

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



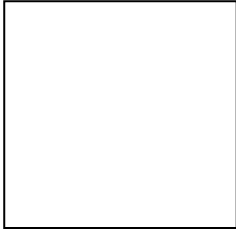
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REGIONAL ANALYSIS (TEMPLATE)

Deliverable D.T 1.3.1

**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, 09/02/2021

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.

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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 of 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 constrains/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 will be explained the main approaches that stands 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, and 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 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 Armenia.

Chapter 1. Armenia background / situation

Armenia is situated at a cultural, historical, and religious intersection and located at the crossroads between Europe and Asia, in the southern Transcaucasus. Armenia, situated along the route of the Great Silk Road, is a landlocked country of rugged mountains and extinct volcanoes, located in the southern Caucasus, between the Black Sea and the Caspian Sea. It is the smallest of the former Soviet republics, bounded by Georgia on the north, Azerbaijan on the east, Iran on the south, and Turkey on the west.

The country spans 29,700 square kilometers of mountainous terrain centered on the Ararat Valley, the heart of the Armenian nation since biblical times. Ancient geographers called the Armenian Highlands the "Island of Mountains" or the "Rooftop of Asia Minor."

Armenia was a regional empire with a rich culture in the years leading up to the 1st Century CE, at one period controlling all the land between the Black and Caspian Seas. In 301, Armenia was the first state to formally adopt Christianity as its official state religion, twelve years before Rome.

In fact, Armenia is a relatively small country located in the Transcaucasian and Iranian ecogeographical crossroad which resulted diversity in ecosystems, landscapes, soil and climatic conditions to allow cultivate diverse cultivars throughout the year.

Armenia has a rich flora of ca. 3600 plants species (ca. 50% of the entire Caucasian flora), distributed across (semi)desert, steppe, forest and alpine landscapes. Armenia is rich with crop wild relatives 2518 and considers one of the significant center of crops origin

(wheat, grape etc) and the part of the most important “hotspots” of the World biodiversity- Caucasus.

Agriculture is the main source of economic activity in rural areas and significant contributor to GDP. It produces 13.7 % of GDP (as of 2018) and employs **33, 15%** (2019) of the working population of whom nearly 56% are female farmers. Women are over-represented in seasonal and precarious employment and 82.1% of all women working in agriculture do so informally.

However, in recent decades, Armenia has moved from an agriculture-based economy to service provision. Agriculture accounted for the lion’s share of GDP in 1993, when it reached 48.2 per cent of total economic output. Its share has declined steadily since, to 13.7 per cent by 2018 (*Table 1*).

Table 1

Basic agriculture indicators in Armenia (World Bank WDI database)

	2008	2018	Difference	Diff. %
Population	2 907 618	2 951 745	44 127	1.52
Agriculture, value added (% of GDP)	17.9 (2012)	13.7	- 4.2	- 23.47
Agricultural land (% of total population)	61.43	58.9 (2016)	- 2.53	- 4.12
Rural population (% of total population)	36.36	36.85	0.49	1.35
Employment in agriculture (% of total employment)	37.35	33.29	- 4.06	- 10.87
Employment in agriculture, female (% of female employment)	44.38	36.59	- 7.79	- 17.55

About 317,000 farming enterprises provide 97% of the gross agricultural output, of which each enterprise has 1.48 hectares of land (*Table 2*).

Table 2

The dynamics of the gross agricultural output as of separate branches, Armenian dram, billion (World Bank WDI database)

The total population was slightly less than 3 million (2.951.7 million) in 2018. Armenia is generally mountainous country, having its lowest point 375m above sea level and culminating at 4095 m with an average altitude of 1850m. In fact, geographical constrains decreased number of agricultural lands. For instances, 44 % of the territory of Armenia are high mountainous areas, not suitable for inhabitation thus for agriculture. Thus, the degree of land use is strongly unproportional. The zones under intensive development makes 18.2% of the territory of Armenia with a concentration of 87.7% of total population. On these areas the population density exceeds several times of the ecological threshold index (200person/km²) reaching here up 480-558. Meanwhile, the average population density is 100 inhabitants per sq. km; and about 37 per cent of the population lives in rural areas.

The greatest part of Armenia is mountainous (about 1800 meters above sea level), while 1/3th is pastureland. A land of rugged mountains and extinct volcanoes, its highest peak is Mount Aragats, 4 095 m. There are more than 200 streams and rivers in Armenia, none navigable, however, because of their steep descents and rapid currents. The Armenian countryside also boasts some 100 small, but picturesque lakes. One of the largest mountain lakes in the world, Lake Sevan, covers an area of 1 400 square kilometers and is about 2 000 meters above sea level.

Armenia has 2.974 million ha of land, of which 2.043 million ha is considered agricultural land. The total area of arable land is 446.0 thousand ha (21.8% of

agricultural lands), out of which 68.1 thousand ha is concentrated in Ararat valley (15.2 %). More than 57% of agricultural land in Armenia is pastures and meadows. Around 29.1% of cultivable land is not utilized for various reasons.

The Agricultural Census distinguishes two main farm types:

- holdings without legal status which includes individual households and individual farms of members of horticultural associations,
- holdings with legal status being legal entities and private entrepreneurs.

The second category are the larger, commercial companies which comprise of less than 0,1% of all farmers and about 4% of all private land.

The distribution of the farm sizes are as follows: 340.000 family farms between 1,2 and 1,4 hectares, fragmented into an average 2 to 3 parcels. 42.000 ha have plantations (65% orchards, 34% vineyards and 1% berries 2), mainly in private ownership. Most arable land is located in the Araks river valley and along its tributaries (e.g. in Ararat, Armavir, Shirak, Kotayk and Aragatsotn regions) and around Lake Sevan (Gegharkunik). Most plantations are located in Armavir, Ararat and Aragatsotn regions.

Most cultivated essential plant in Armenia requires between 500- 700mm average precipitation, however the annual precipitation comprises about 300mm in the cultivated area, which is mainly spread over winter season, thus the irrigation is very crucial for the production of fruit trees, grape, vegetables, berries, cereals etc. Only 7.6 % of total agricultural land and 26.7 % of arable land are irrigated by comprising 170 Th.ha. Actual irrigated in 2019 around 100 Th. Ha.

Chapter 2. Agriculture policies in Armenia

Local/regional/national policies in agriculture and connected sectors

One of the guiding documents of the agrarian policy is the 2020- 2030 strategy of the main directions ensuring the economic development of the RA agricultural sector approved by the RA Government Decree No.1886- L dated December 19, 2019. The core of the agricultural policy is the increase of agricultural efficiency, increase of the food security level, introduction of modern technologies, increase of exportation volumes, increase of profitability of all entities engaged in the entire value chain of agriculture - small households, farming cooperatives, processors, and exporters.

The Sustainable Agricultural Development Strategy gives primacy to technology-focused modernization: promoting digital agriculture and technological innovation;

investing in digitalization of the agricultural sector; building the local ecosystem for technological innovation; and boosting regional digital agricultural services leadership.

Since 2018 the RA has developed new loan policy for local farmers to boost smart farming systems (intensive orchards, greenhouses, smart cattle breeding bars etc).

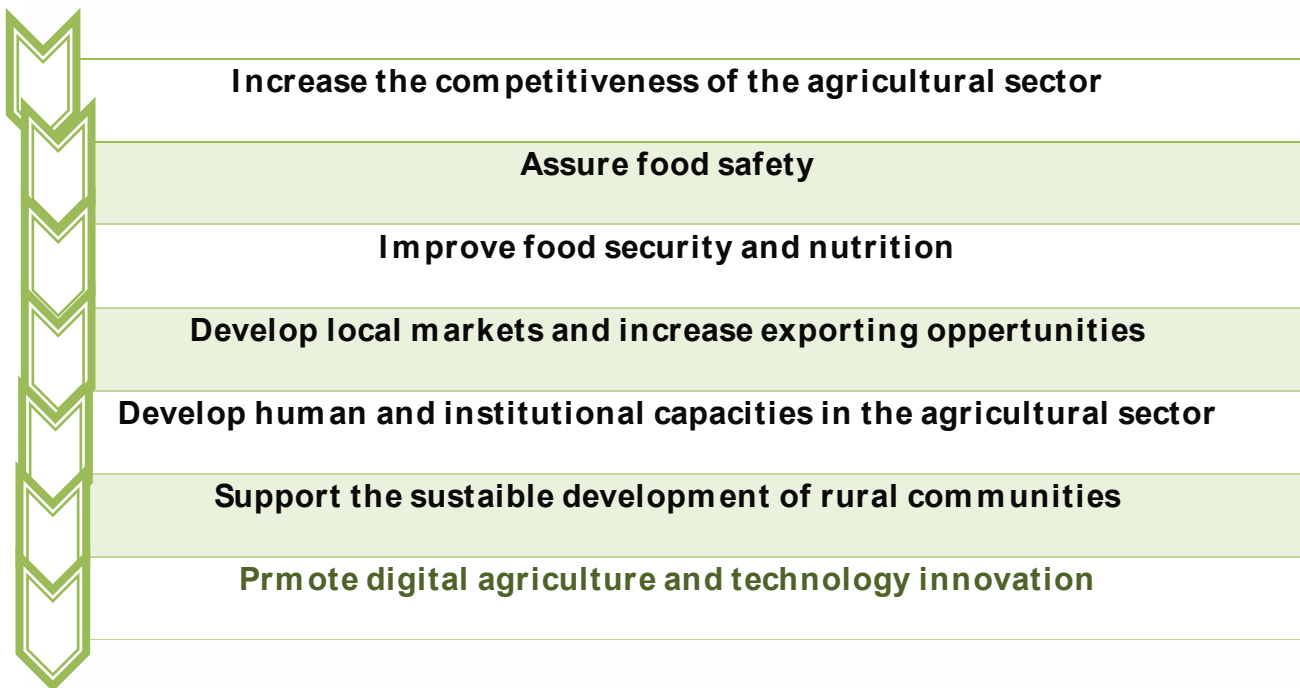


Figure 1: 7 priorities of agrarian policy in Armenia

The vision of the strategy for the next 10 years is to have agriculture that ensures sustainable development, is innovative, creates high added-value, is careful towards natural resources and environmentally friendly, creates ecologically clean products and guarantees the well-being of people living in rural areas.

Along with the task of creating a competitive and efficient agriculture that is based on new technologies and science, the RA Government has also set a goal to:

- Support the development of cooperative agriculture and define the minimum prerequisites required for realization of cooperatives.
- Create educational, scientific and research, industrial clusters and contribute to enhancement of cooperation between educational, scientific, scientific and production and consultation centers in agricultural and agrarian sector.
- Support the introduction of agricultural and food system equipment, new technologies, as well as food safety systems.

- Implement state support programs aimed at development of local seed breeding and seed production, intensive agriculture, and livestock breeding, as well as support establishment of pedigree farms.
- Contribute to the expansion of non- agricultural activities in rural communities and development of agritourism .
- Ensure the introduction of an effective system for prevention of animal and plant diseases.
- Ensure the introduction of a system on dissemination of agriculture- related knowledge and experience and access to information among agricultural producers.
- Ensure the introduction of insurance system in the agricultural sector.
- Define the main principles, methodology, and strategy of assistance to agriculture.

In order to implement the afore- mentioned policy, the expenses envisaged by the state budget for the mid- term program in the Republic of Armenia will be primarily aimed at execution of the following projects:

- Application of subsidizing the loan interest rates and compensation mechanisms to enterprises operating in the agricultural sector and agricultural products processing entities.
- Supply of technical means for the agrifood and agricultural sector through affordable mechanisms - financial lending, leasing.
- Activities to promote intensive gardening implemented by modern technologies.
- Introduction of modern technologies for irrigation.
- Support to introduction of hail protection nets.
- Introduction of small and medium- sized greenhouse enterprises and “ smart” livestock buildings using compensation mechanisms.
- Activities for development of viticulture and winemaking.
- Agricultural and chemical surveying of soils and increase of fertility.
- Implementation of state assistance programs aimed at development of animal breeding.
- Introduction of advanced technologies in livestock raising.
- Implementation of a pilot agricultural insurance project.
- Enhancement and development of information and consultation sector.
- Organization of seed breeding and seed preservation activities.
- Seed quality inspection and state- funded testing of sorts.
- Plants protection measures.
- Anti- epidemiological measures against infection diseases of farm animals.

- Targeted and coordinated use of natural grazing lands.

The Agrarian Strategy acknowledges the importance of partnerships and includes a final section with calls to action and ideas for collaboration with other Armenian line ministries Governmental institutions and initiatives. These include, for instance, the Ministries of High Tech, Finance, Environment, Territorial Administration and Infrastructure, Education, Science, Culture and Support, and other Governmental bodies and programmes such as the Work Armenia initiative. The main key indicators of the Strategy are presented in the Table 1.

Table 1

The Main Indicators

N	INDICATORS	2019	2024	2029
1.	Annual average income per farm holding (Armenian drams)	0.640. mln	2.0 mln	5.0 mln
2	Labour productivity improvement of farmers	3%	+45%	+ 100%
3.	Average annual growth rate, agricultural value-added	- 2%	5.50%	7%
4	Share of uncultivated arable lands	45.5%	35%	<25%
5	Increase of agricultural lands productivity	-5%	+25%	+103%
6	Share of irrigated arable lands	26%	>35%	>40%
7	Export volumes of primary agricultural products and processed food	697.7 mln USD	850.0 mln USD	>1.0bln USD
8	Degree of diversification of agricultural products export (10% more foreign markets)	1	2	3
9	Share of eco-products in gross agricultural product	0.20%	1%	>5%
10	Global food safety index	52.3	65.3	75.0

As a result of the implemented agrarian policy and realization of projects aimed at it, in the mid- term perspective, each year 3.5- 5.5% growth of the gross agricultural output will be ensured compared to the previous year.

Institutional changes to improve performance in agriculture

The Government of Armenia has first decided in 2008 to integrate information technologies and use innovations in the public sector, so as to improve the provision of

public services and make them more efficient. In 2010, the Government introduced “www.e-gov.am”, an electronic governance portal aimed at making all electronic government tools and databases available in one place and at creating a comfortable environment for their use. In addition, in 2010, it approved the Concept Paper on the Development of the Electronic Society in Armenia. In 2014, it approved the Electronic Governance Strategy, to improve public service provision and solve other issues.

While adopting policy documents on ICT, e-society and e-governance development, the Government moved the provision of a number of public services and broad public access to information and databases to online platforms. Its priorities include to ensure maximum output at minimum cost in all spheres of public administration, based on know-how and technologies; to provide accessible, affordable, reliable, safe, high-quality and internationally competitive services to develop the economy; and to improve the people’s quality of life. To achieve these objectives, the Government has decided to:

- put in place contemporary infrastructure ensuring information security, cybersecurity and personal data protection, and develop e-platforms for delivery of e-services by government agencies;
- digitize the information managed by public administration bodies;
- develop unified and comprehensive databases, synchronize State information programmes, and enhance interoperability of information systems and their rational use;
- increase the efficient use of digital technologies by public administration bodies, cut expenditure, maximize output and improve the quality of public information and services;
- design State standards for information security and ensure implementation and control. The e-governance ecosystem in Armenia is currently being developed thanks to the efforts of the Government and donor agencies.

The Sustainable Agricultural Development Strategy in the Republic of Armenia (Vision 2029) gives primacy to technology-focused modernization: promoting digital agriculture and technological innovation; investing in digitalization of the agricultural sector; building the

local ecosystem for technological innovation; and boosting regional digital agricultural services leadership.

According to the strategy, the agricultural sector currently has poorly developed modern information systems, and this is having a negative impact on the development of more accurate policies and efficient implementation thereof.

The following are the most important missing components:

- development and launch of a digital farmer register;
- development and realization of digital systems for counting and registering livestock;
- elaboration and use of a database of digitized maps of agricultural lands and agrochemical research;
- development and application of a centralized database of technical and economic performance indicators and standards in the agricultural sector.

During its session on August 27, 2020, the Government of the Republic of Armenia approved the Small and Medium- sized Entrepreneurship Development Strategy for 2020- 2024 and its associated action plan for 2020- 2022 developed by the RA Ministry of Economy.

The goal of the strategy is to create a favorable environment for SMEs of the Republic of Armenia through development of entrepreneurial skills, implementation of ideas, increasing the competitiveness, which will allow providing SMEs with access to domestic and foreign markets.

The target measures of the strategy are aimed at increasing the accessibility of financial resources for SMEs, capacity building, as well as formation of institutional and legal environment necessary for promotion of entrepreneurial culture.

At the effect of implementation of the measures defined by the strategy, it is planned to facilitate the growth of the SME productivity, increasing the productivity by 3% in 2020- 2023, and by 7.5% in 2024. In particular, the benefit produced by one employee

in SMEs in 2024 will amount to 12 million AMD, which is almost doubling the same indicator in 2018 (6.7 million AMD in 2018).

At the effect of the targeted activities stipulated by the strategy, the number of people employed in SMEs will increase by an annual average of 2.5%.

In order to mitigate the effects of the pandemic, more attention was paid to improving the mechanisms of the bankruptcy process and the second chance, overcoming additional difficulties related to access to financing, the need of SMEs engagement in large value chains. At the effect of the implemented activities, not only will the productivity of SMEs significantly improve and the number of employed will increase, but also, due to the transferred skills and improved environment, engagement in an entrepreneurial activity can become an alternative to work abroad, lost jobs, and recovery of income.

Chapter 3. Funding initiatives in Smart Farming from Armenia

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

The main directions of ensuring economic development in agriculture for 2020- 2030 according to the Ministry Strategic Development Policy is strengthening sustainable,

innovative, high value- added agriculture in a harmony with the environment, ensuring care of natural resources.

In order to develop large scale investment of modern technology in the agriculture the government offers favorable conditions for the loans and subsidization on the different programmers e.g. - *establishing drip irrigation systems* in orchards etc while applying within the agricultural cooperatives (so in 2019- 2023, it is anticipated to contribute the establishment of about 1800 ha of drip irrigation system in Armenia); - *Small and Medium Smart Cattle Barn constructing* and reconstructing programmes (in 2019- 2021 some 3.2 billion drams are to be invested in the construction of [230 "smart' farms](#), the project is for the period of 2019- 2024); - *greenhouse construction and reconstruction* support projects; - *intensive orchids investment projects* etc.

The development and establishment of intensive orchards or smart cattle breeding farms will contribute to increase the yield or production capacities (e.g. in case of intensive orchard the yield capacity can increase over 50%). In parallel, it contributes the natural resources efficient use e.g for water around 30-50%. In addition, considering the fact that about 28 thousand ha has over normative irrigation demand (Ararat, Aragatsotn, Kotayk Regions), the development of drip irrigation system is highly demanded and crucial to improve efficient use not only for the water but cultivated land resources, which is limited due to country's mountainous relief.

Thus, the development of drip irrigation system in Armenia is one of the essential issues due to its scarce water resources and harsh climate condition in the country during the crops vegetative period.

The government planned in March 2019 to proceed up to 8000 ha of land area in Armenia to drip irrigation by 2023. Between 2019 and 2023 drip irrigation systems will be installed in 1600 ha of land areas and raining systems will be installed in 200 ha of land areas. Loans will be provided to carry out these works with 3 years of repayment term and interest rate of 12%. 10- percent point will be subsidized for 1200 ha and 12- percent point will be subsidized for 220 ha. According to the governmental decision made on September 10 in 2019, the drip irrigation has potentially growing for the last decade and within the period of 2017- 2019 the growing ha of drip irrigation.

The drip irrigation is continually growing in the country over the last decade from 0,4 % comprising 3.27% of all irrigated area, particularly in the vegetables, orchards (grape, fruits) agri-land (ref. governmental decision N 212- L, different statistical research). The growing rate is increased especially during the recent 5 years, as the government gives special subsidize loans (over 106,6 billion) for the farmers, in order to contribute the development of drip irrigation in Armenia.

In addition, the government supports the local farmers or SMEs in the agri-food production system in Armenia who has suffered due to the COVID- 19.

Projects implemented in the agricultural field

Main state institution, which provided assistance to farmers and small and medium entrepreneurs in 2016- 2018, was SME Development National Center of Armenia (SME DNC). The organization was responsible for the implementation of SME state support programmes, aiming to help start-ups and already functioning SMEs to develop their capacities and knowledge. Support to SMEs was provided by different assistance tools, some of which with assistance of the donor community.

Programme implemented by the SME DNC to support start-ups is **The Loan Guarantees Provision programme**, with the location of all marzes/regions of Armenia.

The Loan Guarantees Provision programme supports SMEs that lack collateral and have low liquidity for loans. The programme allows entrepreneurs to qualify for loans by guaranteeing up to 70% of the principal of the loan and the interest rates for up to 5 years. The maximum amount guaranteed cannot exceed 15 million Armenian drams. The loan guarantees are provided to SMEs operating in the regions with low level of economic activity (close to the border and rural areas, disaster zone, former industrial and scientific sites) in manufacturing, services provision and trade sectors. They should be involved in import substituting activities or be and exporting SMEs or have an export potential. Only SMEs that introduce and use new technologies and innovations are considered. Detailed information and procedures are available on <https://smednc.am>.

The European Neighbourhood Programme for Agriculture and Rural Development (ENPARD)

The purpose of the project was to strengthen and establish primary producers' groups within the targeted value chains in selected regions of Armenia, improve their capacity and actively engage in value addition and provide direct assistance within the selected value chains that will benefit not only stakeholders of those value chains but also Armenian consumers locally and nationally.

EU contribution: € 5 000 000 (plus EUR 20,000,000 as a budget support)

Implementing organisations: Ministry of Agriculture of the Republic of Armenia, the United Nations Industrial Development Organization, United Nations Development Programme and the Food and Agriculture Organization of the United Nations, local authorities and farmer groups.

Duration: October 2014 – September 2018

Location: All marzes/regions of Armenia

EU Organic Agriculture Support Initiative (OASI)

This project specifically aimed at increasing local value-added of Armenian organic products as well as assisting higher efficiency of relevant public and private institutions. Supporting the Ministry of Agriculture with creation of a clear and enabling legal environment for organic producers and processors in line with international standards was one of the objectives of the project.

Activities of the project included promotion of organic extension services, raising awareness of organic production and products, and increasing market access for the producers. The OASI Project has also provided 45 beneficiary farmers and processors with financial assistance of about 1 million euros to start or expand their organic production. Moreover, nearly half-a-million euro worth export has been registered because of the continued participation at the international exhibitions.

Total budget: € 3 300 000, **EU contribution:** € 2 800 000

Implementing organisation: Austrian Development Agency (ADA)

Duration: 42 months | September 2015 – March 2019

Location: All marzes/regions of Armenia

Boosting competitiveness of regional SMEs

The overall objective of the project is to boost the competitiveness of regional SMEs and to create employment opportunities in Lori, Syunik and Armavir regions of Armenia, focusing on the sectors of food processing and tourism. It promotes the development of entrepreneurship by creating business opportunities for progressive young people, equipping start-ups and growing SMEs with contemporary business skills and competences, facilitating access to finance and markets, providing relevant skills and promoting sustainable employment.

Three group of activities are involved in the project:

1. **Establishment of a Road Side Station (RSS) in Lori region**, as a marketing infrastructure for local products and services. The RSS is a multi-functional sale and rest facility on the highway, facilitating the development of local production and tourism, and includes a local brand shop, an information/training centre, and a rest station. Market research in the food processing and tourism sector was conducted for the plan RSS.
2. **Entrepreneurship promotion:** A special toolkit for start-ups “Successful Start” was implemented in target regions of Armenia. In the framework of this assistance, operating SMEs and start-ups received targeted business trainings contributing to business skill development. The toolkit included also a loan guarantee facility: the most viable business plans received during the successful start campaign had an opportunity to apply for SME DNC’s loan guarantee facility for start-ups.
3. **Job promotion:** to address the issues of the mismatch between job seekers’ skills and required qualifications on the labour market, the project organised a series of sector specific and general business trainings for young job seekers

Total budget: € 1 604 808, **EU contribution:** € 1 123 370

Implementing organisations: “Small and Medium Entrepreneurship Development National Center of Armenia” (lead) and its partners: “Strategic Development Agency” NGO, “Armavir Development Center” NGO, “Spitak-Farmer” NGO and “Syun” NGO

Duration: 2016 - 2019

Location: Lori, Syunik, Armavir (regions) of Armenia

Advice for Small Businesses

Implementing organisation: European Bank for Reconstruction and Development (EBRD)

The programme aims to promote good management in the small and medium - sized enterprise sector by providing technical assistance and consultancy, helping them to grow their businesses.

Objectives of the programme are:

- Contribute to improved access to finance for SMEs and enhance competitiveness of assisted SMEs.
- Strengthen and improve sustainability of local business advisory services infrastructure

The activities of the programme include:

- Provision of a business advice through international advisers and local consultants. This includes teaching and mentoring activities as well as the dissemination of commercial and technical know-how to key managers;
- Organisation of study visits;
- Provision of financial support.

The programme is implemented in all regions of Armenia. As of today, about 76% of assistance was provided to SMEs operating outside of Yerevan. The programme works in almost all sectors of economy. Eligibility criteria of the assistance are:

- **Size:** annual turnover up to EUR 50mIn or balance sheet total of less than EUR 43mIn. Usually support is provided to companies which have fewer than 250 workers;
- **Ownership:** Businesses established by local Armenian citizens;
- **Operation:** Businesses should be operational two and more years;
- **Sector:** Almost all sectors (except military sector, producers of tobacco, gambling or financial sector).

Total budget: € 16 000 000

Duration: 2010 – 2019

Location: All marzes/regions of Armenia, other Eastern Partnership Countries

Enterprise Europe Network (EEN): Scaling up for grow

Implementing organisations: SME Development National Center of Armenia

Duration: 2017 - 2018

Location: All regions/marzes of Armenia

The main objective of the project was to boost regional scaling up SMEs in further growth and internationalization.

Main supporting tools included:

- Thematic trainings,
- Individual consultancy,
- International partner search by EEN tools

Target groups of the project were scaling up SMEs operating up to 5 years in food processing sector.

Investments in agriculture

Subsidizing interest rates of loans provided to agricultural sector **Implementing organisation:**

Ministry of Economy of the Republic of Armenia

Location: All marzes/regions of Armenia

Overall objective of the programme is contribute to improve capacities of business operators involved in agricultural sector, introduce modern technologies and increase agricultural productivity by through the partial subsidization of interest rates of loans provided to business operators by financial institutions.

In the framework of the programme, the interest rate of agricultural loans is defined 0% for beneficiaries of borderline communities³, 3% for agricultural cooperatives and 5% for other economic operators. The amount of the loan is AMD 3- 15 mln. The loan term is maximum 5 years depending on the direction of the investment.


For the implementation of the programme, the government works with the following financial institutions:

- ACBA- Credit Agricole Bank CJSC
- Arm businessbank CJSC
- Converse Bank CJSC
- “CARD AgroCredit” Universal Credit Organisation CJSC
- “Farm Credit Armenia” Universal Credit Organisation Commercial Cooperative

- “Kamurj” Universal Credit Organisation CJSC
- “Aniv” Universal Credit Organisation LLC
- Agroleasing LLC
- “Development and Investment Cooperation of Armenia” Universal Credit Organisation CJSC

To be entitled to benefit from the programme the business operator should have relevant certificate provided by the Ministry of Economy. The Application procedure is available on the website www.minagro.am.

Detailed information can be obtained also from the Agriculture Development Programmes Department of the Ministry of Economy, tel.: +375 11525 232.



Subsidizing interest rates of loans provided for the purchase of agricultural raw materials

Implementing organisation: Ministry of Economy of the Republic of Armenia

Location: All marzes/regions of Armenia

Overall objective of the programme is increase the loan accessibility level for business operators engaged in processing of agricultural products in the territory of the Republic of Armenia.

The annual interest rate of loans provided in the framework of the programme should not exceed 12%, 9% of which will be subsidized by the Government. For businesses, operating in borderline communities⁴ the interest rate of mentioned loans is 0% (fully subsidised by the Government).

The balance of the principal amount of loan cannot exceed AMD 1.5 billion, the maturity date is up to one year. Loans subject to subsidy should be targeted solely on the payment of the harvested agricultural raw materials.

In the framework of the programme, the government works with the following financial institutions:

- ACBA- Credit Agricole Bank CJSC
- Ameriabank CJSC
- Ardshinbank CJSC
- Armbusinessbank CJSC
- Armeconombank CJSC
- Armswissbank CJSC
- Biblos Bank Armenia CJSC
- Converse Bank CJSC
- Evocabank CJSC
- HSBC Bank Armenia CJSC
- Inecobank CJSC

- VTB- Armenia Bank CJSC
- “CARD AgroCredit” Universal Credit Organisation CJSC
- “Development and Investment Cooperation of Armenia” Universal Credit Organisation CJSC
- “Farm Credit Armenia” Universal Credit Organisation Commercial Cooperative

In order to benefit from the programme the business operator should sign the raw material procurement contract with relevant farmers (template is available at www.minagro.am), fill in the application form and submit the documents to relevant financial institutions. Detailed information can be obtained from the Agri- processing Development Department of the Ministry of Economy, tel.: +375 11 230 180.

State support for leasing: Financial lease of agricultural equipment in agri- food sector of the Republic of Armenia

Implementing organisation: Ministry of Economy of the Republic of Armenia

Location: All marzes/ regions of Armenia

The main objective of the programme is to provide support to business operators involved in agri- food sector of the country, by supplying equipment on affordable terms, particularly with the use of financial leasing mechanisms. It is expected, that this assistance will create prerequisites for increasing the volumes of agricultural primary production and processing, as well as to produce qualitative and safe products according to international standards and increase competitiveness of Armenian agricultural products in foreign markets.

In the framework of the programme, the equipment is provided in following sectors:

- Livestock breeding, including cattle breeding, sheep breeding, pig farming, poultry farming, beekeeping, fish breeding, industrial animal husbandry;
- Crop production, including greenhouses;
- Cold storages, including for milk;
- Sorting, packaging of fresh fruit and vegetable;
- Slaughterhouse
- Agri- processing
- Other activities in agri- food sector

Leasing is given in Armenian drams, with the maturity term of up to 8 years and annual interest rate of up to 11%, up to 7% of which is subsidised by the Government (final annual interest rate for the business operator should be 4%). For businesses, operating in border-line communities⁵, the interest rate is 0% (fully subsidised by the Government).

The total amount of the equipment obtained in the framework of programme should not exceed AMD 400mIn.

In order to benefit from the programme, the business operator should select a supplier

organisation, together with whom submits a financial leasing application to selected financial institutions. As soon as the applicant pays the prepayment (20% of the price of equipment); the

financial institution signs delivery agreement with supplier organisation and provides equipment to the applicant, as soon as it is imported to Armenia.

The following financial institutions are involved in the programme

- Ameriabank CJSC
- Armeconombank CJSC
- Armswissbank CJSC
- Converse Bank CJSC
- “ACBA Leasing” Credit Organization CJSC
- “CARD AgroCredit” Universal Credit Organisation CJSC
- “Development and Investment Cooperation of Armenia” Universal Credit Organisation CJSC

Detailed information can be obtained from the Agri- processing Development Department of the Ministry of Economy, tel.: +375 11 230 180.

Projects implemented in the smart and IoT technologies applied to agriculture

Green Agriculture Project

Total budget: € 11 700 000, **EU contribution:** € 9 700 000

Implementing organisation: Austrian Development Agency

Duration: 2019 – 2022

Location: Northern marzes/regions of Armenia

The expected start of the project is September 2019, aiming to create high- value agriculture ventures and develop capacity of agricultural stakeholders, establish quality infrastructure for increasing efficiency and sustainability, and enhance export opportunities in agriculture and irrigation sector. The project will be implemented in three norther regions of Armenia: Lori, Shirak and Tavush.

Main support foreseen by the project include:

- Capacity building activities for agricultural stakeholders,
- Improvement of machinery and post harvesting infrastructure,
- Support to VET in agricultural sector
- Provision of small grants
- Marketing support and awareness raising.

Currently the project does not have any sectoral preference. Sectors of further assistance

will be decided after implementation of value chain analysis. However, harvesting of herbs and production of organic herbal teas are considered as one of possible sectors, where the project will intervene.

IMPACT AIM ANAU AgriTech Accelerator program is designed to support science and technology- backed startups and budding entrepreneurs offering solutions to tackle challenges in the agricultural sector of Armenia and worldwide. The program is launched by UNDP ImpactAIM Accelerator and implemented jointly with Armenia National Agrarian University (ANAU), International Center for Agribusiness Research and Education (ICARE) Foundation, Foundation for Armenian Science and Technology (FAST), Nation in Action initiative, is supported by Armenian National Innovation SDG Lab and ADB Ventures Facility.

AIM ANAU AgriTech Accelerator program is the follow- up phase of the ANAU AgTech incubator launched in 2019 at Armenian National Agrarian University (ANAU) with a 10- week pre- incubation training program and deep learning workshops for 44 participants including ANAU students and the young professorship. Several monetary prizes were awarded. One of the main outcomes of the program is the construction of the venue for ANAU AgriTech Incubator in the premises of ANAU with an expected opening in September 2020 granting students and professors the opportunity of testing their entrepreneurial projects in real life.

AgriTech Acceleration program aims to provide the necessary knowledge, expertise, network, and funding for setting up, and/or scaling up existing ventures. Gap assessment is conducted to offer a tailored program best fitted to the participants' individual needs.

The program targets only science and technology- backed startups (**pre- seed, seed, and growth stage**) and budding entrepreneurs (Idea Stage). **Individuals, teams and registered entities** (CSO/NGO, LLC, LTD, etc.) both from Armenia and around the world

are eligible to apply if they offer solutions to tackle the following **challenges in the agricultural sector**:

- Data- driven agriculture
- Online management systems and E- commerce
- Increased efficiency in food production value chain through new technologies

EU- GAIA with joint efforts of Nation in Action, ICARE foundation and Armenian National Agrarian University has been implemented start- ups call under 35 000 Eur competition fund. 10 companies were presenting interesting topics in green agriculture and challenges.

3 companies were selected as a final winner such as Revalcon, Garoon Tech and MiCofe:

[Revalcon](#) - presented digital app and web projects to control irrigation system

[Garoon tech](#) – presented interesting digital platform for agricultural extension

MiCofe – presented novel technologies for reusing of coffee grounds to receive ecologically safe and biodegradable organic fertilizer.

[ArmSIS](#) – Soil map

The Armenian Soil Information System has been formally launched during World Soil Day 2020, December 5. ArmSIS represents an essential assessment of soil resources to guide the effective and knowledge- based policymaking to combat land degradation in Armenia.

The project has been initiated by the Ministry of economy of Armenia, and ArmSIS were established through a collaboration between FAO, the Global Soil Partnership, the Armenian National Agrarian University, the Center of Agricultural Services (SNCO) and the Institute of Geological Sciences.

ArmSIS is financially supported by the Ministry of Finance of the Russian Federation. The new and fully functional ArmSIS was created by digitizing legacy and soil data while compiling fresh data based on agrochemical sampling campaigns.

In the second half of 2018, the EU- funded FAO European Neighbourhood Programme for Agriculture and Rural Development (ENPARD) project, “ Technical Assistance to the Ministry of Agriculture of the Republic of Armenia” , which benefits from FAO technical cooperation, helped the government develop a vision for the national e- agriculture

strategy. FAO continues to support the development of the action plan for digital agriculture in conjunction with the Ministry of Economy and Ministry of High-Tech Industry of Armenia supports the elaboration of [national digital agriculture strategy](#) starting in May, 2020. FAO supports in transforming agriculture through the adoption of digital technologies and innovation.

The national digital agriculture strategy can help Armenia increase food production, establish incentives and facilitate the development of digital technologies for the agrifood sector. It can be used to promote new markets, strengthen social protection, decentralize trade and serve as a driver for digital agricultural innovation.

Armenia SME Finance and Advice Facility

Implementing organisation: European Bank for Reconstruction and Development

Started in 2017, the SME Finance and Advice Facility aims to deepen and diversify access to finance for local SMEs by combining technical advisory services with the grant support for equity and other forms of capital investments. The facility will try to improve access to finance for SMEs through a combination of investment projects and technical assistance, and a diversification of sources of finance, ultimately creating jobs, contributing to increased investment, capital market development and diversification of economic activity.

The facility has two pillars:

- Expanding financing options to SMEs in Armenia including equity and quasi- equity (around EUR 11mIn is planned to spend for achievement results of this component). Component, including the creation of a private equity fund, expected to make investments in eligible Armenian SMEs over a five- year investment period
- Providing advisory services to SMEs in order to promote competitiveness and innovation and enable businesses to grow and to attract further investment (EUR 4mIn will be spent under this component). Particular focus will be on investment readiness to help targeted SMEs to access the financing they need to grow.
- Beneficiaries of the Facility are SMEs operating in all regions of Armenia.

Total budget: € 15 380 000 (EU funded)

Duration: 2017 – 2029

Location: All marzes/regions of Armenia

Rural Economic Development – New Economic Opportunities (RED- NEO) Program

Total budget: USD 4 000 000

Implementing organisation: Center for Agribusiness & Rural Development (CARD), AM Partners Consulting, Armenian Women for Health and Healthy Environment NGO, and Hicks Burnham and Williams LLC

Duration: 2019 – 2024

Location: At least 60 communities in all marzes/regions of Armenia

The RED- NEO project launch was in April 2019. RED- NEO activities will promote inclusive, sustainable economic security and economic growth by supporting at least 100 businesses in at least 60 communities. The program will accelerate the growth of small- and medium- sized enterprises (including farms and cooperatives) in the regions; facilitate market linkages between producers and buyers; and establish networks to promote local economic development. It will foster the development of a competitive agriculture sector by improving the performance of rural businesses and cooperatives, and their ability to meet quality standards.

The project is currently in the stage of identifying target communities and analysing their needs. However, harvesting of herbs and production of organic herbal teas are considered as one of possible sectors, where the project will intervene.

German Nature and Biodiversity Conservation Union (NABU): Free Organic Certification

Implementing organisation: NABU and ACBA- CREDIT AGRICOLE BANK

Duration: Annually

Location: All marzes/regions of Armenia

German Nature and Biodiversity Conservation Union and ACBA- CREDIT AGRICOLE BANK signed a cooperation agreement on February 20, 2015. Within its framework, a project for the development of organic agriculture is being implemented annually.

The project is aimed at development of organic products' market in Armenia and export promotion. Every year an organic certification contest is being organized.

The support includes assistance for organic certification, as well as in participation in exhibitions and trade fairs.

BSB opportunities and EU programmes

Enterprise Europe Network

The Enterprise Europe Network is a European initiative, aimed at providing innovation and business support to all businesses across the European Union and beyond. The EEN comprises of around 600 partners in more than 60 countries offering a wide range of services to businesses.

Starting from 2016, the Small and Medium Entrepreneurship Development National Center of Armenia in consortium with the National Academy of Science of the Republic of Armenia, hosts the Enterprise Europe Network in Armenia.

The activities of EEN in Armenia are directed to the internationalization of Armenian entrepreneurship and to development of their capacity for entering the European market. Main services offered by the EEN Armenia include:

- Sharing information on European legislation, policies, standards, possible sources of financing, business cooperation opportunities and other EU issues,
- Supporting SMEs to identify potential business partners and to establish new business cooperation in the European market,
- Dissemination of business and technological profiles of Armenian businesses in foreign countries,
- Provision of information and consultation on intellectual property rights and further commercialization issues,
- Organization of business cooperation events and support in organization of meetings with potential partners.

In order to promote the international cooperation, the Enterprise Europe Network periodically organizes regional, national and European level events. Information on these events can be found here: <http://een.ec.europa.eu/tools/services/EVE/Event/ListEvents>.

Detailed information on EEN activities in Armenia can be found on the official website of the project "Enterprise Europe Network Armenia" <http://eenarmenia.am/>.

Implementing organisations: SME Development National Center of Armenia

Duration: since 2016

Location: All regions/marzes of Armenia

EU4Business – Eastern Partnership: Ready to Trade

The overall objective is to enhance the international trade of SMEs from the six Eastern Partnership countries, in particular with the EU, strengthening SME competitiveness and building up value chains in each country.

The project helps small and medium- sized enterprises from Eastern Partnership countries integrate into global value chains and access new markets with a focus on the European Union. The intervention will assist SMEs in producing value- added goods in accordance with international and EU market requirements; while linking them with buyers from global value chains and markets. As part of this process, the assistance will improve sector specific services to SMEs along the selected value chains by strengthening the capacity of local business support organisations.

In Armenia, the project primarily supports the agro- processing sector, focusing on **processed fruits and vegetables, dried fruits and vegetables, and herbs/teas**, assisting exporting and export- ready SMEs along the whole value chain. The support will be directed to helping companies access the EU market through targeted capacity- building, advisory services and market access activities.

Activities of the project include, but not limited to:

Total budget: € 6 000 000

Implementing organisation: International Trade Centre

Duration: 2017 – 2020

Location: All marzes/regions of Armenia

European Fund for Southeast Europe (EFSE)

Implementing organisation: Kreditanstalt für Wiederaufbau (KfW), Finance in Motion GmbH

EU contribution: € 5 100 000

Duration: 2009 – 2021

Location: All marzes/regions of Armenia, Eastern Partnership countries

The Fund aims to foster economic development and prosperity in the Southeast Europe and in the European Eastern Neighbourhood regions through the sustainable provision of additional development finance, notably to micro and small enterprises and private households, via qualified local financial institutions.

The fund provides small loans, including in local currency, and assistance to micro (fewer than 10 employees) and small (fewer than 50 employees) enterprises, as well as to low- income private households. Support is available to MSEs in sectors such as agriculture, industry, trade and services.

The EFSE operates through local partner lending institutions, including commercial banks, microfinance banks, microcredit organisations and non- bank financial institutions such as leasing companies. Partner organisations in Armenia are:

- ACBA Credit Agricole Bank CJSC
- Araratbank CJSC
- Inecobank CJSC
- “ACBA Leasing” Credit Organization CJSC

Detailed information and country contacts can be found at <https://www.efse.lu/>

Women in Business

Implementing organisation: European Bank for Reconstruction and Development

Total budget: € 5 035 000

Duration: 2012 – 2022

Location: All marzes/regions of Armenia, other Eastern Partnership Countries

The objective of the programme is to promote women's entrepreneurship and access to finance, and more broadly women's participation in business, by facilitating access to finance and advice for women-led SMEs.

Programme is specifically focused on women-led SMEs - businesses with fewer than 250 employees and less than €50 million in annual turnover or with a balance sheet total of less than

€43 million. For a business to qualify for this programme, overall operational management responsibility for the company should be held by a woman, who may also partially or wholly own the business.

The Women in Business programme helps women-led small and medium-sized enterprises to access the finance and the know-how they need to grow. The EBRD provides access to finance through credit lines to local banks dedicated to develop women-led SMEs, alongside business advice to help businesses become more competitive. The programme also offers training, mentoring and other support to enable women entrepreneurs to share experiences and learn from each other.

The Programme is active in two main areas:

1. Access to finance
 - Dedicated credit lines to participating financial institutions for on-lending to eligible women-led SMEs. Partner financial institutions in Armenia are ACBA- Credit Agricole Bank CJSC, Ameriabank CJSC, Araratbank CJSC, Armeconombank CJSC
2. Access to know-how
 - Business advisory and coaching
 - Training in key entrepreneurial skills
 - Online business diagnostic tool Business Lens

- Mentoring
- Networking seminars

There is almost no sector limitation: and women-led businesses in almost every sector and industry can apply for the assistance. The only exception are businesses in banking or financial services, military products or services, gambling or tobacco.

For more detailed information please visit <http://www.ebrdwomeninbusiness.com>

Chapter 4. Quadruple helix approach in agriculture field

Quadruple helix approach has been identified as an innovative system for the research work to identify the preparedness level of smart farming in Armenia and enhance the active participation and collaboration all of the parties from the four helixes: business, academia, government and civil society. In fact, the success of digital transformation requires active involvement and collaboration of many different parties. While digital large international companies predominantly use transformation in a business context, it also affects other organizations such as governments, public sector agencies and entities, which are involved in tackling societal challenges such as rural livelihood, youth unemployment and agrifood entrepreneurs, by leveraging one or more of these existing and emerging digital technologies. At the farm level, digital agriculture has the potential to contribute to a more economically, environmentally and socially sustainable agriculture and meet the agricultural goals of a country.

To investigate preparedness level of smart farming in Armenia stakeholders mapping has been conducted based on different research methods to define specific investigations and needs. In general, we have collected 103 stakeholders' data from the relevant quadruple helixes based on different research methods to elaborate their data and work profiles.

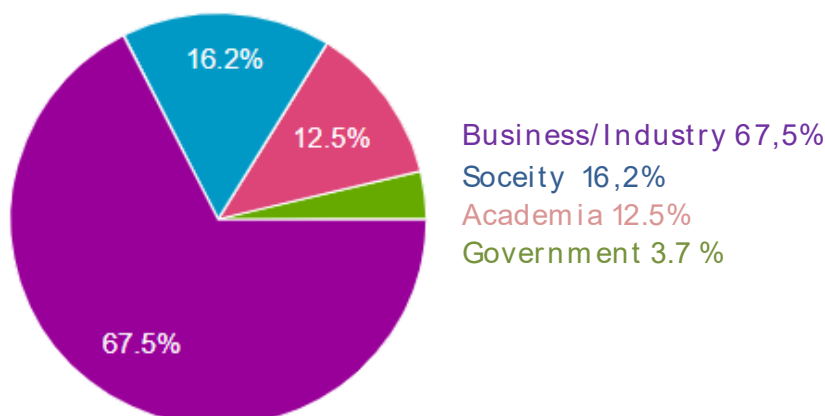


Fig. 1: Quadruple Helix approach

The interconnections within the different helixes has been identified during the work. In addition, future interested stakeholders were defined to elaborate survey data and to identify ways for future collaborations. In fact, 47% were identified as registered businesses whereas 33% were unregistered local farmers (see Fig. 3). It is one of the country's agriculture peculiarities, to conduct farming without state registration. Overall, the both comprise 80% of the mapped stakeholders within the project. Business Helix comprises almost all- different type of organizations such as local farmers (unregistered), IE (individual entrepreneurs), LLC, CJSC and Cooperatives (see Fig. 2).

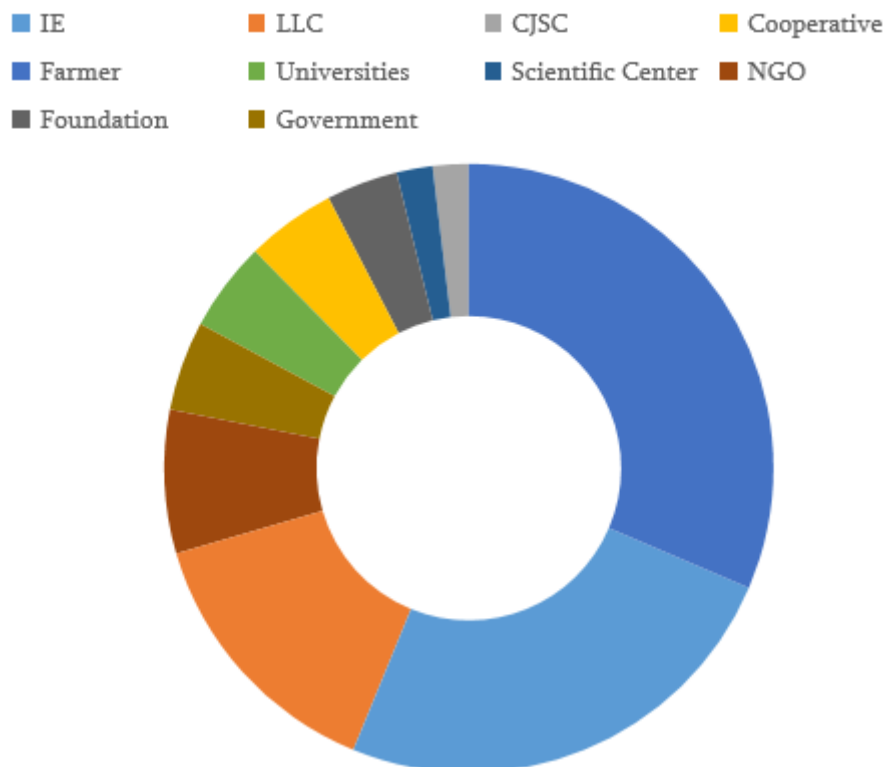


Fig. 2: Digital agriculture map in Armenia

In the total number of civil society to comprise 10%, the NGO is 8% and Foundations to apt at civil society are 2% (see Fig. 2 and 3). In addition, 2% of the Foundations are

relevant to the academia (see Fig.3). The universities or scientific centres in Armenia are allowed to register as a foundation except the university to keep different form of making their activities and profiles work to be possible and more versatile.

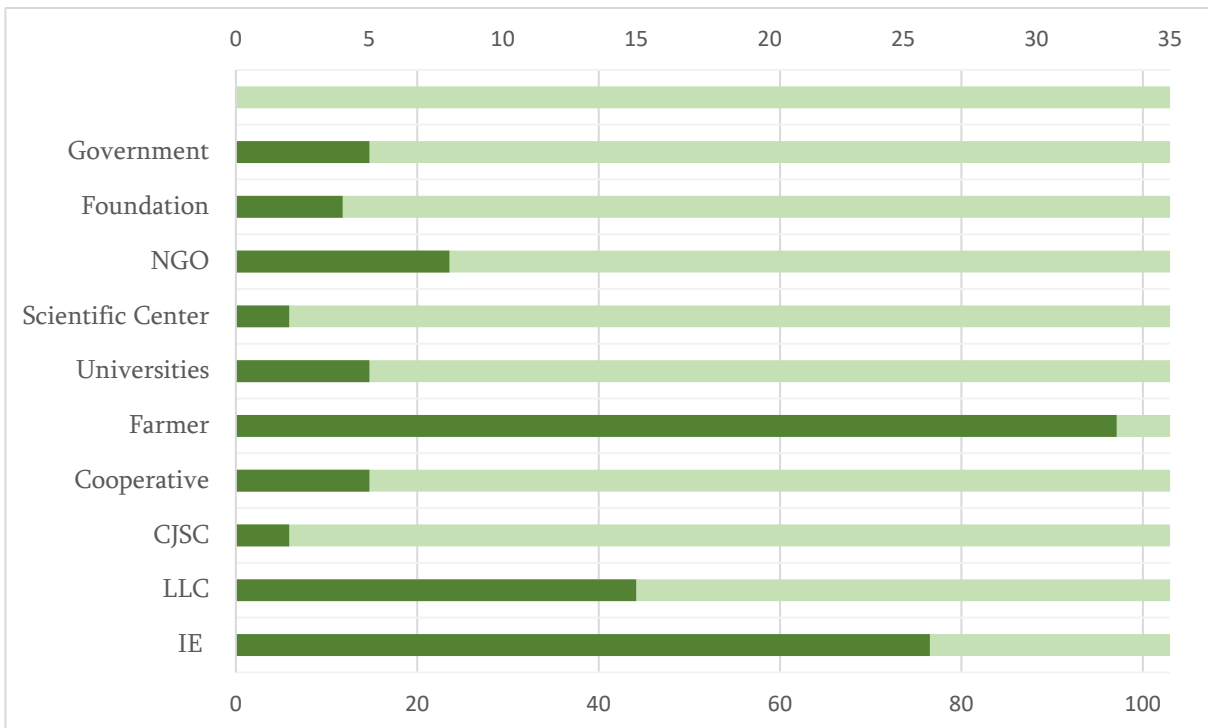


Fig. 3: Distribution of digital agriculture stakeholders in Armenia

Research academia helix requires 5% participants in respect to the project. However, the percentage of academia helix is 7% to encompass 3 higher education institutions, 2 highly tech developed and internationally recognized STEM education centers, and 2 scientific centers (Fig. 1 and 2).

Also, it has been defined 2 Ministries, Ministry of Economy and Ministry of High Tech Industry of the RA to collaborate and enhance a policy for smart farming development in Armenia. Too, 3 local authorities, communities and municipalities has been involved within the mapping.

The survey form requires at least 50 stakeholders to identify the the level of preparadness of smart farming in Armenia. However, 87 organizations took part in the survey. 78.2 % of them are private organizations and just 21.8 % are public. 67, 8 % from all organizations are non- commercial and 32, 2 % are commercial. Only 13, 8 % of total surveys belong to non- governmental organizations.

The organizations that participated in the survey are mainly involved in the following areas:

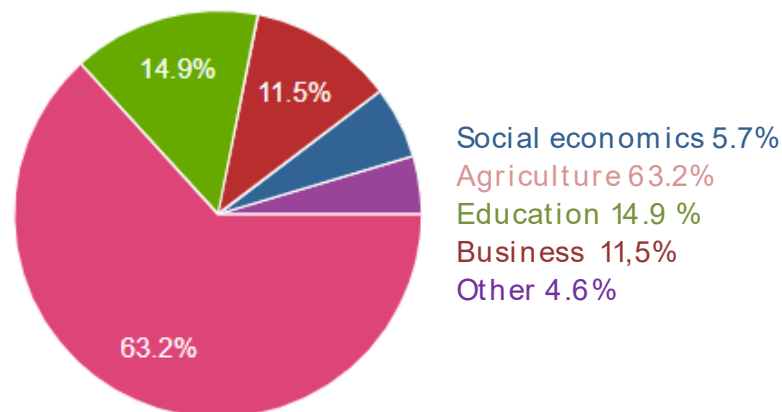


Fig. 4: Field of activity

As can be seen from the diagram, the majority of participants (63, 2 %) are involved in agriculture work.

69.9 % of total surveys is farm , from which 41.3% are unregistered farms and 28, 6 % are registered farms. Different types of farms were involved: 34.6 % traditional farms, 30,8 % conventional farms, 17,3 % artisanal farms, 9,6 % bio farms and etc.

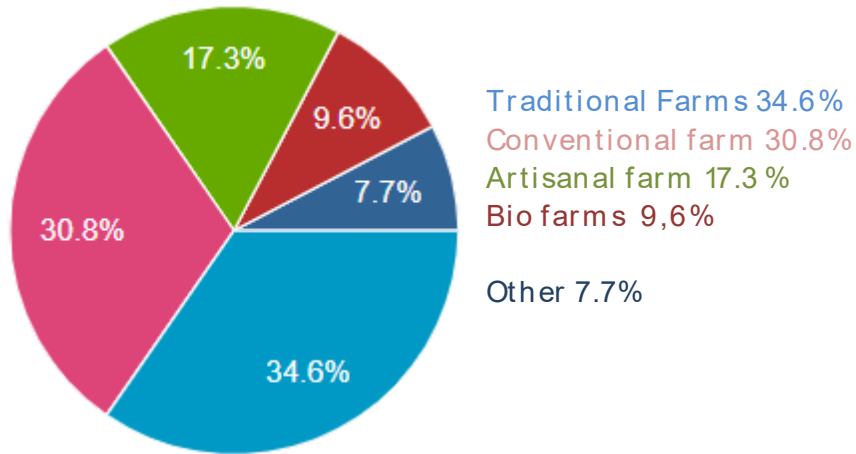


Fig. 5: Type of Farm

All of these farms also differed in size. Large farms (> 10 ha) are a small part of the total, only 3%. Majority of farms (36.4%) are marginal and have a very small area, less than 1 ha.

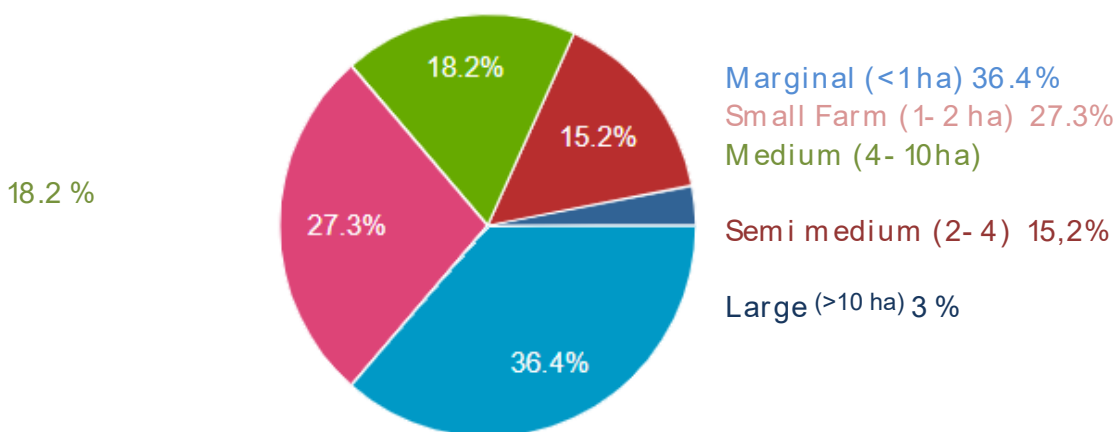


Fig. 6: Farm sizes

Chapter 5. Smart and IoT technologies existent in Armenia

Smart Technologies provided assessment show that just a few farmers apply smart technologies.

Local public authorities are mainly municipalities and also local agencies and services. Regional and national public authorities had not been included.

According to the representatives of the scientific- educational sphere, most of the respondents were Education/Training Centers, than Higher education organizations.

Have been done investigation on level of preparedness for smart farming. Surveys show that participants are well informed about smart farming applications, such as: water deficit detection and control, climate conditions monitoring, crop management, pests and diseases detection, cattle monitoring etc.

Results show that already we have applied smart technologies in different farms. These include automated systems, data or images from sensors, digital maps, and global positioning systems and, most interestingly, drones. 85.9 % of all participants think that smart farming is increasing productivity, 78.8% - that it gives us high quality products, 75.3% - increased profit etc.

Here is some example of smart and IoT technologies in the country.

Revalcon – Integrated irrigation system. The company develop digital app and web projects to control irrigation system.

Garoon tech – The Company presented interesting digital platform for agricultural extension in the country.

Smart farm experimental center at Stepanavan, Lori Regions in Armenia. The smart farm aims to decrease the inventory capital and increase the cattle growing profits with milk and meat production up to 30- 50%. The farm was set up by the financial support of CARD and ADA.

The interview and desc research has defined that Smart technologies and IoT tools has been widely applied in Greenhouses since 2010. For instance, Priva Connex digital controle is one of them .

Overview of ICT infrastructure in Armenia

In respect with the International Telecommunication Union (ITU) Measuring the Information Society Report 2017, 64.7 % of households had computers, 60.5 % had Internet access, and 62 % of individuals used the Internet in Armenia. In addition, according to Social Snapshot and Poverty in Armenia (2018), published by the Statistical Committee of the Republic of Armenia, in 2017 96.7 % of the population had mobile phones and 88.8 % had access to a mobile Internet connection. Armenia was one of the first countries to launch LTE in the CIS region. It has a high level of mobile- broadband coverage: 3G is available to almost 100 % of the population and LTE coverage is above the CIS region average. According to the World Economic Forum Executive Opinion Survey, the level of digital skills among the active population is 4.42 on a scale of 7. Armenia is ranked sixty- first in terms of the Global Competitiveness Index indicator “ Future orientation of government ” (with a value of 3.84 on a scale of 7).

Services, applications, knowledge sharing

The main body behind the organization of e- governance tools in Armenia is Ekeng CJSC (e- Governance Infrastructure Implementation Unit), which is responsible for planning, developing and maintaining e- governance solutions. At present, ICTs are used for e- governance purposes in the land registry, taxation, health and many other sectors (such as law and art), with several of the services being offered for more than eight years. There is as yet no centralized electronic system, but solutions exist in the agricultural sector (agro.am, minagro.am, social media groups, start- ups, among others). The Ministry of Economy is planning to introduce an e- marketing platform that can be used to sell locally produced fresh and processed agricultural products. The e- marketing platform should simplify procedures, promote exports and heighten awareness of Armenian products. In the second half of 2018, the EU- funded FAO ENPARD project, “ Technical Assistance to the Ministry of Agriculture of the Republic of Armenia ” , which

is being implemented with the technical cooperation of FAO, supported government efforts to develop a vision for the national e- agriculture strategy. In the framework of the programme, “ Developing the Capacity of Digital Agriculture Strategy in Armenia” , implemented by the FAO, an action plan was developed for three outcomes of Priority 7 (Promote Digital Agriculture and Technology Innovation) of the Sustainable Agricultural Development Strategy (Vision 2029). The digital agriculture strategy and action plan are to be implemented during 2020. FAO continues to support the development of the action plan for digital agriculture in 2020.

Chapter 6. Agricultural needs of the rural communities in Armenia

An analysis of the agricultural field by sectors was also carried out. Almost all farmers involved in agriculture are engaged in crop production. More than half are involved in livestock production. Small part is involved in agricultural economics and engineering. From Crop production, sector farmers mainly cultivate fruits and nuts. Vegetable plants, then grapes and grains occupy the second place. Analysis of Livestock production sector shows as that main type of livestock are cattles, then poultries, pigs. A small number of farmers are engaged in sheep breeding. The main directions of the agricultural economics sector are development of economy, development of rural communities and agrobusiness.

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

About question, do farmers from their territory would like to adopt smart farming technologies, there is no one participant who thinks that they would not like to apply them. All confidently think that these are applicable technologies and they should be applied 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. Farmers are less motivated to use drones, due to its high cost.

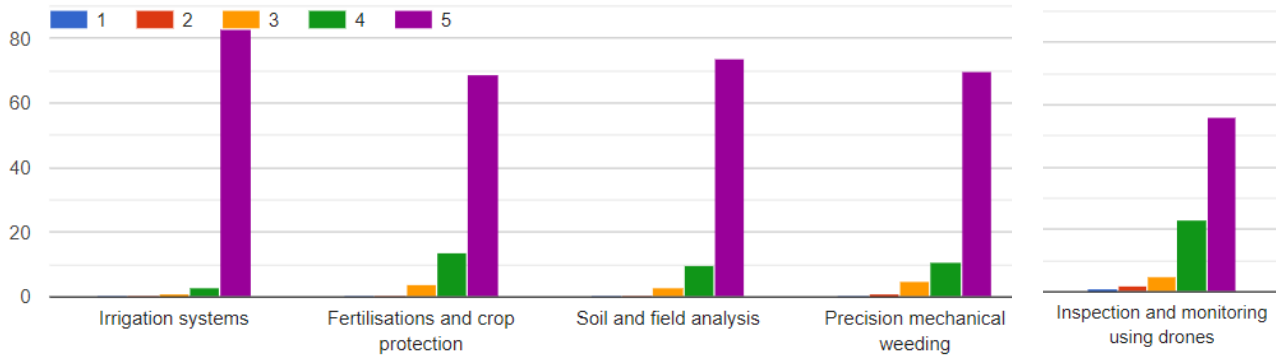


Fig. 1: Needs of Smart Farming technologies in the Crop production, scale from 1to 5

In the livestock production field it include cattle/sheep health monitoring, feeding or drinking control, milking automated systems and etc. The results shows that farmers have more needs on cattle health monitoring, feeding control, milking automated systems rather than animal indoors tracking or barn monitoring.

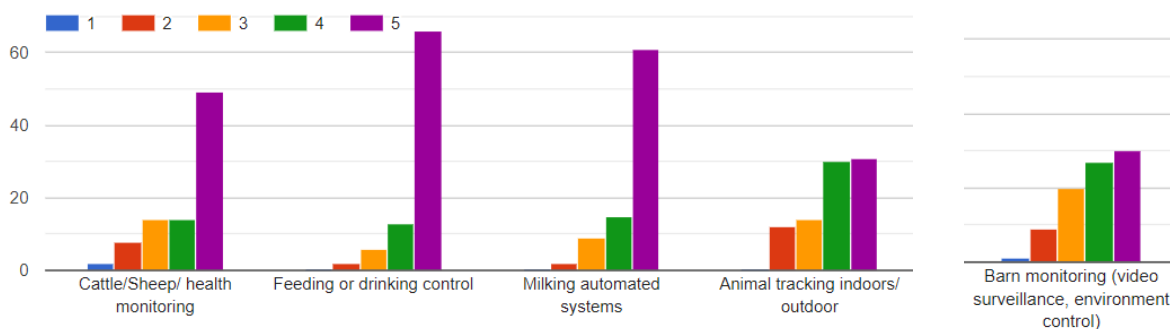


Fig. 2: Needs of Smart Farming technologies in the livestock production, scale from 1to 5

In the Agricultural, economic specific field the main emphasis is on Commodity Trading/Markets.

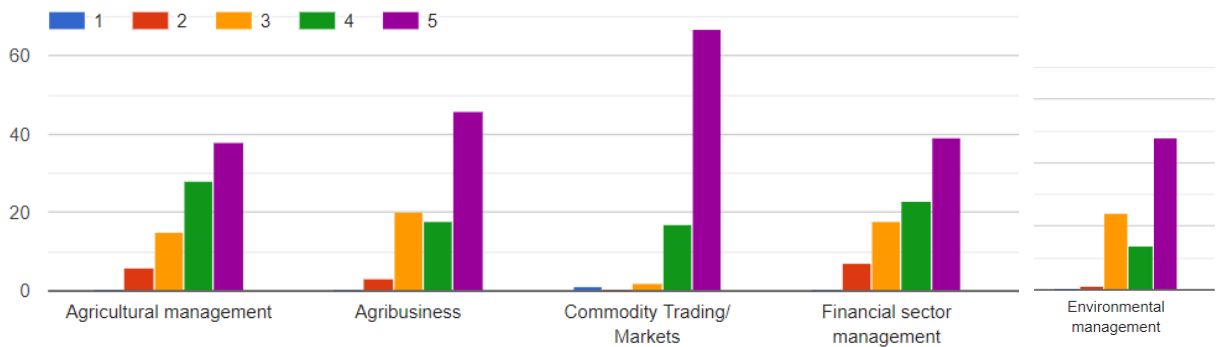


Fig. 3: Needs of Smart Farming technologies in the Agricultural economic, scale from 1 to 5

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.

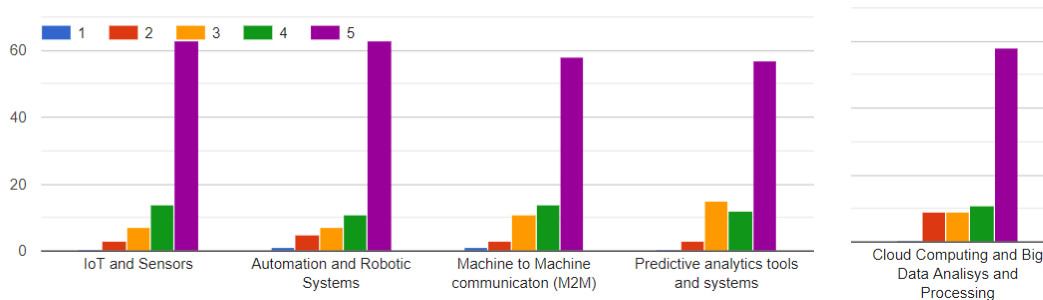


Fig. 4: Needs of Smart Farming technologies in the Engineering, scale from 1 to 5.

60,9 % of participants think that smart technologies and IoT can lead to proper management of the agriculture field and answer to other main socio-economic challenges, such as the brain drain, youth unemployment and brain waste.

Best practices exchange between farmers, training activities and on-farm demonstration are acceptable by participants to promote smart farming within the farming community in the territory. Information campaigns and online events (workshops, webinars) are not much encouraged.

Conclusions and recommendations

Smart farming solutions may lead to the development of agricultural sector in Armenia including all value chains of involving diverse processing and fields. Although the research study reveals the ICT infrastructure of Armenia is relatively high, however the farmers have weak knowledge in usage of IoT and ICT. Partially due to the aging problem, in agriculture the average age is above 35 years, which limits elder people to access IoT and ICT tools.

The project will give an opportunity through the workshops, on site visits or/ and field excursions to exchange their knowledge and skills on smart technologies and IoT tools. The increased capacities of farmers, as well as the large application of smart technologies will enable to solve the aging problem in the farming system. In its turn, this will decrease the shrinking populations from rural areas to the urban areas.

The study shows that most interesting parties within the surveys were farmers with small lands. Thus it is essential to create some IoT solutions for generating communities, or increasing social enterprises within agroecosystems.

There is need to create digital farmer register, digital systems for counting and registering livestock, development and application of a centralized database of

technical and economic performance indicators and standards in the agricultural sector etc.

In fact, the great aim of this study is to identify ways of covering knowledge and information gaps between different parties of agricultural field. Quadruple Helix approach is used first time in Armenia and definitely will enhance the successful widespreading of smart technologies and IoT tools implemantions within the country's agriculture.



D.T1.3.1. Regional analysis