Assessment of the innovative development of agriculture in Russia

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Abstract. In the presented study, an assessment was made of the innovative development of agriculture in the Russian Federation. As part of the study, it was found that innovative development is the effectiveness of the type of activity, which consists in increasing the use of new technologies, saving resources, reducing operating and capital costs, reducing environmental impacts, etc. In this regard, the work analyzed indicators reflecting energy capacity, internal research and development costs and the volume of innovative goods and services. The analyzed indicators indicate that in agriculture there is no tendency to switch to innovative technologies, as a result, the study proposed a model for ensuring the innovative development of agriculture. At the end of the study, conclusions are drawn from the results of the work.

1 Introduction

In recent years, processes related to the transition of various fields of activity to innovative and digital technologies have been updated. Such a transition allows us to increase the efficiency of our own production, reduce capital and operating costs, reduce the amount of resources used and ensure high-quality output. At the same time, an innovative transition was planned to be implemented ten years ago, and in some states the issues of transition to digital and artificial intelligence are already being considered [1].

Processes aimed at creating innovative and digital technologies in many countries are the basis for economic development and creating added value, however, in Russia the development of innovative technologies is not carried out at the planned pace, which, of course, negatively affects all areas of activity. The creation of innovative technologies would allow modern industrial enterprises and agriculture to produce more products and provide the necessary markets with the necessary markets [2-3].

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It is worth noting that the transition to new and innovative technologies is ongoing, for example, if at the beginning of the 20th century all agriculture was based on exclusively manual labor, sometimes, using animals that carried out arable land, provided the necessary fertilizers, helped to process and harvest crops; during the Soviet period, various types of machinery began to be used, for example, automobile transport, combines, various sowing and irrigation machines. Today, in agriculture, technologies are used that are associated with automatic irrigation, the constant creation of artificial lighting, and the processing of various fertilizers in remote-digital mode. However, such innovative development is proceeding at a slow pace, and these technologies are used in rare cases and are not widespread throughout our country [4].

The authors of the study believe that due to the fact that the Russian Federation has adopted many programs in the field of innovative development of fields of activity, studies are being conducted in the field of innovative development of various fields of activity, including agriculture, we consider it necessary to consider this problem in prism assessment of innovative agricultural development. Problems of agricultural development are dealt with by such scientists as Shutkov A.A., Taran V.V., Romanova Yu.A., Paptsov A.G., Afarsky N.D., Tkach A.V. and many others who develop and develop directions for the general and private development of agriculture.

In recent years, areas of activity have been moving to the sixth technological order, associated with the introduction of digital and intellectual technologies in the production process and in all areas of entrepreneurial activity. In this regard, we consider it necessary to assess the level of innovative development of agriculture in order to objectively perceive a possible transition to the next technological stage of agriculture.

2 Materials and methods

The purpose of the work is to assess the innovative development of agriculture in Russia. The following tasks were presented in the study:

- Analyze indicators reflecting the level of innovative development of agriculture in the Russian Federation;
- To propose a model for ensuring the innovative development of agriculture.

The study analyzed statistical data published in open sources. In the work, scientific approaches and methods were used, among which statistical, logical, systemic, comparative, analytical and others, allowing to reveal the goal of the study.

3 Results

The modern development of any field of activity, including agriculture, is assessed on the basis of a combined analysis of the capacities, equipment and other devices and equipment used which can ensure increased productivity and reduce the amount of manual labour used. It is worth noting that such approaches can be used to assess the development of agriculture, but it is certainly impossible to assess development by such criteria. In order to conduct an analysis of innovative development, it is advisable to evaluate indicators reflecting the innovative component in the products, the costs of ensuring the innovation transition, the level of education of specialists working in this field of activity, etc [5-6].

It should be noted that innovation is an introduced or being introduced innovation, which provides an increase in production efficiency, ensures sustainable development of the field of activity and reduces operating expenses. The process of introducing innovations is called innovative development, that is, the process of searching, developing and introducing new technologies. But the process of creating innovative products and

innovative technologies is complex and multifaceted, which can be divided into two stages - this is research and development and the product life cycle process. Thus, to assess innovative development, it is necessary to analyze the processes of creating innovative technologies and the results obtained. Of course, any development is based on financial costs from the relevant industries, which plan to obtain certain benefits based on the results of all these activities, namely increasing production efficiency and lowering operating costs. In this regard, we believe that the assessment of the innovative development of agriculture should be based on the analysis of two most important indicators:

- Volumes of funding for research activities;
- Assessment of the results of this activity, which can be expressed in the volume of received innovative products (goods, services, etc.).

However, the fifth technological structure implied a transition to innovative technologies, which were to be integrated into a single Internet network, and any objects are managed remotely. Of course, such management in agriculture is not developed, since not all Internet facilities are connected and not all processes can be controlled remotely, but it is worth noting that during this period a qualitative transition from manual labor to industrial technologies took place, which can be represented as energy capacities used in agriculture.

Energy capacities of agricultural organizations - the total capacity of all energy sources serving the production process: mechanical and electric motors, electrical installations, manpower. The ratio of the total energy capacity to the sown area characterizes energy supply; the average annual energy capacity per employee is the labor power ratio [7-8].

Thus, we will first consider the energy capacities of commercial organizations that have not yet reached the level of use of various technical devices in agriculture, and then the volumes of R&D financing in agriculture and the results of this activity (figure 1) [9].

From the presented figure it can be seen that over the 4 years under review, almost all indicators remain unchanged, which indicates a lack of development even in terms of indicators that indirectly relate to innovative development. Such a situation indicates the absence of a qualitative transition of agriculture to a new development path, namely, the abandonment of manual labor and the transition to the industrial and innovative stage of the existence of agriculture.

Fig 1. Energy capacity of agriculture.

Further, for a more visual representation of the situation in agriculture, we consider the volumes of domestic expenditures on research and development, which show the costs of

performing various researches created by one's own, including various costs, regardless of the sources of lending (figure 2) [9].

Fig. 2. Domestic research and development costs, billion rubles.

The figure shows the volume of domestic expenditures on research and development, the indicators of which are increasing annually, and by 2018 reached 25 billion rubles. At the same time, if we compare agriculture and other areas of activity, we can conclude that, the volume of costs in agriculture is about 13 times less compared to industrial production. However, there are industries where the amount of domestic expenditure on research and development is less than in agriculture, including construction, communications, services, environmental protection, etc [10-12].

The last indicator that should be analyzed in the framework of assessing the innovative development of agriculture is the volume of innovative goods, works and services, which shows the share of new goods, services and works that have undergone various technological changes over the past three years. This indicator reflects the volume of production of innovative products in agriculture (figure 3) [9].

It can be seen from the presented figure that the volume of innovative products produced by agriculture by main types of activity, such as animal husbandry and the cultivation of annual and perennial crops over the past three years does not exceed three percent, which, of course, indicates the absence of breakthrough technologies in agriculture. Some indicators, such as seedling cultivation, have a pronounced growth; however, in no way affect the main areas of activity, such as the cultivation of annual and perennial crops.

Fig. 3. The volume of innovative goods works and services of agricultural organizations, in percent.

Thus, we can conclude that the constancy of the indicators of innovative activity of agriculture restrain the development of agriculture. As a result, it is advisable to propose measures and mechanisms to increase the level of innovative development of agriculture.

4 Discussions

From the analysis it was found that in agriculture the volume of innovative products is about 3%, when, as in industrial production or other areas of activity, this indicator can reach 15-20%, this indicates the absence of an effective policy for innovative development and requires areas of activity will return to the classical mechanisms of policy formation in the field of innovative development.

A system that allows for a high-quality transition of agriculture to innovative technologies should be based on a set of measures, which should include the use of labor, material, economic and technological resources. Such a system must meet modern requirements to create the final innovative product or innovative production, which will provide the chain of creation of innovation. In our opinion, the achievement of the innovative development of agriculture can be represented in the form of a causal relationship scheme (figure 4) [13-18].

Fig. 4. Scheme for ensuring innovative development of agriculture.

The presented scheme reflects the stages of ensuring the innovative development of agriculture, which should include a set of measures to create innovative production based on the combined use of information, labor and material resources.

5 Conclusion

Thus, in the presented work, an assessment of the innovative development of agriculture was carried out, which included an analysis of three indicators - energy capacity, the volume of internal costs for research and development, and the level of innovative products of agricultural organizations. The analysis showed that in agriculture there is no tendency to switch to an innovative development path, and as a result, the study proposed a scheme for

ensuring the innovative development of agriculture, which contains information, labor and material resources.

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