Project funded by EUROPEAN UNION

Jointly preparing the conditions in the agricultural and connected sectors in the BSB area for the digital transformation (BSB Smart Farming)

Project Ref: 908 | No. MLPDA 94989/10.07.2020

REGIONAL ANALYSIS

Deliverable D.T1.3.1

WPT1 – Investigation on the level of preparedness

for Smart farming in BSB area

Activity A.T.1.3. Common research on the level of preparedness for Smart farming of BSB area countries

Version 01.00/02/2021

UNIVERSITAS GALATIENSIS

SUMMARY

The Deliverable *D.T1.3.1. Regional analysis* constitutes a document that aims to provide conclusions and recommendations for the relevant BSB Smart Farming project partners countries agriculture and connected sectors.
It was produced during the implementation of *WPT1.1. Investigation on the level of preparedness for Smart farming in BSB area*, *Activity A.T1.1. Common research on the level of preparedness for Smart farming of BSB area countries*.
It is the outcome of work of PP4 partner in collaboration with BSB Smart Farming partners.

Joint Operational Programme Black Sea Basin 2014-2020

Author/s: “Dunarea de Jos” University of Galati in collaboration will all project partners

February 2021

Joint Operational Programme Black Sea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.

This publication has been produced with the financial assistance of the European Union.

TABLE OF CONTENTS

OBJECTIVES OF THE INVESTIGATION 4

CHAPTER 1. BULGARIA'S BACKGROUND / SITUATION 7

CHAPTER 2. AGRICULTURE POLICIES IN BULGARIA 8

CHAPTER 3. FUNDING INITIATIVES IN SMART FARMING FROM BULGARIA 9

CHAPTER 4. QUDRUPLE HELIX APPROACH IN AGRICULTURE FIELD 10

CHAPTER 5. SMART AND IOT TECHNOLOGIES EXISTENT IN BULGARIA 11

CHAPTER 6. AGRICULTURAL NEEDS OF THE RURAL COMMUNITIES IN BULGARIA 12

CONLUSIONS AND RECCOMANDATIONS 13

Objectives of the investigation

The aim of this document is to present the results of the investigation in the Black Sea Basin (BSB) farming communities, that is in an urge need of becoming more competitive, sustainable and productive, by improving their businesses, production processes, products and services through a smart farming ecosystem, supported by the digitisation of services. The main objective of the research is to identify the preparedness for smart farming in BSB Smart Farming project partners' country. This regional analysis will become part of the final synthesis report that aims to present specific recommendations on smart farming and IoT solutions to agricultural problems and identified constraints/basic needs of the main actors in the partner's countries.

There were more research activities conducted: primary research and secondary research. In the following sections it wil be explained the main approaches that stand to the elaboration of this report, prepared with the collaboration of the BSB Smart Farming project partners, during the implementation of work package **T.1. Investigation on the level of preparedness for Smart farming in BSB area**, activity **A.T.1.3. Common research on the level of preparedness for Smart farming of BSB area countries**.

The present report started with the preparation of a common research methodology, applicable to every partner countries participating in the project. The methodology is presented in Deliverable D.T1.1.1. Moreover, this research comes with results collected from a stakeholder's database of 600, 100 per country, and in-depth primary research and secondary research analysis. A desk research has been conducted using materials published in research reports and/or similar documents, available from public libraries, websites, data obtained from already filled in surveys etc. The resources used were the data available from the internet, governmental and non-governmental agencies collected and processed data, public libraries data, research and/or educational institutions data reports, commercial information sources like newspapers, journals, magazines, radio and TV interviews.
The focus was pointed on the overall situation, policies, quadruple helix stakeholders, projects implemented on both the agricultural needs/challenges of the

rural communities and smart and IoT technologies that can be adopted to meet the needs/challenges.

Another research method was the elaboration of an online survey on the stakeholders needs, concerns, level of preparedness, regional digital entrepreneurship ecosystem and related opportunities. The online survey was conducted through a specific questionnaire elaborated during the implementation of the project. It included specific questions related to the stakeholders needs, concerns, level of preparedness, regional digital entrepreneurship ecosystem and related opportunities. There were created focus groups that offered support to the respondents in order to fill the proposed and agreed questionnaire, aiming the identifications of the smart and the IoT technologies that can address stakeholders needs.

In addition, a training needs assessment and draft estimation was conducted, in order to identify the current level of competency, skill or knowledge in the project specific field. In case of BSB Smart Farming project the training needs assessment can be conducted the following phases as: the identification of the business needs, performing a gap analysis, assess training options,and finding training needs and training plans.

During the investigation on the level of preparedness for smart farming, in Black Sea Basing (BSB) partner countries, from the project consortium, all the stakeholders from the quadruple helixes were envisaged to be involved in the investigation. In order to obtain a detailed analysis of the regional BSB partners country areas level, the following quadruple helix figures were envisaged: farms, farmers, regional public and national public authorities, sectoral agency, infrastructure and (public) service providers, interest groups including NGOs, higher education and research institutes, education/training centres and schools, business support organisations, international organisation under national law and enterprises.

The main research questions raised in the investigation were:

- What are the agricultural needs of the rural and peri-urban communities that, when addressed through the application of smart technologies and IoTs, can

lead to the poverty alleviation, improve the effectiveness and efficiency of use of the rural area resources;

- How is it possible to address the agricultural local needs and identified constraints through IoT and smart technologies solutions to strengthen the development of smart farming in rural and peri-urban areas within BSB partner countries to decrease the poverty level and increase the efficiency of agriculture production and natural resources use? What smart and IoT technologies are implemented already in the country, which of the existing might be transferred from one country to another and what smart technologies and IoTs can in the future be designed and developed by the involved stakeholders and entrepreneurs in the BSB area to meet these needs effectively and efficiently, mobilising the local/regional resources to further fostering the competitiveness of the economies in the BSB area in answer to other main socio-economic challenges in the area, such as the brain drain, youth unemployment and brain waste.
- What are the successful use cases of smart farming in BSB partner countries and how we can adopt and widen it?
- How to strengthen the interactions between the relevant helixes, particularly how to boost research, innovation and business cooperation development?

In the investigation recommendations and conclusions on the level of preparedness for smart farming in BSB partner countries were drawn and will be presented in this deliverable. The recommendations are based on findings from the investigation achieved in Bulgaria.

Chapter 1. Bulgaria's background / situation

- Description of country's background

The Republic of Bulgaria is situated in the eastern portion of the Balkan Peninsula in southeastern Europe. Founded in the 7th century, Bulgaria is one of the oldest states on the European continent. It is intersected by historically important routes from northern and eastern Europe to the Mediterranean basin and from western and central Europe to the Middle East. Before the creation of the Bulgarian state, the empires of ancient Rome, Greece, and Byzantium were strong presences, and people and goods traveled the land with frequency.

It is bordered by Romania to the north, Serbia and North Macedonia to the west, Greece and Turkey to the south, and the Black Sea to the east. The capital and largest city is Sofia; other major cities are Plovdiv, Varna and Burgas. With a territory of 110,994 square kilometres (42,855 sq mi), Bulgaria is Europe's sixteenth-largest country.

- **Brief description of COUNTRY or BSB region agriculture and history**

In 2017 it amounted to 5,029,529 ha or 45.3% of the country's territory, increasing by 0.2% compared to the previous year. Arable land is the area that is included in crop rotation, temporary meadows with cereals and legumes, fallow land and greenhouses. In 2017, it decreased slightly (by 0.2%) compared to the previous year, to 3,473,825 ha, which represents 69.1% of the utilized agricultural area. In the 2016/2017 business year, the total number of farmers registered in the register under Ordinance № 3/1999 was 96,476, which is 1,827 more than in the previous year. As of the beginning of August 2018, the number of registered farmers in the 2017/18 business year is 92,328.

According to NSI data, in 2017 the gross domestic product produced in the country increased by 3.8% compared to the previous year in real terms. The nominal value of GDP for the year amounts to BGN 101,043 million (EUR 51,662 million). At

the end of 2017, inflation increased by 2.8% on an annual basis, and the average annual inflation was 2.1%. According to BNB data, in 2017 exports amounted to BGN 52,710 million (EUR 26,950 million), which represents 52.2% of GDP. Imports for the year amounted to BGN 54,208 million (EUR 27,716 million) or 53.6% of the country's GDP. As a result of the outpacing rate of increase in exports compared to imports, the negative trade balance for the year shrank by 22.2% compared to the previous year, to -1,498 million levs (-766 million euros).

In 2017, foreign direct investment in Bulgaria amounted to BGN 2,718 million (EUR 1,390 million), which represents 2.7% of GDP. The gross value added by the branches of the national economy in 2017 amounted to BGN 87,634 million (EUR 44,807 million) at current prices, marking a real growth of 4.2% compared to the previous year. The value added of the entities from the agricultural sector in 2017 amounts to BGN 4,114 million at current prices. In real terms, it increased by 8.9% on an annual basis. According to preliminary seasonally issued NSI data, in the first and second quarters of 2018 the total GVA for the country's economy increased by 3.1% and 3.0% respectively compared to the respective period of 2017 in real terms. Regarding the GVA formed by the agricultural sector, the preliminary data show an increase on an annual basis in real terms by 0.4% in the first quarter of 2018 and a decrease of 0.9% in the second quarter. In 2017, GVA from agriculture, forestry and fisheries represented 4.7% of the total GVA for the country.

- **Agriculture field in comparison with other sectors**

The agricultural sector in Bulgaria (including rural economic activities agriculture, forestry and fisheries) is the third most important sector in the national economy. Its contribution to the gross value added created steadily declining - from 12.1% in 2001 to 4.4% in 2016, and the trend is comparable to that in the EU, where the share of the agricultural sector according to Eurostat is even smaller - about 2.0%. However, taking into account its role in feeding the population, in creating additional employment, respectively to provide additional income, to limit depopulation and the desolation of the territory and for the sustainable development of the environment, then its

importance for the functioning of the state and the quality of life of the population acquires strategic dimensions.

Agriculture as an economic activity has a dominant place in the agricultural sector of Bulgaria. According to economic accounts for rural holding gross value added at basic prices, created by agriculture amounts to BGN 2,961.2 million, which is 84.1%
of the total added value for the agricultural sector.

Taking into account the socio-economic role of agriculture and its importance
its Conservation of Ecosystems and Biodiversity, the European Union annually allocates around € 40 billion (almost 50% of the Community budget) to policies aimed at supporting its sustainable development and conservation of agricultural holdings as main production structures.

The adaptation of Bulgarian agriculture to European norms and practices began immediately after the early 1990s last century agrarian reform that lasted more than a decade. As a result of the restoration of ownership of agricultural land it is fragmented into small pieces plots. Due to lack of funds and material base, but also due to lack of economic interest among owners in the late 90's more than 25% of arable land in Bulgaria is abandoned. Most agricultural techniques are physically and morally obsolete. The building stock of the existing to current production structures is highly depreciated, and much of farm animals - destroyed. Investments in the industry are practically terminated. Much of the traditional markets for agricultural exports
outputs are lost. All these circumstances largely predetermine how successfully Bulgarian agriculture will be integrated into the agrarian community of the EU.

The harmonization of Bulgarian agriculture with European policies in the sector began at the beginning of our century with the implementation of pre-accession SAPARD program. After Bulgaria's accession to the EU, the trends in its development are almost entirely determined by the principles and mechanisms of the General Agricultural Policy (CAP).

- **Local/regional/national policies in agriculture and connected sectors**

According to the Ministry of Agriculture, Food and Forestry, the Common Agricultural Policy (CAP) for Bulgaria is an integral part of the treaties created by the European Community (EC). The CAP is based on three fundamental principles: free trade within the Community on the basis of common prices, preferences for European production on Community markets, and common financial responsibility.

The aim of the European CAP is to ensure an acceptable standard of living for farmers, to provide quality food to consumers at reasonable prices, to preserve Europe's heritage in rural areas and to help protect the environment.

One of the main documents on national policies in agriculture, part of National Development Program BULGARIA 2030 is a detailed strategy under Priority 6 "Sustainable Agriculture" Structural and sectoral balance of agriculture.

Establishing a more rational structure of agriculture will improve its economic, social and environmental sustainability. The main focus of agricultural policy will be to accelerate the restructuring processes in the sector - strengthening small family farms, achieving an appropriate balance between crop and livestock and their subsectors, the entry of young people into the agricultural business. This will help to improve the viability of economic structures and ensure food security.

Crop production - the existing imbalance between the different production lines of crop production will be overcome through targeted support (coupled support, investment and market support) for the development of intensive sub-sectors with potential for production of higher value-added products - vegetable production, fruit growing and viticulture. winemaking, for which the country has favorable conditions for development.
Efforts will be focused on improving the sustainability, efficiency and profitability of livestock farms. Particular attention will be paid to sensitive sectors such as

dairy and beef cattle, buffalo, sheep and goat farming, as well as beekeeping. The breeding of animals with high productive qualities will be encouraged, which will contribute to the optimization of production and will create conditions for better marketing of the products.

Economic potential of small farms

In order to reduce the disparities in the development of the economic structures of different sizes in agriculture, measures aimed at increasing the economic potential and improving the competitiveness of small farms are envisaged. Investments for modernization and implementation of innovative solutions, improvement of their market access, increase of knowledge and professional skills of farmers will be encouraged, mechanisms for more balanced support of their incomes will be applied.

Rural competitiveness economy

The basis for increasing the competitiveness of agriculture are increased production efficiency, accelerated entry of innovation, productivity growth, improving marketing and market organization of supply, and finding access to new markets. Improved competitiveness will contribute to increasing the added value of agriculture will create greater resilience to industry and will increase its capacity to respond to environmental and social challenges and commitments.

Modernization, innovation and digital technologies in agricultural holdings

Investment in agricultural modernization will continue to be encouraged in holdings and processing plants aimed at improving their productivity and competitiveness. Interventions will have a special focus, aimed at implementing innovations and digital solutions, including related ones with precision farming. The application of modern information and communication technologies in agriculture will increase its potential
for more productive, environmentally friendly and less productive food production. It is envisaged to build a complete Electronic Information System in
agriculture, which will allow the electronicization of information flows from

and for carrying out the administrative activity and, electronization of services provided to farmers. Automated exchange of data will provide optimization of the decision - making process as in policy formation by the administration and in the management of
the activity of the farms themselves.

The role of the agricultural sector in the protection of environment

In addition to providing food, the agricultural sector also provides a number public benefits in the field of environmental protection. In order to strengthen this contribution will encourage the application in agricultural production of environmentally friendly practices, contributing to the protection of water, soil, air and
biodiversity. Emphasis will be placed on the use of solutions for adapting agriculture, forests and rural areas to the changing environment and those contributing to mitigating the effects of climate change

- **Institutional changes to improve performance in agriculture**

Based on the analysis, the effects and trends in the resource security of agricultural holdings are outlined.
The emphasis is on the study of small farms. Their scope, economic potential, specialization, role and problems are outlined. The effects of the CAP on their economic situation are indicated. The factors influencing the restructuring of small farms and their transformation into viable and market-oriented business units are analyzed.
The guidelines and opportunities for increasing the efficiency, competitiveness and income of agricultural holdings in the country are outlined.

Chapter 3. Funding initiatives in Smart Farming from Bulgaria

- **Local/regional/National Strategies for funding agriculture and connected sectors**

With the implementation of the common agricultural policy of the EU and the support policy under the I and II pillars, the Bulgarian producers gained access to a huge financial resource, which in recent years amounted to over BGN 2 billion per year. Only direct payments and area and payments tied support is over BGN 1.7 billion. Bulgaria is among the few countries where between 2007-2016 there is a significant increase in the amount received subsidies per holding. The jump in the support received, without taking into account investment aid reaches six times for the period under review.
Along with the direct and other compensatory payments that come through I and II pillars of the CAP, the agricultural sector also receives national funding under the state aid line. State aid in agriculture is granted in compliance with EU law, aiming to cover sensitive proceedings where temporary problems are observed and in cases where there are unusual or emergency situations. In general, state aid schemes can be summarized in the following areas: investment aid, compensatory aid, aid aimed at ensuring the use of quality crops material in plant growing and maintenance of breeding activity in animal husbandry, food aid and raw materials, de minimis aid, aid for participation in exhibitions. These State aid schemes target crop and livestock production, as the funds and the overall administration are carried out by the State Fund
"Agriculture".

Along with them, state aid is applied in the form of tax relief for both sectors, one of which is of an investment nature and the other is in the form of vouchers for excise duty discount on fuels used in agriculture. State aid for investments in agricultural holdings by transferring corporate tax administered by the NRA and aims to encourage investment in new and new buildings agricultural machinery in

the production of unprocessed plant and animal products. The last 2 schemes are aimed at reducing the costs that farmers do in their business and although they can not be called
mass schemes, covering a very large number of beneficiaries (on average over the years about 10% of all recipients of such aid), the amounts distributed through
they represent about 50% of the total annual amount of state aid in the sector.

- **Projects implemented in the agricultural field**

The Bulgarian Rural Development Programme (RDP) was formally adopted by the European Commission on 26 May 2015, outlining Bulgaria's priorities for using € 2.9 billion of public money that is available for the period 2014-2020 (€ 2.4 billion from the EU budget, including € 28 million transferred from the Bulgarian envelope for CAP direct payments and € 0.5 billion of national funding). Under the first objective of improved competitiveness and balanced development of the country's agri-food and forestry sectors, about 3 500 agriculture holdings and about 120 companies active in the forestry sector are expected to receive investment support. More than 4 000 small farmers will receive support to develop their farms and 1 630 young farmers will receive start up aid to launch their businesses. Under the second objective of protection and sustainable management of ecosystems, efficient use of natural resources and mitigation and adaptation to climate change, support for conversion and maintenance of organic farming will cover about 46 000 ha (out of which 23 000 ha will cover conversion to organic farming). Agri-environment-climate measures will be implemented on 113 000 ha and 60 000 ha in designated Natura 2000 areas will benefit from compensatory support. Under the third objective of socio-economic development of rural areas, more than 4 200 jobs will be created through diversification and development of small enterprises, and another 600 jobs via the implementation of local development strategies. One third of the rural population will benefit from improved infrastructure.
Upcoming EU funding opportunities on sub-measure 6.3 and their financial parameters - the total amount of financial assistance is EUR 15,000, divided into two payments: first payment in the amount of the BGN equivalent of EUR 10,000
- is carried out after concluding the contract for providing financial assistance;

second payment in the amount of the BGN equivalent of EUR 5,000

- is performed when after inspection the RA establishes the correct implementation of the business plan.

- **Projects implemented in the smart and IoT technologies applied to agriculture**

As part of the European Union's Sixth Priority set out in Regulation 1305/2013 namely, "promoting social inclusion, reducing poverty and economic development in rural areas, with a focus on improving access to information and communication technologies (ICT), use and quality them in the rural areas ", in the Rural Development Program of the Republic of Bulgaria In 2014-2020, funds in the amount of EUR 30,000,000 are provided under measure 7.3 - Support for broadband infrastructure, including its creation, improvement and expansion, passive broadband infrastructure and access measures to broadband infrastructure and e-government solutions.
10. Financial resources for the development of digitalization in the period 2021-2027

Investments in agriculture

Credit scheme of the State Fund "Agriculture" for investments in agriculture, which aims to stimulate the investment process in the field of agriculture, increase the competitiveness and quality of agricultural products by providing credit for projects in the fields of crop production, animal husbandry and technical support - purchase of machinery, equipment and inventory used in agriculture.

EUR 458 million from the Rural Development Program will be used for investment measures and support for young farmers and small farms.

This decision was taken at a meeting of the Rural Program Monitoring Committee.

At the meeting were discussed and updated criteria for evaluation of projects under the various measures. Applicants for investment measures will now be required to have a 3-year farm history, which will eliminate random applicants. The projects for investments in the farms will have a maximum cost of up to EUR 1 million, half of which will be EU funds and EUR 1.5 million with an aid intensity of 35%.

The projects for processing of agricultural products will have a ceiling of 2 million euros at 50% intensity and 3 million with 35% support with European money.

The maximum amount for the purchase of agricultural machinery is 250,000 euros. The requirement for priority projects for rural areas is dropped. The main goal is to focus on organic production, irrigation and implementation of new technologies in agriculture.

Chapter 4. Qudruple helix approach in agriculture field

Theoretical Approach (theory)

Quadruple helix approach is an innovative system, aming to research and identify the level of preparedness of smart farming and enhance the active participation and collaboration of all of the parties from the four helixes: business, academia, government and civil society.
The success of digital transformation requires active involvement and collaboration of many different parties. Many of the regional strategies and policies aimed at developing innovation emanate from policymakers in centrally located urban conurbations and are assumed to be universally applicable. An example is the classical “Quadruple helix” model and its successors for economic development based around the idea of business, academia, government and civil society organisations all coming together to foster innovation and economic prosperity. In many remote, rural and less-favoured localities, there may not be a university or other knowledge-intensive institution present which makes a difference from the point of view of local development agendas. In many regions, also the business community may be scattered and insufficiently developed in terms of innovation. And furthermore, this kind of region may also have a weak public sector to enhance innovativeness. In such regions, social and community groups may often play the dominant entrepreneurial role. The community may also play a significant

role in remote, rural and less-favoured regions where the basic elements of "quadruple helix" model are present.

- **List of stakeholders from the investigation (100)**

- Ministry of economy, Ministry of Transport, Information Technology and Communications
- Regional Directorate of Agriculture - Burgas, Regional Directorate of Agriculture - Varna,
- Executive Agency for SME Promotion, Employment Agency, Agency for Social Assistance,
- National Council for Social Inclusion, Economic Development Agency - Varna, Association of young farmers, Farmers association, Agricultural Academy, Agricultural Institute Shumen,
- Dobrudzha Agricultural Institute - General Toshevo, Public Environmental Center for Sustainable Development, Association for International Social Development - Varna Branch,
- Varna Tourist Chamber, International Youth Chamber - Varna, REGIONAL AGENCY FOR ENTREPRENEURSHIP AND INNOVATIONS – VARNA, Bulgarian Association of Manufacturers of Greenhouse Products, National Union of Gardeners in Bulgaria, Union of Danube Fruit Growers, Association of Meat Processors in Bulgaria, Vocational School of Agriculture Yambol, Vocational High School of Agriculture Targovishte, VOCATIONAL SCHOOL OF AGRICULTURE AND LIGHT INDUSTRY Karnobat, VOCATIONAL SCHOOL OF AGRICULTURAL FARMING, Dolni Chiflik Vocational High School of Agriculture, Vocational High School of Agriculture and Food Technology - Shumen, PROFESSIONAL TRAINING CENTER at DK GROUP BULGARIA OOD,
- Vocational High School of Agriculture - Novi Pazar, Suvorovo Vocational School of Agriculture, Vocational High School of Agriculture Veliki Preslav, Center for Development and Business Support, Association of Bulgarian Grain Producers, Association of Agricultural Producers in Bulgaria, Register of cooperatives, Municipality of Varna, Varna District Administration, University of Economics – Varna, Bulgarian Industrial Association, Agria Group Holding JSC, Octopod C, Bg Agro, Magic Flame, "MANEX SUN" JSC, Noor Poultry,

- Agricultural Production Cooperative NIVA - Vetrino village, Agricultural Production Cooperative Zvezditsa, Fruit Nursery Ltd. Provadia, Nadezhda - 97 EOOD, Sortovi semena,
- Dobrich municipality, Dobrich District Administration, Farm Sense, Sunfoods, Klasolio, Podbie food, Yaitza i Ptitzi – ZORA“ JSC, Dominion Green, Agropact LTD, Agroprom, Madara agro, Nova agro, Bulagro mashini, Stoychevi Ltd, Renesans, Pesticid LTD,
- Targovishte municipality, Rosa LTD, Ameta Tetrahib, Nara Mel Ltd, E Comers M, HIKS PETROL, Agroelit, Alfacomerse, Kvins Argo, EXPERIMENTAL STATION IN AGRICULTURE, Ardea 2008, Agrovariant, Sem Agro Todor Stoyanov, Yankovi Ltd, US comerce, Burgas municipality, Agrodar Ltd, CHICKEN GROUP Ltd, Agrotehniki & Ko LTD, Bulgarian Association of Agricultural Land Owners, Dairy Yotovi, Biser Oliva AD, Ajaxgroup, Ken Ltd, Alfamaks, Karad Ltd, Bioagro, Eskargot, Agroin, Napredak Agricultural Production Cooperative.

The key stakeholders involved in the questionnaire (50)

Eggs and Birds ZORA AD, BOYAR AD, Executive Agency for SME PromotionE Comers M, Farm Sense, Tetrahib, Ministry of Agriculture, AGRARA LTD, Agrix Bulgaria Ltd., ROSA AD, Agroin Ltd. Stara Zagora, Yotovi Dairy Processing Company, Agroelite, Vocational High School of Agriculture - Novi Pazar, Agropact Ltd., Madara AGRO EOOD, Chicken Group Ltd., Ajax Group, Dobrudzha Agricultural Institute, Suvorovo Vocational School of Agriculture, Stoychevi Ltd., Class Oil AD, Biser Oliva AD, MANEX,

Cross-border cluster for food and organic production BioSafe Dobrogea, The National Association of Young Farmers in Bulgaria, Municipality of Dobrich, Vocational School of Agriculture Yambol, AGRODAR BULGARIA EOOD, National Union of Gardeners in Bulgaria, YANKOVI LTD, Association "Public Center for Environment and Sustainable Development", Agricultural Production Cooperative NIVA, Vetrino village QUINCE-ARGO AND C-IE, Nara Mel Ltd., Municipality of Varna, Burgas Regional Directorate of Agriculture, UES COMMERCE, Agroprom Service Ltd., Novaagro, Bulgarian Association of Greenhouse Producers, Bulgarian Farmers' Association, sole trader "Renaissance KPDT - Kiril Zhendov", Bulagro AGRICULTURAL COOPERATIVE

"ZVEZDITSA", "KARAD" Ltd., DOMINION GRAIN BULGARIA AD, "Nur chicken" Ltd., Varna University of Economics, KEN Ltd

Chapter 5. Smart and IoT technologies existent in Bulgaria

According to the results of the questionnaire, it is clear that farmers in Bulgaria are somewhat aware of the existing smart solutions for rural producers, but most of them do not use or own them.
To the question "What application for intelligent agriculture do you know?" less than half answered that they were familiar with some existing technologies - water deficit detection and control, climate conditions monitoring, crop management, pests and diseases detection, cattle monitoring etc.
Results show that we have applied some smart technologies in different farms. These include automated systems, data or images from sensors, digital maps, and global positioning systems and rarely drones.
73,5 % of all participants think that smart farming is increasing productivity, 59,2 % - that it gives us high quality products, 57,1 % - that leads to cost reduction, increase in profit - 32,7 %

When asked about the desire of farmers to apply technologies for intelligent agriculture, according to the participants, 96% answered in the affirmative.

Regarding which areas of the selected territory farmers need technologies for intelligent agriculture, 46% of them answer - animal husbandry. 49% believe that technologies are needed in crop production, 25% - in agricultural economics, and 13% - in agricultural technology.

Regarding the need for intelligent technologies in the field of agricultural engineering, most of the participants in the questionnaire indicated the need for IoT and sensors and tools and systems for predictive analysis, cloud computing and analysis of large data sets, the need for automation and robotic systems. secondly, thirdly - the communication between machines.

Regarding the type of initiatives suitable for the promotion of intelligent agriculture within the farming community in the respective territory, 64% note the need for training activities, 88% - the need for information campaigns, demonstrations on the farm - 52%.

Chapter 6. Agricultural needs of the rural communities in Bulgaria

Here are some results and analysis of the agricultural field by sectors. In Bulgaria not all the farmers involved in agriculture are engaged in crop production as well. More than half are involved in agricultural production, the other part is involved in livestock, economics and engineering.

From Crop production, sector farmers mainly cultivated grain, vegetables, fruits and nuts. Analysis of Livestock production sector shows that main types of livestock are cattles and poultry, pigs. A small number of farmers are engaged in sheep breeding. The main directions of the agricultural economics sector are development of economy, rural communities and agribusiness.

Agricultural engineering includes workshops, energy & energy efficiency, farm equipment, agricultural machinery etc.

Regarding the question, do farmers from their territory would like to adopt smart farming technologies, all the participants firmly stated the need of them, and that they should be applied both - in crop and livestock production.

In the crop production field it's mainly connected with irrigation systems, fertilisations and crop protection, soil and field analyses, precision mechanical weeding. Some farmers stated the need for drones, although its high cost.

In the livestock production field it includes cattle milking automated systems, health monitoring, feeding or drinking control, etc. The results show that farmers need more milking automated systems, rather than animal indoors tracking or barn monitoring cattle, health monitoring and feeding control were also needed.

In the field of plant growing farmers stated the need of mechanical weeding, irrigation systems fertilization and protection.

In the Agricultural, economic specific field the main emphasis is on agricultural management and agribusiness.

Finally, in the Agriculture engineering field are important IoT and sensors, Automation and robotic systems, Machine to machine communication, predictive analytics tools and systems, cloud computing and big data analysis and processing.

Conclusions and recommendations

Accelerated digitalization of Bulgarian agriculture and rural areas, including the public administration in the person of the Ministry of Agriculture, Food and Forestry (MAF), State Fund "Agriculture", regional and municipal directorates and services, is a necessary process to reduce the bureaucratic burden, optimization of production processes, increase of incomes and yields of farmers, achievement of sustainable bio-industry, maintenance of food safety in conditions of increased industrialization and new non-established technologies, drastic increase of competitiveness and increased demand of Bulgarian products of the single European and on world markets. Digitization allows the agricultural economy to realize its high potential and reap the same successes as the high-tech areas of the economy: increase productivity, add value, improve quality and safety, and thus income and quality of life, drastically reduce pollution to sustainable levels, flexible and quick response to market trends. Monitoring the conditions for the development of production in real time, precise control of enemies, tracking "farm to fork", balancing consumption and other new technologies, easing the administrative burden, accurate prediction of stages in the development of the harvest - all this is possible with the application of the latest computer, robotic and artificial intelligence technologies. Progress and availability of new sensors connected via the Internet of Things (IoT), precise and Internet-connected and geolocated mechanization, Blockchain distributed computer platforms (Blockchain), artificial intelligence systems processing large data sets (Big Data) in real time, robots, satellite systems, drones, ubiquitous access to information - these

are the new tools of progress in agricultural business. These new and revolutionary technologies come from many diverse scientific fields and must be properly directed towards successful and highly productive Bulgarian agriculture.