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# Digital Modernization of Agriculture

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**Abstract**. The article considers the problems of the need for digitalization of agricultural production, which will increase productivity, competitiveness of agricultural production in Russia and on the global stage. Positive aspects that can be emphasized when using digital technologies are numerous. In general, given their focus on the above-said industry development, we consider it necessary to highlight proposals for further digitalization of the industry, which, as it seems, should lead agriculture to the appropriate transformation as soon as possible.

## 1 Introduction

Scientific and technological progress continues to have a tremendous impact on all spheres of human activity, including agriculture. In the current geopolitical situation, when states are racing for new innovative solutions, significant attention should be paid to the modernization of the said industry, especially its technological component.

It will soon be impossible to imagine the agricultural sector development without spraying fertilizers with drones, working with large amounts of data, using systems equipped with artificial intelligence and (or) robotics, introducing a certain automation system, controlling machinery with the help of mobile communication means, creating a digital profile of an agricultural producer, or a network of weather stations [1].

## 2 Materials and Methods

The digital transformation of agriculture involves the integration of digital technologies into all areas of agriculture and the transition from mechanical operations to digital processes. Innovative technologies help farms optimize production activities and reduce costs, increase efficiency through the construction of new business processes [2].

Recently, leading farmers have been actively using information technology in agricultural management. But so far, such digital solutions are available in rather fragmentary ways. Agrarians note the lack of an integrated approach and the disruption of digital chains, which affects the speed of development of the digital transformation of the agricultural sector [3].

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## 3 Results and Discussion

When modernizing agriculture, the main factors are digital technologies that allow significantly improving the efficiency and quality of production of goods. In this regard, the states whose economies are based on the most innovative technologies occupy advantageous positions.

Under modernization of agriculture we mean transformation, i. e. active action aimed at transforming something; in this case we are talking about digital transformation, which thus “transforms” agriculture and all its areas (crop production, animal husbandry, digital services used in this area, electronic document management, automation, etc.). One should agree with the opinion that the international political situation pushes the Russian Federation to significant changes in the agrarian sphere [4]. That is why significant attention should be paid to the current state of digital modernization of agriculture [5].

Undoubtedly, digital transformation can be defined as a phenomenon in which new technologies cause substantial changes in many aspects: in the way employees perform tasks and processes, in their social relations within and outside the organization, and, consequently, in their overall work experience [6].

At the moment, one may state the vector of digital transformation of the agricultural sector. The adoption of many normative legal acts clearly demonstrates that digitalization has an active impact on agriculture. Today, strategic documents have been developed in this area, which include the Order of the Government of the Russian Federation dated November 23, 2023 No. 3309-r “On approval of the strategic direction in the field of digital transformation of the agro-industrial and fishery complexes of the Russian Federation for the period up to 2030 and on amendments to the Order of the Government of the Russian Federation dated September 8, 2022 No. 2567-r”. The main objective of this strategy is to introduce advanced Russian digital technologies in the agro-industrial and fishery complexes. In addition, the amount of scientific and representative events held in the territory of the Russia actualizes the topic under study. One example is the V Federal IT Forum of the agro-industrial complex of Russia – “Smart Agro: Digital Transformation in the agro-industrial complex”.

At the moment, the prerequisites for the digital transformation of agriculture are rather obvious:

first, advances in the development of science, technology, computer (information) sciences and the growth of computing power make it possible to develop new effective methods and tools that allow researching objects, phenomena, or processes;

second, global digitalization and scientific and technological progress have led to the fact that people are not limited by geographical barriers in communication, but very actively use the Internet information and telecommunication network, mobile devices, social networks and other applications for communication;

third, long distances between settlements, plots, and farms cause the need to develop digital technologies in agriculture;

fourth, an important aspect is the national sovereignty and the desire of states to form their own digital technologies that can be competitive in the market.

We would like to dwell on the opinion of experts who think that it is information technologies that are being introduced into agriculture during digital transformation [7, 8]. We believe that this conclusion is debatable as regards to the fact that it is digital technologies that are introduced during digitalization [9, 10].

In general, the agriculture digitalization may revolutionize agriculture and lead to the following staggering results:

- increased crop yields;
- improved product quality and overall productivity;
- reduction of human labor in complex types of production and works;

- reduction of the negative impact of humans and human life factors on the environment;
- reduction of the impact of environmental factors on crop yields;
- reduction of irrigation and other costs;
- increase of the efficiency and quality of production, improved labor conditions for the rural population, increase of the competitiveness of products and economic efficiency of economic entities;
- increase of safety by eliminating some forms of human labor.

Even today the strategy for digital transformation is not just a desirability, but the main vector and an existing necessity of our state [11]. Such a trend is due to the fact that the level of agriculture plays a crucial role in the economic growth, and their guarantee and protection is primarily the responsibility of the state [12, 13]. In this regard, the state as the main regulator should be interested in the development of this industry.

Let us highlight specific proposals for furthering the process of digitalization of the industry, which, in our opinion, should lead agriculture to the appropriate transformation as soon as possible.

1. Adequate attention should be paid to the digitalization of agriculture and its regulatory framework. Competent law-making in this area is a guarantor of correct law enforcement. It will demonstrate the development vector of the state, highlight the main directions, and show its concern in this process. Regulatory requirements for the creation and application of digital technologies will allow using them with due attention to security requirements without any threats. Regulations and rules can help to create uniform approaches to the development and use of digital technologies and keep them compatible and interoperable. Recently, experts are concerned with the questions of digital security and the threats that have arisen and may arise from the creation and use of a certain innovative solution [9].

2. An important direction is the state support and other types of support for innovative solutions and their promotion. Therefore, an important component is grant support, including for the creation of competitive import substitution in this area. Interrelationships between agriculture as a state industry and business, including providing all types of financial assistance: a decent level of cash security, assistance in obtaining housing, for example, subsidized mortgages, subsidies for business development in this industry, etc.

3. A separate focus of digitalization should be the training of highly qualified staff with knowledge of digital issues and relevant competencies. Employees should have sufficient knowledge to work with digital technologies and be ready to work in real agricultural conditions. For this purpose, the state should provide the necessary funding and raise the credibility and prestige among workers in the rural complex.

4. At the moment, educational organizations of the higher education system that provide students with the opportunity to obtain a profession in digital agriculture (for example, a specialist in bioengineering, a molecular geneticist) are mainly located in large metropolitan cities, but graduates are unlikely to move to another (poorer) region to work in this area. One of the solutions would be to create targeted programs in educational organizations to train specialists directly for further work in the regions.

5. Increasing the prestige of working in agriculture: creation of satisfactory employment conditions and favorable working conditions. Replacement of difficult working conditions requiring physical force by robots, and their active application.

6. Due to the current lack of processing of agricultural products, we believe it is important to conduct further research and encourage endeavors in this area in every possible way. While the production of agricultural raw materials and their export are growing, processing is significantly decreasing.

Below we formulate the threats of technological-digital modernization in agriculture:
- lack of promising research and constructive developments;
- lagging behind in innovations;

- deficit of professional specialists in this area;
- outflow of specialists to other spheres of life;
- rigidity of the economy.

## 4 Conclusion

In the context of globalization and the vector of digital transformation, agricultural production has become an important direction of the country's development [14].

Digitalization has a positive impact on the development of the economy, making this industry more resistant to adverse factors. This is extremely important in the context of rapid transformations of the digital transformation of agricultural production.

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