Digitalization Of The Agro-Industrial Complex: Promising Areas Of Innovative Development

Elina Botsieva 1,∗ and Salakh Abdulaev2

1 RTU MIREA, Institute of Information Technologies, Moscow, Russia
2 Kadyrov Chechen State University, Grozny, Russia

Abstract. The development of information technologies has a significant impact on almost all sectors of the agro-industrial complex: production, trade, finance, etc. Currently, the term “e-agriculture” is being actively introduced in the field of agriculture, which is interpreted as “digital (electronic) agriculture” (D( E)SH). The term was introduced by the Food and Agriculture Organization of the United Nations (FAO) and is seen as a new area of activity focused on improving the development of agriculture and rural areas through the improvement of information and communication processes. In Russia, such agricultural information technologies as “programs for calculating and optimizing feed rations and feed mixtures for various animals, software products for diagnosing diseases of animals and crops, information systems for automating operational accounting, programs for animal breeding are already successfully used in Russia today, geographic information systems, accounting information systems that take into account industry specifics, integrated enterprise management systems.

1 Introduction

In the era of the formation of the digital economy, the assessment of the competitiveness of the innovative development of agricultural enterprises is becoming more important in the development of the agro-industrial complex. At present, an agricultural enterprise must be digitalized and competitive not only within the Russian Federation, but also abroad. The article considers the main factors of the competitiveness of innovative development and the problems of increasing the level of competitiveness of agricultural enterprises in the modern digital economy. Within the framework of the main state elements of changing the agrarian sector of the Russian Federation based on the digitalization of agricultural production, the level of financing of the departmental project for the digitalization of the agro-industrial complex was assessed in terms of directions and development scenarios for 2021–2023. The author identifies the main problems of increasing the level of competitiveness of the innovative development of agricultural enterprises in the conditions of the sixth technological order and presents five levels of the impact of the digital era on the competitiveness of an agricultural enterprise. The results of the scientific article are

∗ Corresponding author: eliboc@inbox.ru

© The Authors, published by EDP Sciences. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).
significant for specialized educational institutions and heads of enterprises in the agro-industrial complex aimed at digital transformation.

2 Research Methodology

The methodological approach to analyzing the level of digitalization of the agro-industrial complex was based on research: Russian scientists, statistical data from Rosstat on indicators of the digital economy that characterize the digital transformation of agriculture as the main element of an innovative competitive agricultural producer. As part of the study, the authors used the methods of statistical and comparative analysis, rationale. Over the past decade, the main problem for small and medium-sized agricultural enterprises has become increasing competition. Today, the main problem of increasing the level of competitiveness of agricultural enterprises is considered to be: the spread of chain retailers; limitation of financial resources; lack of young qualified specialists in rural areas; weak technical and technological equipment; the impossibility of collecting, analyzing and processing information about potential agro-industrial competitors, their production and sales methods; lack of domestic (or limited) adaptive AgroTech for the agricultural producer; difficulties with the protection and transfer of digital data and retraining of employees; lack of desire to move in the conditions of the agro-industrial complex development courses put forward by the Government of the Russian Federation.

3 Results and Discussions

In the digital era, the impact on the competitiveness of an innovative agricultural enterprise occurs at five main levels: the first one, which is based on the state; the second is a modern personality, which includes both employees of an agricultural organization and consumers of products; the third level is the agricultural organization itself with an established level of specialization; the fourth level is the soil-climatic zone, with its ecological situation, which is fundamental for agriculture; fifth - heterogeneous biological features of living organisms (plants, animals, birds). Within the framework of the problems of competition of innovative agricultural enterprises to be solved, the following should be highlighted: 1) the introduction, increase or improvement of the digitalization of agricultural production; 2) production on a contract basis, which stabilizes the provision of inclusive access to markets; 3) structural transformation of sustainable value chains; 4) integration of multidimensional concepts of value added and the sustainability of their application in measuring, analyzing and improving the performance of the food system; 5) innovative partnerships between public and private producers; 6) stimulating or encouraging the territorial development of agribusinesses of a certain type of specialization in order to attract transformative investments in agribusiness and coordinate intersectoral goals. Analyzing the most relevant areas of digitalization of agriculture, it was noted that the positive effect of its use makes it possible to reduce the cost of seeds and fertilizers by a quarter, reduce the idle time of equipment by 20%, and increase the collection of products by 15–30% [13] (Putievaya, 2017). In the era of the formation of the digital economy in the conditions of the sixth technological order, which created a new digital ecosystem, the basis of which is a predictive nature, developed agricultural production can no longer exist without digitalization and be innovative and competitive. Thus, based on the statistical data of Rosstat on indicators of the digital economy, it was revealed that the index of digitalization of agriculture in 2019 occupied the last step among other sectors of the economy (where the average indicator is 32) and amounted to only 23 with the highest intensity of using broadband Internet (73.4 %) and in the context of agricultural industries with a prevalence in forestry and logging.
In world crop production, the idea of biological farming (alternative organic) is becoming more widespread. Its main features, in contrast to traditional farming systems, are the limited use or complete absence of chemicals in the complex of agricultural activities. For example, the basic principles of organic farming include the use of agricultural techniques (mechanical) for weed control and surface tillage without reversing the layer. For the successful implementation of these areas, it is necessary to introduce such information technologies as electronic maps of fields and software for working with them, high-precision agrochemical survey, improvement of tractors, combines and other agricultural machines with the installation of navigation systems of different levels of accuracy on them, equipment monitoring (tracking location, fuel level and other parameters). The use of information technologies in the production of environmentally friendly products is paid great attention to farms [13], [14]. According to expert estimates, during the season, the farmer has to make more than 40 different decisions in limited periods of time. Many of these solutions are objects of digitalization [15].

As a result of the analysis of the indices of digitalization of agriculture and a number of other indicators reflected in the Strategy for the Development of an Innovative Society in the Russian Federation for 2017–2030, the Ministry of Agriculture of Russia developed a departmental project “Digital Agriculture” with an implementation plan until 2024 [4, 14], according to the developed indicators for the development of the agro-industrial complex, the state expects large-scale changes from the introduction of information technologies, which are reflected in Figure 3. The current economic situation in Russia has provoked a slowdown in the promotion of innovative principles of digitalization of agriculture. Between 2017 and 2020, the number of digital innovations in agriculture increased by only 18%, of which only 25% had a high impact on ensuring the compliance of the facility with standards [18], as a result of which the Ministry of Agriculture and Food of Russia had to turn to large agricultural producers about the opportunity to finance 20% of the cost of import substitution of the necessary software [20]. Since the main problem of the effective transition of the agro-industrial complex to digital transformation lies in the significant lack of the necessary share of Russian electronic products, by 2022 the priority was to increase the total volume of innovative electronic products used in the implementation of digital transformation projects for the agro-industrial and fishery sub-complex, up to 37.5%. In this regard, the Ministry of Agriculture and Food of Russia worked out the planned financing of the departmental project for the digitalization of the agro-industrial complex, within the framework of which 118 billion rubles were allocated for the period from 2019 to 2024. Financing plan for the departmental project of digitalization of the agro-industrial complex (Digital Agriculture platform) of the agro-industrial and fishery sub-complex, up to 37.5%. In this regard, the Ministry of Agriculture and Food of Russia worked out the planned financing of the departmental project for the digitalization of the agro-industrial complex, within the framework of which 118 billion rubles were allocated for the period from 2019 to 2024.

4 Conclusions

The unlimited needs of the population are becoming a prerequisite for increasing the production of innovative agricultural products, which is currently impossible without the digitalization of the agro-industrial complex. After all, the modern economic environment is developing every day at an ever faster pace. According to a study by the Global Center for Digital Business Transformation, in the next 5 years, the digital revolution will force out of the market 40% of companies that are now leaders in their industries if they do not digitally transform. To stay afloat and have a high level of competitiveness, agricultural enterprises must take into account modern business trends and will be forced to operate on the principles of manufacturability, flexibility and product quality improvement. As a result, they cannot do without digitalization, which is aimed at achieving and maintaining
competitive innovative advantages for the domestic agro-industrial complex, which makes it possible to ensure the effective management of the complex and solve the problem of food security at the federal level.

References
1. A.A. Aitpaeva, Digitalization of agriculture in the context of increasing the competitiveness of the domestic agro-industrial complex, *3*, 56(2019).