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Digital technologies as a tool for improving the efficiency of the agricultural sector

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Abstract. Currently, digitalization is the most urgent problem faced by many agricultural producers, so the main trend in the development strategy of the Russian Federation is digitalization. The goal of this direction is to introduce and improve the use of new technologies in all spheres of national life. Agriculture in the Russian Federation has always been one of the most important areas of the economy, so technological development is very important. "Digital agriculture" will help find and make the best decisions not only for the growth of the company, but also to prevent various inefficient decisions that lead to future bankruptcies. The emphasis on the development of agro-industrial and industrial complexes has once again proved the importance of this sector of the economy for the state. In this article, the authors try to understand the current strategy for the development of agriculture until 2025 and what role digitalization plays in it. According to the authors, the implementation of such solutions and their adoption by companies not only control the development, but also provide a good tool for improving the efficiency of the agricultural sector.

1. Introduction

Recently, digital, information and telecommunications sources have become widespread in the Russian Federation, as well as active digitization of the activity processes in various spheres of society.

Today, digital technologies cover most areas. Agriculture - Russia's strategic industry - is no exception. The Ministry of Agriculture of the Russian Federation is implementing the project "Digital Agriculture", which sets a vector goal: digital technologies will have to contribute to doubling the productivity of agri-food farming by 2024. The digital transformation of agriculture requires experts with new knowledge, as well as new "smart" solutions that will help them achieve their goal.

This project includes the creation and development of the national platform for the digital administration of agriculture "Digital Agriculture", the module "Agricultural Solutions", the industry electronic educational environment "Land of Knowledge". In addition to creating the above products, the project includes training agricultural business professionals to develop their skills in the digital economy [1]. These services collectively collect all the information about the processes of agricultural production, from the smallest details of production to solving global problems in the entire agricultural sector. This will bring agriculture to a new level of development and realize technological breakthroughs in the agro-industrial complex [2].

Today, the use of IT in agriculture is not only the use of computers. Digital technologies help to control the entire cycle of crop production or animal husbandry - "smart" devices measure and transmit parameters such as soil, plants, and microclimate. All this data from sensors, drones and other devices



is analyzed by special programs. Mobile or online applications are used to help farmers and agronomist to identify favorable times for planting or harvesting, calculate fertilizer schemes, predict crops, and more [3-5].

Free and open access to information and resources ensures the optimization of production processes and significantly reduces the costs of companies, which leads to an increase in production indicators for both raw materials, products, and financial and economic activities. In particular, the digital agriculture platform will help to set up work and provide access to information related to customers, which, in turn, will provide quick control over the business to solve serious problems, such as financial organizations, loans and insurance. It is impossible to take into account the planned automation of the production process parts, which is carried out with the help of modern computer technologies[6,7], as well as the installation of mounting systems using various electronic and intelligent sensors and other scanning devices. The platform should help to remotely control the quantity, quality, processing process, movement and other operations with the received product.

About 70% of farms in the United States, Canada and Europe already use "smart" technologies for agriculture. Russian farmers are far from such indicators, but the demand for "figures" is growing. According to experts, digitalization will help the Russian agro-industrial complex to make a powerful leap forward.

The Ministry of Agriculture of the Russian Federation is actively working in this direction. Last year, the industry project "Digital Agriculture" was developed for implementation until 2024. Its main goal is to achieve the digital transformation of agriculture through the introduction of digital technologies and platforms to enable technological breakthroughs in agro-industrial complexes and achieve productivity growth.

The project also involves active interaction with other federal executive authorities and their services, which will help them to receive additional information and update it in a timely manner. Thanks to the established interaction, the platform, as a simple information space in the field of agriculture, should perform the tasks of planning and forecasting production activities, which help timely identification of problems that hinder or "block" the processes of agricultural development, and develop measures to solve them as soon as possible. These guidelines help to understand in detail the implementation of the relevant project, to develop an integrated approach and a comprehensive understanding of the mechanism for implementing digital technologies in the agro-industrial complex both at the level of the Russian Federation and countries as a whole.

2. Overview of the industry in Russia and abroad

One of the priorities of the innovative sphere in the agro-industrial complex is innovation, which helps to supplement the Russian market with cheap and high-quality food products of domestic production. As for the introduction of sanctions for Russian farmers, the conditions of sale and competitiveness of products have improved: sales markets have opened, competition with foreign goods has decreased. This helped to increase the production volume of domestic products and maintain high quality.

The USA economy has gained a lot of experience in solving the problems of managing the innovation process. On the basis of the functional division of labor in the economy, a special entrepreneurial type has developed which is actively developing and specializes in innovative activities, called "risk enterprises". Within the framework of the American agricultural societies, methods and forms of management were developed for the organization of innovative processes that are as close as possible to the principles of the functioning of large enterprises.

At this stage of scientific and technological development [8-12], the role of small enterprises in research and development in the agricultural sector has increased significantly. This is due to the fact that scientific and technological development has helped small and medium-sized high-tech enterprises to acquire modern equipment that corresponds to the size, to carry out the development of high-tech production at relatively low costs; the activation of small businesses in the innovation industry has greatly contributed to the new types creation of capital investment financing for this type of venture capital for high-risk innovation enterprises.

From the point of view of the costs concentration in economically developed countries, the scientific sphere is significantly ahead of production. Currently, the 300 largest companies in the USA account for 92% of the industry's research costs, including the 4 largest companies at 22%. The situation is similar in other countries, 77% and 25.6% in the UK, 95.6% and 20.9% in France.

Russia is one of the largest agricultural potentials in the world. Only 2.2% of the world's population has 8.9% of arable land, 2.6% of pastures, 20% of the world's fresh water, and 8.3% of mineral fertilizers.

The concept of long-term socio-economic development of the Russian Federation by 2020, developed by the Ministry of Economic Development of the Russian Federation, provides for a scenario of innovative development, accompanied by active structural changes, supported by a significant increase in resource efficiency. The share of the innovation sector in GDP will increase from 10.5% in 2006 to 18.1% in 2020 (prices of 2006 year), and the share of the oil and gas sector will decrease from 19.7% to 12%. This structural maneuver will be a sustainable growth in innovation activity based on increased spending: R & S (through resources, total funding) - up to 2.8% of GDP and 4% of GDP in 2020, in 2015; education - 4.8% and 5.2% of GDP, respectively.

Despite many difficulties in development and application of the innovative sphere, the National agro-industrial complex of the Russian Federation has a huge potential for successful activity in this area: a scientific and educational complex, a complex base of natural resources, as well as a large potential of the domestic food market of the country.

Nanotechnology products deserve special attention in the innovation industry. Various nanomembrane systems, cleaning fluids, nanomodifiers that significantly extend the life of agricultural machinery, animal cutting or labeling systems, as well as agricultural products based on RFID technology, test systems for rapid diagnosis of infertility, without agricultural livestock, special equipment, as well as gentle animal health specialists, probiotics to be effective in the treatment of infectious or non-infectious diseases, animals, birds, etc. New-generation antacid drugs and much more are offered to enterprises and organizations of the agro-industrial complex for testing and subsequent use.

Recently, adaptive agricultural production has been developed, namely, the use of the latest technologies to manage the potential of agroecosystems and agrolandscapes, based on the differentiated use of resources and the use of agricultural space resources.

Russia has chosen the path of modernizing food production using resource-saving technologies [17,18], making it a greener agricultural sector, harnessing the full potential of selection and genetic research, and ensuring sustainable rural development. Russia's competitiveness is mainly supported by a high level of natural resources for the agricultural sector, which provides a strategic advantage for Russia in the medium term.

With these development parameters of the "knowledge economy", Russia will become competitive in comparison with its European and Asian partners and the global development of the national innovation system will be guaranteed.

The Krasnoyarsk Region is one of the regions in Russia, where at the moment almost all conditions for the active development of the innovation sphere are created.

The modern agro-industrial complex of Russia, located at the forefront of advanced science and technology, is sometimes not only a resource that facilitates re-equipment, but also a resource for covering production costs. This leads to low investment activity of agricultural enterprises, which hinders the development of the agro-industrial complex as a whole. It is known that the main source of the development of the agro-industrial complex is agriculture, which is the need for mechanical agricultural products; the IT-chemical industry (the domain of the agro-industrial complex) is the supplier of products for the IT-food industry (the third domain of the agro-industrial complex). This is similar to the basic agri-food sector intensive agricultural development drives transportation in the USA after the first food product fully protects the needs of the third food sector [13-15]. At the same time, this should be the third sector of the agro-industrial complex, in which food imports are partially increasing. In turn, to increase the production of raw agricultural products on the market, you will

receive "import substitution", which will have a positive impact on all market participants in the agricultural sector. The structure of the economy of the Krasnoyarsk region, the current state of industry, the tools of the territory, the focus on raw materials with high physical and moral wear [16-18]), production capacities, the market of high-tech products in the transition from import substitution, requires a prompt and effective approach to the development of innovations.

Since 2016, the development has been almost completely focused on the economic goods sector, the food industry, the layers of scientific and personal potential, and the economic degradation of the region as a whole. The creation of an innovative model of social production, first of all, requires the definition of long-term strategic guidelines for both the public and private sectors, liberates relations between their hobbies, creates appropriate mechanisms and incentives. Therefore, in the strategy of this reform, the tactics should be leading, so that the regulatory role of the state becomes stronger and stronger.

In the innovative model of social production, it should implement an appropriate strategy for the development of the scientific and technical IT-industry, which, as a scientific and technical base, will be unproductively aimed at stimulating structural changes in the economy, ultimately enterprises that export raw materials and ensure high quality products:

- involved in the turnover in the economy is responsible for the accumulated strategic services, the new results create a base of applied research and development;
- use of intellectual property in the implementation of innovations, competition in the Russian and global markets;
- strengthening the concentration of resources on the territory of the government, control bodies at all levels, and organizations for the development of innovation activities is one of the priority areas of Russia's development. In the Krasnoyarsk region, almost all the necessary conditions have been created for the active development of the innovation sphere.

3. Problems

In the state complex of economic problems in various areas, including in agriculture there is a big problem - the technical backwardness of the population to the problem of the village development. At the enterprise, there is an acute shortage of funds for the modernization of production. At the same time, the plan of the agro-industrial complex Department for the production of crop products will largely preserve the situation with the production of obsolete means of production. New innovations in human capital, despite the obvious importance of this side, are too slow without a load, which, of course, complicates the overall instability of agriculture and rural recovery.

In general, there are three main reasons for the lack of new innovations in the agro-industrial complex. First reason is the lack of a finished product is a necessity for international research. Second reason is the inertia of entrepreneurs working in the agro-industrial complex, especially among farmers and small farmers. Third reason is the lack of attitude between the government and business to these problems.

4. Development prospects or solutions

On the basis of innovations, two trends in the introduction of innovations with each other are distinguished, aimed at increasing the efficiency of the farm business, increasing their interest and sharply increasing the cost:

1. formation of innovative activities in terms of expanding opportunities to ensure and improve their quality, their nature and decision-making about the interests of the target science; organization in the form of differences in research directions (participation in the competition of subordinate organizations, obtaining funds, research results, as well as the formation of sources of funding for their own research and employment under state orders).

2. research funding is a dynamically developing state with limited financial capabilities, the implementation of which is one of the main functions: the search for options for less state funding of science, business and government agencies, public organizations are looking for options to increase the

ability to make decisions about the commercialization of science, its preferred role, the productive forces of society and its development [19-22].

5. Conclusion

Artificial intelligence technology has great potential to increase food production by analyzing and optimizing agricultural production in each specific region. With the help of various technological breakthroughs, mainly machine learning, big data, neural networks, etc., the development of agricultural artificial intelligence technologies has made progress.

It is worth noting the positive opinions of agricultural managers and experts about artificial intelligence technology. The vast majority of them have no concerns about the development and implementation of these technologies. In addition, we believe that there are high expectations from the use of these technologies. The fact is that a large percentage of respondents believe that productivity will increase by more than 20% due to the introduction of artificial intelligence technology.

The introduction of artificial intelligence technology in agriculture and other industries will have a significant impact on the development of various social institutions. Experts believe that most of them, in particular, all private property, the market, production, the family, education, the state and legal institutions, will undergo radical changes. At the same time, the expansion of the use of artificial intelligence technology in agriculture and other industries requires further research.

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