DIGITAL TRANSFORMATION OF ECONOMIC ACTIVITY IN AGRICULTURE: PROBLEMS AND DEVELOPMENT PROSPECTS

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Abstract: The scientific article was prepared as a part of the dissertation and is devoted to the study of the features of digital transformation of economic activity in agriculture. The research was carried out on the basis of the analysis of scientific works of scientists, statistical data, regulatory legal framework, as well as the data obtained from the results of the author's survey conducted among representatives of peasant (farm) households and rural individual entrepreneurs in the article. information is provided. Particular attention is paid to the systematization of the factors that determine the specific characteristics of starting the process of digital transformation of agriculture, including the provision of information to the network, infrastructural aspects of the activity, the level of digital maturity of agricultural producers, as well as the development of the innovative system of the industry. The analysis of modern research has shown that the use of information technology solutions in the production process has a number of important advantages in addition to the traditional farming method, as it helps to increase labor productivity, reduce production costs and increase competitiveness. The insufficient level of knowledge of experts in the field of application of information technology solutions, the lack of financial opportunities for the introduction of digital technological solutions into the production process, and the lack of personnel are the main obstacles to the digital development of the agricultural industry. The article reveals the dependence of the rate of introduction of

information technology solutions on the production volume of agricultural entities, as well as the relationship between the introduction of digital technologies and the effective development of agricultural business in four ways. defined at the level of digitization: digital governance, digital economy, data-driven economy and digital communication.

Keywords: *digital transformation, digital technologies, information technology solutions, infrastructural features, agriculture.*

Introduction

Currently, the process of digital transformation is large-scale and affects most sectors of economic activity, including the agricultural sector, which plays an important role in ensuring the country's food security. With the increase in population and its density, society's need for food products is increasing year by year, but the available resources remain finite and limited. This problem reveals the need to develop a new approach to the process of modernization of the agricultural industry, to establish an effective work mechanism taking into account the use of digital technological solutions.

The urgency of the process of digital transformation of economic activity in agriculture is related to increasing the efficiency of the production process. Due to the introduction of specialized "smart" equipment for production, the use of artificial intelligence technologies, digital detailing of statistical data, as well as the use of digital platform solutions and network databases, production losses are reduced, labor productivity is increased. increased, product quality improved.

The object of research is the process of digital transformation of agriculture.

The subject of research is information technology solutions used in the production process of certain categories of agriculture.

to analyze the results expected from the digital transformation of some categories of agriculture during the introduction and use of information technology solutions.

Research Methodology

The research is based on the analysis of available statistical data, literature sources, as well as the latest articles in the field of IT.

To achieve the goal of the research, the following tasks were set:

• To study the characteristics of the process of digital transformation of economic activity and to determine the characteristic consequences of the introduction of digital technologies into the production process.

• to identify the main obstacles preventing the use of information technology solutions in the agricultural sector.

• To determine the rate of introduction of information technology solutions to different categories of agricultural producers depending on their production volume.

• description of the importance of infrastructural features in the framework of digital transformation of economic activity on the example of peasant farms and rural individual entrepreneurs.

Literature review

Research on the digital transformation process can be divided into several areas, based on customer experience, operational processes and business models. As a rule, the study of the digital transformation process is based on these components and Kravchenko N.A. [1], Gribanova Yu.I. [2], Tolstykh T.O. [3], Tsenjarik M.K. [4], Ermolenko O.D. [5] reflected in the research. It should be noted that the topic of digital transformation of agriculture and the formation of a

mechanism for the introduction of information and technological solutions into the field occupies a wide place among modern researches. However, there are very few studies devoted to the infrastructural aspects of the activities of small-scale agriculture and the prospects of digital transformation of small-scale agriculture, so this research can be considered relevant and has scientific novelty.

The research is based on theoretical and methodological principles developed by local scientists.

Analysis and results

In writing the scientific publication, the author used the following methods: analysis and synthesis of scientific studies and articles, regulatory documents and documents, analysis of statistical data, as well as tabular and graphic methods of visualizing statistical data.

The process of digital transformation represents the transition to conducting business based on a comprehensive change of the company's operations, business processes and business models, maximizing the capabilities of digital technologies. Digital transformation often leads to the emergence of new businesses, customers and markets. In order to remain competitive, enterprises must take a strategic approach to assessing digital opportunities and understand internal and external environmental factors. It is also worth noting that the main factors of the digital transformation process include mobility (access to the Internet), the constant increase in the volume of data, computerization, the spread of network technologies, and the speed of economic processes. development of digital technologies, including artificial intelligence, formation of an ecosystem for integrated implementation of innovative processes and use of digital solutions [6].

It should be noted that various studies on the introduction of digital technological solutions in agriculture are directly related to the processes of

automation of production, forecasting of current yields, estimation of the cost of existing products and profit calculations [7]. At present, there are various categories for the dissemination of technologies for the digital transformation of economic activity in agriculture. Digital transformation technologies can be based on the management system of agricultural enterprises: precision agriculture and animal husbandry, digital service of agrometeorological data, monitoring of agricultural equipment, drones, Big Data, robotics, markets, biotechnology and genetic engineering, alternative forms [8]. Other authors suggest dividing digital technologies into the main groups of "smart" agricultural technologies, including "precision agriculture", "agricultural robots", "AIoT platforms / AIoT applications", "Big data" [9]. Digital transformation of economic activity will help increase the competitiveness of the agricultural industry, attract investments, reduce the cost of agricultural products, as well as provide reliable and timely information about the current state of this industry and related industries. allows to obtain [10].

In the author's research, digital technologies are divided into four categories of information technology solutions: agricultural accounting and planning technologies (for example, 1C program: Accounting for an agricultural enterprise, 1C: Document circulation, etc.), automation technologies units (e.g. digital sensors, measurement transducers, position sensors, pressure velocity, force, etc.), forecasting technologies (e.g., remote sensing technologies, crop yield forecasting technologies, analytical software, etc.), information collection and transmission . technologies (mobile terminals, communication system with a mobile video surveillance station, unmanned aerial vehicles, etc.) (Fig. 1).
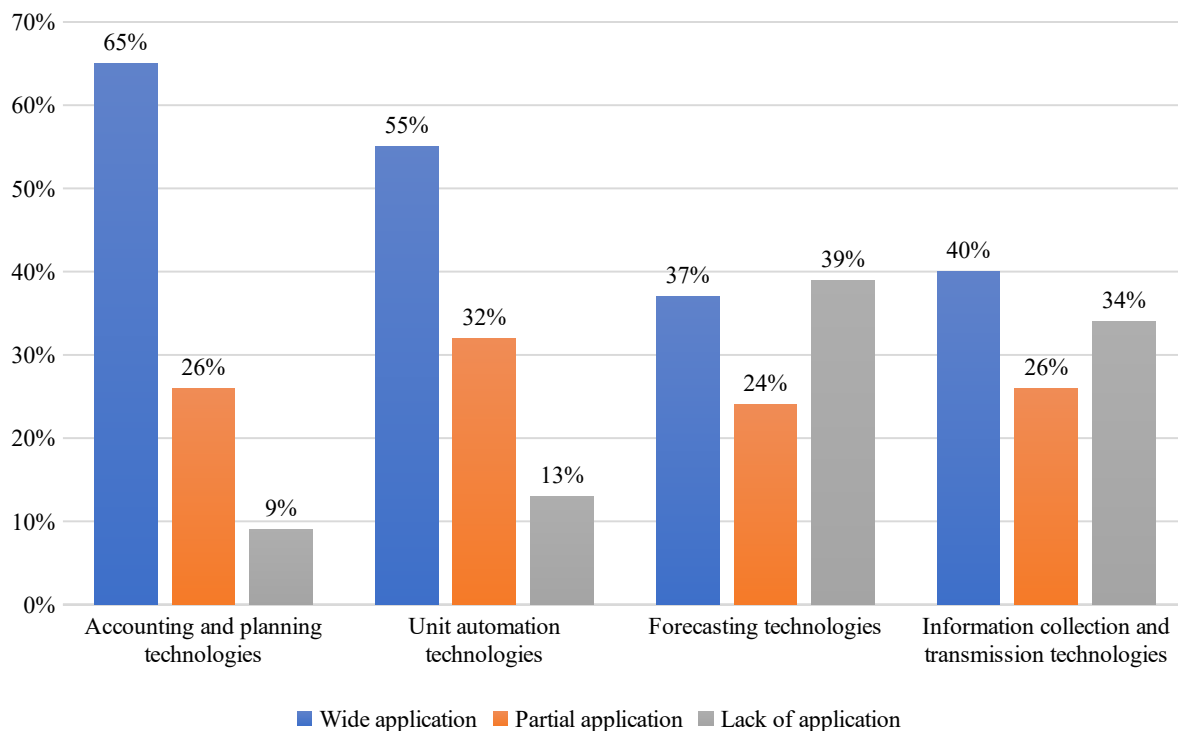
Figure 1. Application of different types of information technology solutions by peasant (farm) farms and rural individual entrepreneurs (compiled by the author)

According to the received data, agricultural activity accounting and planning technologies are currently used most (65%) by peasant (farmer) enterprises and rural individual entrepreneurs, in second place are division automation technologies (55%), followed by information collection and transmission technologies (40%), forecasting technologies (37%). Taking into account the use of information technology solutions in their activities, it should be noted that the representatives of peasant farms and rural individual entrepreneurs are highly interested and open to the process of introducing digital mechanisms into their production activities.

At the same time, there are a number of factors that prevent the introduction of information technology solutions in agriculture (Table 1). The main factor is the insufficient knowledge of the representatives of peasant (farm) households and

rural individual entrepreneurs on the practical application of digital transformation and information technology solutions. It should also be noted that small and medium-sized businesses, due to the fragmentation of the information infrastructure, often turn to the help of specialized consulting centers using the principle of outsourcing. This problem shows the need to improve the means of digital transformation of economic activity in agriculture, which can be expressed in the formation of network databases and expert communities.

The second obstacle is the lack of financial opportunities to introduce digital technological solutions into the production process. The third reason that prevents the implementation of information technology solutions in agriculture is the lack of personnel and the insufficient level of skills of specialists in the field of digital technologies. This problem is the lack of knowledge, skills and qualifications for the use of digital technological solutions in the production, not having the necessary, correct and timely information, one of the main problems in the process of managing the enterprise. once again confirms that.

To a lesser extent, factors related to the reluctance of industry representatives to change the traditional way of business management to new management methods, issues of government support for agribusiness, the labor-intensive process of implementing digital solutions and the lack of readiness of agribusiness are implications for digital innovation. Despite the fact that the digital transformation of small and medium-sized agricultural enterprises is scattered compared to large-scale agricultural enterprises, the majority of respondents from farmers and rural entrepreneurs see the need to introduce digital methods. In agricultural business management, the factor "lack of visible need to introduce digital methods in agricultural business management " has taken an extreme place among other factors that prevent the introduction of information technology solutions in the agricultural sector.

Table 1.

Factors preventing the implementation of information technology solutions in agriculture

Factors preventing the introduction of information technology solutions in agriculture	Interest distribution
Lack of readiness of agricultural business for digital innovations	24.7 %
Lack of sufficient knowledge in the field of digitization	55.8 %
Lack of financial opportunities in the implementation of digital technologies in production	51.9 %
There is not enough support from the state in the digitalization of agricultural business	35.1 %
Reluctance to change the traditional way of business management to new ways of management	36.4 %
Lack of specialized personnel, insufficient qualification of experts in the field of digital technologies	46.8 %
There is no clear need to introduce digital methods in agricultural business management	19.5 %
The complexity of the process of introducing digital solutions, the lack of guarantees of their high efficiency	29.8 %

To determine the rate of implementation of information technology solutions for different categories of agricultural producers (households, peasant farms, medium-sized agricultural enterprises, large agricultural farms) It is recommended to apply to the National Research Institute. According to the results of this study, the level of demand among agricultural producers for the use of digital

technological solutions in their activities directly affects the need to form an agricultural production information system. is showing a secret. The level of demand for new technological solutions among different categories of agriculture (households, peasant farms, medium-sized agricultural enterprises) can be observed as follows (Table 2):

• Implementation potential for farms: high (organic agriculture, waste-free (circular) agriculture), medium (drip irrigation, integrated pest management), low (precision agriculture, large conveyor livestock, urbanized agriculture, automation and computerization, biofuels).

• Potential for adoption by households: high (zero-waste (circular) agriculture), medium (organic agriculture, integrated pest management), low (precision agriculture, large-scale conveyor livestock, drip irrigation, urbanized agriculture, automation and computerization, biofuels).

• Adoption potential of agricultural products: high (integrated pest management, biofuels), medium (organic agriculture, precision agriculture, drip irrigation, automation and computerization, rotational agriculture 'jaligi'), low (large-scale conveyor farming, urbanized agriculture).

• Large agricultural holdings have a high potential for introducing new technologies according to almost all indicators of technological solutions, except for waste-free (circular) agriculture (average implementation potential) and organic agriculture economy (low implementation potential) is excluded.

Data analysis shows the uneven distribution of the digital development of certain categories of agriculture, which is explained by the level of profitability, the scale of production, the specialization of production, as well as the dispersion of organizational units of business entities. The study of the potential of the introduction of technology describes the ability of agricultural enterprises to use a digital business model based on the automation of the entire cycle of the production

chain for comprehensive digitization of production, automation of the maximum number of economic activity processes. In turn, the potential for introducing new technological solutions to small and medium-sized agricultural enterprises is scattered, which indicates the possibility of introducing information technology solutions only through the automation of individual management functions. Such functions include accounting, food market monitoring and business planning [11].

Table 2.

Demand for new technologies by economic entities of the agro-industrial complex

Technology	Personal auxiliary farms (subsidiary farming)	Farms/ individual entrepreneurs (semi-commodity farm)	Medium-sized agricultural enterprises, social entrepreneurship corporation (commodity)	Large agricultural holdings (commodity, export-oriented farming)
Organic farming	M	H	M	L
Precision agriculture	L	L	M	H
Large conveyor belt farming	L	L	L	H
Drip irrigation	L	M	M	H
Integrated pest management	M	M	H	H

Urbanized agriculture	L	L	L	H
Automation and computerization	L	L	M	H
Zero-waste (circular) agriculture	H	H	M	M
Biofuel	L	L	H	H

Technology implementation potential: H - high, M - medium, L - low.

In general, the low potential of introducing digital technologies in smallest and medium forms of agriculture is a serious obstacle to the digital transformation of the sector's economic activity. In this regard, the agricultural industry faces the task of forming a comprehensive approach to the process of introducing digital technologies, as well as supporting agro-startups, which are the vector of development of this sector [12].

Conclusion/Recommendations

Thus, the mechanism of agricultural management is experiencing a number of important changes due to the large-scale digital transformation of economic activity, the state, realizing the need to introduce digital technologies into the agricultural industry, is rapidly modernizing the management business model. using digital components. Digital management of agriculture involves monitoring the quality and quantity of the produced products, analyzing the efficiency and effectiveness of enterprise activities, collecting and processing large amounts of data in order to create a single statistical database. The study of new trends in

agricultural management serves the development of the agricultural sector, the effective use of the resource potential of our country with the correct distribution of costs, and the preparation of a pool of personnel with digital skills. The basis of strategic planning for the development of the agricultural industry is scientific and technical forecasting, taking into account global, social, ecological and technological problems.

The study of the possibilities of introducing digital technologies into the economic activities of agricultural producers showed that the speed of introducing digital technological solutions is directly related to the production volume of economic entities. The rate of adoption of digital technologies in large agricultural enterprises is significantly higher than that of medium and small enterprises, which is due to the differentiated level of financial capabilities, production scale, related to the release concentration level. However, due to the increasing trend of widespread distribution and use of digital technology solutions, the availability of digital technologies is increasing, the user mechanism is being simplified, the cost of digital technologies is decreasing, which will lead to an increase in the number of digital technologies over time.

The article lists the main obstacles that prevent the introduction of digital technologies in the agricultural sector: lack of sufficient knowledge in the field of digitization, lack of financial opportunities to introduce digital technological solutions into the production process, lack of qualified specialists. employees. As a solution to these problems, it is appropriate to consider the possibilities of improving the means of digital transformation of economic activity, expressed in the formation of network databases and expert communities, which provide a quick solution to problems in the field of agriculture.

The data of the author's research showed that digital technological solutions are already finding their piecemeal application in the economic activities of small

forms of agriculture, the introduction of digital technologies and the effective development of agricultural business at four levels of digitization the relationship between Agricultural accounting and planning technologies are the most common, unit automation technologies are also used, information collection and transmission technologies and forecasting technologies are used less often. In order to accelerate the process of introduction and application of digital technological solutions in agriculture, it is necessary to ensure effective cooperation between the subjects of separate agricultural sectors, to modernize the infrastructural features of activities that allow to ensure the continuity of reproduction processes.

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