velopment of a market economy. Agribusiness, in turn, is a sector of the market economy that is closely linked to agricultural production, distribution, storage, and processing.

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УДК 338

DIGITALIZATION IN THE AGRO-INDUSTRIAL COMPLEX

Gorustovich T.G. master of Economics
Sergey Ivanovich Nekrashevich, PhD in Economics, Associate Professor
UE «Minsk Greenhouse Complex»
Rublevskaya E.P.
Belarusian state agrarian technical University Minsk

Аннотация: Рассмотрено использование цифровых технологий в сельском хозяйстве; изучены основные направления развития сельского хозяйства в условиях цифровизации. что позволит повысить уровень управленческих решений с использованием цифровых технологий для наращивания конкурентоустойчивости организаций.

Summary: The use of digital technologies in agriculture is examined, and the main areas of agricultural development in the context of digitalization are explored. This will improve the quality of management decisions using digital technologies to enhance the competitiveness of organizations.

Ключевые слова: государственные программы, цифровая экономика, мониторинг, навигация, IoT, «умная ферма», точное земледелие.

Keywords: government programs, digital economy, monitoring, navigation, IoT, "smart farm", precision farming.

The modern digital economy is a highly technological production using digital technologies—an economy based on new methods of processing, transmitting, storing, and generating data, as well as digital computer technologies. Implementing digital economy principles allows Belarusian businesses to transition to a new, modern format of economic relations. Digital solutions are increasingly penetrating all segments of the national economy, including the agro-industrial complex. [1]

While previously, digitalization in agriculture was primarily limited to automating specific activities, monitoring crop conditions, or monitoring animal health, it is now focused on "smart" solutions for managing production processes and agricultural machinery. Two areas of digital transformation in the agricultural sector can be used to illustrate this: precision farming and smart livestock farming. According to analysts, precision farming can increase yields by up to 60% on existing farmland, reduce costs per hectare by 15%, and halve the number of personnel. In addition to reducing costs and increasing yields, precision farming helps equalize the physical and agrochemical properties of the soil, creating a regular field shape that is convenient for agricultural operations [2]. Precision farming utilizes sensors and detectors, as well as a central computer that, in conjunction with a navigation system, receives signals from them. Regarding smart livestock farming, a number of farms are already using robotic milking modules that monitor milk quality and animal physiological status, which reduce mastitis rates by 25% and extend the lifespan of animals to four lactations. The use of robotic feed preparation and distribution systems increases milk yield by 30%. Furthermore, the profitability of products produced using Smart Farm technology can exceed 35%.

Digitalization is becoming an increasingly important production tool, impacting the social, economic, and environmental aspects of the country's economy. Digital technologies in the agro-industrial complex increase enterprise profitability and the quality of agricultural products. Relevant tools include geographic information systems, precision farming, artificial intelligence, sensors, the Internet of Things (IoT), satellite imagery for data collection, and more. Our country's experience in developing digital technologies in the agro-industrial complex has been analyzed. Belarus offers a striking example of digital transformation in agriculture: the state-owned enterprise "Voskhod" [3]. This digitalization project, based on elements of "Agriculture 4.0," was launched in 2023. At the Voskhod agricultural enterprise, as at the other holding companies, three automated information systems have been implemented: a satellite vehicle monitoring system for monitoring the operation of existing

vehicles; the "Field History" precision farming software suite with integration with the vehicle satellite monitoring system for managing crop production processes; and the "M-Complex" system for managing livestock production processes. By the end of 2023, a GPS monitoring system was implemented, which analyzes vehicle efficiency, along with the "Field History" digital precision farming platform and the "M-Complex" system for precision livestock farming [4].

Training on development and innovation management methods was also conducted jointly with the Russian company RinQ. As a result, employee project and personnel management skills, digital literacy, motivation and professional competencies have improved, creative ideas have emerged, and teamwork has been enhanced. The following results were achieved through digitalization at Voskhod State Enterprise: 3,401 hectares of arable land were digitized for the Field History system; by the beginning of 2024, 100% of the transport fleet (105 units of equipment) was equipped with GPS trackers and fuel level sensors; the entire livestock population (except bulls) was chipped with RFID tags to upload data to M-Complex and optimize operations; the accuracy of feed loading and unloading, as well as the accuracy of tractor driver feeding, reached 97–99%; feed consumption per centner of milk in January–February 2024 decreased year-on-year by 3.2% [4].

The application of digital technologies on dairy farms can also be seen in the example of the Samokhvalochi enterprise (Minsk region). For example, the "M-complex" implemented at the enterprise significantly reduced the amount of paperwork. A comprehensive monthly report is generated with the click of a button.

Digital transformation in Belarusian agriculture is necessary for: improving information and communication technologies; transitioning to e-agriculture; implementing resource-saving precision farming technologies and resource management systems, geographic information systems, automated information systems, and databases; and developing and implementing an industry-wide data transmission network.

Currently, the country is creating the conditions for the formation of a digital space and the implementation and functioning of a digital economy, based on reliable and secure interactions between all economic participants. The digitalization of the agro-industrial complex in the Republic of Belarus for 2026–2030 is being implemented through the key state program, "Agro-Industrial Complex of the Future." The introduction of precision farming, digital platforms, and automated control systems are embedded in the digitalization of the agro-industrial complex, making agricultural production predictable, cost-effective, and environmentally friendly. This program covers everything from soil analysis to crop monitoring. The "Agro-Industrial Complex of the Future" program logically continues the "Agricultural Business" state program (2021–2025), completing existing projects and taking the industry to the next

level. The industry-wide "Digital Belarus" program (2026–2030) is also being implemented, aimed at creating an import-independent digital ecosystem and implementing smart technologies (providing infrastructure, platform solutions, and digital sovereignty). As of 2025, more than 200 agricultural organizations are using elements of precision farming, from parallel driving systems to differentiated fertilizer application. Information systems are being implemented, such as: “Gostekhnadzor” – for equipment registration, “Monitoring of technical maintenance of milking parlors”, “BELFITO” – for phytosanitary control, GIS “AITS” – for traceability of livestock products [6].

In 2026, Belarus is actively moving toward the digitalization of agriculture. The creation of a unified digital platform for the agro-industrial complex (AIC) will be an important step toward modernizing and optimizing all processes in this sector. The platform will not only consolidate data but also become a fully-fledged digital tool that will enable farmers to effectively manage resources and increase yields.

This initiative is planned to develop and implement an autonomous national module that will incorporate best practices and developments of agricultural enterprises. Particular attention is being paid to artificial intelligence, which will assist in the diagnosis and management of plant health.

A pilot project has already been launched and is being tested on six farms located in various regions of the country. This will allow us to evaluate the platform's effectiveness and make necessary adjustments before its full launch. The neural networks involved in the project are being trained to recognize plant diseases, which will significantly simplify the work of agronomists and improve the efficiency of field cultivation [5].

The main goals of the digital platform are:

- Optimization of agricultural production management processes.
- Increased crop yields through the use of advanced technologies.
- Providing immediate access to data on crop conditions.
- Reducing plant processing and maintenance costs.
- Simplifying interactions between farmers and government agencies.

According to forecasts, the introduction of digital technologies in agriculture could lead to a significant increase in gross harvest and enhance the competitiveness of Belarusian agricultural products internationally. Digitalization of the agricultural sector in Belarus is not only a step toward modernization but also an important element of sustainable agricultural development, which will enable adaptation to modern challenges and market demands.

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