DIRECTIONS OF DIGITIZATION OF THE AGRICULTURE IN THE REPUBLIC OF AZERBAIJAN

AYGUN HAJIYEVA ALIM [1], MEHRIBAN HASANOVA HIDAYAT [2], JAVAHIR ALLAHVERDIYEVA JAVANSHIR [3], SABINA HUSEYNOVA HUSEYN [4] and NASIMI ABBASZADE ALIPOLAD [5]

[1, 2, 3, 4, 5] Faculty of Agricultural Economics, Azerbaijan State Agricultural University, Ganja, Azerbaijan.
Email: [1]aygun-gadjieva@mail.ru

Abstract

Digitization of various fields of economics is the demand of the modern development period of the economy as the economy is experiencing its digitization period. Nowadays, a distinctive feature of the development of agriculture in the world economy is the concentration and specialization of agricultural production, the wide use of information technologies, including navigation for agricultural management. Along with the use of new technologies, energy costs and product costs are being reduced. The participation of international organizations in digitization processes conducted in Azerbaijan and their support for these processes have been announced. Digitization of agriculture, which is one of the leading sectors of the economy of Azerbaijan, will have a positive effect on the development of the agricultural sector and will allow to increase in the volume of the total product produced in the field several times. The relevance of our research is explained by these issues. Digitization in agriculture is carried out in many directions. One of them is the implementation of smart agriculture, precision farming, smart farm, precision breeding projects. The article examines the directions of digitalization of agriculture and shows the benefit they give to the development of agriculture. The specific characteristics of the field, the fact that farmer incomes are low compared to other fields, high risks prevent investments make digitalization in this field more relevant. Producers of agricultural goods must have efficiently adapted technologies, calculate in advance the costs of cultivating agricultural crops and raising animals, program the level of productivity and calculate the cost of the product in advance. Only in this case they will be more competitive compared to other local and foreign manufacturers.

Keywords: Digital Agriculture, Smart Village, Precision Farming, Smart Farm, Precision Breeding Or Husbandry, Digital Technologies.

INTRODUCTION

Digitization of various areas of the economy is a requirement of the modern period of economic development. Because the economy is running through its digital age. The most important element of the digital economy is economic activity that uses data in digital format. In comparison with traditional economy, in the digital economy much more data is used. This data is the product that obtained from the results, processed of numerous investigations. This anables for reasonable increase of big range efficiency in production, technology equipment, storaging of goods and services, sales and delivery. Hence digital economy is more efficient than traditional one. The new economic relationship brings to the fore the information technologies that further activate the work of production relationship production facilities, the application of information technologies and digital platforms in all fields. Formation of the digital economy is one of the most important issues of national security and independence

(Savina, 2018). The objective law of increasing the productivity of public labor adds forms the need for new, more progressive and productive range of human activity.(Tan et al., 2017)

In the past, the most important directions of this activity were the automation and mechanization of production, now it is the digitization of technological processes in all spheres of public life.

Digitization is the application of modern digital technologies to various areas of life and production. The digital economy is not a separate project or direction of automation. It is a new paradigm of economic and social development based on network communications, combining real and virtual life. (Markova, 2020)

The digital economy is a new form of economic and social development. The first was the agricultural economy. It was replaced by the industrial economy. The industrial economy first was replaced by the information economy and then by the digital economy. People began to understand the realities of the new economy more broadly and more deeply. (Ma Huateng et al., 2019)

Digital economy means economic activity based on digital technologies and the use of relevant business processes and models. (Kargina & Lebedeva, 2020)

The purpose of the research - It consists of researching in what directions the digitalization of agriculture is implemented in the world and in Azerbaijan and to reveal the possibilities of using the world experience in the processes taking place in these directions in Azerbaijan.

The methodology of the research - As a result of the systematic reforms implemented in agriculture in Azerbaijan, the state support provided to agriculture and investors, the agrarian sector is one of the most dynamically developing sectors in the country's economy today. In order for the sustainable development of the agricultural sector to be sustainable, the digitalization processes that are the demand of the modern era should be investigated and implemented. In the course of the research, the works of foreign and local scientists on the digitization of various areas of the economy were examined, and more empirical research methods were used.

The practical importance of the research - The practical importance of the research consists of the possibilities and directions of the application of the world experience in the digitalization of agriculture in Azerbaijan's agriculture, and the application of the results in economic practice.

The results of the research - It can be concluded from the conducted research that a lot of work has been done in this field in the country and is ongoing. World experience and the support of international organizations are widely used in the digitalization of various sectors of the economy, including the agricultural sector. Specifically, smart villages are being built in the agricultural sector, digital technologies are being used in agricultural production (for example, the use of unmanned aerial vehicles in the application of fertilizers, the application of drip irrigation systems, the use of tractors and combines equipped with digital on-board equipment). The electronic agricultural information system (EAIS) is used in the application of agricultural

insurance and the provision of subsidies for rural agriculture. Their application makes these works more efficient and transparent.

The scientific novelty of research - The directions of digitalization of agriculture in Azerbaijan and the support of international organizations to our country in this work have been widely investigated. The possibilities of using world experience in the field of digitization of agriculture in Azerbaijan have been revealed.

Digital transformation of the economy

At the G20 summit held in Hangzhou in 2016, the following definition was given to the digital economy: "the digital economy is a tactic of conducting the national economy, where digitized knowledge and information are the main production factors, modern information networks are information carriers, and information-communication technologies are leading force of productivity and optimization of economical structure ". (Ma Huateng et al, 2019)

As the digital economy evolves, its content and scope change over time. The classification, structure and statistical system of economic sectors are changing. For example, the areas on which the digital economy is based include the production of computer equipment, communication equipment and electronic equipment, telecommunications, television and radio, satellite communication services, software, information and technical services, etc. can be attributed. However, retail e-commerce, e-services and other related services are fully digitized. Hence, we can say that all areas built on digital technologies can be considered as spheres of the digital economy.

Globally, digitization is a concept of economic activity based on digital technologies applied to various spheres of life, society and economy. And this concept is widely applied in all countries.

The digital economy is a global network of economic activity, commercial agreements and professional interactions, which are supported by information and communication technologies. Briefly, the digital economy can be characterized as an economy based on digital technologies. (Ustyuzhanina et al.,2017)

Many entrepreneurs to create new companies and business models have embraced the technologies that feed the digital economy. These new companies incorporate different platforms that are used together. For example, ride-hailing platforms Uber and Lyft; Airbnb platform for renting a house. They also use on-demand service content. For example, Netflix and Spotify. There are many examples of digitalization of traditional companies to succeed in business. For example, retail companies (companies that sell various goods to the final consumer). Most retailers have already developed websites for online sales. As the world becomes more digital, forward-thinking retailers are now using new technologies to reach greater market and serve customers through multiple channels. These retailers use online sales and mobile apps to identify shoppers whether they buy online or elsewhere. They can collect and analyze data, which they use to connect with their customers through social networks, thereby providing better service and ultimately increasing sales. (Pilik et al., 2017)

Table 1: The main economic indicators of the ICT sector in Azerbaijan

The name of the indicators	2015	2019	2020	2021
The volume of international internet channels per capita, kbit/s	54,0	111,1	181,5	198,6
Percentage of the population living in the area covered by mobile communication in the total number of the country's population	99,9	100,0	100,0	100,0
The ratio of Internet usage tariff to average monthly gross national income per capita, in percent	0,3	0,1	0,1	0,1
ICT development index*	6,23	6,49**	6,64**	6,67**
Release of products (services) in the ICT sector, million manats	1 589,2	2083,2	2158,2	2 249,7
Volume of added value created in the ICT sector, million manats	970,7	1293,3	1600,2	1 663,8
The specific weight of added value created in the ICT sector in GDP, in percentage	1,8	1,6	2,2	1,8
Investments directed to fixed capital by ICT enterprises, million manats	338,4	294,7	177,2	135,0
Import of ICT products*, million mantas	268,6	901,6	1055,9	1 083,2

Source: The State Statistical Committee of the Republic of Azerbaijan

There is the dynamics of development of ICT recently in Azerbaijan in the table given above. The volume of international internet channels per each person of population increased approximately up to 4 times due to the given indicators, the usage of internet decreased three times. The output of products (services) in the ICT sector increased by 42% during the research period, and the amount of added value created in the ICT sector increased by 71%. The volume of investments directed to fixed capital by ICT enterprises decreased by 61%, while the import of ICT products increased by 4 times. On the one hand, it is a bad situation that investments in ICT development in the country are decreasing, but on the other hand, it is a good thing that new technologies are brought to the country.

John Deere is an example of digital transformation. This one hundred and seventy-nine-year-old company is engaged in the production of agricultural equipment. These companies are also now using data-driven platforms that allow farmers to optimize production. Digital platforms allow increasing the volume of the information environment used in the process of making management decisions in all areas of society's life, which allows choosing optimal strategies (Golovencik, 2020)

Thus, as a result of digitization, new companies and new methods of interaction have emerged. However, many companies and industries that failed to take advantage of these technologies suffered declining sales, declining market share, and even faced bankruptcy.

Leading business experts are of the opinion that digitalization is the demand of the day, and sectors and companies that do not meet this demand are at risk of extinction.

As a result of digitization, new electronic equipment and information technologies open wide opportunities for mastering smart agriculture. Smart agriculture refers to strategic management that uses information technology and relies on receiving information from various sources to make decisions about agricultural production, markets, finance and people.

Digitization of Agriculture

The process of digitalization is gaining momentum in the agricultural sector as well as in other sectors of the economy. The specific characteristics of the field, the fact that farmer income is low compared to other fields, high risks prevent investments make digitalization in this field more relevant. Producers of agricultural goods must have efficiently adapted technologies, calculate in advance the costs of cultivating agricultural crops and raising animals, program the level of productivity, and calculate the cost of the product in advance. Only in this case, they will be more competitive compared to other domestic and foreign manufacturers.

Digitization in agriculture is carried out in different directions. One of them is the implementation of smart agriculture, precision farming, smart farm, precision breeding projects.

Smart agriculture is a modern concept of agricultural production based on the application of new technologies (geoinformation systems, satellite navigation, digitization of the agricultural production process) that ensure productivity and quality improvement and at the same time reduce costs. (Sergeev& Yudanova, 2020)

New electronic equipment and information technologies open wide opportunities for the application of smart agriculture. The USA (80% of farmers), Japan and Western European countries (60% of farmers in Germany) started implementing smart agriculture in 1980, and in Eastern European countries and China in 1990. (Goldstein, 2017)

The precision farming in agriculture is the continuous control, the differential management of agricultural operations that ensures reliability and repeatability of results, thereby reducing costs and making results more predictable. The application of the following innovations serves the realization of precision agriculture: satellite navigation systems, mobile devices, robotics, irrigation systems, Internet of Things, devices, variable planting rates, monitoring of weather changes, monitoring of nitrogen content in the soil and standardization. Comprehensive precision farming is based on three main elements: information, technology and scientific management.

Only after the introduction of precision agriculture, many factors affecting productivity (weather conditions, soil and its characteristics, landscape, differential application of fertilizers and chemical agents against diseases, crop care, harvesting, etc.) become possible to consider more widely and comprehensively. The precision farming system ensures safety, compliance with the speed regime and purposeful use of transport, optimization of routes, economical use of fuel, increasing the quality of technological operations, increasing the speed of work, reducing costs, improving product quality, etc.

Smart agriculture was initially understood only as precision farming. However, in recent years, precision agriculture has been applied to dynamically developing animal husbandry and its fields. Precise dairy cattle breeding, precise pig breeding, precise poultry breeding, etc. were created.

In smart dairy farms, technologies are used to measure the physiological, behavioral, and production indicators of individual animals in order to manage them better.

In animal husbandry, RFID (Radio-frequency identification) tags applied to animals ensure the fulfillment of zoo-veterinarian protocols, and ensure the automatic collection of information about work with livestock. At this time, each head of cattle is treated individually. Examples of smart technologies in dairy farms include the following: Automatic milking machines; automated calf feeding stations, etc. farms using these technologies have the potential to improve management. Technological progress ensures the health and comfort of cows, as well as improves the quality of life of farmers. The assessment of the environmental conditions allows to automatically determine the amount of steam needed. The automated system allows to direct part of the workers to other more important work. For example, an automated feeding line. It can be used to calculate individual feed requirements for each animal; the number of feeding processes can be increased to 6-8 times. Application of this method excludes additional costs. In addition, they implement a complex herd management system, in which they use Wi-Fi or 3G to control the herd. If something happens to the animals, the breeder receives an e-mail, and in the letter, what is needed for the animal for a month is provided; NFC tags are used, which allows the device to recognize the animal and collect all information about it.

Precise (intelligent) breeding, which is a new direction in animal husbandry, is based on the application of digital technologies. These technologies enable personalized care of animals by measuring their biological state. A robot shepherd is used in intelligent animal husbandry. A group of engineers at the University of Sydney have created a semi-autonomous car with four wheels. This machine will be able to control its movements independently in the future. It has 2D and 3D sensors and a GPS device that determines the places where animals graze. One of its most important qualities is its speed. The robot is designed to move at the same speed as the cows.

Precision farming is equipped with geodata systems. These systems are equipped with global positioning sensor devices, onboard computers, and control mechanisms. They are able to install agrotechnologies according to the soil system. This is a new stage in the development of agriculture.

Digital agriculture has great potential for developing agri-food systems and rural areas. In rural areas, digital technologies are used to overcome various failures of the market mechanism and as a tool for the market integration of small farmers. Digitization of agriculture also provides access to digital technologies and digital public goods, improving digital literacy and promoting basic human rights. Digital innovation also opens up new opportunities for employment, reduces the gap between rural and urban areas, and expands the opportunities for young people living in rural areas.

At present, a distinctive feature of the development of rural farming in the world economy is the rapid diversification and specialization of agricultural production, the wide use of information technologies, including navigation for agricultural management. Along with the use of new technologies, energy costs and product costs are being reduced. Modern agricultural

units are equipped with electronics, and modern tractors and combines use many different electronic devices and on-board computers for control and management. Recently, navigation devices have been used to determine the location of agricultural machinery. Various robots are also used in agriculture. (Martin-Shields & Bodanac, 2017)

Partnership with FAO in the direction of digitization of agriculture in Azerbaijan.

Agriculture is being digitized all over the world. Various international and regional organizations support this process. The Food and Agriculture Organization (FAO) of the UN supports the development of digital agriculture development strategies in various countries, including Azerbaijan. Here, it is considered the first step in the direction of digitalization of agriculture, provision of quality services and information to the population living in rural areas, and promotion of local initiatives on the implementation of innovations based on the use of digital technologies. FAO seeks to use the potential of digital technologies to achieve success in four areas (improving production, improving nutrition, improving the state of the environment, and improving the quality of life).

To reveal the potential of the digital economy, the development of human capital is of great importance. In this direction, the virtual learning centers of FAO and targeted initiatives to improve digital literacy can be cited as examples.(Olqa-Ie,2019) These programs are essential to prepare farmers to better respond to modern challenges. FAO also assists member countries in developing electronic management tools (e.g. animal health identification systems, agricultural reporting information systems). In addition, various International Platforms of FAO on food production and agricultural management are active (for example, the Geospatial Information Platform under the "Hand in Hand" initiative, "1000 Digital Villages" initiative, "Roadmap for Digital Cooperation", etc.).

Today, the economy of Azerbaijan is the fastest-growing country in the region. The main goal of the country's government is to develop the national food security system through the diversification of the economy. In order to efficiently use limited resources, all areas of the economy need to be digitized. It also serves to reduce the risks of climate change and adapt the economy to new conditions. Azerbaijan is implementing the process of transforming the country's agriculture into modern digital agriculture. Here, digital technologies are also used to develop rural areas and integrate them into the value chain. Azerbaijan contributes to FAO's "1000 Digital Villages" program by implementing the "Smart Village" project in the territories liberated from occupation.

The digitization directions of agriculture in Azerbaijan.

The application of digital technologies will change the shape of the value creation chain in agribusiness and will allow for an increase in the efficiency of production processes and adaptation to climate change. Agriculture is one of the most strategic sectors of the economy for Azerbaijan. Today, the transition to the digital economy is not only a decisive step for the development of agriculture, the food market, and consumption but also paves the way for sustainable and inclusive agriculture in relation to environmental problems. The high level of environmental tensions in the development of agriculture requires a radical renewal of the

strategy and tactics of agricultural development (Mustafayeva, et al.2022). The use of irrigation technologies and efficient management of agricultural lands and pastures are crucial for adaptation to climate change. The large return to lands freed from occupation and the implementation of "smart village" and "green agriculture" programs will have a direct impact on ensuring the country's food security.

The implementation of digital decisions in the field of food safety in Azerbaijan will create new opportunities, as in the whole world. Changing traditional control systems to modern technologies, digital and innovative decisions play an important role in building a more efficient system in this area.

The Ministry of Ecology and Natural Resources together with the Ministry of Agriculture have developed a long-term joint action program to support "green agriculture". This program aims to mitigate the negative impact on the environment; reduction of waste of heat gases; creation of agrogardens; efficient use of water, land and forest resources; biodiversity protection; It involves the support of aquatic plants and organic agriculture, strengthening of institutional capacity. The main goal of the agrarian reforms implemented in Azerbaijan in recent years is the digital transformation of agriculture; it is the application of advanced technologies that greatly increase the yield from each hectare of cultivated land. Creation of intellectual systems of agriculture is one of the most important tasks of the economy of Azerbaijan. It is planned to use any of them in the process of forming AIC in Karabakh and East Zangezur economic regions.

The global food crisis, which intensified in the last two years, requires a rapid digital transformation of the agricultural sector. First of all, it is about the application of modern know-how in agricultural production and processing, cost-effective irrigation systems, the expansion of the use of mineral and organic fertilizers to reduce crop loss and increase the productivity of cultivated lands. It is clear that these measures are the main condition for ensuring sustainable food security in the world, because reducing the dependence of food consumption on imports creates the basis for lowering the level of imported inflation. One of the main issues in this plan is the digitization of agricultural production, processing processes, logistics, as well as the application of IP-technologies to the management process of farms, product control, the availability of electronic training and advice for agricultural producers, etc. is required. The development of public-private partnership for the purpose of ensuring the country's food security is of particular importance. In order to achieve long-term development, the relationship between science and industry should be developed, and science should be directly transformed into a productive force. (Mustafayeva, et al. 2023)

Many international experts believe that such changes can greatly increase productivity in the agricultural sector, improve access to markets for small and medium-sized farmers, and help provide information and organizational support. Access to digital resources will accelerate the formation of "smart villages" and automated agrocomplexes, thereby creating sustainable rural communities at their base and reducing urban-rural inequality.

Today, these issues are solved in Azerbaijan, which solves complex issues in the field of water use and restores agricultural potential in Karabakh, liberated from occupation, and digitalization programs of agriculture are implemented. Today, there are real opportunities for this in Azerbaijan, the country's agrarian life is gradually changing, managers are ready for digitization, the volume of production is increasing, the digital infrastructure is developing, and technical support is being created. In the last 5 years, agricultural production has increased by 63 percent, including 75 percent in crop production and 52 percent in animal husbandry. The export of agricultural products has also been increasing rapidly in recent years. Thus, the export of agricultural products from the country in 2021 was one million manats. Including, the export of livestock products was 16 million manats, and the export of plant products was 659 (total 675) million manats. In 2017, it was 12 and 518 (total 530) million manats, respectively. Thus, in 2021, compared to 2017, the export of agricultural products increased by 27 percent. (The State Statistical Committee of the Republic of Azerbaijan)

The UN and the European Union support Azerbaijan in this matter. The UN and the government of Azerbaijan have agreed on cooperation in the agricultural sector until 2025. In addition to technical and grant support, the country is provided with extensive advisory support. With the support of the European Union, the project of creating a business information system Rural Business Information System (RBIS) in the agricultural sector was realized. The goal of this project is to develop agricultural activities in the regions through the formation of electronic systems and agricultural product market databases. This will also allow the investor to get the necessary information about the area. The RBIS system will allow farmers to connect to the electronic database and other digital services, and will increase transparency in state-business relations, which is one of the tasks of Azerbaijan's e-government policy. Within the framework of the project, an information portal called rbis.az was created in Azerbaijani and English languages. In the future, the electronic capabilities of RBIS will be expanded and it will be integrated into other profile information systems. Such rapprochement will take place primarily within the framework of the project called "Electronic agriculture" (EAIS), which has been implemented in the Ministry of Agriculture for several years.

Electronic agricultural information system (EAIS) has been developed in Azerbaijan. The modules of this system cover the business processes of agricultural producers, have analytical reporting and modeling capabilities, and have modules aimed at operational management. This system is integrated with state organizations and real-time information interactions between state institutions are implemented. The technical and technological infrastructure of EAIS consists of the following main components: hardware and software; telecommunication channels; primary and reserve centers; payment module; information resource and its management panel; mobile applications suitable for mobile devices with different operating systems (iOS, Android, Windows); system test environment. (Decree of the President of the Republic of Azerbaijan on the approval of the Regulation on the **"Electronic Agriculture İnformation System"**. (2019) Baku city, No. 897)

Since 2020, work on the creation of spatial information infrastructure for agricultural enterprises has started. This system will create a basis for the expansion of information flows of agricultural markets and provide farmers access to digital information. (Borodina et al.,2021) In order to effectively conduct monitoring studies, a European space agency project has created a link aimed at meeting the needs of the public and private sector in grassland management.

The electronic database (Big Data) of these systems creates an accurate picture of the volume and structure of cultivated agricultural crops, crop forecasts, and informs farmers about the current supply and demand, allowing them to choose the most promising and profitable one in that season. (Tan et al., 2017) In addition, farmers can get the forecast of productivity in their fields. Large agrocomplexes will be able to involve unused land in the agricultural cycle with the help of an electronic mechanism. EAIS also played a major role in subsidizing 600,000 Azerbaijani farmers, strengthened control and ensured transparency in this process. In addition, the preferential crediting mechanism for farmers and the agrarian insurance system rely on EAIS, thereby easing the problem of bank collateral for small farms.

In accordance with the "Agricultural Subsidization Rules" approved by the Decree of the President of the Republic of Azerbaijan No. 759, dated June 27, 2019, from 2020, subsidies for crop and animal husbandry are provided to farmers only through EAIS. It also allows to obtain and systematize more comprehensive information about farmers. With this, information on the number of farmers who declared their crops by regions and villages, agricultural areas, economic profiles, as well as subsidies on agricultural plants and animals is structured and analyzed. Information about agricultural markets is very important for effective management decisions in the field of agriculture. In order to regularly and sustainably use such information, an information portal on the prices of agricultural products was created within the framework of the projects implemented jointly by the Ministry of Agriculture and FAO. Later, the ministry improved this portal and created the electronic price information portal www.aqrarbazar.az for agriculture. This price information portal provides wholesale, retail, sale, distribution, etc. provides information on price types, as well as information on retail prices of production equipment. Price information is collected daily, weekly or monthly, taking into account low, medium and high levels depending on the product type or range. On the basis of this information, an operative information bulletin "On wholesale and retail price changes of agricultural products" is prepared every day.("Rules for subsidizing agriculture" (2019) Decree No. 759 of the President of the Republic of Azerbaijan. Baku)

Thus, EAIS is a unified system that includes the basic principles of the Ministry of Agriculture of the Republic of Azerbaijan: support to farmers, transparent and efficient management, and application of innovations. This system allows integration with local and foreign systems and creates a comprehensive database in agriculture. EAIS is primarily a transparent and operational management tool. It envisages the formation of modules covering business processes related to all stages of state support to agricultural producers. At the same time, EAIS is an important information base in the field of agriculture, with which it is possible to prepare analytical reports and build models. These models can make decisions and form the basis for planning future development, collecting and creating "Big Data". With their help, it is possible

to determine the logical connection between all processes related to agriculture, to complete the processes, to make modern technical decisions, to conduct complex analysis and make accurate forecasts. The main goal of EAIS is to create a single database on farmers and the resources they use, and to increase transparency in providing subsidies from the state budget.

One of the important directions of reforms in the agrarian sector is the expansion of the application of modern irrigation systems in the agro sector. At this time, irrigation will be improved in 200,000 hectares.

Digitization methods in agriculture are also used in lands freed from occupation. Here, "green" technologies and computer control and management systems for agrotechnical processes are used, as well as economical irrigation systems. Most of the land in Karabakh has not been used for the production of agricultural products for more than thirty years. For this reason, ecologically clean products will be produced here.

One of the effectiveness criteria of the agrarian policy prepared and supported in the country is its effect on the activities of agricultural producers. Regarding the system of indicators characterizing this, the European commission has created the farm information monitoring system Farm Data Monitoring System (FDMS). FDMS is part of an interagency effort to consolidate reporting on the US government's Feed the Future activities ("Rules for subsidizing agriculture" (2019) Decree No. 759 of the President of the Republic of Azerbaijan. Baku).

At AI level, this system is called Farm Accountancy Data Network - FADN and is used in all member countries. FADN is a network of accounting data that tracks the income and business activity of farmers in the EU. (FADN-Agriculture and rural development-europa.eu) As an important database and the most necessary management tool for the decision-making process in the agrarian sector, this system was the first among the countries to be created in Azerbaijan. To form this database, information is collected from three to four thousand farmers engaged in agriculture in different regions of the country every year.

One of the most important and necessary information in the field of agriculture is the geographic database. Geographical Information Systems (GIS) created by the Ministry of Agriculture is a database that provides coordinated data collection, processing, storage, transmission, as well as cartographic and visual presentation.

The structure of this data base is based on the results of photointerpretation and orthophotoplan of the actual use of agricultural land, perennial plantings and greenhouses located in economic and administrative regions, digital model of the terrain and statistics, and includes all water bodies.

Digital technologies are also applied in the field of agricultural insurance. In 2020, the state-supported agricultural insurance mechanism was launched. Maps have been developed to help the Agrarian Insurance Fund to assess agricultural risks (DEM model) based on the information provided to help plan insurance risks on agricultural land. In accordance with the measures taken to improve the agricultural insurance mechanism, the functions of the software of the agricultural insurance information system will be expanded as a whole.

In addition to these, the process of creating new databases in various fields in the country has started. For example, the azagroinvest.az portal was created as a comprehensive database on investment opportunities in the field of agribusiness. Preliminary technical and economic evaluations are carried out in the field of production, processing and delivery of agricultural products. Based on them, exemplary investment projects are prepared and posted on this portal. Information on the portal is posted in Azerbaijani and English languages and is regularly updated, presented to local and foreign investors.

A number of measures are implemented to improve farmers' access to information and advisory services. A mobile connectivity platform has been created that covers thousands of farmers with information and advisory services. This will ensure that farmers are registered in this attachment through EAIS. Thus, educational information will be available to all farmers through mobile connectivity. Through it, farmers will be able to receive warnings about the risk of disease transmission, advice on agrotechnical services.

The Ministry of Agriculture is implementing the "Digital Agriculture" project. The project has started to operate in several districts of Guba-Khachmaz region. Climate stations covering up to sixty villages work in these regions. The station is a modern innovative system that allows monitoring the development phase of diseases and pests in the process of plant development and accurately predicting field work. Devices included in this system collect, analyze and send data to farmers on air temperature, leaf humidity and when rains will occur. Farmers also plan their work on the control of plant diseases and pests based on this information. As a result, the efficiency of the fight against diseases and pests increases, productivity increases, and farmers get the opportunity to optimize their costs. This system also allows solving the problem of water shortage. Because farmers now know where and how much water to use and do not waste water in vain. The project is gradually being used in other regions.

Digital farming is sometimes called precision farming in the sense that it is more predictable and controlled. It can also be called "dotted". This is due to the fact that the platform device resembles a system of mobile devices connecting a large data base. Many countries aspire to this model, including Azerbaijan.

Based on this system, first of all, a base accessible to agribusiness subjects will be created. This database will include information about the chemical composition of soils, their water-salt characteristics, the value of land plots and their owners. Work in this field has already started in Azerbaijan; intellectual systems of state support measures (subsidies, investment loans, etc.) are formed. The personal cabinet of agricultural commodity producers, that is, recipients of state support, is being tested. In parallel, large leasing companies are leasing modern agricultural equipment, including drones for surveying fields and, in the future, unmanned harvesting equipment. Currently, the equipment park in the country is updated with the models of the car plant located in Ganja. For example, the 575 PALESSE KZS grain harvester exhibited by Caspian Agro can be equipped with intelligent control systems today. In the near future, the government of Azerbaijan plans to create a mechanism for continuous online collection and analysis of information on irrigation, feeding, pest control, if necessary. After that, an algorithm will be created to estimate the value of the product at the end of the season in various foreign

markets. Formation of export batches will take place during harvest in the fields: packing and delivery to logistics centers will be carried out quickly in coordination with export centers. Enterprise Azerbaijan and Azexport.az.portals were created to integrate farmers into the global economic space.

In addition, the Azerbaijan Digital HUB system is constantly being expanded and will help the digital transformation of the country's agriculture. By the end of the twenties, the owners of large farms will reduce their access to the field, because they will get complete information about the product online, and they will hire workers and equipment online. These may seem ideal at first, but today the foundations are being laid. There are real lines of digital systems in Azerbaijan. The government is discussing this topic extensively, road maps are being drawn up and implemented. Let's give an example: in 2019, export orders worth 180 million manats were received through the "Azexport.az" portal. This is about 32% of the export of fruit and vegetable products exported from Azerbaijan. Most of the orders are placed by Turkey, Russia, USA, India and Georgia.

RESULT

It can be concluded from the conducted research that a lot of work has been done in this field in the country and is ongoing. World experience and the support of international organizations are widely used in the digitalization of various sectors of the economy, including the agricultural sector. Specifically, smart villages are being built in the agricultural sector, digital technologies are being used in agricultural production (for example, the use of unmanned aerial vehicles in the application of fertilizers, the application of drip irrigation systems, the use of tractors and combines equipped with digital on-board equipment). The electronic agricultural information system (EAIS) is used in the application of agricultural insurance and the provision of subsidies for rural agriculture. Their application makes these works more efficient and transparent. When describing digitization in Azerbaijan, one should see the perspective and strategic tasks. Today they can be said to be fantastic, but in the next 8-15 years they will become a reality. At the same time, it can be predicted that the use of digital technologies will increase productivity in Azerbaijan's agriculture by 40-50 percent. If we take into account the spread of the Internet in the regions of the country and the fact that Azerbaijan has its own satellite, the above-mentioned seems more realistic.

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