

## About Governance of Agricultural Knowledge and Innovation System. The Case of Bulgaria. Part I

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### Abstract

This paper examines the governance, efficiency, and development of the Agricultural Knowledge and Innovation System (AKIS) in Bulgaria. The Governance of AKIS includes diverse governing agents, a variety of rules, mechanisms and modes for agents, and the process of governing, and the outcome (specific order and efficiency) of the governance. First, participants in the country's AKIS and the type of their relations are specified. Second, a diagnosis of the state and trends in AR&D is made.

The study is based on available data from statistical sources, official reports, fields surveys as well as assessments of a panel of leading experts in the area and stakeholders' representatives. The study has found out that AKIS of the country consists of diverse and numerous organizations, for which activities and complex relations have no sufficient official or other reliable information. Bulgarian AKIS demonstrates low resource endowment and efficiency, domination of outdated public institutions and undeveloped private sector, insufficient sharing of knowledge and innovations, slow and uneven application of modern technologies,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 types of farms, subsectors of agriculture and regions of the country.

**Keywords:** governance; knowledge; innovation; digitalization; agriculture.

**JEL Classification:** D83; O32; O38; Q16.

### Introduction

Stimulating and sharing knowledge, innovation, digitalization and promoting their greater use is set again as one of the strategic ("horizontal") objectives in the new programming period 2021-2027 for implementation of the European Union (EU) Common Agricultural Policy (CAP) (European Commission, 2018). In many other countries, regular in-depth analyses of the state, efficiency, and development factors of the Agricultural Knowledge and Innovation System (AKIS) are constantly made (Anandajayasekaram and Gebremedhin, 2009; Antle et al. 2017; EIP-AGRI EU SCAR, 2012; FAO, 2019; Touzard et al., 2015; Özçatalbaş, 2017; USDA, 2019; Weißhuhn et al., 2018; World Bank, 2007; Virmani, 2013, Chartier et al. 2015). In Bulgaria, there are only partial analyzes of the individual elements of this complex system (Bachev, 2020a, 2020b, 2020c; Bachev and Labonne, 2000; Bachev and Mihailova, 2019). The reason for later is the lack of enough official statistics and other information as well as "sufficient" public interest in the development of this important system.

In this paper, an attempt is made to analyse the governance, state, efficiency, and factors for the development of the country's AKIS at the present stage of development. The goal is to specify major trends and identify main challenges and assist policies formation during the next programming period<sup>1</sup>. The governance of AKIS encompasses (1) the governing agents, and (2) the available rules, mechanisms and modes for agents, and (3) the process of governing, and (4) the outcome (specific order and efficiency) of governance.

For the analysis, a great variety of official statistical, reports, and agencies (Agricultural Academy, National Agricultural Advisory Service, etc.) data is used. In addition, an expert evaluation was made with the participation of 32 leading experts from the research institutes of the Agricultural Academy (AA) and Bulgarian Academy of Sciences (BAS), agrarian and other universities, National Agricultural Advisory Service (NAAS), and major professional organizations of agricultural producers.

<sup>1</sup> In fact, that analysis is being used for identifying public intervention needs and measures in the 2021-2027 Program for Agrarian and Rural Development of Bulgaria (Bachev et al., 2020).

## 1. The Governance of Agricultural Knowledge and Innovation System (AKIS) in Bulgaria

The governance of AKIS includes: diverse governing agents and organisations (investors, research establishments, users of agrarian innovations, etc.); and the variety of available rules (e.g. system of agrarian intellectual property rights and the system of its enforcement), and private, market, collective, contractual, public, hybrid, bilateral, multilateral, national, international, multilevel, etc. mechanisms and modes for governing activity of agents; and the process of governing of AKIS; and the outcome (specific order, efficiency, impacts) of the governance.

In Bulgaria, AKIS is composed of diverse and numerous individuals and organizations involved in the process of generating, sharing, disseminating, and implementing knowledge and innovations in the sector. In addition to diverse types of farmers and agricultural farms (subsistent, semi-market, market, individual, family, cooperative, corporative, etc.), this complex system includes research institutes, universities, and schools, agricultural advisory service, private consultants, specialized consulting, training and innovation firms, professional farmers' organizations, non-governmental 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 kinds, international organizations, private individuals, etc.

Figure 1. Main actors and relationships in the national agricultural knowledge and innovation system of Bulgaria

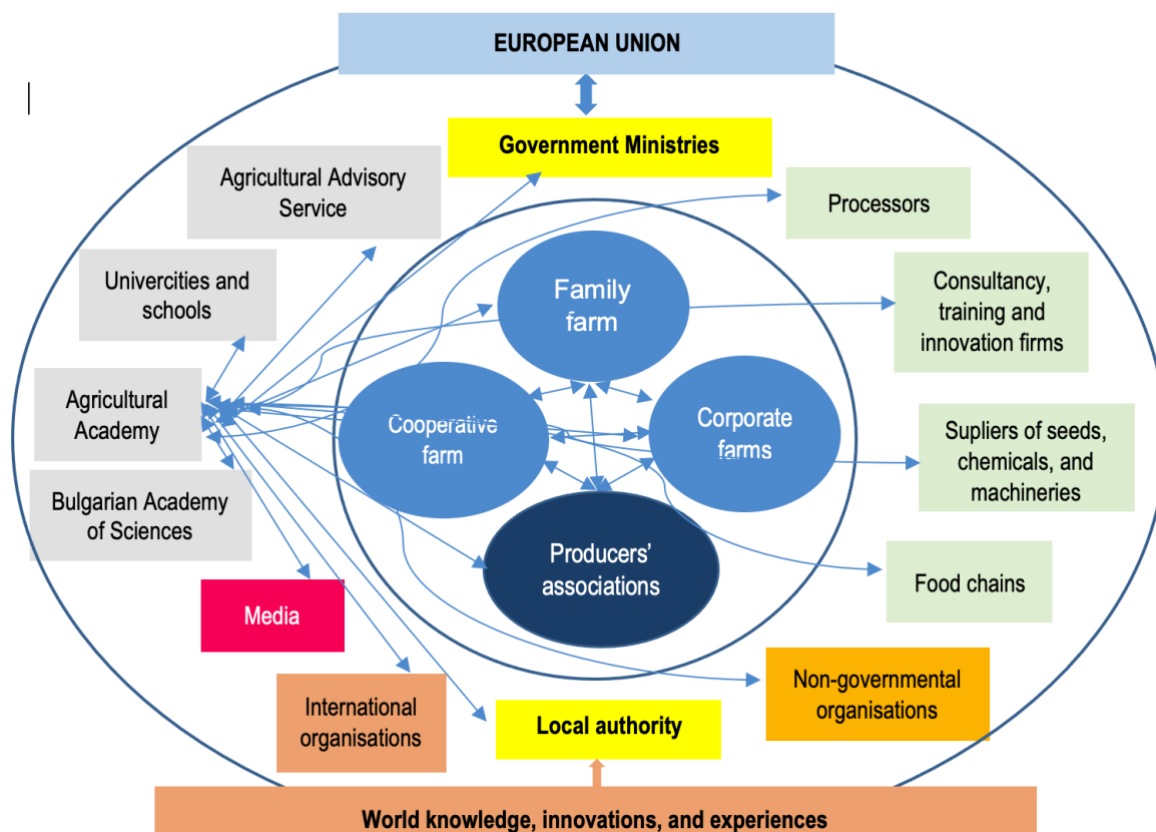


Figure 1 above, shows the main agents involved in the Agricultural Knowledge and Innovation System of Bulgaria. For greater clarity, only relationships of one organization (AA) with other organizations in this complex network of multilateral and complex relationships are highlighted (Bachev and Mihailova, 2019).

## 2. Diagnosis of the State and Trends in Agrarian Research & Development

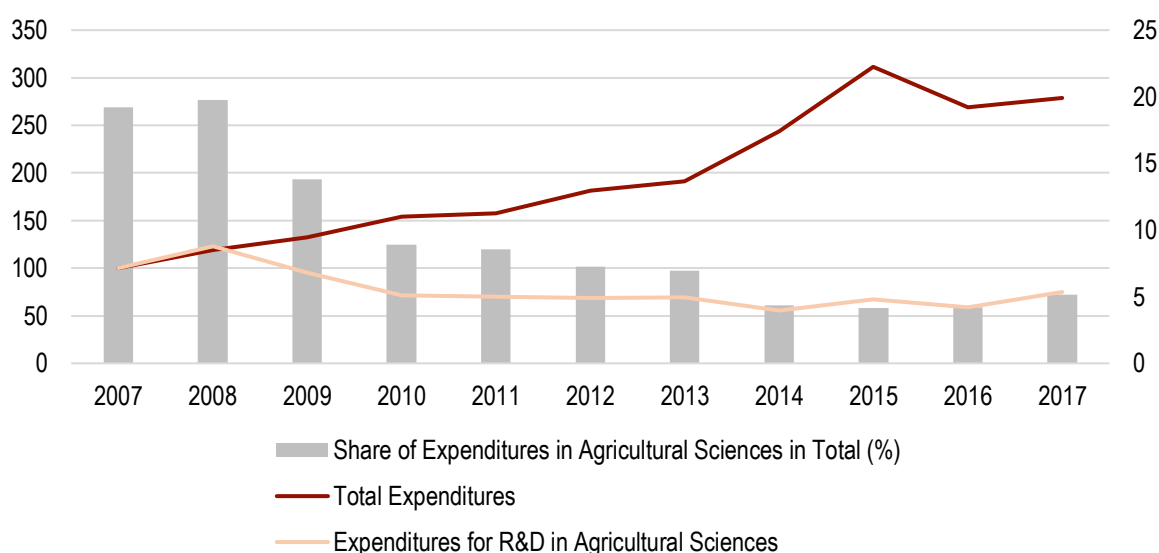
### Personnel and expenditures for agrarian research and development

Agrarian Research and Development (ARD) includes „every creative work, undertaken systematically, and aiming at increasing the body of knowledge, including knowledge about human, culture, and society, as well as utilization of that body of knowledge in new applications“ (NSI). It encompasses fundamental and applied research and experimental works. ARD in Bulgaria is mostly carried out by public organizations – research institutes and experimental stations of Agricultural Academy, some institutes of Bulgarian Academy of Sciences (Institute of Plant Physiology and Genetics, Institute of Economic Studies, etc.), some public and private universities (Agrarian

University, Trasia University, Russe University, Forestry University, University of National and World Economy, High School for Agribusiness and Regional Development, etc.), and to a smaller extent by private firms and organizations, non-governmental organizations, etc. ARD in the country is funded by the state budget (e.g., National Science Fund, National Innovation Fund, state subsidies for Bulgarian Academy of Sciences and Agricultural Academy, etc.), business organizations (own and landed investments for internal R&D, purchase of intellectual property, commissioning research, sponsorship, etc.), non-governmental organizations, foreign states, international organizations (e.g., EU HORIZON 2020 Program, FAO projects, etc.), private individuals, etc.

„Expenditures for research and development activity” include the current costs and the costs for acquiring long-term material assets, for research and development (R&D) within a statistical unit, independent from the source of funding (NSI). The level of dynamics of that indicator gives insight for the state, financial and material conditions, and armament as well as for the evolution of the system for generation, sharing, and dissemination of knowledge and innovation in the agrarian sphere. 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 by 45% until 2014, and demonstrate a growth afterward reaching three-quarters of the initial level in 2017. Simultaneously, the share of the expenditures for R&D activity in „Agricultural Sciences” has experienced a significant drop in the total expenditures for R&D activity of the country – from around a fifth in 2008, to a little more than 4% during 2005-2016, and just above 5% at the end of the period. These data indicate the diminishing importance of the agrarian knowledge and innovation sector in the overall system of knowledge and innovation of the country.

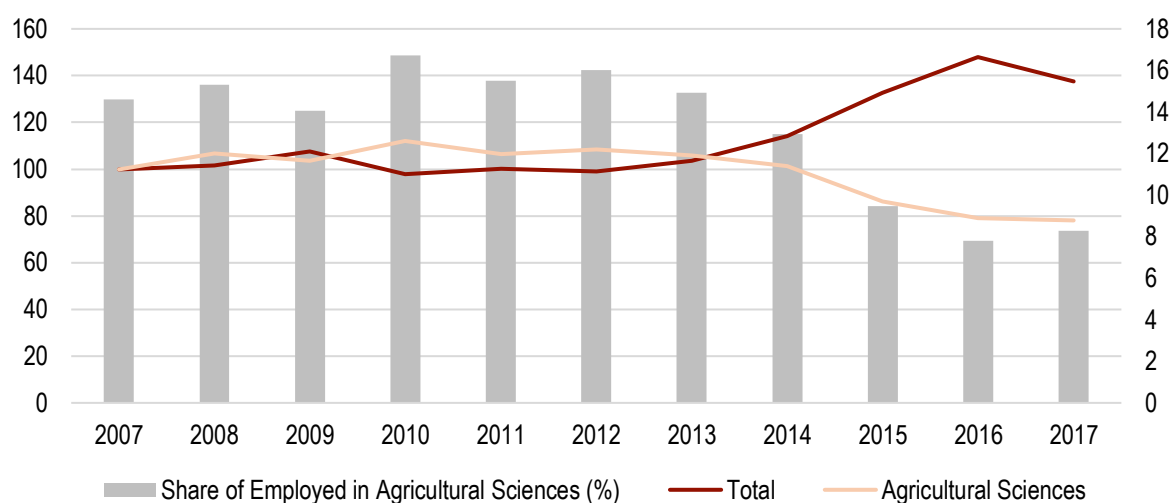
Figure 2. Evolution of expenditures for R&D activity total for Bulgaria and for agricultural sciences (2007=100)



Source: National Statistical Institute (2019)

The indicator „Personnel employed in R&D activity” measures the human resources directly involved in R&D activity, who are responsible for the generation, application, and dissemination of the new knowledge (NSI). It comprises persons, directly carrying R&D activity and persons, directly supporting R&D activity (managers, administrators, bureaucracy, etc.). The level and dynamics of that indicator show the staff endowment of the system of R&D activity in the sector. Since 2007 personnel employed in R&D activity in the area of „Agricultural Sciences” initially augment (up to 12% in 2010), and gradually decreases afterward to 78% of the initial level in 2017 (Figure 3). That indicates the deteriorating of the staff component of R&D activity in the agrarian sphere in recent years. Simultaneously, there has been a change in the share of the involved with agricultural sciences in the total number of employed in R&D activity. Until 2012 their portion augments from 14,6% to 16%, and after that decline twice in the last two years.

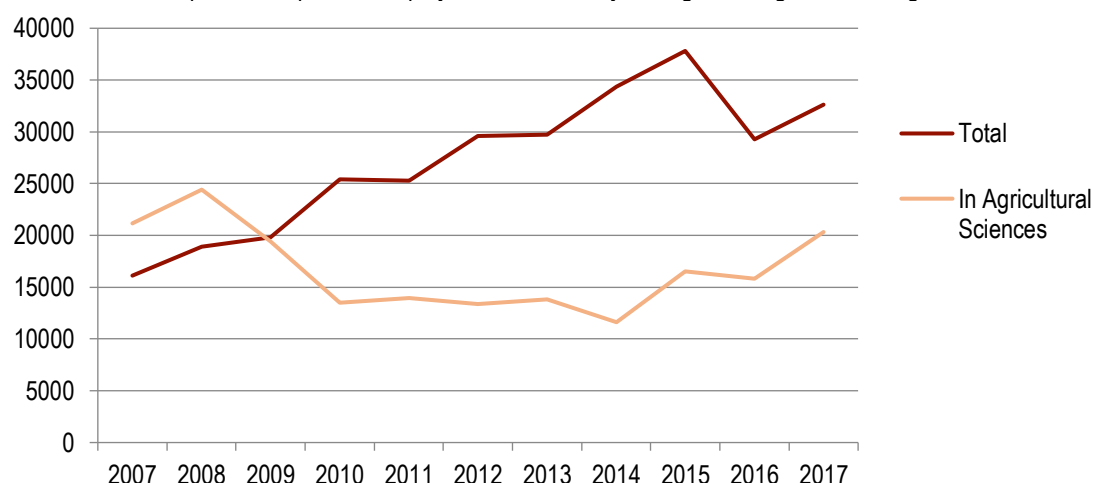
Figure 3. Evolution of employed in R&D activity total for Bulgaria and in agricultural sciences, in full-time equivalent (2007=100)



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 the accession of the country to the EU the expenditures for R&D activity per one employed in agricultural sciences fall by more than 45% by 2014 (Figure 4).

Figure 4. Number of expenditures per one employed in R&D activity average for Bulgaria and in agricultural sciences (BGL)<sup>2</sup>



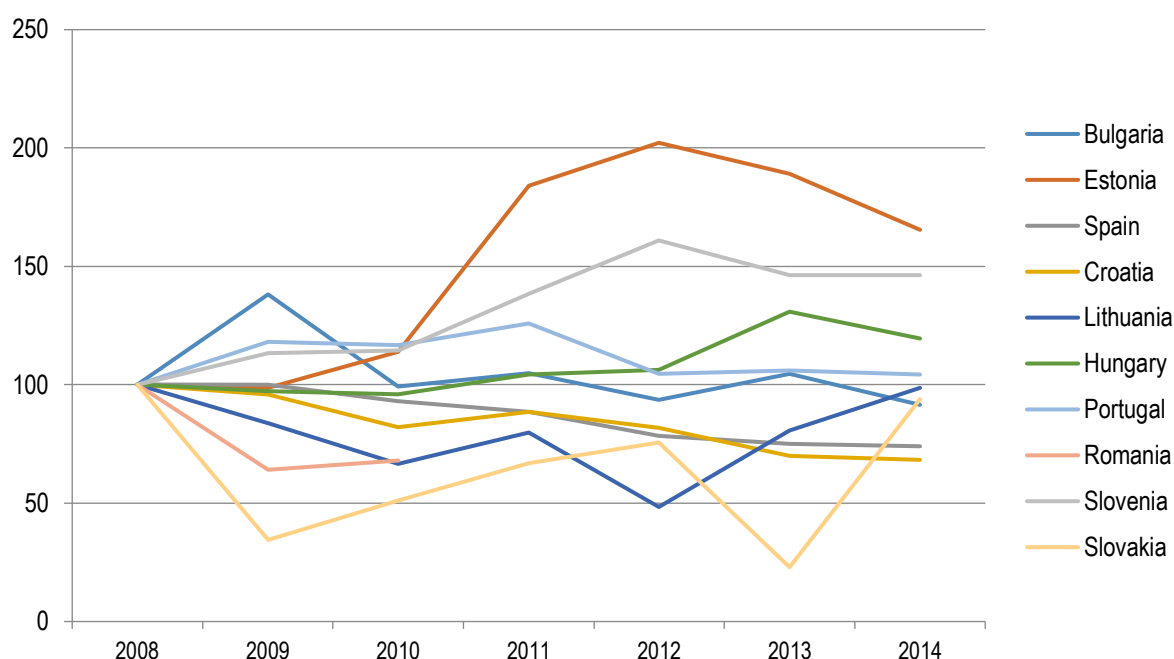
Source: National Statistical Institute, 2019

Since then, their amount gradually augments reaching 96% of the level at the beginning of the period. During the same period, there is a positive tendency for a rise in the average expenditures for R&D activity per one employed in R&D activity in the country. What is more, while in the first two years of the analysed period the expenditures for R&D activity per one employed in Agricultural R&D activity considerably overpass the average in the country (with around 30%), in 2017. They account for merely 63,3% of the average level.

These trends in the evolution of agrarian R&D activity in Bulgaria are similar to other EU member states like Spain, Croatia, Slovakia, and Lithuania, where it has been registered diminution of expenditures for R&D activity in agriculture in the last years (Figure 5). At the same time in certain EU member states like Estonia, Hungary, Slovenia, etc. there has been significant growth in the overall expenditures for R&D activity in the sector.

<sup>2</sup> 1 Bulgarian Lev (BGL) equal 0,511292 Euro (a fixed rate applies during the period).

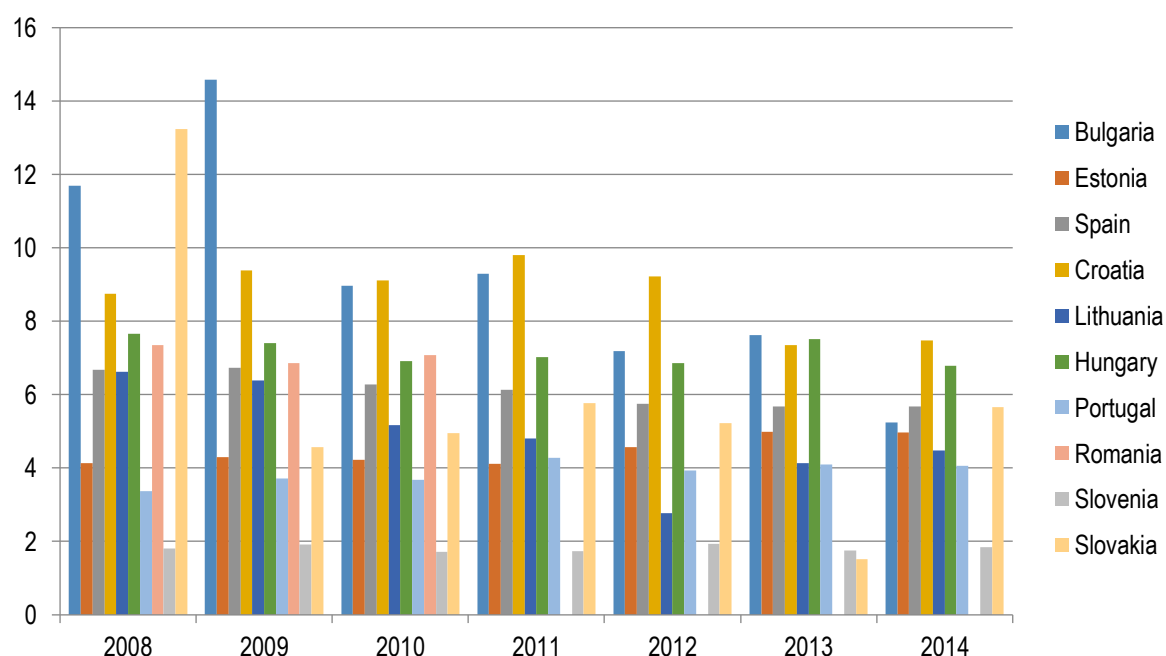
Figure 5. Evolution of intramural R&amp;D expenditures in sector "Agriculture" in EU member states (2008=100)



Source: Eurostat (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 (Figure 6). On the other hand, in Slovenia the share of that type of expenditure for R&D activity is insignificant.

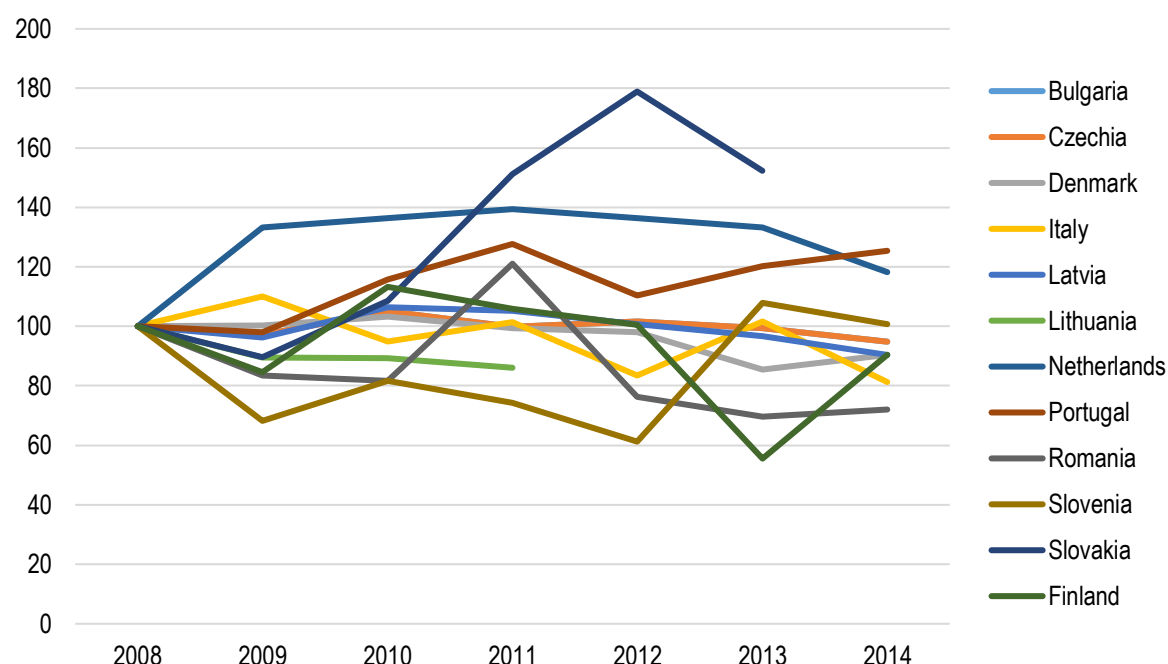
Figure 6. Share of intramural R&amp;D expenditures in sector "Agriculture" in total in EU member states (%)



Source: Eurostat (2019)

A common tendency in many EU countries is a diminution of the personnel and researchers in agrarian R&D activity (Figure 7). The exception is the Netherlands, Portugal, and Slovakia, where there is a considerable augmentation of cadre endowment of agricultural R&D activity.

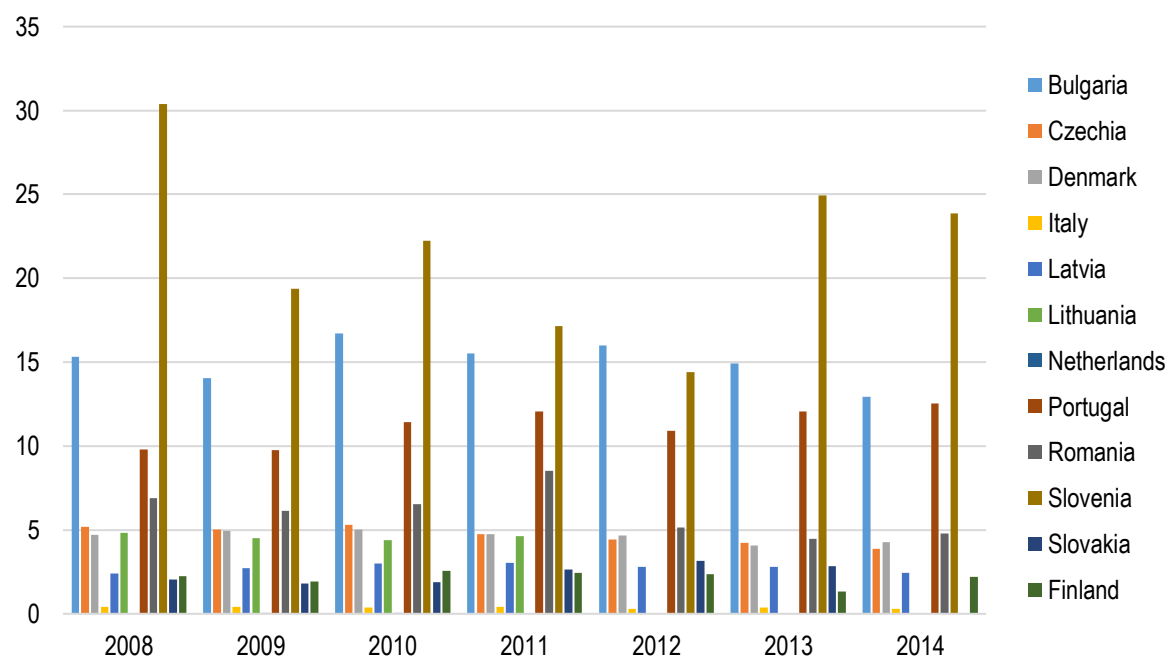
Figure 7. Evolution of R&D personnel and researchers (full-time equivalent) in “Agricultural sciences” in EU member states (2008=100)



Source: Eurostat (2019)

In many EU countries, there is also a reduction, to a greater or lesser extent, of the share of personnel and researchers in agricultural R&D activity in the total of the country (Figure 8). However, in Latvia, Portugal, and Slovakia there is a reverse trend of enlargement of the later proportion. Slovenia, Bulgaria, and Portugal are countries with the greatest relative share of employed in agricultural sciences in the overall employed in R&D activity.

Figure 8. Share of R&D personnel and researchers in “Agricultural Sciences” in total for the country in EU member states (%)

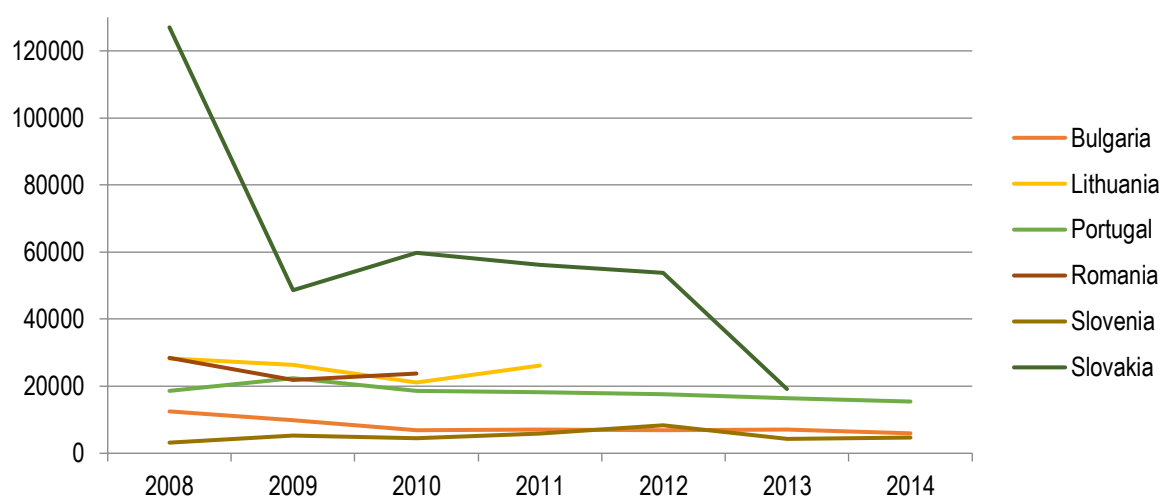


Source: Eurostat (2019)

In most EU member states there is a similar trend like in Bulgaria for a greater or less significant reduction of the financial endowment of employed in agrarian R&D activity (Figure 9). 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. Regardless of the sensitive decline in the expenditures for one employed in agrarian R&D activity in Slovakia during the period, their amount is 2,7 folds higher than the figure in Bulgaria (2013).

Figure 9. Intramural R&D expenditures in sector "agriculture" per full-time equivalent in agricultural sciences in EU member states (Euro)

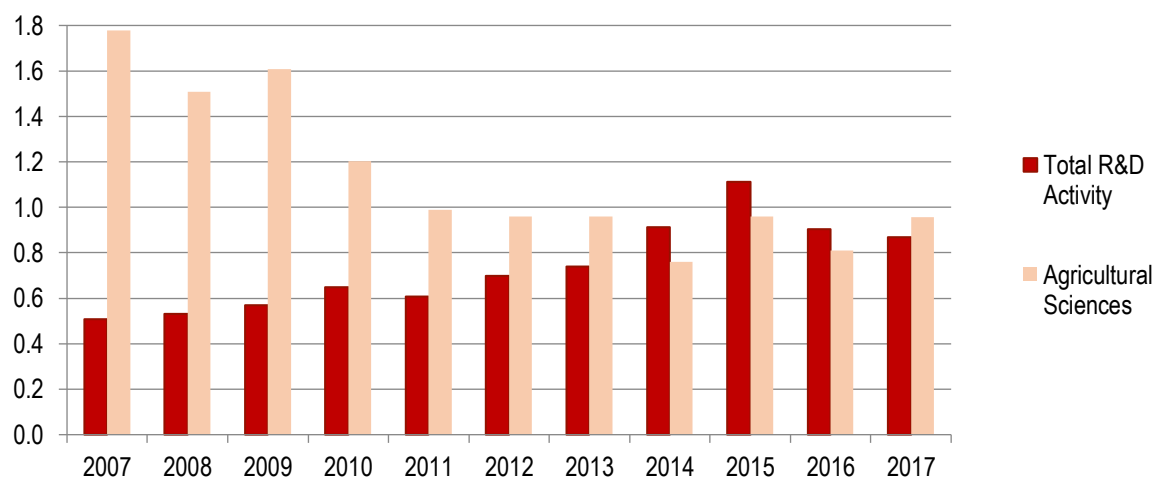


Source: Eurostat (2019)

### Science endowment of agriculture

An important indicator for the science armament of agricultural production is the share of expenditures for agrarian R&D activity in the Gross Value Added of the sector. Since the accession of the country to the 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 10). In 2014 that indicator is 2,3 folds smaller than the 2007 level. In the last three years, there is an 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. There is a positive increase of the scientific endowment as in 2015 this share doubled in comparison with the 2007 level. While at the beginning of the period the scientific endowment of the entire economy was 3,5 times lower than in the agrarian sector, it already overpasses the latter during 2014-2016. As a result of the evolution of the expenditures for R&D activity and the Gross Value Added in 2017 agriculture demonstrates again a little higher level for this indicator - 0,96% (against 0,87% before). It is obvious, that with such pace of progression of investments in R&D activity hardly can be achieved both the EU goals for the number of investments in R&D activity at 3% of the Gross Value Added (for 2020) as well as the national objective of 1,5%.

Figure 10. Share of total and agricultural sciences expenditures for R&D activity in the gross value added of Bulgaria and Agriculture, Forestry and Fishery sector (%)

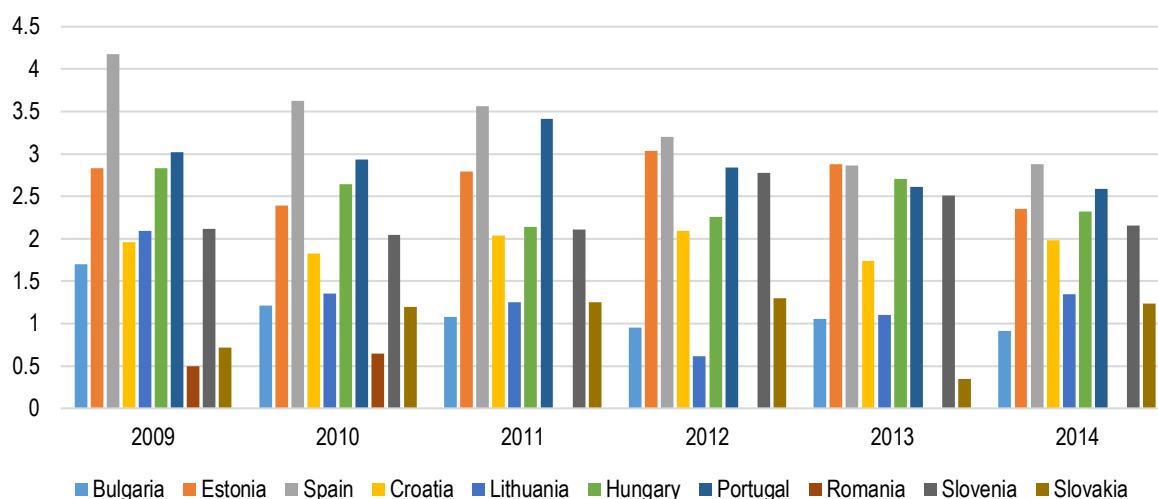


Source: National Statistical Institute (2019)



The Science endowment of Bulgarian agriculture, measured through expenditures for R&D activity in Gross Value Added, is among the lowest in the EU along with Romania (Figure 11). In many member states (Estonia, Spain, Lithuania, Hungary, Portugal) the share of expenditures for agricultural R&D activity in the Gross Value Added of the sector falls during the period 2009-2014 (for which there are comparative data), but exceeds considerably that of Bulgaria during the entire period. In another group of countries like Croatia and Slovenia, the level of these indicators is stable and higher than in Bulgaria throughout the period. On the other hand, there is a significant growth of the initial level up to amounts exceeding that of Bulgaria, but inferior in comparison to other member states.

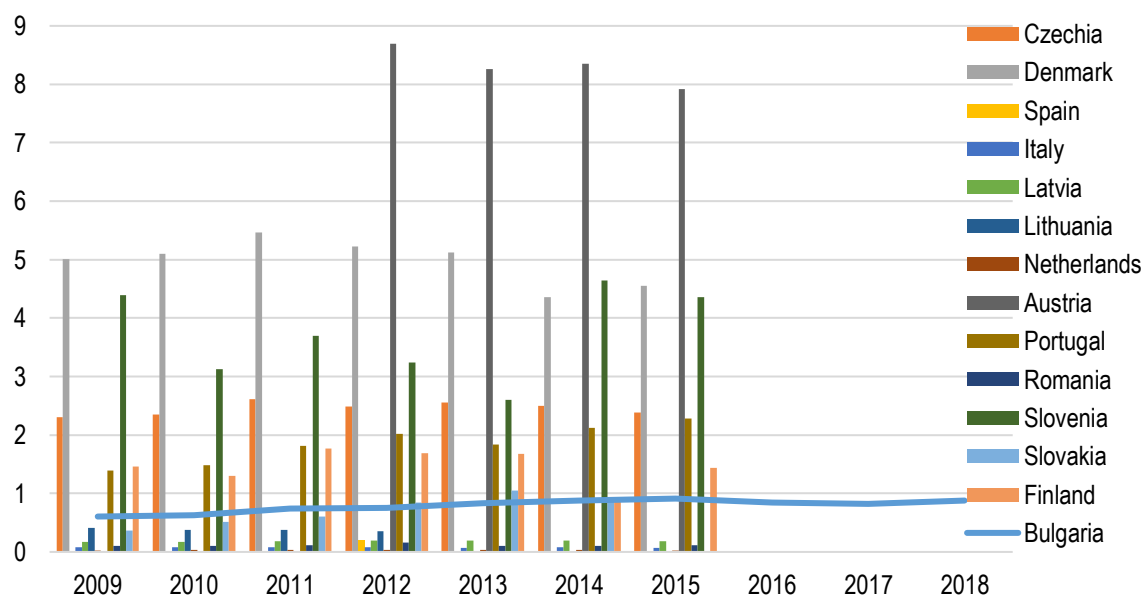
Figure 11. Share of intramural R&D expenditures in sector "agriculture" in the gross value added and Income in the „agriculture, forestry and fishing“ sector in EU member states (%)



Source: Eurostat (2019)

Another important indicator for the science endowment of agriculture is the share of employed in agrarian R&D activity in the totally engaged in agricultural activity. In Bulgaria, the share of employed in R&D activity in the collective workforce of the sector progressively grows during the period 2009-2015 and fluctuates insignificantly afterward. The endowment of the sector with workers in R&D activity grows due to the greater reduction of the number of employed in agriculture and working time in comparison to a diminution of the personnel and researchers in agrarian R&D activity (Figure 12).

Figure 12. Share of employed in R&D activity in sector agricultural sciences (full-time equivalent) in total workforce of agriculture (annual work units) in EU member states (%)



Source: National Statistical Institute, Eurostat (2019)



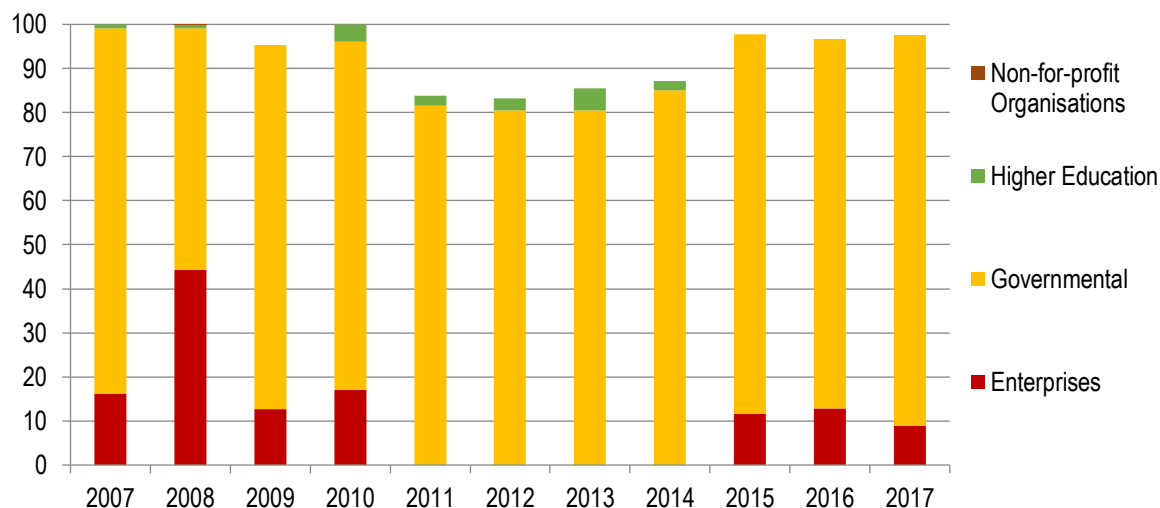
In most EU member states during the period 2009-2016 a stable level of science endowment is observed measured by that indicator. In some countries, like Italy, Spain, Latvia, Netherlands, and Romania, the proportion of employed in agrarian R&D activity concerning the overall involved in the sector, is much lower than in Bulgaria. In Slovakia, the level of this indicator is similar to Bulgaria during the good part of the analysed period. However, most EU member states significantly surpass Bulgaria concerning the number of employed in agrarian R&D activity serving the employed in agriculture. The highest endowment of workers in agrarian R&D activity is Austrian agriculture, which is 8,7 folds higher than in Bulgarian in 2016. During the analysed period in Austria for every 100 employed in farming, there are around 8 researchers and persons in R&D activity in Agricultural Sciences, which also explains the big achievements of that country in the generation, sharing, and dissemination of knowledge and innovations.

### Evolution of major sectors of agricultural R&D activity

Expenditures and personnel potential (capability) of R&D activity are divided into four institutional sectors: Business Enterprise Sector, including all firms, organizations, and institutions, having the main activity of production of market goods and services (without including those, which are included in the sector „Higher Education“); Governmental Sector, including state organizations and institutions, which do not sell but provide services for satisfying individual and collective needs of society and funded mainly by the budget (without including those, which are included in the sector „Higher Education“); Sector Higher Education, including universities, colleagues, high schools, research sectors belonging to high schools and university hospitals; Sector of Private Non-for-profit Organizations, including foundations, associations, partnerships, etc. providing non-market services.

The level, relative share, and dynamics of relevant indicators for these sectors of R&D give insight into the state, development, and importance of major sectors for carrying out agrarian R&D activity in the country. 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 is invested (Figure 13). With an exception of 2008 during the entire period after EU accession of the country, in the latter sector are allocated more than 80% of overall expenditures for agrarian R&D activity. That sector comprises mostly research and development organizations, funding their activities from the state budget by priorities determined by the state.

Figure 13. Share of expenditures for agricultural R&D activity in major sectors of R&D activity in Bulgaria (%)

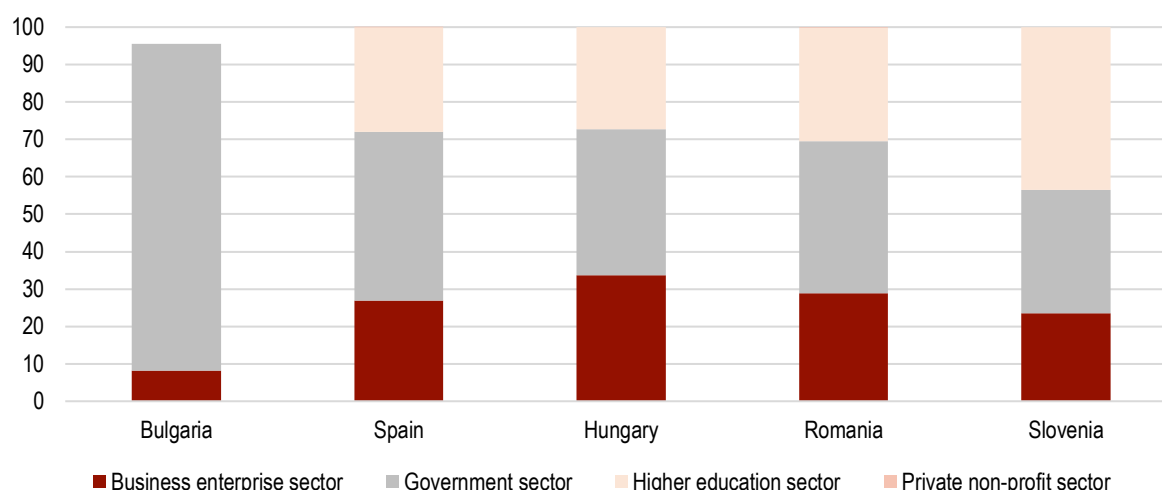


Source: National Statistical Institute (2019)

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, being higher during the first four years (13-44%), after that, there are no data and in the last three years lower (9-13%). 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, for which data are available. In the sector of non-for-profit Organizations are reported expenditures for agricultural R&D activity only for 2008 and they account for a tiny portion (0,01%) of the total expenditures in the country.

Distribution of costs and organization of R&D activity in the major sectors of agrarian R&D in Bulgaria differ substantially from other EU member states (Figure 14). In most 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, for which data are available. In Slovenia expenditures for agrarian R&D activity in the sector, Higher Education is the greatest (43% during the period 2008-2012), while in the rest of the countries considerable (a third in Romania, 28% in Spain, and 27% in Hungary). 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 – a little more than one third in Hungary, almost 29% in Romania, approximately 27% in Spain, and 24% in Slovenia. All these indicate unbalanced development of the main sector of agrarian R&D activity in Bulgaria in a direction different from the common trends in the EU and other developed countries. Similar to Bulgaria in the rest of the analysed countries the share of the Private Non-profit sector in the overall amount of agrarian R&D activity is negligible.

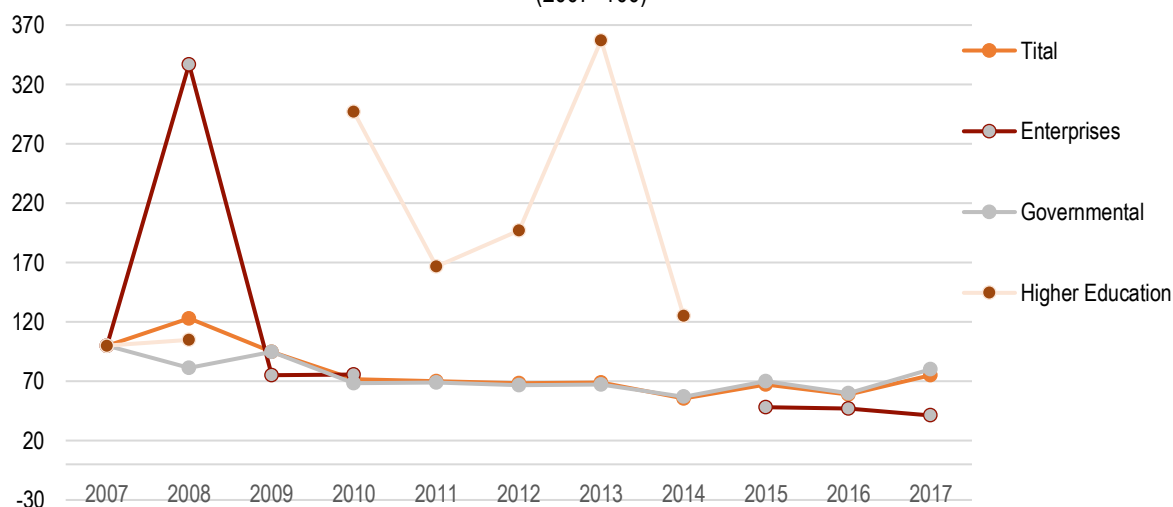
Figure 14. Share of agricultural R&D expenditures in major sectors of EU member states for 2008-2012



Source: Chartier et al. (2015)

The level of expenditures in major sectors of agrarian R&D activity in Bulgaria is with different dynamics since 2007 (Figure 15). 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. Furthermore, since 2010 now dynamics of the expenditures for governmental R&D activity coincides with the dynamics of the total expenditures for agrarian R&D activity in the country, which confirms the leading role of that sector for R&D in agriculture.

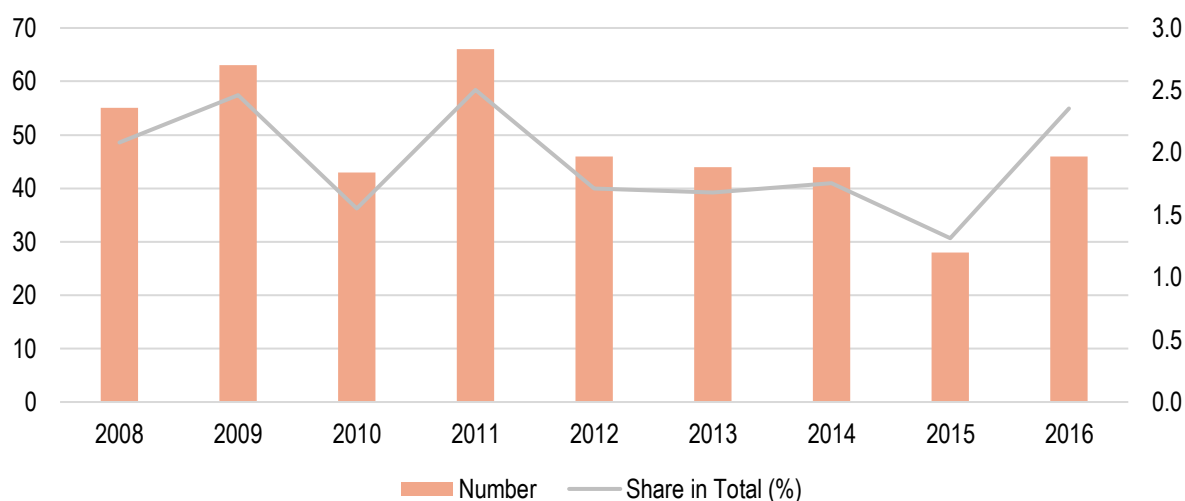
Figure 15. Evolution of expenditures for R&D activity in agricultural sciences in different sectors of R&D in Bulgaria (2007=100)



Source: National Statistical Institute (2019)

There is no statistical data for distribution of the number of workforces in the public (state and university) sector of agrarian R&D activity, but merely in the sector of Enterprises. In the private sector are employed a small portion of the totally involved in agrarian R&D activity in Bulgaria (Figure 16). The amount of that personnel is little, while 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%).

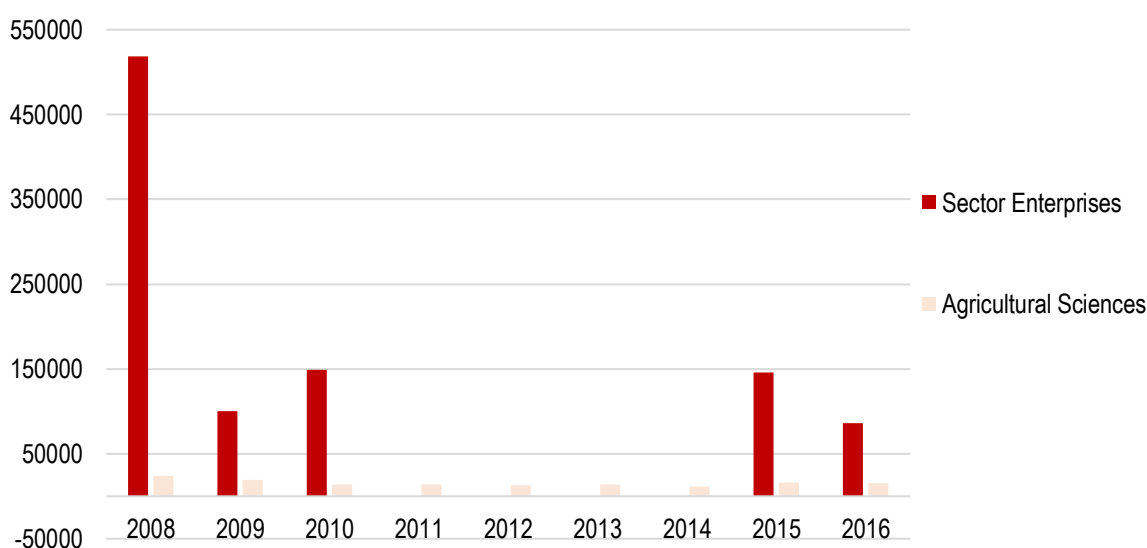
Figure 16. Number of employed in agricultural R&D activity in sector Enterprises and share in the total employed in R&D activity in agricultural sciences in Bulgaria



Source: National Statistical Institute (2019)

At the same time, the endowment with financial and material resources employed in agrarian R&D activity in the private sector (Enterprises) is multiple times higher than in the public sector (Figure 17). Expenditures for one employed in agrarian R&D activity in the private sector vary significantly in the individual year as their level surpasses the average for the country from 5 (2016) to 21 folds (2008). All these express the significant lag in the development of the governmental and university sectors in the financing, payment of labour, and modernization of R&D activity in Bulgarian agriculture in comparison with the business sector.

Figure 17. Expenditures for R&D activity in agricultural sciences per one employed in sector enterprises and average for all sectors of R&D in Bulgaria (BGL)

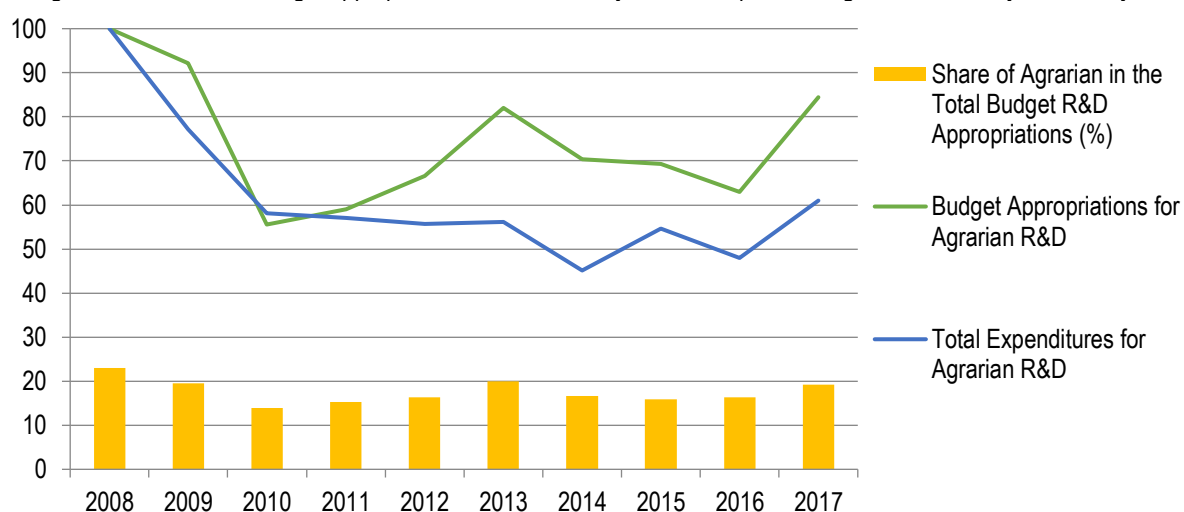


Source: National Statistical Institute (2019)

### Funding of agrarian R&D activity

R&D activity in the agrarian sphere in Bulgaria is predominantly funded by the state budget. An approximate idea about the importance of that type of financing is given by the ratio of the amount of budget appropriations for R&D activity for „Development of Agriculture, Forestry and Fishery“ to the expenditures for R&D activity in „Agricultural Sciences“, averaging for the period of 2008-2017 at 91,8 (NSI). The pace of evolution of the 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 the exception for 2010) (Figure 18). That demonstrates that the importance of the budget financing of agrarian R&D activity relatively increases during the period. At the same time, however, there is a fall in the share of budget appropriations for R&D activity for the „Development of Agriculture, Forestry and Fishery“ sector in the total budget appropriations for the 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 into the diminishing social significance of agrarian R&D activity and their unsustainable funding by the national budget.

Figure 18. Evolution of budget appropriations for R&D activity for „Development of agriculture, forestry and fishery “



Note: 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)

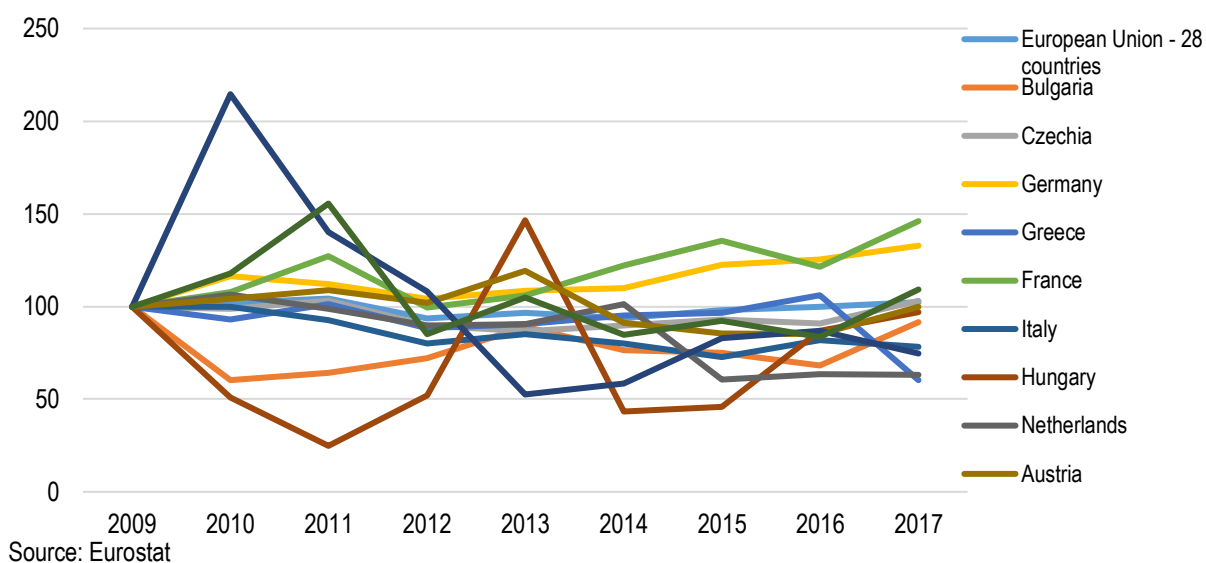
Source: National Statistical Institute (2019)

The budget financing of agrarian R&D activity in Bulgaria is mainly carried out through direct institutional subsidizing of Agricultural Academy and Bulgaria Academy of Sciences<sup>3</sup>, project funding through diverse national, bilateral, etc. science programs of the National Science Fund of the Ministry of Education and Science, and projects for innovation in small and middle-size enterprises of the National Innovation Fund of the Ministry of Economy, etc. For instance, 8% of the budget of the National Science Fund in 2017 is for „Agricultural Sciences“ for 11 projects 45% of which for the institutes of the Agricultural Academy, 36% for the institutes of the Bulgaria Academy of Sciences, and the rest for 2 universities (MES). Implemented programs of the funding agencies aim at the achievement of the strategic priorities of the country (competitiveness, sustainable development, etc.), and they are in line with EU priorities.

Since 2009 now in the EU as a whole there are slight fluctuations in both directions in the level of budget appropriations for agrarian R&D activity (Figure 19). However, in individual member states, there are unlike changes in the financing from the national budget of R&D activity in agriculture. In Germany and France budget appropriations for agrarian R&D activity experience constant growth. In the Check Republic, budget appropriations fall a little bit and recover the initial level afterward. In Austria and Romania, there is the initial augmentation of the budget support and a subsequent drop below the initial level. 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. What is more, for certain countries like Greece, Netherlands, and Italy the decline of the budget funding of agrarian R&D activity in recent years is significantly greater than in Bulgaria.

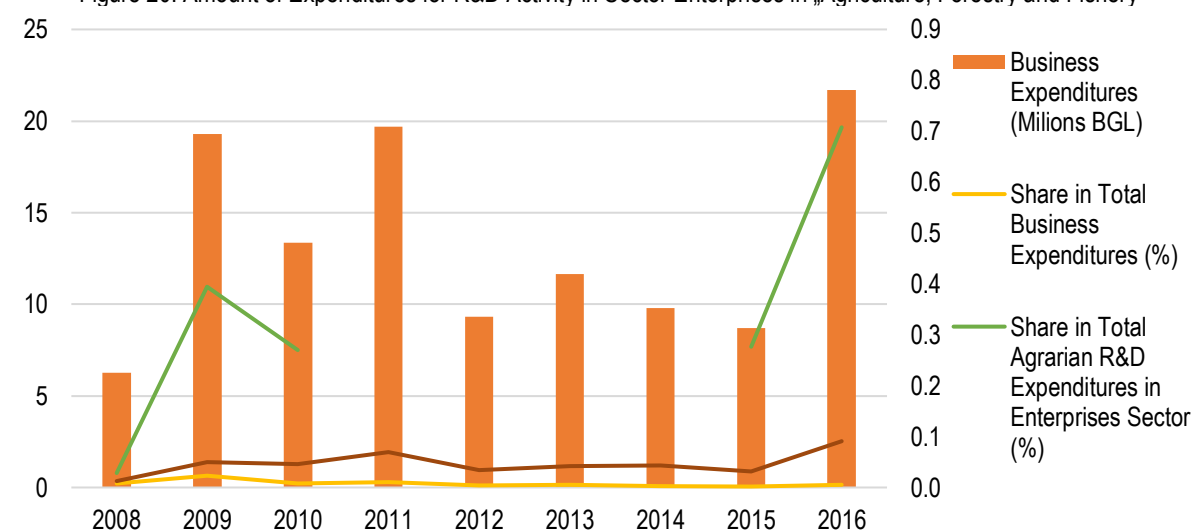
<sup>3</sup> Most Bulgarian universities get some very small budget subsidies for R&D activity.

Figure 19. Evolution of government budget appropriations or outlays on R&amp;D in agriculture in EU member states (2009=100)



Private business investments in the R&D activity are „market-oriented“ and aim at satisfying some practical needs of innovation and realization of economic and other benefits (profit, improving market positions and relations with counterparts, modernization and automatization of processes, the introduction of know-how, new products and technologies, etc.). They are also a means for direct connection of interested parties and effective sharing of knowledge and innovation for the satisfaction of specific needs in the agrarian sphere. The level of business expenditures (of Enterprises) for R&D activity in the „Agriculture, Forestry and Fishery“ sector in Bulgaria varies substantially in different years (Figure 20).

Figure 20. Amount of Expenditures for R&amp;D Activity in Sector Enterprises in „Agriculture, Forestry and Fishery“

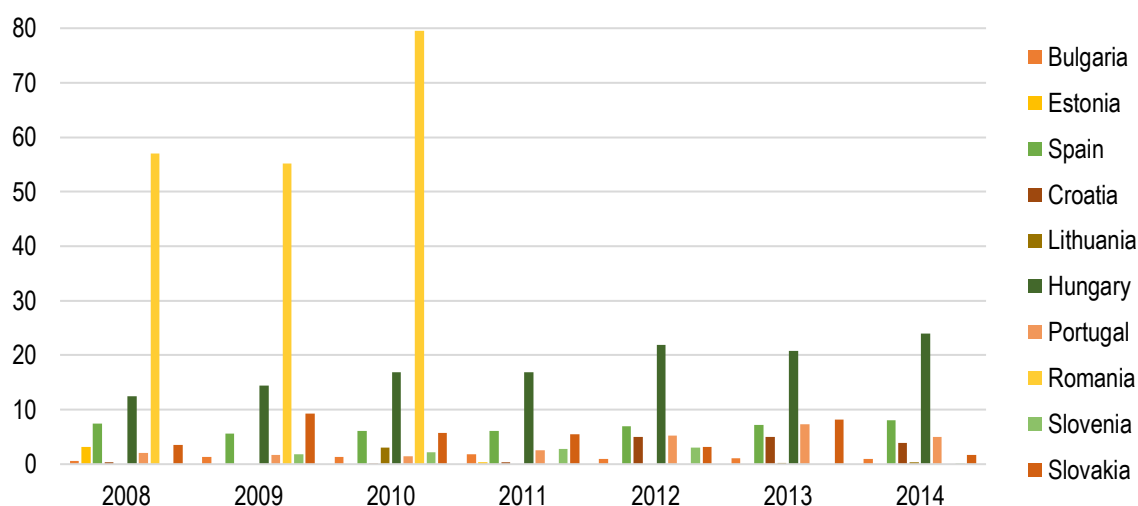


The share of the private sector for financing agrarian R&D activity is insignificant, as they account for a tiny portion (0,05-0,31%) of the total business investments in the R&D activity of the country. The latter demonstrates that incentives for business investments in R&D activity in agriculture are still small generally as well as in comparison with other sectors of the economy. The above is also supported by the fact that the expenditures of the enterprises for agrarian R&D still comprise a 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 carrying 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 latter confirms, that when there are sufficient incentives and benefits the private sector is actively involved in funding and execution of R&D activity in the sector.

Bulgaria, along with Lithuania and Slovenia is among the countries of the 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“ (Figure 21). In certain countries, like Romania and Hungary, private funding of R&D activity represents a considerable portion of the R&D activity of agriculture.

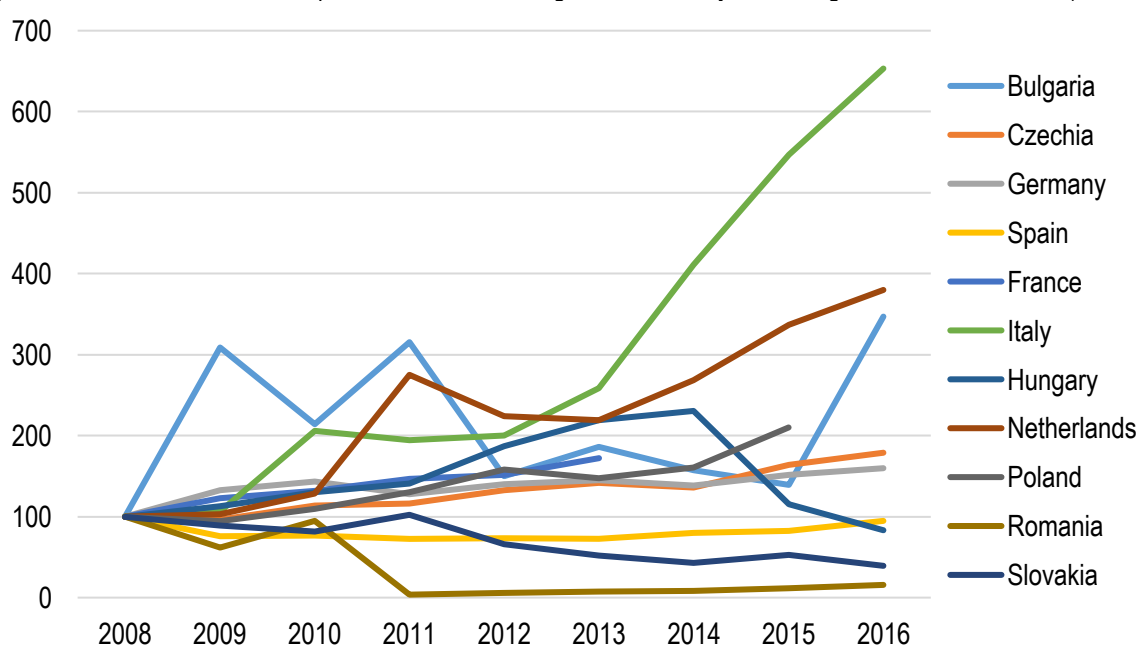
Figure 21. Share of business expenditures on R&D in „Agriculture, forestry and fishing“ in total intramural R&D expenditures in sector agriculture in EU member states (%)



Source: Eurostat

In the EU member state, there are several trends in the size of business expenditures for R&D activity in agriculture during the period 2008-2016, for which data are available (Figure 22). The first groups are countries, in which the business expenditures for R&D activity in agriculture show constant (France, Czech Republic, and Poland) and significant (Italy and Netherlands) growth. In other group countries (Romania and Slovakia), the amount of business investments in agrarian R&D activity demonstrate a sizable drop. In the third group of countries, the level of private expenditures for R&D is relatively stable during the analysed period after an initial decline (Spain) or upsurge (Germany). And finally, there are countries like Bulgaria and Hungary where business expenditures in agrarian R&D of enterprises fluctuate significantly up and down in different years.

Figure 22. Evolution of Business Expenditures on R&D in „Agriculture, forestry and fishing“ in EU Member States (2008=100)



Source: Eurostat

## Conclusion

The country's system of governance of AKIS is composed of diverse and many organizations and agents, for which activities and complex relations lack sufficient official or other reliable information, deterring considerably its analyses and management. Particularly, the microanalysis of applied governing modes and driving factors for agents' choice is hard to be determined. The experts' assessment allows to fill partially that gap and give insights on the governance, state, and the main achievements and challenges to the development of this complex system.

Further analyses will be conducted in the second part of this extensive research study related the Organisation of Agrarian Research, Production and Productivity of the Agricultural Academy as main research unit, Dissemination of research output, State of Agrarian Research Conducted in other Organisations and also the whole System of education and training of agricultural producers.

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