activity it does directly (there enrols a main activity),
- Possibility of belongings gain from a membership fee, benefactions, donations and gifts (in money or paying in kind), financial subsidies etc.[22]
- Association can apply for getting the republic budgetary resources, from the province or the local self-government units for realizing the public interest programs, then can apply for the EU assets, private donations, etc.[23]
- For obligations took over in transactions it is responsible only by its property (if any), and not by property of the members or the founders.
- Association can be a founder of a company independently or with other persons (e.g. the association can found a limited liability company). Whether will the association do economic or other activity directly or via especially founded company is a matter of its business evaluation. In principle, if the association desires to do larger-scale economic or other activity, there recommends to

[22] Physical persons and legal entities which make donations and present to associations can be void of some tax burdens

[23] For the legal safety, for using these assets are necessary for an association to be registered, i.e. to have a status of legal entity.

found a special company, especially taking into consideration that thereby avoids a risk of sanctions, due to imprecise legal clauses regarding its allowed size of the economic activity's direct performance.

- Association can have some customs, budgetary and tax relieves (privileges).

Foundation method and association's authorities. According to the Law on Associations, it founds at the inaugural meeting of the assembly, in which adopts: foundation official document, statute and there elects a person for the association's representation. The association is obliged to make a record of the assembly on course of events and contents of done activities and made decisions, which will, among the others, submit as an application form's enclosure for registering the association into the Registers. None of founding property is necessary for the association's foundation. The obliged association authorities are:

- Assembly (the highest association's body, and a way of decision-making of the Assembly arranges closely by the statute). The Assembly adopts the statute of the association, its alterations and supplements, elects and releases a person authorized for the representation, makes decision on the statutory alterations of the association etc,
- Representative of the associations (a person which signs contracts and undertakes other activities in transactions on behalf of the association).

Besides the assembly and the representative, the association can have also other authorities (singular and collegial), if they are anticipated by the association's statute, i.e. if the assembly suggests them: an Administrative Board (executive body which makes decisions in order to the association's goals achievement), a chairmanship, a director or the president of the associations, an inspecting committee (which controls the association's financial business) etc. In case when the association has the administrative board, there is usual practice that the assembly nominates and releases the administrative board, and the administrative board nominates and releases duties of the association's representatives. Whether the associations will decide to have, besides the assembly and the representatives, also other bodies depends on series of circumstances, including a size of the associations, field of activity, financing sources, etc.

Name and locality of the association. A name must be on Serbian language and in Cyrillic. There are neither special limitations, nor conditions to found an association which will contain in its name a word cluster. The association has a locality, which must be on the territory of the Republic of Serbia, provided that as the locality determines the local self-government unit on which territory is a location from which the association manages.

Some aspects of legal-formal cooperation between the members in the cluster are in addition:

- By registering into the cluster every member keeps its legal and business/economic independence (in transactions each member performs independently), and at the same time, has a possibility to benefit from mutual activities and using budgetary or donor assets,
- Each person can, under equal conditions determined by the statute, become the member of the association. The association independently regulates the conditions for gaining and loosing a characteristic of the association's member.
- There is no difference between the founders and the members (the founders have no special privileges, nor status). Each members of the cluster has a right to take part, on an equal footing with other members, in realizing the cluster's goals, then to participate directly in decision-making at the assembly, as well as via the association's authorities,
- Relations between the members of the network should be characterized by: frequent meetings/contacts, ideas, information and knowledge exchange, competitiveness, mutual activities regarding mutual goals and problems solving,

The cluster/association in the field of financial business is obliged to keep the books, to make financial reports and succumbs to the financial reports revision, in accordance with regulations on accountancy and revision.

Case study: food cluster „Polux", Kikinda

In the internal documentation of food cluster Polux (cluster statute, cluster presentation) in addition are presented the basic organizational-legal issues of this cluster functioning.

The cluster „Polux“, Kikinda is the association of Serbian food products producers (http://www.klasterpolux.rs). The cluster was founded on March 2010, with the locality in Kikinda. The association gathers the members who, by their size, belong to a category of small and medium enterprises and entrepreneurs which produce food products of domestic production, food products without additives and preservatives, organically grown products. The members of the cluster were presented in the graph 2.

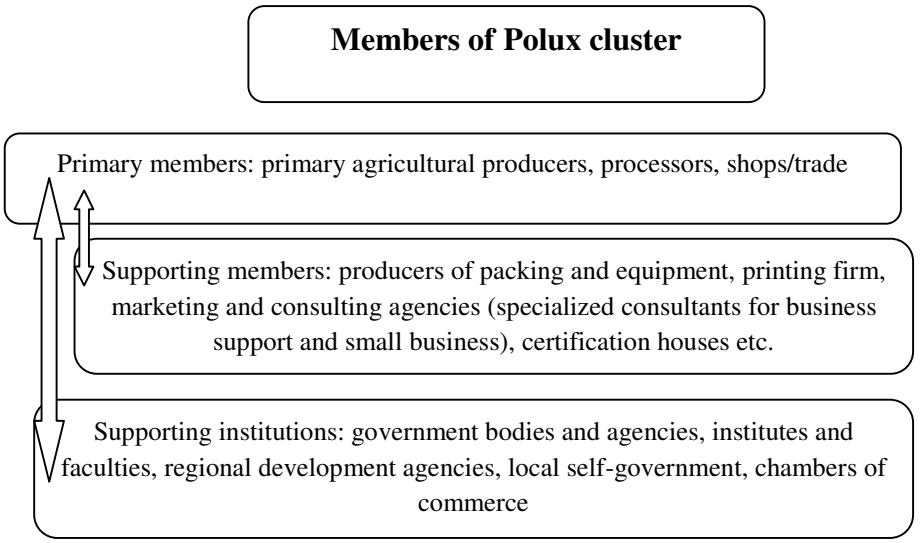
The main goal of joining in cluster is increase of its member's competitiveness. As the most important directions of the cluster members′ activity mention:

- Using joint resources,
- Making joint supply/sale network,
- Organizing mutual marketing activities and winning new markets,
- Education of members and raising business culture,
- Exchange of information, knowledge and ideas,
- Organizing the group quality system conduction (HACCP),
- Support in applying for incentives, etc.

The enterprises/founders of the cluster „Polux“ point out the following advantages of joining into the cluster:

- With its products the member participates in joint supply, whereby decrease commercial costs in the enterprise,
- Mutual goods exchange among the members provides lower prices of raw materials and equipment and ensures reliable suppliers,
- Mutual performance on the market decreases the costs after various bases, as: joint products supply, services of products control, introduction of quality standards, etc.
- With mutual performance on the market and organized transport realizes a possibility that small enterprises sale their products on remote markets,
- Common web-site and catalogues, performances in fairs and various forms of marketing activities,
- Bigger changes for allocation of financial support by different government and non-government organizations and institutions,
- Mutual exchange of experiences and knowledge, organized education etc.

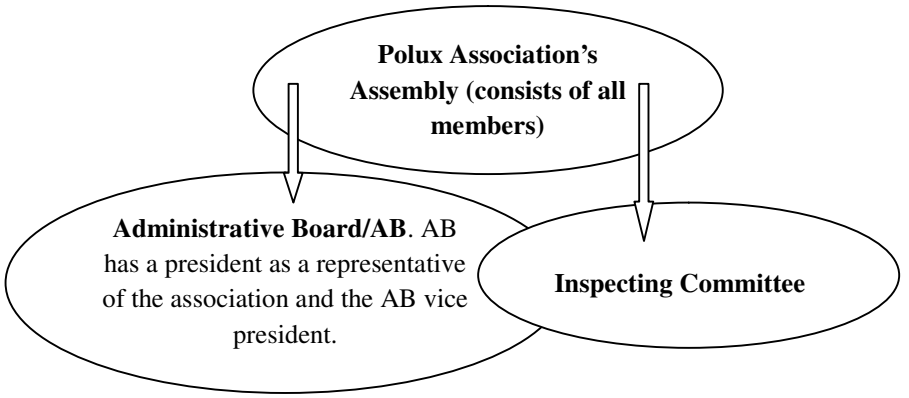
Graph 2. *Members of the cluster „Polux“*



Source*: Internal documentation of the cluster „Polux“.*

The managing bodies in the cluster, defined by the statute, are shown in the graph no.3.

Graph 3. *Management of the cluster „Polux“, Kikinda*



Source*: Internal documentation of the cluster „Polux“.*

Obligations of the cluster members. The members of the cluster POLUX keep their economic independence, and in regard to the cluster have the following obligations:

1. participation in the assembly's work and in realizing the association's goals,
2. regular payment of membership fee,
3. Submitting the data on business and products.

The member of the cluster has a right to: 1) participate in decision-making via the association's bodies, 2) to be elected in the association's bodies, etc.

Conditions for acceptance in the cluster's membership. A decision on the acceptance into the association makes the assembly and informs about it an applicant. The conditions of new member acceptance into the cluster POLUX are:

- Member of the cluster has to be familiar with the cluster's statute,
- Member should have clearly defined interest goals of its membership, and the goals must be in accordance with working policy of the cluster,
- That the member was not in a financial blockade in past year (for legal entities),
- If the member is of production character, it must have in its content at least 51% of domestic origin raw materials.

Conclusion

A cluster in a real and essential comprehension of this concept can exist only as a formal legal registered legal entity, but also can function if it is not legally registered, does not have managing bodies, or clearly defined organizational network/structure of functioning. Generally, formal-legal association into a cluster (registration of a cluster as a legal entity) is a phenomenon of a bureaucratic-administrative character and is mostly connected to use of donor and/or budgetary resources for work and investments of cluster, when is necessary for the cluster to be legally registered and to have a professional management. Otherwise, a need of the legal registration members of a cluster do not recognize and it does not represent a precondition for cluster members to be networked after cluster principle.

What is important to emphasize is that, for developed clusters in the world, clusters which must not be legally registered, are available organizations for support to small and medium enterprises sector (so called, BSO-Business Support Organizations and BSP-Business Service Providers), as legal entities in public private sector, which help enterprises in cluster and the cluster in whole to build and increase their competitiveness on the national and international market.

There can be concluded that each cluster follows its own path of creation and development, i.e. its history, requires less or more organized form, can have formal or informal character and ad hoc or long-term character.

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WINE TOURISM AND SUSTAINABLE RURAL DEVELOPMENT IN THE DANUBE BASIN AREA IN SERBIA

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Abstract

Rural areas in the Danube basin area in Serbia facing serious economic and social difficulties, caused by the transition, the economic crisis and the processes of migration and depopulation, which are particularly evident in the area of the Lower Danube. Danube is known for its centuries-long tradition of producing grapes and quality wines, which is now concentrated in the family wineries. Wine tourism, based on the production of quality wines of protected geographical indications in conjunction with the production of traditional local food and craft products, cultural tourism and nature-based tourism can make a significant contribution to sustainable territorial development. The authors analyze the possibilities and constraints for the development of wine tourism in the wine regions of the Danube basin area, included in the official wine routes of the Tourist Organization of Serbia.

Key words: *vineyards, wineries, quality wines, wine tourism, wine routes, sustainable rural development.*

Introduction

Due to favorable natural conditions and the centuries-long tradition in the production of grapes and wines, some of the most famous wine growing regions / vineyard areas are located along the Danube, forming the backbone of the recently established **Serbian wine routes**: 1) ***Fruška Gora Wine Route*** (Fruška Gora vineyard area of Srem wine-growing region), 2) ***Smederevo Wine Route*** (Smederevo vineyard area of Belgrade wine growing-region, including Braničevo vineyard areas of Mlava wine-growing region, and Krnjevo vineyard area of Šumadija wine-growing region, in the vicinity) and 3) ***Negotin Wine Route*** (Mihajlovac, Negotin i Rajac vineyard areas of Negotinska krajina wine-growing region) (MPŠV, 2011; TOS, 2011).

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Rural areas in the Danube basin in Serbia, including above-mentioned wine production areas, are facing serious economic and social difficulties, caused by the economic crises and transition as well as the processes of migration and depopulation that are particularly severe in the area of the Lower Danube. Taking these facts into account, the Government of the Republic of Serbia in the Danube Strategy Contribution Paper has pledged to enhance agricultural production, encourage diversification of the rural economy through the development of tourism and local crafts, build capacities of the local community and promote the SMEs as the pillars of the local economic development (RS Government, 2010).

According to UN Agenda 21, improving farm production and farming systems through diversification of farm and non-farm employment and infrastructure development is one of the key element of Sustainable Agriculture and Rural Development (SARD) concept. Rural non-farm (RNF) activities include: farm commodity processing, recreation and tourism, light village-based manufacturing, etc., (UN, 1992).

Wine tourism as a form of agritourism (Phillip et al., 2010), special interest tourism (Hall, 1998) and cultural tourism (Asero, Patti, 2009), based primarily on the production of quality labeled wines in small family wineries, in conjunction with typical quality food and craft products, and nature-based tourism, including eco-tourism in protected areas in the vicinity, can make a significant contribution to sustainable territorial development of local communities in the Danube basin area in Serbia.

The early researches in wine tourism were developed in the 1990s, but have not resulted in a unique definition. A conceptual definition of wine tourism that is considered as the most suitable from wine tourist's point of view is that of Hall (1996): *wine tourism has been referred to visitation to vineyards, wineries, wine festivals and wine shows for which grape wine tasting and/or experiencing the attributes of the wine region are the prime motivating factors for visitors*.

In Europe, wine tourism has been largely developed in the form of official **wine routes**. The concept of a wine route incorporates bounded space in the form of an often officially demarcated wine region that proclaims unique attributes for its wines and cultural heritage - *the nature of the grapes and the wines produced, the soils and climate that give them distinctive character and the cultural heritage that nurtured them* (Hall et al., 2000). Hall and Mitchell (2002) use the term of *touristic terroir* to describe *the unique combination of the physical, cultural and natural environment that gives each region its distinctive tourist appeal.* The results of research, conducted in Canada between long distance wine tourists, confirmed that wine was often not the sole or main motivator for a planned visit to wine regions

and, even when wine was the main attraction, the wine tourists, including the most wine-oriented category of *wine lovers*, preferred destinations that have *beautiful scenery* and *lots to see and do*, combining following interdependent sets of critical demand factors for wine tourism destinations:

- *core wine product* (features related to famous wines, wineries, winery staff, wine festivals, and group tours at wineries),
- *essential destination features* (attractive scenery, pleasant climate, moderately priced accommodation, easy to obtain information and well signposted wine trails, lots to see and do, and opportunities for outdoor recreation), and related
- *cultural experiences* (unique accommodation with regional character, fine dining and gourmet restaurants, traditional wine villages, specialty shops or markets selling local farm produce) (Getz, Brown, 2006).

Core wine product features are related to "winescape" - vineyards, wineries and wines (Telfer, 2001). Direct sales of quality wines as well as typical local food, especially those with quality labels, strengthen the image of the wine region and, at the same time, increase the market niche demand for quality wine and food in the country and abroad, building brand loyalty among visitors (Bruwer, 2003), and contributing to the rise of farm income, promotion of the tourist offer, entrepreneurship development and employment generation in the regional economy (Popović et al., 2009).

And although wineries are the core attraction, they cannot stand alone (Getz, 2000). **Cultural and natural values of the region**, including wine villages and ethno-restaurants with high quality typical local food and small shops with traditional crafts are necessary for complement of the wine tourism offer. Authenticity, regional culture and gastronomy are closely linked to wine tourism, particularly having in mind wine tourist segments other than *wine lovers* and *neophytes* (young, potential wine lovers), known as the *occasional wine tourists* and the *hangers–on*. For these wine tourist categories, winery visit is not the primarily motivation for visiting the wine region but they usually take part in a variety of activities in the wine region and, in that way, contribute to regional growth and employment (Alebaki, Iakovidou, 2011).

Grape vine growing (natural and human controlled elements of terroir), wine production and labeling, provision of skilled and pleasant winery staff, excellent in knowledge of grape varieties, wine and wine tasting and natural values and cultural heritage of the wine region, and good accommodation facilities for reception of tourist groups are the necessary precondition for wine producing farm to diversify to wine tourism. The success stories in Europe have been created

around a ***nucleus of dynamic and innovative farms*** which are prepared to investment money and human capital into the initiative (Gatti, Incerti, 1997). Wine routes realize a ***model of district*** that attributes a remarkable weight to the social and cultural factors in the processes of development (Asero, Patti, 2009)[2].

Due to the multi-dimensional nature of wine tourism, there are several stakeholders that should be recognized and networked within collaborative associations/clusters (farms, wineries, tourism destination organizations, private and public enterprises and associations, including environmental NGO, protected area management and cultural heritage institutions, government and local administration), and included in the process of wine tourism destination development and marketing planning. Public investment support to farm for grape wine production and labeling and diversification to wine tourism as well as for natural value and cultural heritage protection, and development of local infrastructure and special wine tourism products (wine museums, wine villages, etc.), is essential, having in mind strong mutual leverage effects of wine, nature/eco and cultural tourism, agriculture and services to sustainable development of wine regions. In European wine regions, especially Mediterranean, wine is deeply connected with regional culture, history and tradition rooted in antiquity and that's the reason of considering it as one of the pillars of cultural tourism and including it in the cultural routes. Council of Europe support projects of wine routes development under Cultural Routes Programme.

Wine routes of the Danube Basin area of Serbia

The viticulture and wine production in Serbia began not only to recover but to make a big shift from the mass production of low-quality wines on large state-owned combines to the production of limited series of quality wine in small and medium-sized family wineries, after a sharp decline in production and exports of wine during the 80's and 90's. High-quality and quality wines now make up about 35% of total wine production in the country. Changes in the structure of wine export, however, are much slower. In the period of 2004-2007 the exports accounted for only 5% of the country's wine production, with only 10% of the exported amount was placed in bottles, while the remainder consisted of wine in bulk, resulting in twice the average export price lower than the average price in the global wine market in this period (Vlahović et al., 2009).

In a highly competitive European and world markets, small and medium wineries need time and inventive marketing strategies for serious progress in changing

[2] According to Beccatini (1990), industrial district is a socio-economic entity, which is characterized by the active presence of both a community of people and a population of firms in one naturally and historically bounded area.

export structure. Wine tourism (and sales on the cellar door) is one of the best ways for their market promotion, especially in the Danube basin area, where there are real opportunities for the development of wine tourism within regional Danubian cultural and recreational tourist routes.

As highlighted in the introduction, in the Danube basin area are concentrated some of the best known wine-growing regions / vineyards of Serbia, which were, by the Tourist Organization of Serbia, officially included in the wine regions and wine routes: 1) Fruška Gora vineyard area of Srem wine- growing region (*Fruška Gora Wine Route* – ***In the Reflection of the Danube***); 2) Smederevo vineyard area of Belgrade wine-growing region, including Braničevo vineyard areas of Mlava wine-growing region, and Krnjevo vineyard area of Šumadija wine-growing region, in the vicinity (***Golden Hill -*** *Smederevo Wine Route*) and 3) Mihajlovac, Negotin i Rajac vineyard areas of Negotinska krajina wine-growing region (***The Rajac Pimnice -*** *Negotin Wine Route*) (MPŠV, 2011; TOS, 2011) (Figure 1).

Figure 1. *Wine Routes in the Danube basin area in Serbia*

Source: *Adapted from:*
http://www.srbija.travel/download/brosure/karta_putevi_vina_2izdanje.pdf

Pillars of wine tourism in these regions were selected wineries, which, with their business performance, knowledge and experience, technology and innovation, should encourage more followers in the sector and other stakeholders in the Danube basin area for the development of entrepreneurship and diversification. Some of them will be mentioned wider in the paper, as representatives of the wine roads observed: *Winery Bononia* – Banoštor (Wine Route Fruška Gora), *Small Cellar Radovanović* - Krnjevo and *Winery Živković* - Kličevac (Wine Route Smederevo) and *Matalj Winery* - Negotin (Wine Route Negotin).

The subject of analysis in the following sections of the paper will be the main elements of the tourist offer at selected wine regions in the Danube basin area in Serbia, in order to identify the main potentials and constraints for the development of wine tourism and its contribution to sustainable rural development, as well as measures to support the promotion of tourism development in the study areas.

Core wine product features - Vineyards, Wines and Wineries

Vineyards

European quality wines are traditionally linked to the place of origin by a set of natural factors and the producer skills, integrated under a single umbrella term - *terroir*. According to the French Wine Guide (2012), *a terroir is a group of vineyards (or even vines) from the same region, belonging to a specific appellation, and sharing the same type of soil, weather conditions, grapes and wine making savoir-faire, which contribute to give its specific personality to the wine*. Natural factors that are believed to largely define the *terroir* are:

- Geological and pedological characteristics of the terrain on which the vineyard was planted (geological basis and soil types in terms of the required level of fertility, drainage and ability to retain heat),
- Climate of wine regions, vineyard areas and vineyard sites (temperature, precipitation, insolation, frost, drought, wind, hail), and
- Relief, including elevation, slope, aspect, and specific topographic features of vineyard surrounding (bodies of water, forest, hill, etc.).

Soil. Each era in the geological timescale has a specific impact on the development of high-quality vineyards and the characteristics of wine-growing regions may be classified according to their geological origin (Fanet, 2004). Economic significance of viticulture is determined by, among other things, the circumstance that the vines can be successfully grown on terrains that are not suitable for the profitable production of other crops. This relates primarily to a number of light, powdery, sandy and gravelly soils, sand, calcareous soils on

marly substrates, as well as the eutric cambisols, terra rossa, alluvial and delluvial soils (Popović et al., 2011). Loose and permeable soil, able to retain heat, and reflect light and adequately provided with essential nutrients and trace elements (nitrogen, phosphorus, potassium, magnesium, calcium, iron, sulfur) is the key factor of vineyard quality. The soil composition of vineyards in the Danube basin area ensures the production of high quality wines.

Fruška gora belongs to the first pedo-geographical region of Serbia and, due to diversity of its geological materials, it is considered as a mirror of geological past. The vineyards are on heterogeneous sedimentary series soil of Srem loess plateau, where eolian loess deposits are alternating with fossil pedological horizons, slope sediments and fluvial gravels and sands. The most common are the following types of vineyard soil: pararendzinas on the marl and loess chernozem eroded and browned, and eutric cambisols, eroded and skeletoidal. Krnjevo, Smederevo, and Braničevo vineyard areas, as well as Mihajlovac, Negotin and Rajac vineyard areas are located in the second pedo-geographical region. Neogene lake sediments (sand, gravel, clay marl, clay and coal) as the most common parent materials decisively influenced the structure of the soil cover. On heavy lake sediments are present vertisol and metamorphic vertisol (Negotin and Rajac vineyard areas), and on the lighter it alternate eutric cambisols (the only soil type in Krnjevo vineyard area, and dominant in Smederevo, and Braničevo vineyard areas). There are vertisol, eutric cambisol and terra rossa complexes in Negotin vineyard area. Brown soils are the second most abundant in Braničevo vineyard area, just behind the eutric cambisols, while in complexes with acid and podzolic soils, are dominant in Mihajlovac and Negotin vineyards. In Braničevo area, nearby Veliko Brdo (324 m), in the northern part of Boževac beam, due to the proximity and position of Ram - Zatonje sands and Koshava wind, loess is mixed with sand and those deposits are designated as aeolian loess sands (Kuzman et al., 2009). Vineyards on the sand are also present in Negotin vineyard area (Kobišnica and Prahovo-Radujevac plateaus). In the river valleys there is recent alluvium (Dinić, 1997; MPŠV, 2008, RSPŠV, 1976).

Climate. The vine is a plant of temperate belt, which requires a specific temperature conditions during the different phases of the annual cycle (beginning of physiological processes on 10 °C, flowering 17-20 °C, maturing 27 + °C) and a certain amount of water (about 690 mm per year) and solar light (1300-1500 hours during the growing season, April - October) (MacNeil, 2001). Climatic features at the vineyard area level (in this case at a wine region level as geographic area of a wine road), along with the vineyard site mesoclimate and particular vine grape row microclimate characteristics, play a major role in selecting the grape varieties and defining the overall *terroir* of wine, originating from a specific location. In continental climate conditions in the regions Fruška

gora and Negotinska Krajina, and moderate-continental climate in the Middle Danube region, vines has favorable conditions for development - four seasons shift, hot summers and cold winters, enough sunlight and considerable diurnal temperature variation, which provide good balance of acids and sugars in grapes and wine. However, vine is also faced with certain weather disadvantages:

- appearance of frost (with fewer days with snow cover) in the winter and early spring (absolute minimum temperature recorded in January, ranging from -23.7 °C in Veliko Gradiste to -28.9 °C in Smederevska Palanka),
- torrential rainfall, accompanied by hail and wind storm in late spring and summer, as well as
- more intensive hot waves and drought - the consequences of climate change that requires irrigation, especially in Negotinska Krajina (Table 1).

Table 1. *Climatic features wine regions in the Danube basin area, 1981-2010*

Met. station	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
MEAN TEMPERATURE °C													
Novi Sad	0,2	1,6	6,4	11,8	17,3	20,1	21,9	21,6	16,9	11,8	5,9	1,5	11,4
Sm. Palanka	0,7	2,1	6,5	11,8	17,0	20,1	22,0	21,6	16,8	11,7	6,2	1,9	11,5
Vel. Gradište	0,1	1,5	6,2	11,8	17,0	19,9	21,9	21,5	16,8	11,7	6,0	1,4	11,3
Negotin	0,3	1,9	6,6	12,2	17,7	21,3	23,5	22,8	17,6	11,6	5,5	1,1	11,8
PRECIPITATION, mm													
Novi Sad	39,1	31,4	42,5	49,2	63,0	91,4	64,3	57,5	53,8	52,7	53,8	48,8	647,3
Sm. Palanka	42,4	39,2	43,6	50,1	54,3	78,7	60,5	58,9	56,4	51,2	50,0	51,8	637,2
Vel. Gradište	45,0	42,2	41,5	57,2	59,8	81,6	61,4	55,9	57,5	51,8	48,4	50,7	653,0
Negotin	41,8	44,1	47,6	53,5	50,8	59,2	49,4	47,5	45,4	49,5	58,4	66,4	613,6
INSOLATION – average, hours													
Novi Sad	64,8	99,0	156,4	190,1	250,8	269,4	303,6	285,8	205,7	158,9	92,4	58,4	2135,3
Sm. Palanka	78,1	107,6	156,3	188,8	242,4	263,9	299,1	281,8	208,7	166,1	104,8	70,2	2167,8
Vel. Gradište	67,2	95,5	151,8	183,5	235,6	257,0	291,3	280,5	203,9	156,8	92,1	58,6	2073,8
Negotin	80,2	99,0	141,3	185,5	243,1	279,8	310,1	284,1	208,4	139,0	76,8	62,0	2109,2
DAYS WITH FROST– average													
Novi Sad	22	18	10	2	0	0	0	0	0	2	9	18	81
Sm. Palanka	22	18	11	2	0	0	0	0	0	3	10	18	83
Vel. Gradište	23	19	11	2	0	0	0	0	0	2	9	18	84
Negotin	22	18	11	1	0	0	0	0	0	2	9	19	82
TROPIC DAYS – average													
Novi Sad	0	0	0	0	1	6	11	11	2	0	0	0	32
Sm. Palanka	0	0	0	0	2	7	13	13	3	0	0	0	37
Vel. Gradište	0	0	0	0	1	7	13	13	2	0	0	0	37
Negotin	0	0	0	0	2	8	16	16	3	0	0	0	44

Source: *RHMZS, (2012).*

Due to the large annual climate fluctuations, ***vintage*** is gaining in importance, especially in the production and marketing of high-quality wines.

Relief. Orographic characteristics of vineyard grounds (elevation, slope, and aspect, the degree of relief dissection), and characteristics of the vineyard site (near

the big river / lake, close to the forest complex, hilltop, etc.) affect climate of the vineyard area and microclimate of the vineyard site. The hills and hillsides with a slope of south, southeast and southwest aspects, and flat plateaus on elevated terrain provide more sunlight and excessive water runoff, water mirror of the river /lake nearby mitigates extreme temperatures and increases the intensity of sunlight, and forest reduces harmful effects of wind.

The vineyard grounds of Fruska gora are on plateaus and slight slopes of different aspects, which extend to the north toward the Danube and south toward Srem plain, at elevations of 85 - 350 m. Vineyard terrains between 180-200 m above sea level are usually flattened plateaus, suitable for large plantations, while the higher grounds have fractured configuration.

Krnjevo vineyards are located on hills with slight slopes and altitude of 120-260 m, between the valleys of the rivers Morava and Jasenica. The hilly, slightly angled relief altitude of 100-273 m is also typical for Smederevo vineyard area. Braničevo vineyard area stretches Pek river watershed, along the right bank of the Danube, from Kostolac to Golubac, where the terrain is mainly flat, with low terraces in Stig plain altitude of 110-240 m, and clearly expressed plateau on Sopot and Boževac beam, that gradually descend to the Mlava river.

The vineyard areas of Negotinska Krajina cover alluvial plains of Danube (Danube terrace, Prahovo – Radujevac plateau) and Timok river valleys and Negotin Plain (the town of Negotin fringe and Kobišnica plateau) at an altitude up to 150 meters, and the vast hilly area toward the central part of Negotin municipality, mostly in altitude of 150-200 m (low hills). This area is intersected by numerous river valleys, with slight slopes of predominantly southeast aspect.

Among the factors that may have an impact on *terroir*, which is controlled by the grape and wine producers are certain *inputs*, particularly the choice of grape varieties, and *techniques* of grape growing and vinification.

Grape varieties. Climate, soil and topography are of decisive influence to the decision of which grape variety to plant in the vineyard area. Fruška gora, as an area with expressed continental climate is suitable for growing high-quality white wine varieties. The grape varieties recommended by the competent ministry are those for white wines: Italian Riesling, Rhine Riesling, Pinot Blanc, Sémillon, Sauvignon, Traminer Red, Muscat Ottonel, Neoplanta, Sirmium, Župljanka and Chardonnay. According to 2008 data (MPŠV, 2008), the white wine varieties are the most common in the vineyards of Fruška gora vineyard area – Riesling Italian (31.7%) and Chardonnay (25.5%).

Varieties recommended for agro ecological conditions of Smederevo and Krnjevo vineyards include: varieties for red wines – Prokupac, Gamay Noir and Pinot Noir; the variety of white wines - Riesling Italian and Smederevka; and varieties for table grapes - Muscat Hamburg and Afus-ali. In Smederevo vineyard area white wine varieties dominate, led by Smederevka (40.1%), which is followed by Rkatsiteli (18.5%) and Riesling Italian (12.4%). In Krnjevo vineyards the largest share has red wine variety Cabernet Sauvignon (28.6%). The following are white wine varieties: Chardonnay (22.3%) and Smederevka (12.2%).

In Braničevo vineyard area, there are recommended grape varieties for red wines: Prokupac, Gamay Noir, Cabernet Sauvignon and Merlot, varieties of white wines: Plovdina, Smederevka and Riesling Italian, and varieties of table grapes: Muscat Hamburg and Afus-ali. The most present variety in the vineyards is the table grape variety Muscat Hamburg, with the share of 29.5%. It is followed by white wine variety - Smederevka (8.2%) and variety for red wines - Prokupac (8%).

Widest range of recommended varieties is available to winegrowers of Negotinska Krajina region where varieties of red wine is traditionally prevailing, but in recent decades the increased share of white wine varieties is observed. The most present grape varieties in the Mihajlovac vineyard area are: Riesling Italian (16.4%), Gamay Noir (11.1%), Vranac (9.9%) and Cabernet Sauvignon (9.3%); in Negotin vineyard area: Rhine Riesling (32.5%), Riesling Italian (26.2%) and Chardonnay (23.8%), and in the Rajac vineyards area: Rhine Riesling (20.2%), Cabernet Sauvignon (18.5%) and Gamay Noir (14.3%).

Of the varieties of red wines for growing in Mihajlovac, Negotin and Rajac vineyard areas are recommended: Alicante Bouschet, Pinot Noir, Franconia, Gamay Noir, Gamay Tenturier, Cabernet Sauvignon, Cabernet Franc, Merlot, Muscat Hamburg, Prokupac, Saperavi, Vranac, and Začinak, and among the white wine varieties: Pinot Blanc, Chardonnay, Riesling Emerald, Muscat Ottonel, Muscat Frontignan, Neoplanta, Rivaner (in Negotin vineyard areas), Italian Riesling, Rhine Riesling (in Negotin vineyard area), Rkatsiteli, Sémillon, Silvaner, Sirmium, Smederevka, Sauvignon, Shasselas Bouvier, Shasselas, Traminer Red and Župljanka (Mihajlovac and Rajac vineyard areas) (MPŠV, 2008).

Producers in selecting varieties take account of these recommendations, but, within these frames the decisions related to varieties, further harmonize with the environmental conditions on the particular vineyard site[3]. Thus Bononia winery own two vineyards on Fruška gora, the total area of 7 hectares. One of them is

[3] http://www.vinarijabononia.com/, http://www.podrumradovanovic.rs, http://www.matalj vinarija.rs/imanje.html, http://www.blic.rs/Vesti/Srbija/32235/Vina-iz-Klicevca-pili-su-i-stari-Rimljani

located in Banoštor, on slight slopes near the Danube, and the other on the plateau above the Danube, where, using microclimate benefits of light reflected from the water surface, is successfully grown varieties of white wines: Chardonnay, Riesling Italian and Župljanka, and variety for red wines: Franconia, Merlot, and Cabernet Sauvignon and Muscat Hamburg as a variety of table grapes. The plantations have been recently extended with Rhine Riesling.

On the southeastern aspect hills in Krnjevo vineyard area, Cellar Radovanović has total vineyard area of 22 ha, where following wine varieties dominates: Rhine Riesling, Chardonnay, Pinot Blanc, Pinot Gris and Pinot Noir, Cabernet Sauvignon, Cabernet Franc and Merlot. On loess sand around Kličevac in Braničevo vineyard area, where the plain Stig descends to the Danube, Živković winery a few years ago successfully restored family vineyard with the Cabernet Sauvignon, Merlot the Chardonnay.

And, as representative of the famous Krajina vineyards, winery Matalj is represented here with its two vineyards. The Danube terrace is a vineyard of the total area of 12 hectares and is located in Mihajlovac vineyard area, on the plateau above the Danube, the altitude of 120 m. On the river banks consisted mostly of gravels, sand and clay, white wine varieties Chardonnay and Sauvignon Blanc and red grape variety Merlot are grown. Specific microclimate, with a large number of sunny days and cool nights in autumn provides optimum ripening while preserving the acid, especially important for the quality of white wine varieties. Vineyard Kremenjača, total area of 5 ha, is located in Rajac vineyard area, at an altitude of 220-250 m, in the hinterland of mountains Deli Jovan and Stol. Protected from cold winds, with the plenty of sun in the summer and warm and dry autumn, on the complex of eutric cambisols and vertisols with lots of stone, this location is particularly suitable for late ripening of red grape varieties, Cabernet Sauvignon and Merlot.

Grape and wine making savoir-faire. Apart from the selection of varieties, it is very important to respect natural conditions during entire process of growing grapes and producing wine. Producers adapt the technique of grape and wine production to the characteristics of each vineyard parcel. According to the presentation of their wines[4], observed vintners are trying, using their own family traditions and skills, to give each wine a personal touch.

Precision agriculture has proved to be particularly suitable for application in viticulture. Combining different management approaches, including zonal and adaptive management, precision viticulture accomplish a variety of production

[4] Ibid.

practices (trellis design, pruning practices, irrigation and fertilizer application schedules, pest management, selective harvest based on timing of ripening, etc.), to the specific natural conditions and grape vine needs in a particular location. This production technique is particularly suited for use in integrated and organic wine grape production. Popularity of eco-wines in recent years in Europe is growing, and with it, the area under these systems of vine grape growing (Birkenštok, 2012). The Center for Organic Farming in Negotin municipality promotes Negotinska Krajina as an ideal environment for healthy food production using organic method, and it certainly is suitable for all low-intensity production systems, including integrated and organic viticulture, particularly in areas that gravitate NP "Đerdap" (Nikolić, Popović, 2010).

Vinification process also (length of maceration and time in contact with lees, temperature during fermentation, as well as processes like micro-oxygenation, chaptalization, clarification with fining agents and reverse osmosis - Robinson, 2006) must be tailored to the specific characteristics of the grapes obtained from specific locations. According to Fanet (2004), nature provides the raw material, but only people know how to turn it into something exceptional. The longer tradition of producer in the production of grapes and wine is in a given area, it is likely that he has appropriate grape and wine making savoir-faire, adapted to particular vineyard site. The result is wine that fully expresses the wine *terroir*.

Wine

Small family wineries are oriented to production of limited quantities of terroir-driven high-quality and quality wines. While there is considerable disagreement among experts regarding factors and impact of *terroir* on a distinctive quality of wines (Spielmann, Gélinas-Chebat, 2011; Fanet, 2004), this concept is in the basis of the systems of geographical indications and names of origin protection for wines and other agricultural products and foodstuffs around the world (the EU Protected Geographical Indication/Protected Designation of Origin – PGI/PDO, French Appellation d'origine contrôlée - AOC system, etc., including Serbia[5]). It is especially important for the marketing of wine in the wine tourism regions.

In Serbia, in producer year 2011/2012, 41 wineries produce 108 wines with geographical indications of origin. From Fruška gora vineyard area are eight of them, with 28 wines, and among these eight producers are two wineries included in the Fruška gora Wine Route: *Vinum* (wines: Sauvignon Blanc and Frankovka) and *Winery Bononia* (wines: Riesling Italian, Chardonnay and Merlot). From Krnjevo vineyard area on this list is a *Small Cellar Radovanović* (wines:

[5] See MAFWM form of Elaborate of production of wines with geographical indications, http://www.mpt gov.rs/ articles/view/119/ 505/index.html?menu_id=23.

Chardonnay, Cabernet Sauvignon, Rhine Riesling), and from Smederevo vineyard area *Janko Cellar* (wines: Smederevka, Mission and Adut), both involved in the Smederevo Wine Route. Another two wineries (4 wines) in the Mihajlovac vineyard area and three wineries (4 wines) in the Rajac vineyard area produce wines with geographical indications of origin (MPŠV, 2012).

Wine producers and their associations, especially those involved in wine tourism, are aware of the importance of authentic wines to differentiate among highly competitive producers of known international variety wines. Differentiation in the market is achieved by increasing the number of ***wines with geographical indications*** as well as the restoration of plantations with local indigenous and old domesticated varieties of grapes and the production of ***traditional local wines***. Thus in Fruška gora vineyards today Vranac and Portuguiser are grown, and in the wineries you can find again the famous aromatized Ausbruh wine, Bermet and young wine Portugiser. Winegrowers in Smederevo vineyards are forcing Smederevka, and in Negotinska Krajina the restoration of plantations of Braghina (Matalj wineries) and Tamjanika Red (Agricultural School in Bukovo, founded in the 1887th at the Monastery Bukovo, Negotin municipality). Winemakers Association of Negotinska Krajina are committed to obtain the mark for a regional wine "Wines of Negotinska Krajina", in line with the growth in demand for high-quality wines with a specific regional identity.

In the promotion of traditional local wines it should be emphasized their long presence in the European and global wine market (wines of Sremski Karlovci were exported even in the 15th century in the Czech Republic and Poland, wines of Negotinska Krajina from 70-years of the 19th century in France, Austria-Hungary, Germany, Russia and other European countries and bermet was present in the U.S. market 150 years ago and in the wine list of the Titanic...) (TOS, 2011).

Wineries

Wineries are critical points for the competitiveness of wine and profitability of wine tourism. The level of technical equipment and expertise of employees affects the quality of wine. Quality wines and additional cellar door services available to winery visitors, including dedication, courteousness, and skills of winery stuff are critical factors for customer satisfaction, which is reflected in cellar door wine purchasing and brand loyalty establishing. The cellar door sale often is the most important distribution canal for small wineries. Visitor satisfaction is also very important for leader wineries as it can greatly affect its market position, including online sales and brand loyalty. Selection of additional cellar door services (traditional food, music, souvenirs and crafts, ethno - exhibitions, visits to vineyards, participation in the grape harvest, education in culture of wine,

organization of visits and meetings for wine professionals, wine festivals, etc.) must be preceded by careful visitor segmentation.

Observed wineries in the Danube basin area, members of the wine routes, are dedicated to producing quality and high-quality wines and wine tourism development. *Bononia Winery* produces about 40,000 l of wine, which keeps in a traditional cellar - lagum near the Danube. In the vicinity of the cellar is a large terrace with views of the river, where tourists taste wines with traditional local food. There are organized grape harvests in the vineyards for tourist groups. *Cellar Radovanović*, as one of the leaders among domestic wineries, with the young team of professionals and continuous investment in equipment and innovations has reached an annual production of 200,000 bottles of wine and is active in wine tourism too. *Živković Winery* opened wine tasting room in Požarevac city, but to meet the tourists the most important is archeological site Viminacium, near the wine farm of Živković family in Kličevac. Živković Winery has modern capacities for the production of 20,000 l of quality wine. *Matalj winery* has a capacity of 45,000 l per year and offers tourist visit to vineyards and wine cellar with wine tasting and consuming traditional local food.

It is obvious that there is a space for additional services to winery visitors, but it is important to connect these services with other tourist activities in the region in order to obtain complete tourist offer, so called *tourist terroir* of the wine region.

Essential destination features and cultural experiences

Natural values. Outstanding natural and landscape values are concentrated in the Danube basin area, particularly in protected areas in the territory of the observed wine regions (NP "Fruška gora", SNR "Koviljsko-petrovaradinski rit") or their hinterland (RAMSAR / IBA "Labudovo okno," NP "Đerdap," IBA "Mala Vrbica"). Nature tourism, including eco-tourism, and especially recreational activities (educational and scenic walking tours, biking, horseback riding, fishing, etc..), and special interest tourism such as bird watching, etc., can provide additional high-quality tourist experiences.

Due to its geological history, the National Park "Fruška gora" (IPA, IBA, and PBA site), is a complex composition of steppe, forest-steppe and Mediterranean floristic elements, with over 40 plant species in the status of natural rarities, large complexes of lime and mixed forests, hunting and fishing areas, hiking trails and rich ornithofauna. SNR "Koviljsko petrovaradinski rit" is IPA and IBA site - wetlands particularly attractive due to conservation and landscape diversity (islands, backwaters, ponds, and wetlands), marsh plant communities (forests, meadows, swamps, reeds) and ornithofauna. RAMSAR/IBA site "Labudovo

okno" is located between Deliblato sand on the north and Ram settlement on the south, including a small section of the right bank of the Danube between Kostolac and Ram. It is the most important nesting, wintering and migratory station of wading birds in Serbia. NP "Đerdap" is a region of outstanding geological features (three gorges, two canyons and three valleys) and biodiversity, which are represented in many ancient and endemorelict plant species and communities and heterogeneous fauna (sturgeon species, large carnivores ...). The park is on IPAs and PBAs lists, and on IBAs list, with aquatic habitat "Mala Vrbica".

Cultural values. As previously mentioned, due to sharp competition in the global market of international variety wines, it is necessary not only to tie their quality to the region of origin, but also to the long tradition of grape growing and wine production, which in our vineyards is dating back to Roman times and earlier. For this reason, thematic cultural and historical routes, such as "Roman emperors Route" have a prominent role in the promotion of wines and wine regions. According to the Master Plan, the route is positioned as a product of high value touring, which the ancient Roman grounds, combines tangible and intangible cultural heritage, as well as the natural fascination of the Danube, East Serbia and Srem region. It is a path that connects the locations where they were born and / or lived Roman emperors (in the Danube - Sirmium, Singidunum, Viminacium, and Iron Gate part of the Roman Limes) (MERR, 2007). One of them was Marcus Valerius Aurelius Probus (276-282 AD), which was on the southern slopes of Fruška gora mountain, near his home town of Sirmium (Sremska Mitrovica), and in Upper Moesia, on the hill Orašac (Mons Aureus) near Smederevo, planted vines and is considered the founder of viticulture in Serbia (RSPŠV, 1976).

Added to Roman time heritage are the following cultural values as a valuable segment of *tourist terroir*: archaeological sites of the Danubian Neolithic culture (Lepenski Vir and Vinča); fortress on the Danube (Fetislam, Golubac, Ram, Smederevo, Kalemegdan, and Petrovaradin); monasteries of Fruska gora, known, among other things, as a stronghold of viticulture development and production of high quality wines; old city cores and traditional wine cellars (lagumi), in Fruska gora vineyard area (Novi Sad, Sremski Karlovci, Irig) and old wine villages in the Negotinska Krajina (Rajac, Rogljevo, and Smedovac pimnice); traditional cuisine in ethno-ambient of local restaurants and old crafts and handicrafts, as well as local cultural heritage customs and beliefs, especially typical for Negotinska Krajina.

Insufficient and inadequate accommodation facilities, lack of riverbank infrastructure and traffic infrastructure in the inland wine regions, underdeveloped tourist signalization and integrated tourism destination marketing, as well as lack of financial resources, entrepreneurial initiative and qualified human resources are the most common weaknesses in the tourism sector of the study area.

Institutional organization and support

Wineries - leaders are holders of investment in technology and innovation and play a leading role in encouraging the entrepreneurial spirit of other winegrowers and vintners towards the development of wine districts within the wine region. Over 60 wineries are active in the Fruška gora vineyard area, in Negotinska Krajina several dozen, and in Smederevo vineyards more than 10. However, wineries can give the full contribution to the economic development of these areas through their producer associations, i.e. their actions in collaboration with other stakeholders in the local communities and the region as a whole, with institutional and financial support from the state[6] and EU funds.

The result of this organization at the Serbian Danube basin area was a number of local associations of winegrowers and vintners, and regional tourism cluster ISTAR 21.The cluster brings together municipalities on the Danube, as well as entrepreneurs, including producers of local foods, wines and spirits and their associations, tourism agencies and organizations, managers of protected natural area and cultural heritage, ports/marinas, and the spa and recreational centers, event organizers, NGOs dealing with tourism and conservation of nature and all the other entities involved in tourism. Activities take place in the form of strategic partnerships at the municipal level and at the cluster, with the goal of creating an authentic regional tourism product. A number of local stakeholders, as well as the cluster, are members of the Danube Competence Center, established in 2010 as a regional platform for cooperation and marketing in sustainable tourism, and coordination in the Danube Strategy implementation.

For wine tourism in the Danube region it is of particular importance the realization of the project supported by EU DG Enterprise and Industry, through Competitiveness and Innovation Framework Programme of the European Commission (CIP): ***Cultural Routes on the Middle and Lower Danube - Roman Emperors Route and Danube Wine Route***. The project started in mid-2012 and will run for 18 months under the leadership of the Danube Competence Center, in cooperation with key public and private tourism institutions and organizations of Croatia, Serbia, Romania and Bulgaria. The main objectives of the project are: introduction of international standards of tourist services/products, improving the quality of cultural heritage presentation, support to local partnerships and small and medium-sized enterprises, strengthening of transnational cooperation and transfer of knowledge and experience (Camernik, 2012).

[6] A number of measures of investment support to winegrowers and vintners, including wine tourism are envisaged in the National Rural Development Programme (Official Gazette. RS, 15/2011) and operationalized through the government regulations on an annual basis.

Conclusions

Favorable natural conditions and centuries-old tradition in the production of grapes and quality wine in the Danube basin area in Serbia, as well as a successful transition shift in the vineyard sector towards strengthening family wineries, and their inclusion in Danube wine and cultural routes represent a good strategy to enhance wine tourism and its contribution to territorial development. The perceived financial and infrastructure limitations and weaknesses in human resources must be rapidly overcome with efficient actions of the state and local communities, including EU assistance.

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