Scientific support of the innovative development of agriculture in the Russian Federation: problems and solutions

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Abstract. The article analyzes the most important sphere of the economy of any state, which is the agro-industrial complex. It provides production of the most important products necessary for human life and society as a whole. At the same time it is the innovation and implementation of innovation activities that can ensure the competitiveness of the country's agricultural products in the world arena. The aim of this article is to identify the features of scientific support of innovative development of agro-industrial complex in modern economic conditions. The key priorities of scientific support of the process of implementation of advanced technologies in this area have been considered. The features of the implementation of innovation processes in agriculture have been investigated. The model of innovative development of agriculture of the country is offered.

1 Introduction

The food systems of the leading countries have entered a new stage of the technological development known as Agriculture 4.0, which is the process of using "smart" technologies by agricultural enterprises. Among these technologies are robotics, precision farming, IoT (Internet of Things), biotechnology, and alternative technologies and sources of raw materials. The competitiveness of agricultural products of domestic enterprises in the world market depends on scientific support of the innovative development (development of the scientific, personnel, production, infrastructure, financial and other types of potential) and innovative technologies used by agricultural enterprises. Only through the solution of these problems, it is possible to improve the quality of agricultural products so that they can meet international standards.

The studies of both domestic and foreign researchers deal with the issues of scientific support for the innovative development of agriculture [1-7]. The analysis of these works made it possible to identify directions of the innovative development in agriculture. Firstly, the efficiency of agricultural enterprises depends on the innovative technologies used and, to a lesser extent, on the climatic and biological factors.

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Secondly, the most promising areas in the development of the agribusiness are genetics and breeding, the IT sector, industrial design and engineering. Thirdly, the progress of the agro-industrial sector is affected by the largest producers of agricultural products, which have more significant potential for implementing innovative technologies. Fourth, the robotization of the agricultural industry will change the structure of employment, and reduce the number of low-skilled workers which creates a need to develop a new model of education aimed at training specialists with key competencies that enable them to work in the digital economy. Therefore, the issue chosen for the current study is relevant which confirms the need for scientific support for the innovative development of agriculture.

2 Materials and methods

Research methods such as the methods of analysis and synthesis, the abstract-logical, computational-constructive and expert approaches were used in the present study. In the work were used such methods of research as the method of analysis and synthesis, abstract-logical, calculation-constructive and expert. The calculation of indicators reflecting the dynamics of indicators, their structure, the average value was used for the study. The study was based on official statistical data, which are published in official statistical collections, as well as by state and municipal authorities. It should be noted that Russian agriculture is the most important component of the national economy. The importance of agriculture for the economic development has been confirmed by statistical data. For example, in the national GDP, the share of agriculture is 4.7% [8]. A slight increase in the share of agriculture in the national GDP was observed. An analysis of the main indicators of agriculture shows that in 2021 in the structure of agricultural enterprises, more than 53% of enterprises dealt with crop production and 47% - with animal husbandry. Of the total volume of investment in fixed assets, only 3% were used for the development of agriculture. In the structure of investment, about 55% are own funds of enterprises. The share of budgetary funds does not exceed 2%. The share of depreciated fixed assets is high [9].

As the world experience of developed countries shows, the competitiveness of agricultural producers depends on the efficiency of innovative activities of agricultural enterprises. In many developed countries, the innovative technologies used in agriculture correspond to the sixth technological order. These are nano- and biotechnologies, alternative energy, and new information technologies. Most Russian agricultural producers demonstrate the level of production that corresponds to the third or fourth technological order [10]. The data indicate the need for scientific support for the innovative development of agriculture in the current economic conditions.

The efficiency of agriculture can contribute to the national system of food and biological security and ensure the economic security. In this regard, it is necessary to analyze indicators of the innovative activity of Russian agricultural enterprises and develop a model for the innovative development of agriculture based on the use of advanced technologies, ensuring the effectiveness of social reproduction [11-12].

3 Results

An analysis of the works of domestic and foreign researchers made it possible to identify features of the innovative processes that occur in agriculture (figure 1).
Fig. 1. Features of innovation processes in agriculture

National agricultural producers implement individual innovative projects. At the same time, the level of innovative activity of agricultural enterprises is extremely low. Figure 2 shows the dynamics of the innovative activity of agricultural enterprises.

Fig. 2. The level of the innovative activity of agricultural enterprises, %

Despite a slight 6.6% increase in the innovative activity of agricultural enterprises in 2020, the share of innovative enterprises does not exceed ten percent of the total number of companies. According to statistics, only 0.6% of companies have research and development departments. The number of employees conducting research is about 600. In this regard, the majority of innovative enterprises seek help from third-party organizations. The data confirm the extremely low innovative activity of companies.

One of the key pros associated with the low level of scientific support for the innovative development is the lack of a unified model for performing innovative activities in agriculture, which would ensure the innovative development of the agricultural industry though the effective interaction of all key elements. To solve this problem, we developed a model presented in Figure 3.
The model can ensure the effective interaction between the main participants in the innovation process, including the scientific community, businesses and society, and improve the efficiency of the innovation activity of agricultural enterprises through the use of innovative and information technologies.

4 Discussion

Further research on scientific support for the innovative development of agriculture will be aimed at overcoming negative consequences such as the lack of a strategy for the development of innovative activities of agricultural enterprises and an effective mechanism for stimulating its development; the low level of technological modernization of enterprises engaged in the production of agricultural products; the extensive method of agricultural production; the lack of an effective innovation process due to the targeted implementation of innovations aimed at modernizing only the material and technical base of the agricultural industry; the low level of development of human, scientific, financial, industrial and infrastructural potential of agricultural enterprises [13-14].

Moreover, in the near future, the scientific support for the innovative development of agriculture will involve the use of high-tech agricultural technologies, technological modernization of agriculture, the integration of agriculture and animal husbandry on an ecological landscape basis, the development of regional models of agricultural production, and the design of agricultural landscapes.

The main areas of application of new technologies in agriculture in Russia include the following:

- Growing bioinsecticides for pest control. Every year new biofarms appear in the country. Reducing the use of chemicals to protect agroindustrial crops is the main goal of bioinsectic development;
- The use of modified seeds. There are many technologies that allow the production of modified seeds. The use of modified seeds makes it possible to improve the quality of crops and increase their yields;
• Use of special mechanisms for soil sampling. The use of these technologies makes it possible to reduce labor costs when studying soil quality;
• Use of space monitoring. This technology allows remote sensing of the Earth by means of electromagnetic radiation. Research results are necessary for planning of agricultural works.

The use of modern technologies in the agro-industrial complex in Russia refers to one of the promising areas of development. It makes it possible to obtain high profits, which is attractive to investors in this area. The use of new technologies, including information technology, provides financial profits and high yields.

Agro-industrial complex is important for the economic development of any state. Ensuring food security depends on the activities of agro-industrial enterprises. There are still countries in the world where more than eighty percent of the population is engaged in agriculture. As a rule, these are the developing countries of the world.

In the developed world no more than three percent of the population is engaged in agriculture (e.g., the United States or Great Britain). Despite this, the USA is the leading exporter of agricultural products. This is achieved through the use of new technologies in agricultural enterprises. This confirms the relevance of the research and the need for scientific support for this problem.

5 Conclusion

The most important component of any national economy is agriculture, which produces the most important products required for people and society as a whole. At the same time, it is innovative activities that can ensure the competitiveness of agricultural products on the world stage.

The present study showed that the level of innovation process in the agro-industrial complex remains low. Most researchers that deal with the development of agriculture in the context of digitalization of the economy claim that it is necessary to create a unified system of the sectors of agriculture.

In order to enhance the innovative activity of agricultural enterprises, a model of innovative development of agriculture based on the use of advanced innovative and information technologies was developed [13]. It can ensure the effectiveness of social reproduction and consolidate the interaction between the government, businesses and society. The federal and local governments should develop scientific, personnel, production, financial and infrastructural potential of the agricultural industry both at the federal and regional levels [13].

In order to create an effective system for the innovative process of the agro-industrial complex, laws on innovative activities, technical and technological re-equipment of agricultural enterprises are required. It is necessary to create an effective mechanism for stimulating the innovative activity of enterprises, to develop innovative infrastructure, to train highly qualified personnel focused on the digital transformation of the economy. It is also necessary to improve the efficiency of research, to expand the integration of agricultural science and production, which will ensure the economic growth of national agriculture, enhance the competitiveness of producers, develop rural areas, improve the quality of food products, increase the economic potential of the industry.

References

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