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# **Identification of development strategy and intervention needs of AKIS in Bulgaria**

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# Identification of Development Strategy and Intervention Needs of AKIS in Bulgaria

*Hrabrin Bachev<sup>1</sup>*

**Abstract.** The goal of this paper is to assess the state, specify trends, compare with other EU states, and identify intervention needs of Agricultural Knowledge and Innovation System (AKIS) in Bulgaria, and assist policy formation for the next programming period. Modern scientific approaches of SWOT, Strategic Orientation, Gap Analysis, Comparative Institutional Analysis, etc. are used to identify actors and relations, trends in development, assess Strengths, Weaknesses, Opportunities and Threats, formulate adequate strategy, and specify overall and public intervention needs of AKIS in the country. Bulgarian AKIS demonstrates low resource endowment and efficiency, domination of outdated public institutions and undeveloped private sector, insufficient sharing of knowledge and innovations, slow and uneven application of modern technologies, varieties, production and management methods, digitalization, etc. in different type of farms, subsectors of agriculture and regions of the country. The list of specified AKIS needs is provided to government for taking a political decision about appropriate measures for public intervention. This study demonstrates that preparation of country's RDP is (has to be) based of comprehensive scientific approach while research community proves that it can contribute to solving an important academic and practical problem.

**Keywords:** knowledge, innovation, agriculture, strategy, EU CAP, Bulgaria

## Introduction

Stimulation and sharing of knowledge, innovation and digitalization is defined as one of the strategic (cross-cutting) objectives of the EU Common Agricultural Policy (CAP) during the next 2021-2027 programming period [1, 2]. Its achievement requires effective diagnosis of the state of Agricultural Knowledge and Innovation System (AKIS), proper identification of its needs, and selection of adequate measures for public interventions [3, 4, 5]. The later can only be realized by using "new" approaches and methods of preparation and designing of the country's strategic plan, including active experts and stakeholder's involvement during all stages of the process.

The goal of this paper is to assess the state, specify trends, compare with other EU member states, and identify intervention needs of AKIS in Bulgaria. It only presents a new science based approach and major results of a long, multistage, multiactor, and multilevel work for assisting top level decision making of policy formation for the next programming period<sup>2</sup>.

Methodological framework suggested by EC [1] is applied and ameliorated through inclusion of the Strategic Orientation [7], Gap Analysis [8], and Comparative Institutional Analysis [9] for better formulation of intervention needs.

Initially, actors and links in Bulgarian AKIS are identified. After that the state and trends in AKIS evolution assessed using official statistical, report, etc. data [10, 11] and evaluations

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<sup>2</sup> In fact, this study is being used for identification of public intervention needs and measures in the 2021-2027 Program for Rural Development (PRD) of Bulgaria [6].

of 32 experts from research institutes, universities, National Agricultural Advisory Service (NASS), and producers' organizations.

Next Strengths, Weaknesses, Opportunities and Threats of AKIS are formulated using SWOT analysis [12] and participation of stakeholders' representatives.

Next Strategic Orientation for AKIS development is specified by building SO matrix, determining importance of S, W, O and T (by experts), and confronting scores of S and W with O and T. The quadrant with the highest scores indicates principle type (Reform, Attack, etc.) of most effective strategy for AKIS development.

Subsequently, an effective strategy which let profiting from S and exploring O while overcoming W and protecting from T is formulated.

The most important needs of AKIS development for achieving the specified strategy are identified using GAP analysis.

After that, most appropriate needs for public intervention are determined by applying Comparative Institutional Analysis of feasible modes of public involvement (PRD measures, R&D policies, credit and tax instruments, etc.), and potential of market and private sector to fulfill existing needs.

Preliminary reports for AKIS state, SWOT, strategy, overall and intervention needs are publicized and broadly discussed with major stakeholders as constructive suggestions timely incorporated.

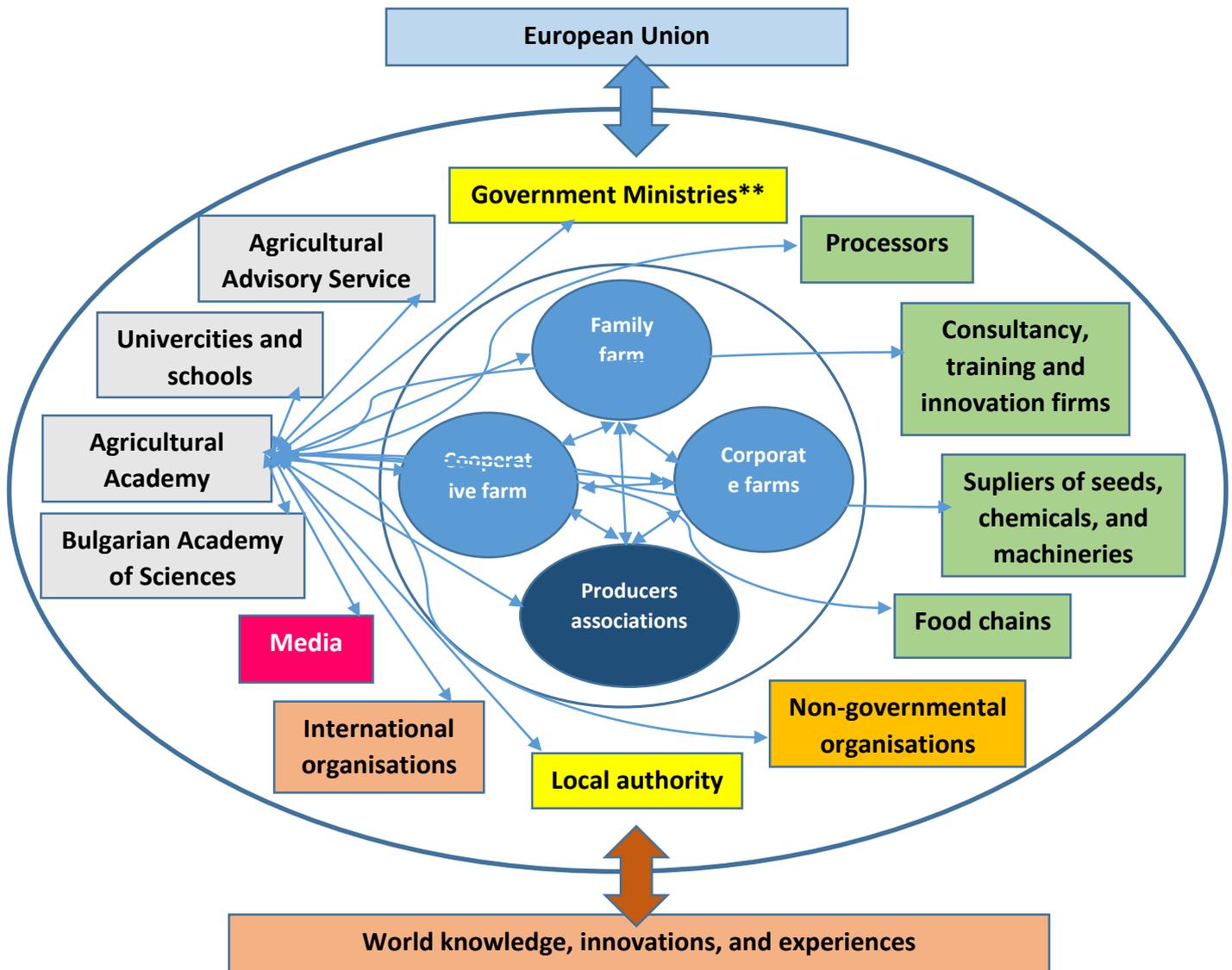
## **1. Diagnosis of the State and Trends in AKIS**

### **Agrarian Research and Development (AR&D)**

Bulgarian AKIS is composed of diverse and numerous individuals and organizations involved in generation, sharing, dissemination and introduction of knowledge and innovations. In addition to diverse type of farmers and agricultural producers (subsistent, semi-market, market, individual, family, cooperative, corporative, etc.), this complex system includes research institutes, universities and schools, NAAS, private consultants, specialized consulting, training and innovation firms, producers organizations, suppliers of machinery, chemicals and innovations, food chains, processors and exporters of agricultural produce, government agencies, local authorities, non-governmental organizations and interests groups, media of various kind, international organizations, private individuals, etc. (Figure 1).

Like most of the other EU member states, there is insufficient official (statistical, reporting, etc.) information on the status and development of this complex system, its individual components, and the complex relationships between its participants. All this makes it difficult both to analyze the state and development of this important national system and to make comparative analyzes with other member states of the Union.

**Figure 1. Main Actors and Relationships in the AKIS of Bulgaria\***



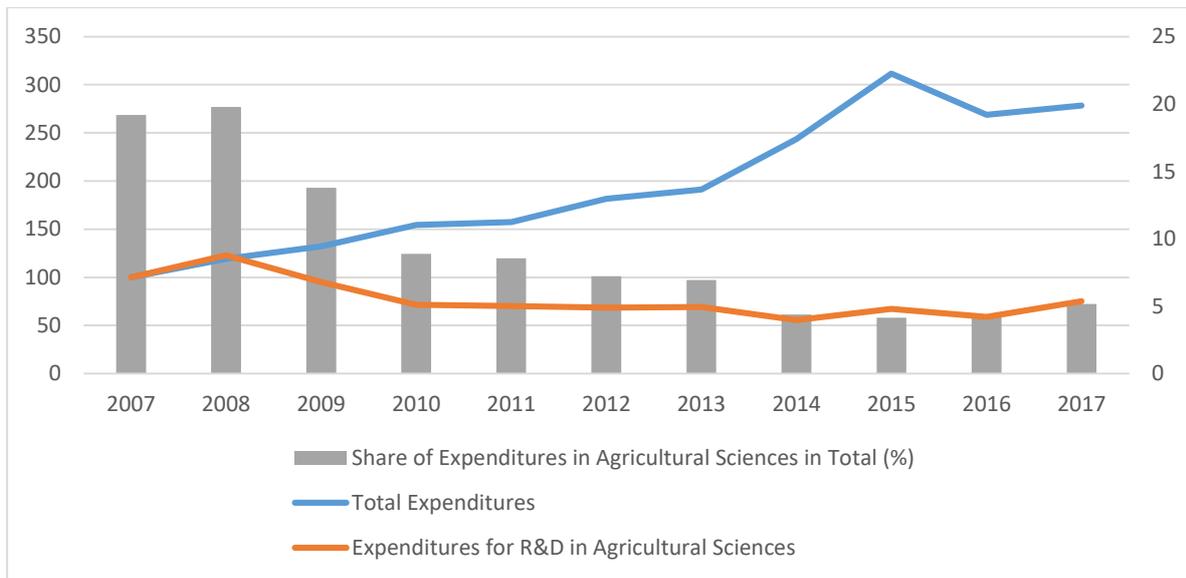
\* For clarity only relationships of one actor (Agricultural Academy) with other organizations are highlighted

\*\*Ministry of Agriculture and Food, Ministry of Education and Science, Ministry of Industry, etc.

Source: the author

In the past years the expenditures for R&D activity in „Agricultural Sciences“ have diminished considerably both absolutely as well as a relative share in the total expenditures for R&D activity in the country (Figure 2). [While the overall amount of the expenditures for R&D activity has increased almost three times after 2007, the expenditures for R&D activity in „Agricultural Sciences“ have diminished with 45% until 2014, and demonstrate a growth afterwards reaching a three-quarters of the initial level in 2017.

**Figure 2. Evolution of Expenditures for R&D Activity Total for Bulgaria and for Agricultural Sciences (2007=100)**

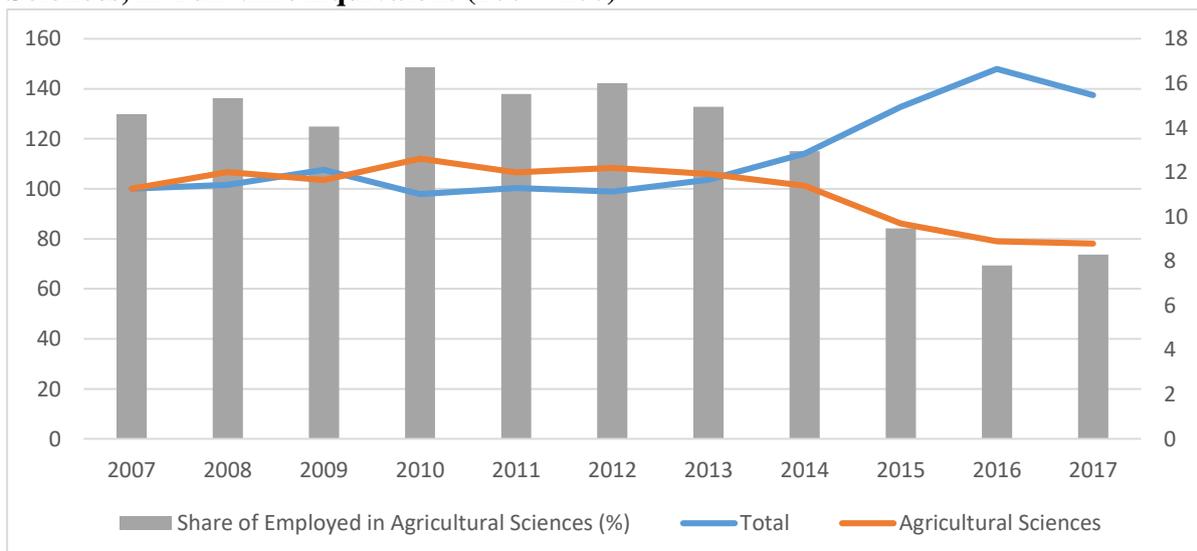


Source: National Statistical Institute, 2019

Simultaneously, the share of the expenditures for R&D activity in „Agricultural Sciences“ have experienced a significant drop in the total expenditures for R&D activity of the country.

Since 2007 personnel employed in R&D activity in the area of „Agricultural Sciences“ initially augment (up to 12% in 2010), and gradually decreases afterwards to 78% of the initial level in 2017 (Figure 3). That indicates deteriorating of the staff component of R&D activity in agrarian sphere in recent years.

**Figure 3. Evolution of Employed in R&D activity Total for Bulgaria and in Agricultural Sciences, in Full-time Equivalent (2007=100)**

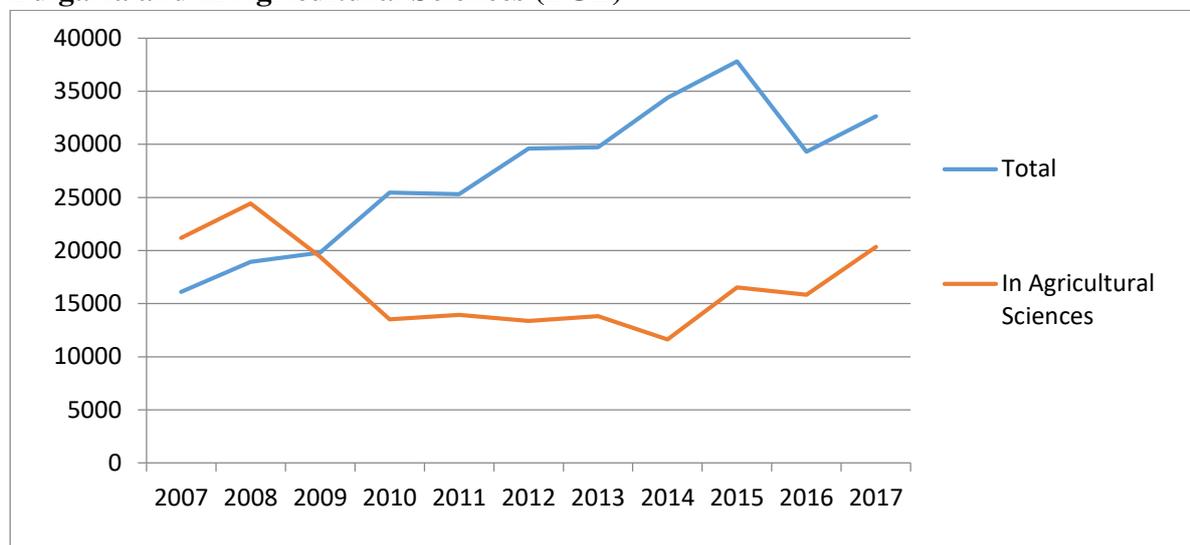


Source: National Statistical Institute, 2019

Along with the worsening of the personnel armament of R&D activity in agricultural sciences, there is also a decline in the material and financial endowment of the employed in

R&D activity in agricultural sciences. After accession of the country to EU the expenditures for R&D activity per one employed in agricultural sciences fall with more than 45% by 2014 (Figure 4). Since then their amount gradually augments reaching 96% of the level at the beginning of the period.

**Figure 4. Amount of Expenditures per One Employed in R&D Activity Average for Bulgaria and in Agricultural Sciences (BGL)<sup>3</sup>**



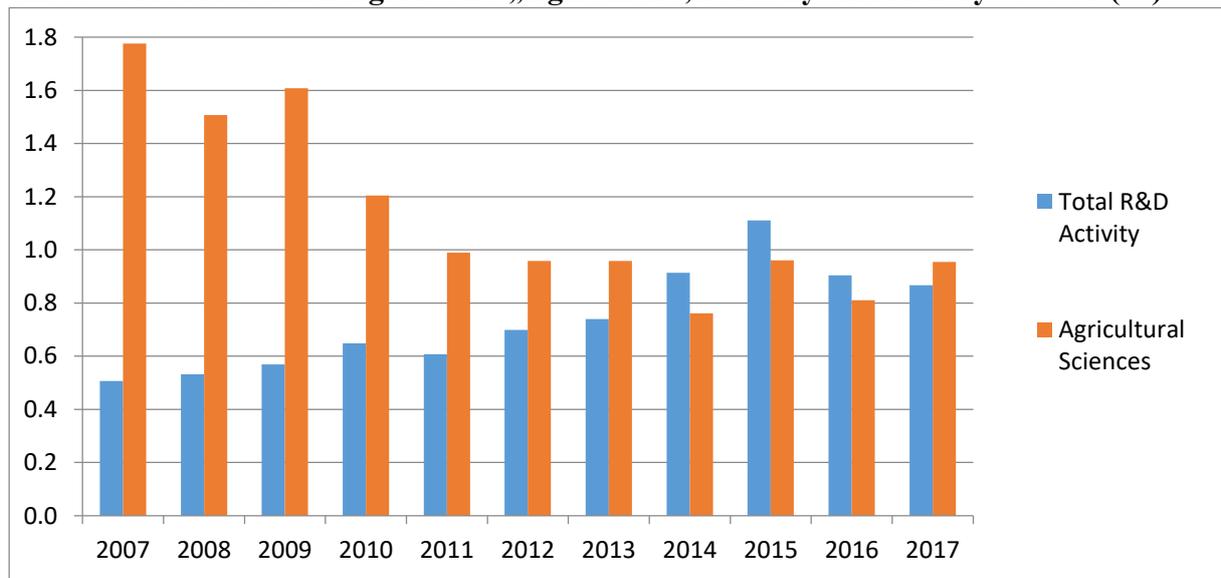
*Source: National Statistical Institute, 2019*

In many EU countries there is a tendency for reduction of the relative share of expenditures for agrarian R&D activity in the total for the country. Nevertheless, Bulgaria is among EU countries (along with Croatia, Romania, Hungary, etc.), in which the portion of expenditures for agricultural R&D activity in the overall of the country continues to be the highest. In most of EU member states there is a similar trend like in Bulgaria for a greater or less significant reduction of financial endowment of employed in agrarian R&D activity. Despite that however, the expenditures for R&D activity for one employed in R&D activity in sector Agricultural Sciences in Bulgaria are among the lowest in EU, similar to Slovenia.

Since the accession of the country to EU there is a considerable diminution of the expenditures in R&D activity in sector Agricultural Sciences in the Gross Value Added of the sector „Agriculture, Forestry and Fishery“ (Figure 5). In 2014 that indicator is 2,3 folds smaller than the 2007 level. In the last three years there is improvement in the level of „science armament of the sector, but levels are far below the levels for the period before 2012. The opposite is the tendency in dynamics of the indicator share of total expenditures for R&D activity in the Gross Value Added of the country.

<sup>3</sup> 1 Bulgarian Lev (BGL) equal 0,511292 Euro (a fixed rate applies during the period).

**Figure 5. Share of Total and Agricultural Sciences Expenditures for R&D Activity in the Gross Value Added of Bulgaria and „Agriculture, Forestry and Fishery“ Sector (%)**



*Source: National Statistical Institute, 2019*

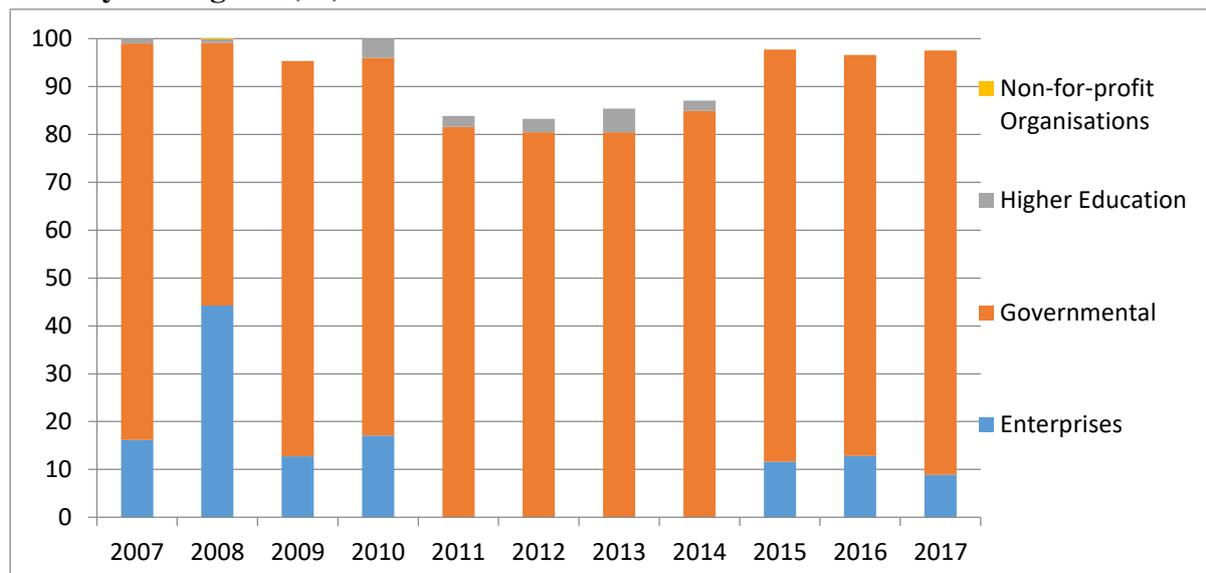
Science endowment of the Bulgarian agriculture, measured through expenditures for R&D activity in Gross Value Added, is among the lowest in EU along with Romania.

In Bulgaria the share of employed in R&D activity in the „collective workforce“ of the sector progressively grows during the period 2009-2015 г. and fluctuates insignificantly afterwards. The endowment of the sector with workers in R&D activity grows due to the greater reduction of number of employed in agriculture and working time in comparison to diminution of the personnel and researchers in agrarian R&D activity.

Most EU member states significantly surpass Bulgaria in relation to the number of employed in agrarian R&D activity „serving“ the employed in agriculture.

The most important sector of agricultural R&D activity in Bulgaria is the Governmental sector, in which the greatest part of the total expenditures of R&D activity in the sector are invested (Figure 6). With an exception of 2008 during entire period after EU accession of the country, in the later sector are allocated more than 80% of overall expenditures for agrarian R&D activity.

**Figure 6. Share of Expenditures for Agricultural R&D Activity in Major Sectors of R&D Activity in Bulgaria (%)**



*Source: National Statistical Institute, 2019*

The second most important sector is that of Private Enterprises, which comprises mainly private firms and organizations managing their investments and activity for benefit of owners and according to the rules of market competition. The share of this sector in the total expenditures for agrarian R&D activity considerably varies during the period (9-44%).

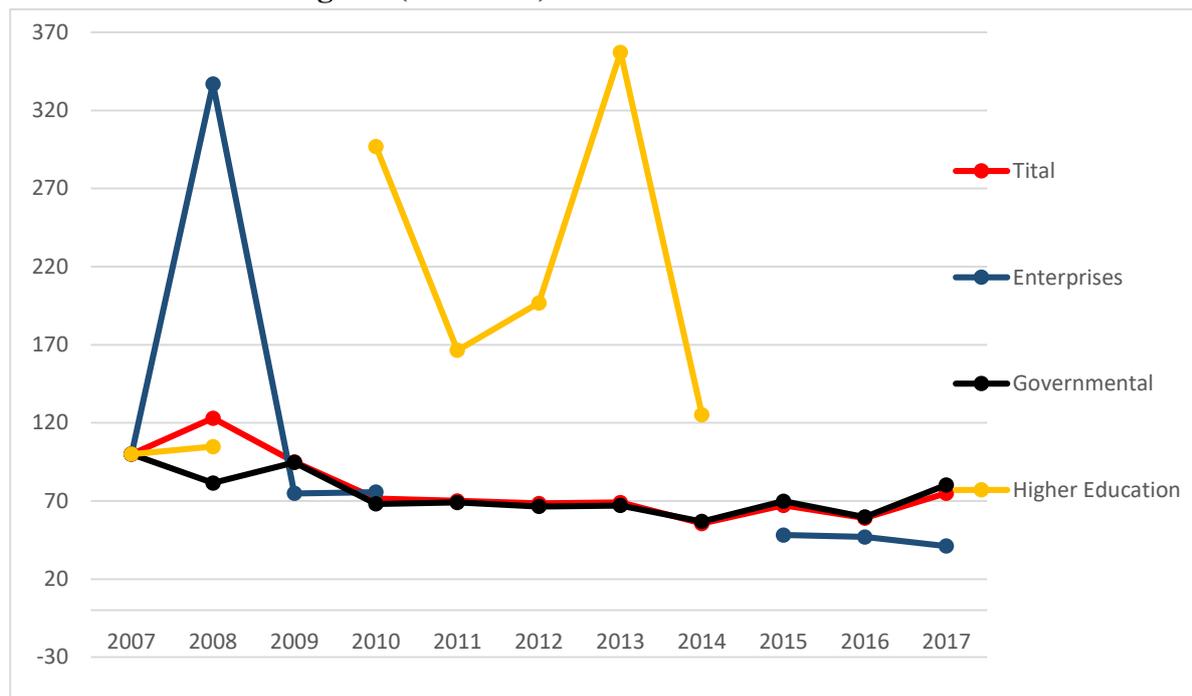
The third by volume of expenditures for agricultural R&D activity is the sector Higher Education, in which are allocated quite a different portion of the overall expenditures, varying from 0,8% up to approximately 5% in individual years.

In the sector of Non-for-profit Organizations are reported expenditures for agricultural R&D activity only for 2008 r. and they account for a tiny portion (0,01%) of the total expenditures in the country.

In most EU countries the governmental sector for agrarian R&D activity dominates, but in Bulgaria its share surpasses two and more folds the portion in other member states. Unlike Bulgaria in other member states a strong private (business) sector of agrarian R&D activity is also developing, in which are invested a significant part of the total expenditures. All these indicates unbalanced development of main sector of agrarian R&D activity in Bulgaria in a direction different from the common trends in EU and other developed countries.

The level of expenditures in major sectors of agrarian R&D activity in Bulgaria is with different dynamics since 2007 (Figure 7). While in the sector Higher Education there is a growth of expenditures for agrarian R&D activity, the Government and the Private sectors experience decline. Moreover, the diminution of the expenditures in the Private sector is much bigger than in the Government sector.

**Figure 7. Evolution of Expenditures for R&D Activity in Agricultural Sciences in Different Sectors of R&D in Bulgaria (2007=100)**



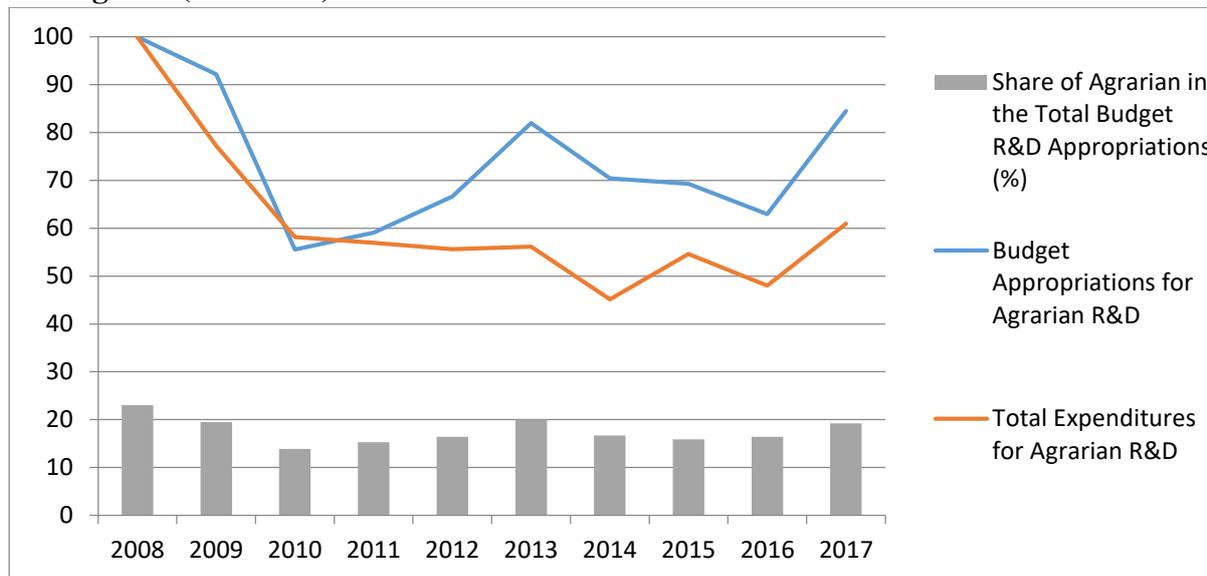
*Source: National Statistical Institute, 2019*

In the private sector are employed a small portion of the totally involved in agrarian R&D activity in Bulgaria. Besides their number and share in the overall persons and researchers, engaged in agrarian R&D activity vary considerably in individual years (from 28 to 66 persons, and between 1,3% and 2,5%).

At the same time, the endowment with financial and material resources of employed in agrarian R&D activity in the private sector (Enterprises) is multiple times higher than in the public sector. Expenditures for one employed in agrarian R&D activity in the private sector vary significantly in individual year as their level surpasses the average for the country from 5 to 21 folds. All these expresses the significant lag in development of the governmental and university sectors in financing, payment of labor and modernization of R&D activity in Bulgarian agriculture in comparison with the business sector.

R&D activity in agrarian sphere in Bulgaria is predominantly funded by the state budget. The pace of evolution of amount of budget appropriations for agrarian R&D activity is similar to that of the total expenditures for agrarian R&D activity, but the decline of the 2008 level is comparatively smaller (with exception for 2010) (Figure 8). That demonstrate that the importance of the budget financing of agrarian R&D activity relatively increases during the period.

**Figure 8. Evolution of Budget Appropriations for R&D Activity for „Development of Agriculture, Forestry and Fishery“, Share in the Total Budget Appropriations for R&D Activity, and Evolution of Total Expenditures for R&D Activity in Agricultural Sciences in Bulgaria (2008=100)**



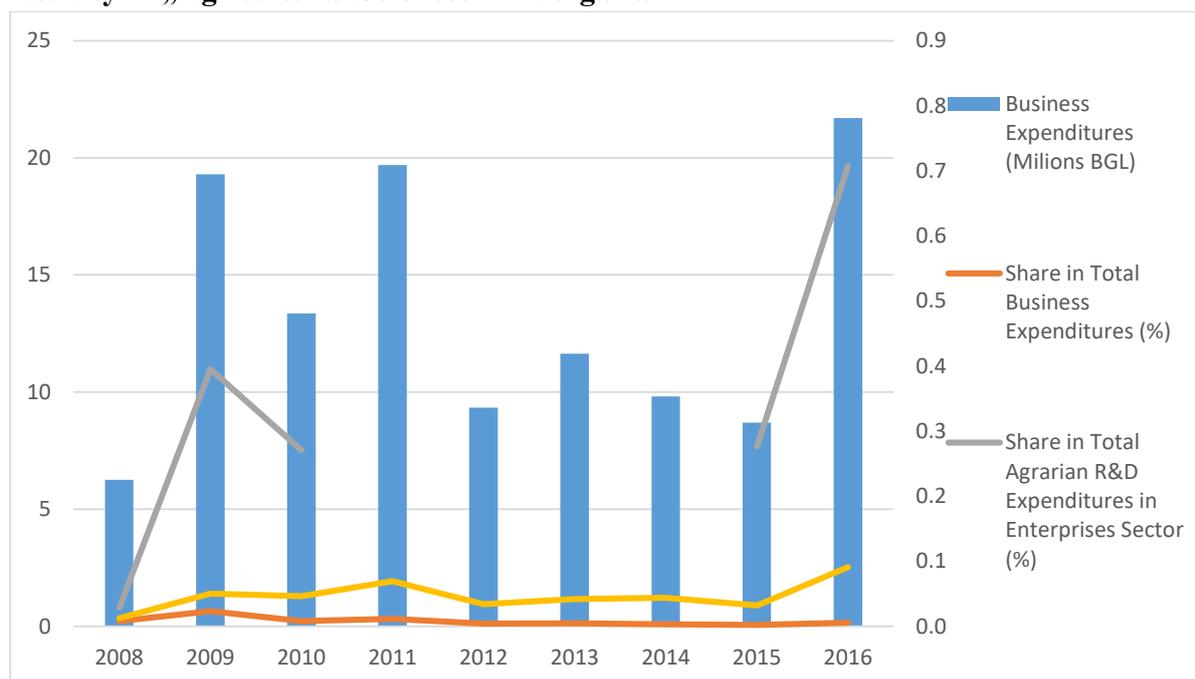
Source: National Statistical Institute, 2019

At the same time however, there is a fall in the share of budget appropriations for R&D activity for „Development of Agriculture, Forestry and Fishery“ sector in the total budget appropriations for development of R&D in the country. What is more, the share of agrarian funding of R&D activity from the national budget is quite fluctuating as initially dramatically falls (from 23% in 2008 to 13,9% in 2013), and after that increases a little bit (up to 19,2% in 2017). These figures give insight for the diminishing social significance of agrarian R&D activity and their unsustainable funding by the national budget.

Since 2009 now in EU as a whole there are slight fluctuations in both directions in the level of budget appropriations for agrarian R&D activity. In most EU member states there is a tendency for permanent reduction of the importance of the state budget in the sustentation of R&D activity of agriculture.

The level of business expenditures (of Enterprises) for R&D activity in „Agriculture, Forestry and Fishery“ sector in Bulgaria varies substantially in different years (Figure 9).

**Figure 9. Amount of Expenditures for R&D Activity in Sector Enterprises in „Agriculture, Forestry and Fishery“ and Share in the Total Expenditures for R&D Activity in „Agricultural Sciences“ in Bulgaria**



*Source: National Statistical Institute, 2019*

The share of the private sector for financing agrarian R&D activity is insignificant, as they account for a tiny portion (0,05-0,31%) of the total business investments in R&D activity of the country. The later demonstrates that incentives for business investments in R&D activity in agriculture are still small generally as well as in comparison with other sectors of the economy.

Above is also supported by the fact that the expenditures of the enterprises for agrarian R&D still comprise relatively little share of the total expenditures for agrarian R&D activity of the country – from 0,35% to 2,5%. That indicates besides lack of sufficient incentives (profit, other benefits) also low (staff, technical, financial, etc.) capability for private R&D activity at the contemporary stage of development of Bulgarian agriculture.

However, for carried in the sector of Enterprises agrarian R&D activity, in individual years private (business) investments in agrarian R&D activity accounts a good proportion of the overall expenditures for R&D activity of Enterprises (from 7,5% to almost 20%). The later confirms, that when there are sufficient incentives and benefits the private sector actively involves in funding and execution of R&D activity in the sector.

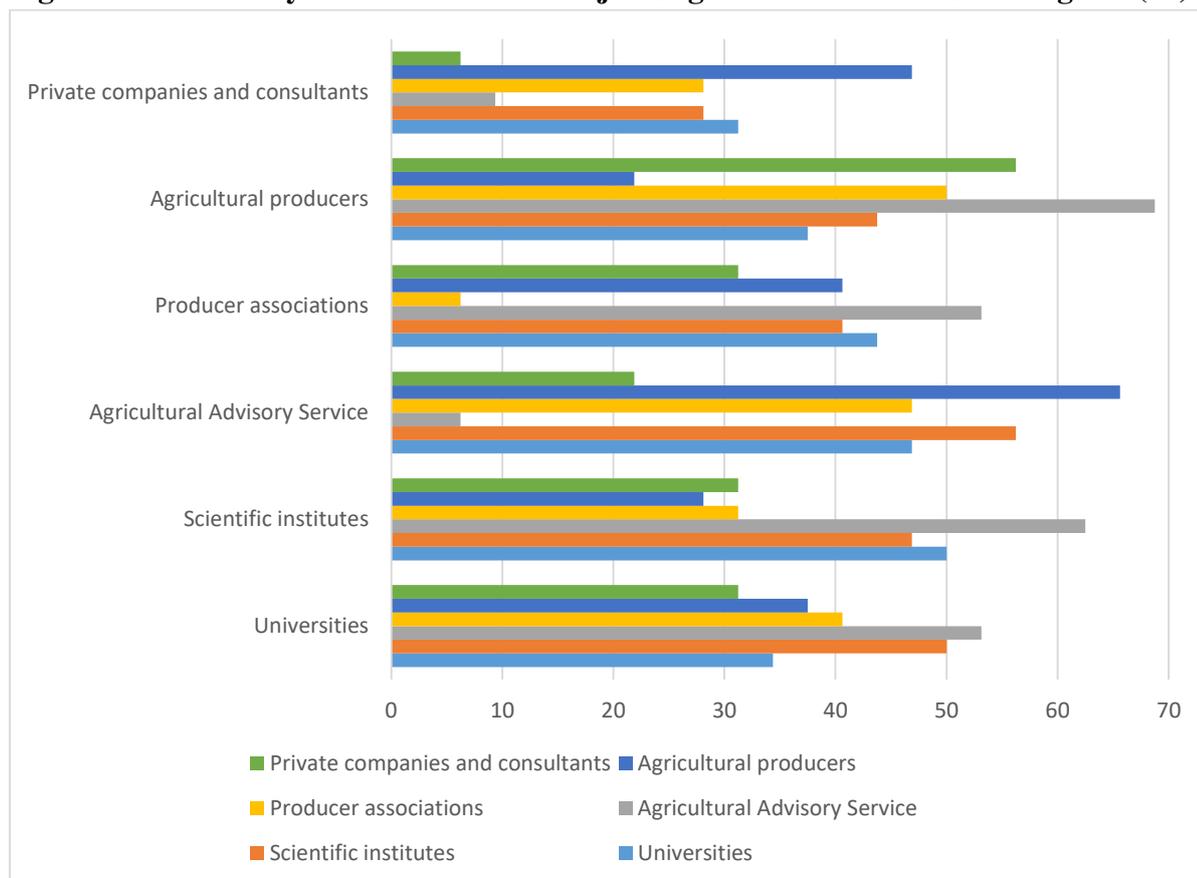
Bulgaria, along with Lithuania and Slovenia are among the countries of EU with the smallest share of the business expenditures for R&D activity in „Agriculture, Forestry and Fishery“ in the total expenditures for R&D activity in the sector „Agriculture“.

Agriculture is the only sector of Bulgarian economy for which a special scientific service structure – the Agricultural Academy (AA) is established and publicly funded. Some of AA institutes manage significant resources, but the material and technical base of most of them is outdated, while some have no a "critical" mass of resources for modern research. AA own and external revenues vary widely and decrease in past years.

Despite many "reforms" in the last 20 and so years, in Bulgaria still there is no effective structure for organization of AR&D and systems for public funding, coordination and evaluation of research, evaluation and stimulation of researchers and organizations, and protection of agrarian intellectual property.

According to 2019 Expert assessment the majority of experts regard some important links between major actors in AKIS as highly effective – namely between the universities and scientific institutes, scientific institutes and NAAS, NAAS and farmers, NAAS and producer associations, producer associations and agricultural producers, private companies and consultants and farmers as highly effective (Figure 10).

**Figure 10. Efficiency of Links between Major Organizations in AKIS in Bulgaria (%)**



*Source: Experts assessment, 2019*

At the same time, some important links for the development of the AKIS are not identified as effective by experts - between individual universities, universities with farmers and private companies and consultants, scientific institutes with farmers and private companies and consultants, NAAS with private companies and consultants, producers' associations among themselves and with private firms and consultants, between private firms and consultants, and between farmers themselves. Also, only 46.9% of the experts are convinced that the links between the scientific institutes themselves are highly effective, which is not a good indicator of the degree of integration and coordination of the activities of the various scientific institutes in the country.

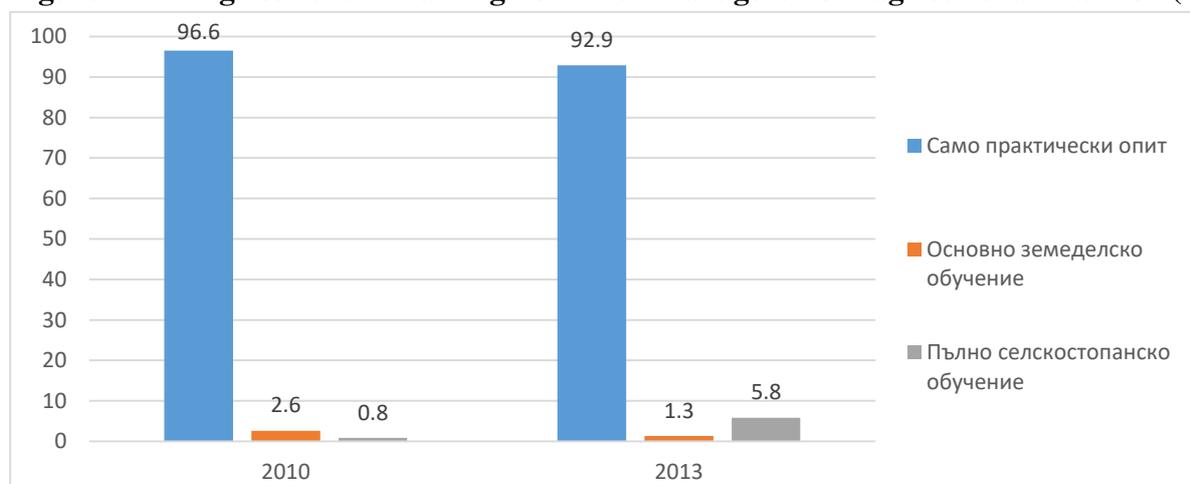
In order to improve all these critical links for the development of the AKIS, effective measures are to be taken immediately from the leadership of the public sector organizations, as

well as adequate incentives for participants and public support introduced through state funding, tax relief, logistics, assistance, regulations, networking, etc.

### Agricultural Training and Consultations

Available data on the agricultural training of the managers of agricultural farms in Bulgaria show that in the first years after the accession to the EU, only a small number of them have basic or full agricultural training, most of them being only with practical experience (Figure 11). Moreover, in 2010, only 1.3% of the farm managers had undergone some form of training in the last 12 months. By this indicator, Bulgaria is among the most lagging behind countries in the EU, along with Romania, Greece and Cyprus.

**Figure 11. Agricultural training of the managers of agricultural farms (%)**



Source: Eurostat

As a result of the undertaken measures for public support during the period 2010-2013 the share of managers having completed full agricultural training increased from 0.83% to 5.8%, while those with basic agricultural training and only practical experience decreased slightly. At the end of the First programming period for the implementation of the CAP in the country almost 93% of all farm managers are only with practical experience and without any agricultural training.

In the course of implementation of the RDP 2007-2013 Measure 111 “Vocational training, information activities and dissemination of scientific knowledge”, a total of 40 062 farmers were trained, with an average training duration of 5.1 days. This represents almost 16% of the total number of farms in the country and just over 52% of the number of registered farmers in 2013. This is a significant success given the large number of farmers in the country and their (low) qualification level.

The biggest number of participants in the trainings and information events are in the thematic area “Sustainable management of natural resources and environmental protection”. This area represents 42.8% of all trained persons and expenditures and 32.7% of all training days, with an average of 4.4 days of training.

The second most popular topic is "Technical knowledge and skills - new technological processes and machines, innovative practices", which represents 37.2% of the number of

trainees and total expenses and 41.9% of the training days, with an average length of training of 5,4 days.

The third topic that farmers are most interested in is "Administrative, Management and Marketing Skills", in which 14.7% of the participants are trained, 15.7% of the training time is engaged, with an average duration of 5.4 days.

An average for the EU countries, these three thematic areas also dominate, along with "Others", but take a different relative share than in Bulgaria.

In terms of the number of training days, Bulgaria is 2.4 times above the EU average, well above that in developed countries such as Austria, the Netherlands and Poland, and well below the duration in Hungary and Romania. At the same time, the public expenditures of one participant and one day of training in the country are significantly lower than the average for the Union and some of the compared countries. This is an indicator of the higher (economic) efficiency of the organization of training compared to other European countries.

The RDP 2014-2020 also gives a priority for the "Knowledge transfer and information actions" (Measure 1), "Consultation services, farm management, and transfer of farms" (Measure 2) and "Cooperation" (Measure 16). The implementation of the main activities under the individual measures in the country is significantly behind in comparison with other European countries. For example, due to the delay of competitions, trainings have not been supported so far. There are also no funded EIP projects of stakeholder groups, researchers, consultants and businesses within the European Innovation Platform.

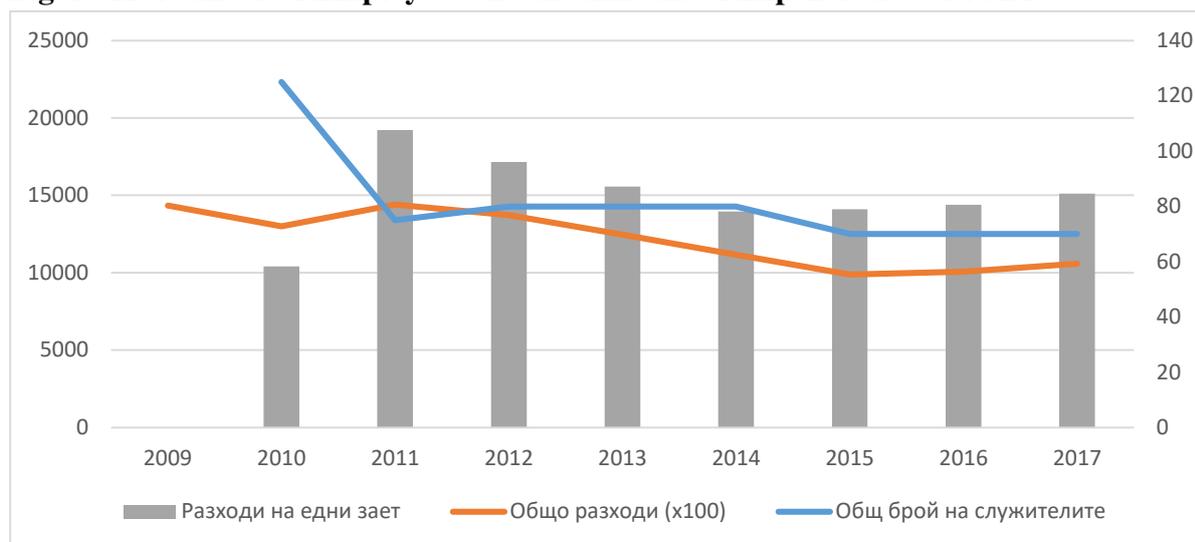
Despite the various forms of education and training offered and the considerable amount of public money spent, the participation rate in rural areas remains weak and steadily decreasing in the years after accession of the country to the EU. This trend is the opposite of that in most EU Member States except Romania and Greece. In terms of formal and non-formal education and training in rural areas, Bulgaria is also much worse than most of the EU countries (Eurostat).

Supporting a specialized advisory service (NAAS) and consultation services to farmers is another major priority for the state during the years following country's accession to the EU.

All consultations provided by the NAAS are free of charge to farmers, which helps to effectively share knowledge and innovation in the sector. Funding of the activities of the NAAS is provided by budget subsidies and projects financed by various national, European and others organizations.

Following the peak of the overall expenditures of the NAAS in 2011, their size was reduced by 2015, and has increased slightly over the last two years (Figure 12). At the same time, the number of NAAS staff has been steadily declining, with a 44% decrease over the last three years compared to 2010 (70 full-time employees).

**Figure 12. Number of Employees and the Amount of Expenditures of NAAS**



*Source: Годишни отчети за дейността на НССЗ*

The endowment with financial and material resources per one employed follows the dynamics of total expenditures. Reduced public support for the NAAS's activity is indicative of the reduced financial capacity of the state, the "reduced" need for advices, new public priorities, as well as directing of the budget subsidies to other organizations and activities.

Since the country's accession to the EU, the number of consultations provided by the NAAS has almost doubled, reaching nearly 93,000. The majority of consultations (about 90%) take place at NAAS offices, but there is a slight increase in the share of on-site consultations on the farm.

Compared to 2009-2010, the number of persons consulted is significantly reduced to 16,000 and varies significantly from year to year. That is a result of both the improving qualification level of farmers (the need to consult a smaller number of farmers) and the development of alternative forms of service provision (private companies, suppliers of machinery and chemicals, producer organizations, scientific institutions, etc.).

In order to extend and facilitate farmers' access to advisory services and reduce their costs from 2015, the NAAS is implementing a new form of "field receptions" (consultancy days) in various settlements, usually far from the regional centers.

In recent years, the share of farmers consulted by the NAAS in the total number of the agricultural holdings and the registered agricultural producers has different dynamics. In 2010 and 2016, the number of persons consulted represented respectively slightly above and slightly below 10% of the total number of agricultural holdings in the country (compared to nearly 8% in 2013). During the same period, the proportion of the consulted persons in the number of registered agricultural producers dropped sharply from close to 57% to just under 20%. The NAAS does not limit its consultations to only certain groups of agricultural producers (registered, small, etc.), and the number of different groups is not constant - the total number of holdings is constantly decreasing, the number of registered producers is increasing, etc.

Although approximate, the above proportions give an idea of the scope of agricultural producers covered by the consultancy services of NAAS. In 2017, about 17% of all registered agricultural producers were consulted and nearly 10% of the total number of farms in the

country. This can be considered a great achievement given the number of the farmers and the experts of NAAS.

The analysis of the various persons consulted according to the type of their farming in recent years shows that those who have not yet set up a farm and do not cultivate land or raise animals occupy a dominant share. Moreover, after 2012, the number and relative share of the potential farmers, which in 2015 increased, represent 44% of all consulted persons. The later confirms the important role of the NAAS in advising new entrepreneurs in agriculture.

Producers of cereal, beans and oilseeds, other field crops (excluding vegetables) and mixed crops are the largest group of farmers involved in the consultations of NAAS. During the analyzed period their number and relative share decreased significantly, accounting for 16% of all consulted in 2017.

The second largest among consulted by NAAS is the group of farmers specialized in fruit production (including fruit, berries and nuts trees), vineyards and other perennials. Their share dropped slightly until 2015, after which it again increased to 14% of all consulted persons.

The consulted farmers involved in mixed crop and livestock (including bees) are the third largest group targeted by the NAAS consultations and their relative share is relatively constant over the period (9%). The relative share of the consulted farmers specialized in growing vegetables, flowers and animals is relatively small and constant over the period.

Most of the farms consulted are small in size (Standard production volume of up to EUR 8000) - over 90% in the last few years. The economic size of most of these farms is very small (up to 2000 euros) and they are essentially “semi-market” producers.

The large-sized farms have their own specialists (agronomist, etc.) and/or the ability to hire outside private consultants and to a small extent use the services of the NAAS. The number of large farms consulted (over € 25,000) is small, but their relative share increases up to 1.8% over the period. This proves that NAAS has the capacity and manage to serve the needs of all types of farmers.

The farms of different size groups in the country receive to a various degree consulting services from the NAAS. In 2016, the largest proportions of consulted farmers are in the total number of small market-oriented farms in the country, with a Standard production volume of EUR 4,000 to 8,000 (just over 12% of them). They are followed by the small semi-subsistence farms (up to EUR 2,000) and those ranging from EUR 2,000 to 4,000, with slightly less than 12% and slightly more than 8%, respectively, receiving consultations from the NAAS.

Along with the evolution of the needs of agricultural producers, the theme (subject) of the consultations provided by the NAAS has been progressively developing. The consultations regarding the possibilities for supporting the farms with the measures of the Rural Development Programs dominate followed by the specialized consultations, other consultations and consultations related to direct payments.

In the first thematic group, the most consultations in the last years have been provided for sub-measure 6.3 "Start-up aid for the development of small farms", 6.1 "Start-up aid for young farmers", sub-measure 4.1.2. "Investments in agricultural holdings” under the Thematic Sub-Program for the Development of Small Farms and the measure “Organic agriculture”. In the last three years, special attention has also been paid to consultations related to the National Climate Change Action Plan 2013-2020 and river basin management plans, in relation to the Water Framework Directive and the Water Act.

In the volume of specialized consultations those in the field of crop production and agrarian economy dominate, as their share varies in each year during the period 2009-2017 respectively from 25% to 39% and from 25.6% to 38% (Figure 25). This is undoubtedly related to the dynamically changing regulatory, market and natural environment, which requires intensive consultations with experts.

Livestock consultations are the third most important in this thematic group, with their number and relative share decreasing over the period (from 23% to 14%).

Furthermore, NAAS also uses other effective forms of dissemination of knowledge and innovations in the sector - various long and short-term courses, hundreds of different events (information meetings, seminars, demonstrations, consulting days, etc.), information materials, media presentations etc.

A large part of the NAAS activities is organized jointly with leading AA scientific institutes, agrarian and other universities, development and other organizations and individual experts or teams.

In the period after 2010, the number of events conducted by the NAAS, the total number of participants in them, and the average number of participants per event varied from year to year and tend to decrease. The reduced number of participants in a single event enables the improvement of communication and exchange of knowledge and experience between experts and farmers and between the participants themselves, a greater adaptation to the specific needs of the participants and increased efficiency.

Since 2015, the NAAS has introduced a new form of dissemination of information to farmers through the so-called. "Farmer circles". The purpose of the 27 farming circles set up in each region is to increase the efficiency and reach to more farmers through consultations, advices, dissemination and sharing of useful information, promotion of good practices for applying and implementing RDP projects, etc.

An informal Advisory Council is also put in place to improve the service activity to farmers at each territorial office of the NAAS. This form allows for effective discussions with farmers, professional organizations, scientific institutes and representatives of the local state structures on how to improve the activities of the respective office. All of this contributes to increasing the efficiency of the NAAS in transferring, disseminating and sharing knowledge and innovations.

Agricultural and other universities, AA institutes and stations, producer organizations, various non-governmental organizations, etc. also provide training and provide a wide range of advices to farmers. In addition, with a similar or complementary (as part of a marketing and production strategy) activity are also involved numerous organizations and individuals from the private sector - suppliers of seeds, chemicals, machinery and technologies, agricultural processors, specialized firms for training, consultations and innovations, and the farmers themselves. In this way, farmers receive such services for free, in a "package" with the main commercial activity of suppliers and/or buyers, or share and/or trade with each other.

Part of AKIS are Local Initiative Groups, partnerships around them and the National Rural Network, but their great potential not yet been fully realized.

### **Introduction of Innovations**

According to a 2014 survey by IAE in Sofia, there is a growing interest in introduction for almost all types of innovations by agricultural producers. This trend is most strongly

observed in the implementation of new machinery, equipment and equipment, in which the share of innovators is more than half (56.5%). A similar tendency exists with regard to the introduction of new production technologies, in which the total share of those who have firmly decided and rather had a positive attitude towards this innovation is 47.8%. An exception is observed in the formed attitudes to cultivate new varieties of crops, where the share of potential innovators is decreasing (31.2%), and in the field of application of new animal treatment methods (5.7%).

Companies are most interested in introducing innovations. Depending on their production specialization, the orientation towards innovations of mixed-type agricultural holdings is the highest, where the share of those with a high degree of innovation activity reaches 30.6%.

Moderate differences in the level of activity towards innovation in agriculture are also observed according to the economic type of farms, with the greatest need to introduce innovations into production activity being recognized in small and large farms.

The factors that most motivate farmers to implement an innovative solution in their practice are to obtain higher yields and realize higher profits, followed by higher livestock productivity and expected time savings. The main factor driving the innovation of the major part of producers is "Lack of the necessary financial resources" (50.9%), followed by "Lack of sufficient markets and the necessary information for innovation in agriculture" (26.9%), "Psychological" (unwillingness to take risks when introducing innovations in agriculture and adherence to old methods and means of production (14.3%) and "Lack of necessary qualifications, skills, etc." (7.9%).

In Bulgaria there is no summarised information on the extent of implementation of the different types of innovations in agriculture. In all subsectors there are good examples of implemented modern innovations of different types. These innovations are implemented by innovative entrepreneurs who are able to learn, transfer and adapt the best in the field, providing the necessary organization, funding, advice and know-how privately. However, the general level of innovation implementation in the country is far below the global levels, with significant differences in the technological level of few "leading" farms and the "average" level in most farms.

Our survey with farmers' organizations and innovative farmers has found that there is insufficient information on the achievements and "innovations" of the institutes of Bulgarian academies and universities. Moreover, most of the innovations implemented in the country are "imported" from abroad, due to the lack of effective solutions in the local institutes and universities for the contemporary needs and conditions of the Bulgarian farms.

Modernization of agricultural holdings is an important area of public support for the Bulgarian farms. Under measure 121 "Modernization of agricultural holdings" of RDP 2007-2013, EUR 537 824 106 or 58% of all public expenditure under Axis 1 was invested. For the period of application of the measure 2008-2015, agriculture was incurred fixed capital formation amounting to BGN 2 832 million, with only the investments generated under M121 amounting to BGN 2 161 million or 76% of the total gross formation in the sector for the period (Table 1).

**Table 1. Distribution of Public Support under Measure 121 of RDP 2007-2013 and the Total Amount of Investments Made by different Subsectors of Agriculture**

Subsectors								
Field crops								
Horticulture								
Wine								
Perennials								
Milk								
Herbal (without milk)								
Pigs								
Domestic birds								
Mixed								
Others								
<b>Total</b>								

Source: MAFF

A total of 4,560 farms were supported, of which 22.8% were able to introduce innovations - new technologies or products. The implementation of the indicator of introduced new products and technologies is below the planned level - only 28.1%, due to the primary needs (priorities) of the farmers during the period and the existing "disintegration" between the research and development centers and the agricultural business in the country.

The Field Crops sector received almost 49% of the public support under the measure and covers about 52% of the total investments made. The Milk Sector ranks second after Field crops in terms of assistance received - 18% of public aid and contributing 16% to the investments made.

The highest ratio between the received support and the investments made is in the case of permanent crops - with 9% of the total aid received, 10% of the investment is invested. Subsidizing the technique constitutes 69% of all investment support and 71% of all investment made under the measure.

In animal husbandry, 1,178 farms have been approved, 803 of them (68.2%) are assisted farms in the Milk sector, and represent only 3% of dairy farms over 1 ECU in the country. About 6% of all farms are supported for the crops and the Fruits and Vegetables.

The RDP 2014-2020 also prioritizes Investments in tangible assets (Measure 4). Sub-measure 4.1 "Investments in agricultural holdings" started in 2015 and 903 financial aid contracts were concluded at the first reception, amounting to EUR 177.39 million. As of the same date, 577 contracts with a total financial aid amount of EUR 225.14 million were signed on the second sub-measure. At the end of 2018, the existing contracts were 848, with approved financial assistance amounting to EUR 296.02 million, and the final payment contracts amounting to 632 with public expenditure of EUR 105.54 million.

Based on the 2015 and 2016 signed contracts, there has been strong support for the so-called "sensitive sectors", which, in addition to priority under sub-measure 4.1, have been identified as a horizontal priority for the whole RDP. The highest share of contracts was concluded in the Fruit and Vegetables sector with 635 contracts with approved financial assistance amounting to EUR 166.59 million or 40.37% of contracts, and projects in the livestock sector with 573 contracts or 36,42% of the concluded contracts and approved financial assistance amounting to EUR 181.01 million. The contracts in the sector of Essential oils and Medicinal crops and Mixed or other projects are 8.13% and 15% respectively of the concluded contracts and the amount of financial assistance EUR 22.49 million and EUR 50.20 million.

The highest share of completed fruit and vegetable projects is 274, with financial aid of € 32.59 million paid, while projects in the livestock sector with final payment received are 244 and financial aid of € 37.46 million. In the "Essential Oils and Medical Cultures" sector, 56 projects have been completed with financial assistance paid to them in the amount of EUR 5.66 million. Under mixed or other projects, the concluded contracts are 58 with financial aid paid to them amounting to EUR 9.95 million.

At the end of December 31, 2018, completed projects in Mountain areas and Areas with Natural handicaps other than mountain areas were 340 with a disbursement of EUR 54.87 million. At the same time, the completed projects outside the scope of these regions are 292, with a financial contribution of EUR 50.66 million.

The data from the concluded contracts show that individuals under the age of 40 represent almost 25% of all contracts concluded by the end of 2018, significantly less are individuals over 40, representing about 13% of the concluded contracts. Under contracts concluded with persons under 40 years of age, a financial resource of EUR 63.58 million or around 16% was committed, with men under 40 years of age having an advantage over women. Although the majority of agricultural holdings in the country are natural persons, traditionally within the RDP, legal entities - farmers have the largest relative share with 921 contracts concluded and a financial aid amount of EUR 315.86 million.

As of 31.12.2018, the number of completed projects is for the benefit of individuals 160, but as a volume of paid financial aid, legal entities with paid funds in the amount of EUR 35.68 million, with a total of EUR 12.40 million for individuals. This data may be due to the small amount of investment undertaken by the individual farmers and the shorter implementation time.

There is no information on the extent to which the implemented and completed projects under this sub-measure are related to innovation implementation. It can be assumed that the number of innovative projects is similar and even more than those under measure 121 of RDP 2007-2013.

Under sub-measure 4.1.2: "Investments in agricultural holdings under the Thematic sub-program for the development of small farms" no sub-contracts have been concluded by 31.12.2018, with applications received amounting to EUR 1.9 million.

Under sub-measure 4.2 "Investments in processing/marketing of agricultural products", as of 31.12.2018, 295 contracts were concluded and are in force with a total amount of approved public funds amounting to EUR 193.73 million.

Of the concluded and existing contracts, 10.5% are implemented in the Northwest region of the country, which is in line with one of the horizontal priorities set out in the RDP and the Partnership Agreement. The approved financial assistance for existing projects in the Northwest region amounts to EUR 15.27 million, or approximately 9% of all public funds.

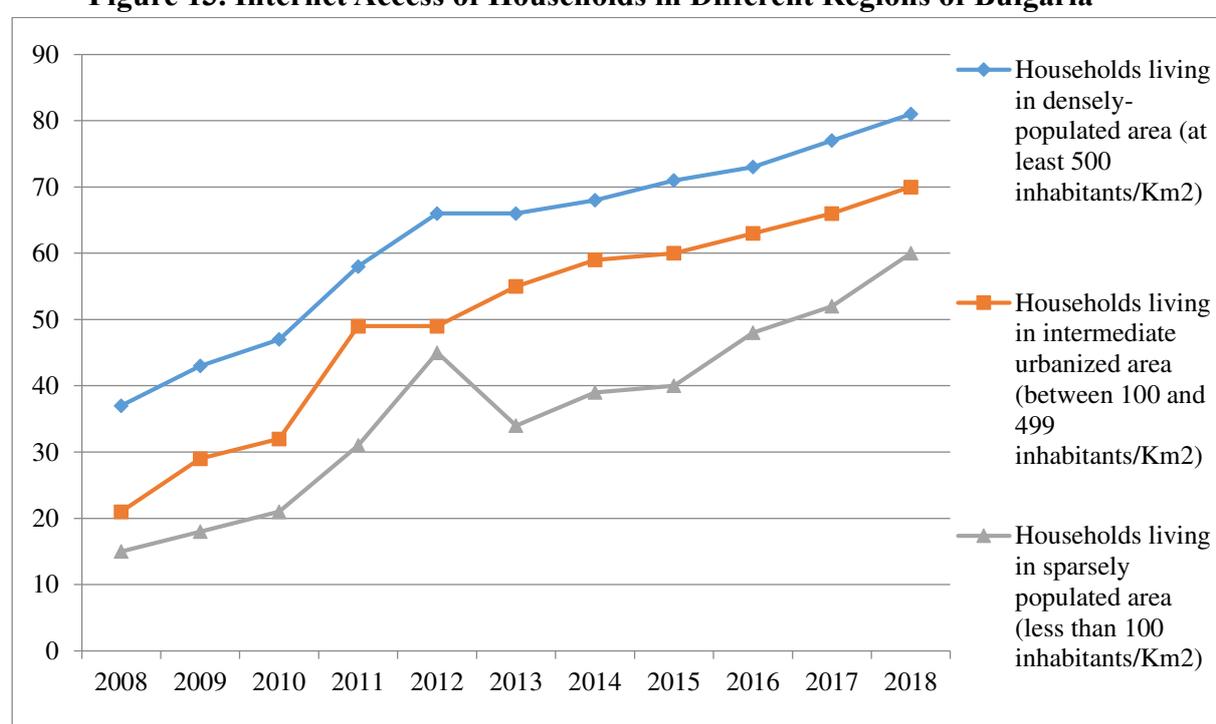
2019 Expert assessment also confirm that the extent of introduction of new production methods, forms of organization and marketing, precision technologies and process automation

is low in Bulgarian farms (Bachev and Mihailova, 2019). There is a significant differentiation in application of innovations in different sub-sectors, in farms of different types and sizes, and in different regions. There is a great unrealized potential for organizational, technological and product innovations and needs for public support.

### Digitalisation of Agrarian and Rural Sector

Over the last 10 years, there has been a significant improvement in the access of Bulgarian households to the Internet as a whole and in the regions with varying degrees of population density (Figure 13). It can be assumed that the general trends in the country apply to both rural households and farmers' households, which means that the use of the Internet is progressively increasing in the agricultural sector.

**Figure 13. Internet Access of Households in Different Regions of Bulgaria**



Source: Eurostat

However, despite the significant progress, there are still large differences in household Internet access in densely populated areas (at least 500 inhabitants/km<sup>2</sup>) and medium-urbanized populations (between 100 and 499 inhabitants/km<sup>2</sup>), and sparsely populated areas (less than 100 inhabitants/m<sup>2</sup>) regions of the country - 81%, 70% and 60% of them respectively. It can be assumed that farmers living in the areas concerned use approximately the same extent of the Internet.

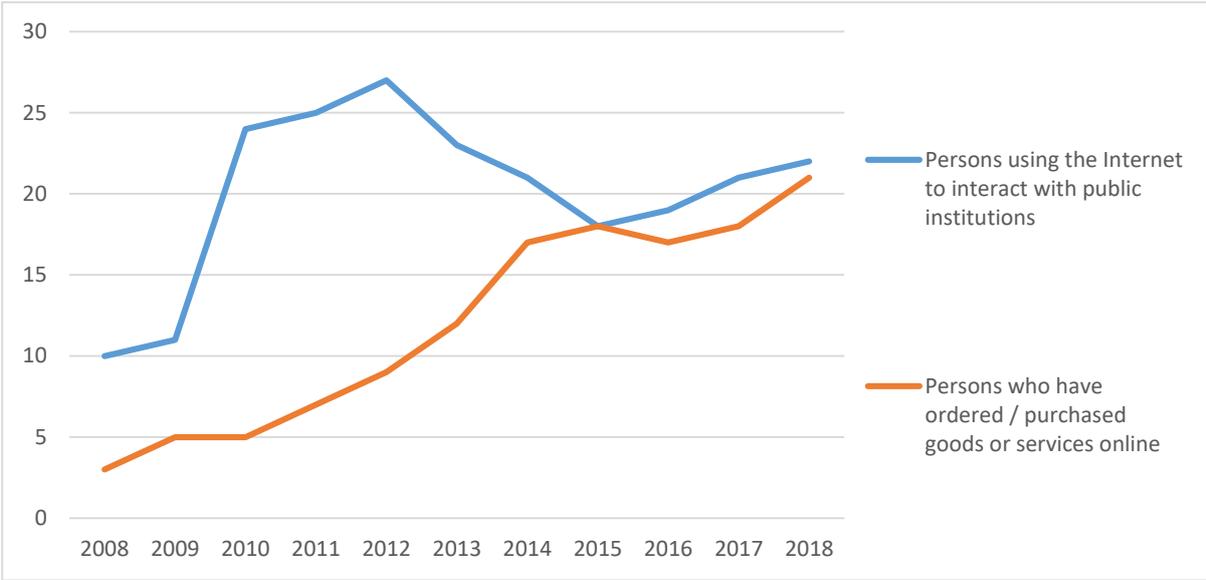
Bulgaria is in the group of lagging countries along with Greece, Lithuania and Latvia, ranking last in internet access in all categories of regions.

Nevertheless, in 2018, only 7.8% of the individuals have not used some kind of mobil (smartphone, portable pc, tablet, etc.) devices to access the Internet in the last 12 months. This implies that many farmers and members of their households use this type of devices for internet access.

Over the last ten years, the number of people using the Internet to interact with public institutions or to order/purchase goods and services has increased significantly (Figure 14). In 2018, just over a fifth of the population have used the Internet to engage with public and private organizations in the last twelve months. It can be assumed that the implementation of digital relations with public institutions and commercial organizations in rural areas and among farmers has a similar trend, but is less widespread.

Compared to other EU countries, however, the development and use of e-government and e-commerce is much smaller, with Bulgaria last (along with Romania) in this regard.

**Figure 14. Individuals Using Internet for Relations with Public Authorities and Order/purchase of Good or Services in Last 12 months**



Source: Eurostat

The use of the Internet by businesses and households for e-commerce, Internet banking, information and training is far from potential possibilities. By the end of June 2015, Bulgaria has coverage of a new generation of broadband access infrastructure (> 30Mbps) for 72% of the households but reaching only 2.7% in rural areas, well below the EU average.

The in-depth analysis also shows that Bulgaria lags far behind the other EU member states in terms of digital penetration into the economy and society. In recent years (2017 and 2018), the country ranks 26th in the EU in the Integrated Index of Digitalization of Economy and Society - The Digital Economy and Society Index-DESI (DESI, 2019).

In terms of DESI measurement for “Connectivity”, Bulgaria ranks 25th in the EU.

As regards to the “Human Capital” in digital technology area, Bulgaria is also making slow progress, with the overall level of skills being among the lowest in the EU (27th) and the level of all indicators below the Union average. In terms of "Internet Usage", the country is among the last places in the EU (26), with major indicators showing significant differences depending on the activities carried out online. In terms of "Introduction of Digital Technologies", the country is also one at the last places in the EU (26) and the use of digital technologies in Bulgarian enterprises is generally well below the European levels. It can be

assumed that in the agricultural and rural enterprises the implementation of these technologies is lagging behind even more than in the cities and high-tech industries. Similar is the situation with regard to the “Digital Public Services”, where the country is ranked 23rd in the EU.

A MAFF survey among farmers in 2019 on digitalization of Bulgarian agriculture found out that for the question "Are you familiar with the nature of digital agriculture" the majority (49%) answered that they are not familiar, 27% are partially familiar, 19% are average familiar, and only 5% are familiar to a great extent (M3XT, 2019).

With regard to the question "Do you use modern digital technologies on your farm" 86% of the respondents said that they do not use modern digital technologies and the remaining 14% use digital technologies, mainly GPS navigation systems.

To the question "Do you expect digitalization to affect the number of employees on your farm?" 83% said they expect a change, 13% said they expect the number to decline and only 4% said they expect a staff increase.

To the question "Do you have a department or designated employee who is specifically responsible for digitizing on your farm?" only 8% of the respondents said that they have an employee in charge of digitization and the majority (92%) have no such an employee.

To the question "Do you plan to invest in the next five years for the development of digitalization in your farm?" 4% said they intend to invest more than 10% of their planned investment funds for digitalization, 96% said they intend to spend less than 10% of their planned funds or do not intend to spend any money at all for digitalization.

To the question "Do you intend to link your production with digitalization in the future?" 38% of respondents stated that they intend to digitize their production, 33% intend to digitize only some of the production stages, and the remaining 29% plan to introduce digital technology within the next five years.

To the question "What do you think would be the benefits for your farm with the introduction of digital technologies?" 22% cite efficiency gains, 17% cost reductions, 16% better planning and management, 14% productivity gains, 12% data acquisition and analysis, 9% competitiveness retention, 4% increase in turnover, 2% say more value added and the ability to customize products, 1% point “Time-to-market” acceleration, and 1% see no benefit in digital technology.

To the question "What do you think are the potential barriers and risks to digital adoption?" 24% of respondents indicate employee qualifications, another 24% indicate the amount of investment, 19% identify unclear economic benefits, 15% data security, 7% insufficient maturity of technologies, 5% insufficient standardization and certification, 3% insufficient capacity for recording and storing digital information, 2% lack of clear priorities by the management of the holding, and 1% cannot identify risks and obstacles to the entry of digital technologies.

To the question "In what areas is public administration action required regarding the introduction of digital technologies?" 21% of respondents indicate support for measures for further qualification of employees, another 21% indicate tax incentives for planning of

measures and digitization of activity, 18% encouragement of young professionals, 11% introduction of internationally recognized standardization and certification processes, 11% adapting data protection legislation, 11% securing high-speed and high-speed networks, and 7% promoting development activity.

A representative survey of farms in the mountainous regions of the country in 2017 found that only 5% of producers actually use computer programs in agricultural management (IAE).

Under Horizon 2020 in 2019 AgroHub.BG was established in Bulgaria at the initiative of the Institute for Agro-Strategies and Innovations.

Large-scale measures have also been taken in recent years to digitize the agricultural administration in the country. As a result, a number of information systems, databases, software products and registers have been built into the Ministry of Agriculture, Food and Forestry (MAFF) system. Simultaneously, the MAFF is developing an "Information System with Electronic Registers for the Specialized Administration (EPCA)", which aims at creating a unified information system. All this leads to an increase in the efficiency of the administration and an improvement in the service provided to farmers.

In 2019 The Strategy for Digitization of Agriculture and Rural Areas of the Republic of Bulgaria was adopted, which aims to turn Bulgarian agriculture and related agricultural business into a highly technological, sustainable, highly productive and attractive sphere of the global economy, which improves the living conditions of the agricultural producers, and rural areas in general. The priorities are to be defined and European and national funds earmarked for the implementation of the strategy and effective digitalization of Bulgarian agriculture in the period 2021-2027.

## 2. SWOT and development strategy and intervention needs

On the base of the diagnosis of the state and trends in development of AKIS, SWOT for AKIS is formulated by the panel of experts (Table 2).

**Table 2. SWOT for AKIS in Bulgaria**

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<p>AKIS of the country includes diverse and well-developed scientific, university, private and professional organizations</p> <p>Agriculture is the only sector for which special service structures (Agricultural Academy and NAAS) are built and publicly funded</p>	<p>There is insufficient official or other reliable information on AKIS in the country</p> <p>The share of the university and private (business) sectors of AR&amp;D is negligible</p> <p>Poor staffing and age structure of AR&amp;D</p> <p>Material endowment of AKIS lags behind world standards</p>

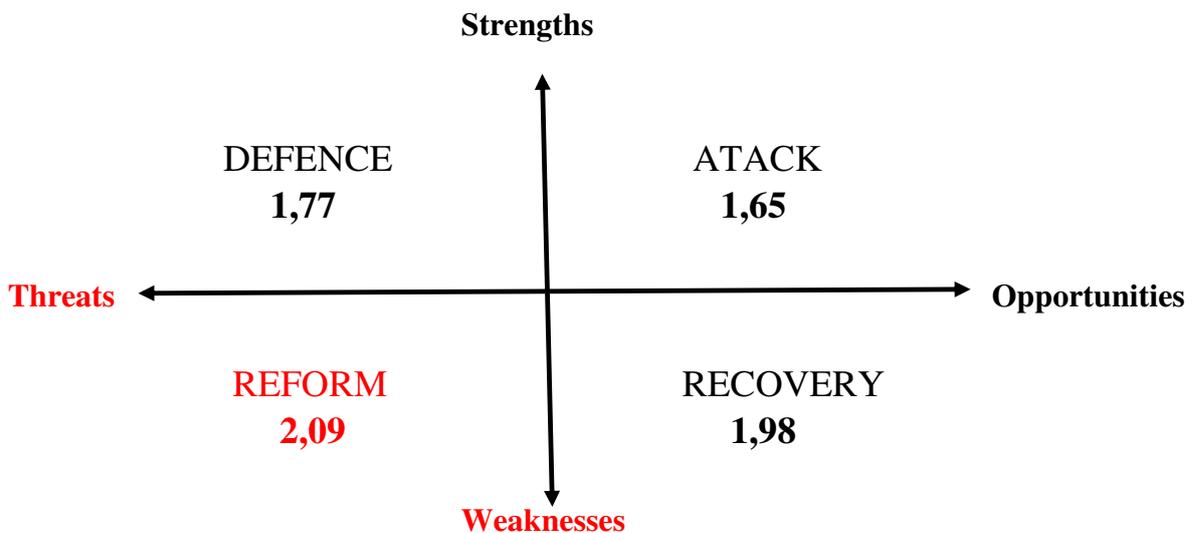
<p>The relative share of scientists, doctors and doctors of science in AR&amp;D is increasing</p> <p>The number of recognized new varieties and hybrids of plants and animal breeds, and approved technologies is considerable</p> <p>Vocational education in the field of agriculture and forestry is provided in a large number of secondary and higher schools</p> <p>The number of consultations provided to farmers has increased and the subjects expanded</p> <p>Availability of free and affordable support to farmers through NAAS</p> <p>Opportunity for farmers to participate in hundreds of diverse events for transfer and dissemination of knowledge and innovation</p> <p>Private consultancy organizations are active in preparing business plans and projects for investment measures</p> <p>There is a growing interest in implementation by producers for all types of innovations</p> <p>Numerous activities taking place related to digitization of agriculture, an important part of which is the Digital Innovation Hub</p> <p>Significant measures taken to digitize agricultural administration, leading to increased efficiency and improved services</p>	<p>Obsolete facilities and reduced, on the border of the "critical" mass, personnel, financial and material resources in some of the AKIS units</p> <p>Low quality of education and insufficient adaptability of schools to the business needs</p> <p>Most farm managers are only with practical experience and no agricultural training.</p> <p>Lack of financial resources, unwillingness to take risks and insufficient training of farmers make it difficult to innovate</p> <p>In many areas, a limited number of private organizations providing consultancy</p> <p>Only 5% of producers in mountainous regions use computer programs in farm management</p> <p>There is considerable variation in internet access of households in densely populated and rural areas</p> <p>Much of the links in AKIS are not efficient</p> <p>The degree of introduction of new production methods, forms of organization and marketing, precision farming technologies and process automation is unsatisfactory</p> <p>There is considerable differentiation in the use of advice and consultations and introduction of innovations in different sub-sectors of agriculture, in farms of different legal types and sizes, and in different regions</p> <p>There is insufficient information among farmers and producers' organizations on the achievements and innovations of local institutions</p> <p>Few publicly supported farms introduce new technologies or product</p> <p>Nearly half of farmers are unaware of the nature of digital agriculture, and only 14% use modern digital technologies</p>
<p style="text-align: center;"><b>OPPORTUNITIES</b></p> <p>The role of budgetary funding for AR&amp;D is relatively increasing</p> <p>With sufficient incentives and benefits, the private sector is actively involved in AR&amp;D</p>	<p style="text-align: center;"><b>THREATS</b></p> <p>Expenditures for R&amp;D in agricultural sciences is significantly reduced in both absolute and relative terms</p> <p>Significant reduction in AR&amp;D expenditure in the Gross Value Added of agriculture</p>

<p>Existence of significant public support and funding for “Transfer of Knowledge and Actions”, “Consultancy Services, Farm Management and Replacement Services” and “Cooperation”</p> <p>Modernization of agricultural holdings is an important area of public support for Bulgarian farms.</p> <p>Adopted Strategy for Agriculture and Rural Digitization aiming to turn agriculture into a highly technological, sustainable, productive and attractive sphere</p> <p>There is great potential for increasing efficiency with adequate support and modernization of AKIS</p> <p>European and world AKIS offer great opportunities for rapid and efficient transfer of knowledge and innovations</p>	<p>Share of AR&amp;D budget expenditures in the total budget expenditures is decreasing while the share of AR&amp;D funding from the state budget is variable</p> <p>The costs of innovations are high, leading to high prices for innovative technologies and products</p> <p>There is no effective organization of AR&amp;D, and systems for public funding, coordination and assessment of activity, evaluation and stimulation of researchers and teams, and protection of intellectual agrarian property</p> <p>Most of the innovations implemented in the country are "imported" from abroad due to the lack of effective solutions in the local institutes and universities</p> <p>Regulatory restrictions for implementing public-private partnerships between research centers and agribusiness</p> <p>Bulgaria lags far behind the rest of EU in terms of the entry of digital technologies into the economy and society</p> <p>Implementation of measure 16.1 of the RDP 2014-2020 is lagging behind comparing to other EU states</p> <p>Competition with global suppliers of new knowledge and innovations in the agricultural sector is increasing</p>
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Source: the author

After SWOT is done the Expert panel gave scores indicating importance (Scale 0-3) of the major Strengths, Weaknesses, Opportunities, and Threats of AKIS in Bulgaria. On that base a Strategic Orientation matrix have been built (Figure 15).

**Figure 15. Strategic orientation for AKIS development in Bulgaria**



Source: the author

The summary of experts' assessments found out that the scores in quadrant IV are the highest, which means that Weaknesses of AKIS in the country prevent from confronting the Threats of the socio-economic, market, and natural environment. This calls for selection of a general REFORM strategy.

Morover, the scores in Quadrant III are close to the highest one, indicating that AKIS in the Bulgaria has many Weaknesses and it is not able to take advantage of the existing options of the environment. That also call for a need to launch a global RECOVERY type strategy.

Concequently, the specific strategy for AKIS development during the next programing period is suggested and agreed upon:

***"Improving the level and forms of agriculture through stimulating knowledge sharing, innovation and digitization".***

Five major needs and 23 sub-needs for public intervention for the realization of the defined strategy have been specified after careful consideration (and assessment of comparative efficiency) which needs of AKIS could be effectively fulfilled by the market and private modes and where there is a strong need for public involmment during the next programing period.

### **Needs for public intervention in AKIS with PRD 2021-2027**

#### **I. Collecting complete and reliable information on the state and development of the System of Sharing of Knowledge and Innovations and Digitization in agriculture**

a. Collecting information on the status and development of research, consultancy and innovation introducing activities of universities;

b. Collecting information on the status and development of research, consultancy and innovation introducing activities of private sector;

c. Collection of information on the digitization of agriculture and rural regions;

#### **II. Significant modernization of the AKIS of the country**

a. Significant increase in investment for R&D activity and for introduction of innovations in agriculture;

b. Support and stimulation of private investment in R&D activity and introduction of innovations in agriculture;

c. Supporting and stimulation public-private partnerships and co-operation in financing and organizing R&D activity and introduction of innovations in agriculture;

d. Improvement of the system of registration, protection and commercialization of intellectual agricultural products (new varieties, breeds, technologies, production methods, etc.);

#### **III. Significant expansion of the AKIS of the country**

a. Sustainable growth of budgetary investments in R&D activity and introduction of innovations in agriculture;

b. Improving the incentives for retaining and attracting highly qualified staff research and development activity in agriculture;

c. Improvement of the material and technical base, and the resource, financial and human endowment of the public scientific, educational and consulting organizations in the agricultural sphere;

**IV. Improving the educational and qualification level of managers, specialists and workers in the agricultural sector**

a. Encouragement and support of all forms of training and upgrading of the employees in the agricultural sector;

b. Encouragement and support for improving the educational and qualification level of managers and workers in agricultural holdings and rural residents;

c. Expanding the training and qualification of the AKIS participants in priority areas, including the organization of networks for sharing of knowledge and innovations;

d. Adapting the training system to the contemporary needs of farmers and businesses;

**V. Promoting and supporting the various forms of dissemination of knowledge and innovations in agriculture**

a. Encouraging and supporting joint initiatives of scientific, business, non-governmental and professional organizations, and farmers for dissemination of knowledge and innovations in agriculture;

b. Accelerating the setting up of operational groups of interested farmers, researchers, consultants and business (EIP) in agriculture to solving specific problems;

c. Free, easily accessible, tailored to the needs and diverse in forms and subject consultations and information for agricultural producers;

**VI. Overcoming the big differences in the technological level and production efficiency in different types of farms, subsectors of agriculture and regions of the country**

a. Enhanced support for sharing and transfer of knowledge and digitization in lagging areas;

b. Enhanced support and incentives for the introduction of new production methods and technologies for precision agriculture, processes automating, and implementation of digital technologies, software and other innovations in perspective areas;

**VII. Supporting and stimulating the digitization of agrarian management, agricultural production and rural areas**

a. Expanding the use of digital technologies in the management of the sector and in the relationships with producers;

b. Expanding access to and use of computers and digital technologies in agriculture and rural areas;

c. Supporting the introduction of digital technologies in small and medium-sized agricultural producers and their organizations;

d. Supporting innovative initiatives for the creation, adaptation and introduction of digital technologies in the management and production of small and medium-sized enterprises.

## Conclusions

The list of AKIS needs is provided to government officials for taking a political decision about appropriate measures for public intervention - direct supports from PRD, modernization of regulatory framework, reorganization and improvement of management of public agencies, public-private partnerships, etc. The process of preparation of the Strategic Plan for agrarian and rural development in Bulgaria for coming 7 years in the course of preparation. The list of scientifically defined needs wait the verdict of agrarian administration and politicians.

For the first time preparation of RDP in Bulgaria is being done on the base of comprehensive scientific approach. Scientific community has demonstrated that it can contribute substantially to solving an important academic and practical (business and policies forwarded) problem.

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