Investing in Innovation as a Driver of Economic Transformation in the Context of Global Challenges

Natalia Meshkova[1,*], *Elena* Golovchanskaya[2], *Ruslan* Batashev[3]

[1]National Research University Moscow State University of Civil Engineering, Moscow, Russia
[2]Financial University under the Government of the Russian Federation, Russia
[3]Kadyrov Chechen State University, Grozny, Russia

Abstract. The competitiveness of the agricultural sector of the Russian Federation in the future depends on strategic decisions in the field of innovative development. The article examines the state of financing innovative activities in the agro-industrial complex, and also provides a comparison with the leading countries of the world in this industry. The strategy of innovative development of the agricultural sector is proposed, the emphasis is on attracting public and private investments in scientific research and financing, primarily the processing industry, agricultural engineering and domestic startups. The strategy of innovative development of the agricultural sector is proposed to be implemented in stages. The first stage is aimed at the industrialization of the agricultural sector, the second at the construction of world-class processing enterprises, the third at the formation of a national innovation system, the fourth at the evolutionary transition to sustainable agroecological development and its priority financing. The strategy of innovative development of the Russian agricultural sector and the possibility of financing the introduction of innovations by agri-food enterprises are considered, which will increase competitiveness and profitability. In order to support the innovative development of the agricultural sector, it is proposed to use benefits for exporters of innovative products. The introduction of benefits will increase the demand for innovative products and increase the export of agricultural goods with high added value. The method of calculating the index of benefits and the amount of benefits that are provided to both the investor and the manufacturer is proposed.

1 Introduction

The dynamic development of the agricultural sector and increased competition in the international arena encourage Russia to strengthen its competitive position by forming, financing and implementing a strategy for priority innovative development. The course of Russia actualizes the processes of searching for factors to increase the innovativeness of the

* Corresponding author: 21meshkova@gmail.com

agricultural sector and sources of financing, based on the structure of the economy and financial capabilities [1].

It should be noted that agricultural innovations do not guarantee an increase in the competitiveness of manufactured products due to the significant impact of natural and climatic conditions on the volume, quality of products and significant price volatility depending on global production and consumption. This aspect affects the interest of agricultural producers in the introduction of those innovations that provide, if possible, stable incomes and minimize the negative effects of natural and climatic conditions on the production of agricultural products and reduce operating costs. In Russia, this applies to a limited range of highly profitable crops, and innovations are aimed at increasing productivity and changing labor intensity. Current trends in financial support for the agricultural sector are undergoing certain changes, the emphasis is on indirect support, ensuring a guaranteed minimum income for the farm, financing technology transfer, and introducing innovations, in particular digital technologies and artificial intelligence.

An equally important task of innovative development for the agar sector is the adaptation of agricultural production to global climate change and the preservation of the rural settlement network, the natural environment in conditions of intensification of production and growing demand for food from poor countries. Russia needs to radically change the structure of the agricultural sector and its financing, giving priority to innovative development, which will ensure competitiveness and expand sources of financing.

In the innovative promotion of Russia, it is important to choose a strategy for the development of the agricultural sector, which would be based on the priority development of activities with increasing returns, and its implementation would provide sufficient financial resources for the creation and implementation of innovations. The financial resources that the state directs to support the development of agricultural production based on scientific achievements are not enough, this entails a slowdown in the innovative development of agriculture. The volume of state aid to the agricultural sector has averaged $7208 million in China over the past 5 years, $6720 million in EU countries, and $1914 million in Brazil. [2,3]. In Russia, this figure is 635 million dollars. The innovative activity of agricultural complexes, despite the positive dynamics of innovation growth, is at a fairly low level (table1).

Table 1. Dynamics of the level of innovative activity of agricultural organizations in the Russian Federation, % [4]

Name	Years					Deviation 2022 to 2018
	2018	2019	2020	2021	2022	
Growing annual crops	4.0	4.8	7.1	8.8	8.6	4.6
Cultivation of perennial crops	1.4	2.4	4.8	5.7	3.6	2.2
Growing seedlings	5.6	5.0	8.7	13.3	7.7	2.1
Animal husbandry	4.2	4.0	7.5	8.6	8.9	4.7
Mixed agriculture	9.4	2.8	2.5	6.8	9.0	-0.4
Ancillary activities in the field of crop production	3.4	4.3	4.5	5.4	4.2	0.8

The dynamics of the level of innovative products produced in agriculture of the Russian Federation for the period 2018-2022 shows stable growth in almost all indicators, but this growth is not sufficient to achieve effective indicators in the field of agriculture.

2 Methods and materials

The following methods were used in the study: the method of scenario analysis – when considering strategies for innovative development of the agricultural sector, depending on the projected change in the directions and priorities of the development of the agricultural sector and the analysis of an alternative strategy for innovative development; the synthesis method – to determine the stages of implementation of the strategy of innovative development and its financing; the comparative method – to study the level of financing of innovations by agricultural holdings; the analysis of financing the innovative development of the national economy in comparison with the high–tech agricultural sector and leading positions in innovative development was carried out, which allowed to identify key differences in priorities and sources of innovation financing; by statistical analysis – to identify problem areas in the components of the innovative development financing indicator; generalization method - to formulate the outcome of the research results.

3 Results and discussion

The functioning of the domestic agricultural sector based on the principles of an innovative development model is an objective necessity and requires urgent measures aimed at increasing scientific and technological potential, ensuring its more effective use. In order to increase the competitiveness of agricultural exports and increase the volume of exports of high-value-added products, it is necessary to provide priorities for innovative development and their financing. It should be noted that insufficient funding has a negative impact on the content and effectiveness of the implementation of innovation policy measures at both the federal and regional levels [5].

Today, Russian agricultural exports are mainly of a raw material nature and are aimed at increasing foreign exchange earnings and searching for new markets. The humanitarian aspect is that the export of Russian grain will help to avoid famine in poor countries. According to scientists, by 2050, the demand for food will double, while the area of arable land, according to an optimistic forecast, will remain unchanged [6]. At the same time, in Russia, demand is regulated by the process of changing the natural and climatic conditions of growing crops and the growth of problems with their water supply, which is associated with global climate change processes. These trends create a huge demand for innovation in the entire agri-food sector.

It is necessary to implement an economic development strategy based on an innovative development model as a key vector for the formation of a competitive economy. The strategy of innovative development of the agricultural sector is proposed. The emphasis is on attracting public and private investments in scientific research and financing, primarily in the processing industry, agricultural engineering and domestic startups. There is a demand for innovations from agricultural producers and this demand is stimulated by the state. Financial instruments used: preferential taxation of income received from innovative activities; reduction of the tax base by the amount invested in innovations, their development and implementation; use of financial support from the state by exporters of innovative products with high added value; priority financing of scientific developments in the field of information technology, greening of production and artificial intelligence; venture financing; budget support [7]. Such a financial support model allows us to prioritize the development of activities with increasing returns and generate a growing amount of financial resources, to

obtain a multiplier effect from financing the expanded innovative development of not only the agricultural sector, but also related sectors of the economy, including industrial production, including agricultural engineering.

The experience of countries with a high-tech agricultural sector has shown that priority innovative development is based on the attraction of national innovative products, their improvement, replication and implementation. We propose to develop a strategy for the innovative development of the agricultural sector using the Rosabeth Moss Kanter methodology [8] for building an innovation pyramid. At the top are the key tasks of national importance, setting the direction of future innovative development and receiving a large share of funding. The middle level – the tasks of the regional and sub-regional level in innovative development. The lower level is a task for innovative companies, startups, and research institutions working on a wide range of ideas and innovations that have not yet been developed. By implementing the strategy of innovative development through the prism of the innovation pyramid, it is possible to better evaluate current tasks, make adjustments and have a holistic picture of the tasks at all three levels.

We propose to implement the strategy of innovative development of the agricultural sector in stages.

The first stage is aimed at the industrialization of the agricultural sector by creating a joint venture or acquiring a license with an increase in the degree of localization of production of a line of modern competitive tractors and combines, and other basic types of agricultural machinery. Their functionality is being refined and modern remote control systems are being installed, based on the operating conditions and available innovative products, the demand for precision farming systems. Innovative developments of startups are attracted and their implementation is carried out. Personnel are being trained to introduce innovations in advanced countries, students are being sent to study at agricultural and engineering universities in other countries with high-tech agricultural production, for example China [9-10].

The second stage. The construction of world-class processing enterprises and the attraction and creation of modern technologies for processing, energy saving and environmental packaging and storage of products. Implementation of green course programs and standards in the field of energy conservation, cultivation of environmentally friendly products, their processing and environmental packaging. Modern innovative developments in the field of purification and efficient use of water for irrigation in the southern regions of Russia are being studied, improved and implemented [11].

The third stage. Formation of the national innovation system and development of a strategy for its development, interaction and financial support. The main directions of strategic development of the agricultural sector: digital technologies for agricultural production (blockchain, Bigdata, etc.), innovative technologies for processing agricultural products (tracking the supply chain from field to table using blockchain), energy efficiency, automated control systems, environmental, reasonable packaging, artificial intelligence, renewable energy sources.

The fourth stage. The evolutionary transition to sustainable environmental development and its priority financing. The national innovation system is developing. Russia is gradually moving towards dominance in the agricultural export of technologies, agricultural machinery, innovative turnkey processing enterprises and products with high added value. Various financial instruments are used to financially support the implementation of this model, in particular the cluster financing model, attracting venture financing, risk insurance for the introduction of innovative products, budget support, financing within the framework of public-private partnerships, tax regulation of innovation, the issuance of innovative vouchers and agricultural receipts.

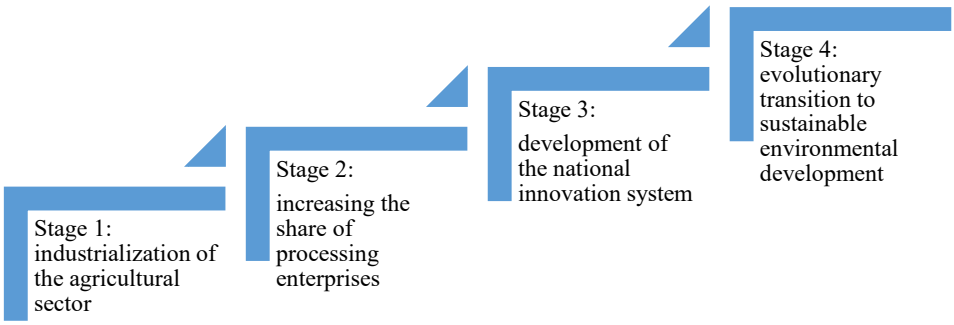

Fig. 1. Stages of implementation of the strategy of innovative development of the agricultural sector.

As the first step in implementing the strategy of innovative development of the agricultural sector, we consider it advisable to introduce benefits for exporters of innovative products of the agricultural sector, which will stimulate demand for innovations and exports of products with high added value.

The following formula is attached to calculate the benefits index:

$$I_L = \frac{\sqrt{\gamma_i^2 + \gamma_{ei}^2}}{2} \quad (1)$$

where:

I_L – benefits index;

γ_i^2 – the share of innovative products;

γ_{ei}^2 – the share of innovative products exported.

The number of benefits provided to the investor and the manufacturer is determined by the formula:

$$\sum_L = I_L \times \Sigma N \quad (2)$$

where:

$\sum_L$ – the number of benefits, rub.;

I_L – benefits index;

ΣN – the amount of the company's tax payments.

Financing of benefits and stimulation of innovative activities in the agricultural sector can be carried out at the expense of deductions from the export of raw materials. This approach to the strategy of innovative development and financing of its implementation will gradually move to the export of products with high added value and ensure the priority of innovative development of the agricultural sector. The development of processing, agricultural engineering, and information technology will contribute to the growth of activities with increasing returns and, in turn, provides financing for innovative development [12].

4 Conclusions

Thus, the strategy of innovative development of the Russian agricultural sector and the possibility of financing the introduction of innovations by agri-food enterprises are considered, which allows them to increase their competitiveness and profitability. The analyzed current state and rating of agricultural companies in terms of their innovativeness and financing of innovations.

The main stages of the implementation of the strategy of innovative development of the agricultural sector and the instruments of its financing, which will significantly accelerate the implementation of technological innovations in the first place, are considered. The main focus in financing should be on the dominance of activities with increasing returns and stimulating the export of innovative products. The promotion of innovation activities should be transparent, accessible, understandable and stable. The formation of a mechanism for financing the innovative development of the agricultural sector in the modern period is relevant and determines further scientific research.

References

1. L. Pawera, R. Manickam, C. Wangungu, U. Bonnarith, P. Schreinemachers & S. Ramasamy, Agricultural Systems, **218** (2024).
2. Ministry of Agriculture of the Russian Federation, Analytics [Electronic resource]. URL: https://mcx.gov.ru/analytics.
3. Z. Taishykov, M. Tolysbayeva, K. Zhumanazarov, S. Ibraimova & Z. Mizambekova, World Development Perspectives, **33** (2024).
4. Aleksei Bogoviz, , Ivan Sandu, and Natalia Ryzhenkova, MATEC Web of Conferences, **212** (2018).
5. Sergey, Butorin, MATEC Web of Conferences, **212** (2018).
6. R. M. Kanter, Harvard business review, **84(11)** (2006).
7. Farooq, Muhammad, and Michele Pisante, eds., *Innovations in sustainable agriculture* (Berlin/Heidelberg, Germany: Springer International Publishing, 2019).
8. Pignatti, Erika, Giacomo Carli, and Maurizio Canavari, Journal of Agricultural Informatics, **6.4** (2015).
9. C. Chen et al., Journal of Rural Studies, **110** (2024).
10. H. Ma, X. Mi, Y. Zheng, N. Lv, S. Zhang, C. Hu ... & Y. Cao, Chinese Journal of Population, Resources and Environment, **22(2)** (2024).
11. E. Pignatti, G. Carli & M. Canavari, Journal of Agricultural Informatics, **6(4)** (2015).
12. Knickel, Karlheinz, et al., Journal of rural studies, **59** (2018).