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FOREIGN EXPERIENCE IN DEVELOPING SCIENTIFIC AND INTELLECTUAL POTENTIAL OF THE AGRIFOOD COMPLEX

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Abstract

The formation of the scientific and intellectual potential of the agri-food complex contributes to the achievement of sustainable socio-economic growth. The article proposes models for the development of the scientific and intellectual potential of the Russian agri-food complex. An analysis of the activities of existing institutes for the development of agricultural scientific research was carried out. The assessment of the state of scientific and intellectual potential was carried out on the basis of cross-country comparisons of indicators of the number of researchers and expenditures on research and development. Empirically, imbalances were identified between the number of researchers and internal R&D costs. The positive experience of forming the scientific and intellectual potential of countries with developed market economies has been systematized, priority directions and stimulation of innovation and investment development have been identified. The practical significance of the research results lies in increasing the efficiency of agricultural production based on the development of scientific and intellectual potential.

Key words: *scientific and intellectual potential, agri-food complex, world experience, innovative agricultural systems, internal costs for research and development*

INTRODUCTION

In modern conditions of structural transformation and transition to a neo-industrial economy, the relevance of information and knowledge and the introduction of advanced knowledge-intensive and digital technologies are increasing. One of the main factors determining the competitiveness of a national economy on the world stage is the level of development of its scientific and intellectual potential.

A country's global competitiveness is largely determined by the efficiency of its research sector. Sustainable socio-economic development of the agri-food complex is predetermined by the possibilities of creating, introducing and disseminating innovations and knowledge-intensive solutions. To develop the main directions for the balanced development of scientific and intellectual potential at the federal, regional and industry levels, it is necessary to use the concept of national and regional innovative agricultural systems. According to the World Bank, agricultural research development institutions include the National Agricultural Research Systems (NARS), the Agricultural Innovation System (AIS), and the Agricultural Knowledge and Information System (AKIS).

These structures have their own goals, factors, results, organizational principles of construction, the role of the policies pursued, as well as a mechanism for implementing innovations [6, 17, 23].

The scientific works of foreign scientists examine trends in the development of the world economy, which must be taken into account when forming the innovative potential of the agro-industrial complex and developing mechanisms for its effective use [2].

Many scientists agree on the importance of innovative factors for increasing the efficiency of agricultural production Dasgupta S., Mamingi N. [4], Oliver, Y., Robertson, M., Wong, M. [12].

Fundamentally new production technologies, the implementation of which requires additional financial resources, make a great contribution to the formation of a high-tech agricultural sector [8]

Bush L., Bain C. identified the main areas of network interaction and transfer of knowledge and technology as the main factors in increasing scientific and intellectual potential [3].

A critical analysis of the scientific works of foreign and domestic economic scientists has identified the key areas of research into the innovative development of the agro-industrial complex. In particular, foreign researchers widely use the strategy of technological leadership and the proven practice of forming cluster structures that contribute to the scientific and technological development of large companies, including transnational corporations.Thereisquiteademandforamodelo fknowledgeflowinclusters, whichinitiatesknowledgeasoneofthemainfactor sofcompetitiveadvantagewiththedistinctivefeat ureofself-generation [10].

The formation of new knowledge and its free movement within the cluster represent the necessary conditions for the transition of the cluster to an innovative development model.

For the effective organization of innovation management in agriculture, no small importance is given to substantiating the directions of its balanced development and developing appropriate strategies at the federal and regional levels. In this regard, it is urgently necessary to use the basic provisions of the concept of national and regional agroinnovation systems (AIS)[5,24].

It should be noted that the AIS concept has not yet been finalized; certain provisions are the subject of discussion and adjustment. As some researchers note, there are discrepancies in the categorical apparatus, methods used and assessment and forecast tools [13, 19].

In the process of forming an AIS, disagreements between subjects and divergence of their interests are inevitable [11,18].

There are frequent cases of rotation of actors due to changed interaction relations [21,22].

The functioning mechanisms of AIS include, along with traditional activities (support for research, dissemination and education, development of communications between research, extension services and farmers), additional activities (building professional skills, stimulating the development of partnerships and business, improving knowledge flows; creating conditions for the introduction of innovations).

According to Chris Steiert, effective relationships between company employees largely depend on the startup models used [20]. The experience of operating knowledge-intensive startups in Ankara (Turkey) has shown that stakeholder relationships begin to develop already at the stage of creating a company. The development of mutually beneficial relationships between the startup's stakeholders allows for the successful implementation of the company's development goals [9].Research on the structure of the population, its characteristics, labor productivity and its impact on gross value added is widely presented in the works of Popescu A. [14, 15, 16].

The dissemination of knowledge and high technology occurs through their large-scale transfer. Moreover, the dissemination of innovations and knowledge at the level of one agricultural enterprise can lead to spillover and transfer of knowledge to other farms in the region. These processes are the result of diffusion and transfer of technology and innovation, as well as cross-flow of personnel between science and agribusiness. In the geographical aspect, conglomerates of knowledge and innovation are concentrated in large agrarian-oriented regions, and in the regions themselves in agricultural holdings. Issues of improving agricultural production in regions unfavorable for farming are also repeatedly discussed and calculated from the perspective of resource costs and expected results of agricultural production.

It should be noted that the mechanisms for managing the scientific and intellectual potential of developed countries can be used in countries and regions with similar natural and climatic conditions for agricultural production.

The purpose of the article is to study foreign experience in developing the scientific and intellectual potential of the agri-food complex and develop strategic directions for its use at the federal and regional levels.

MATERIALS AND METHODS

The methodological basis of the study was state legislative acts, regulatory documents, and works of foreign and Russian authors on the topic of innovative development of the agri-food complex. During the research process, monographic, abstract-logical, analytical, economic-statistical, and expert research methods were used. As an information base for the study, regulatory and legislative acts, information from OECD, INSEAD, Global Innovation Index, Rosstat, Higher School of Economics, Deloitte Research Center and other sources were used.

RESULTS AND DISCUSSIONS

The work analyzes and estimates the number of personnel engaged in research and development in various countries.

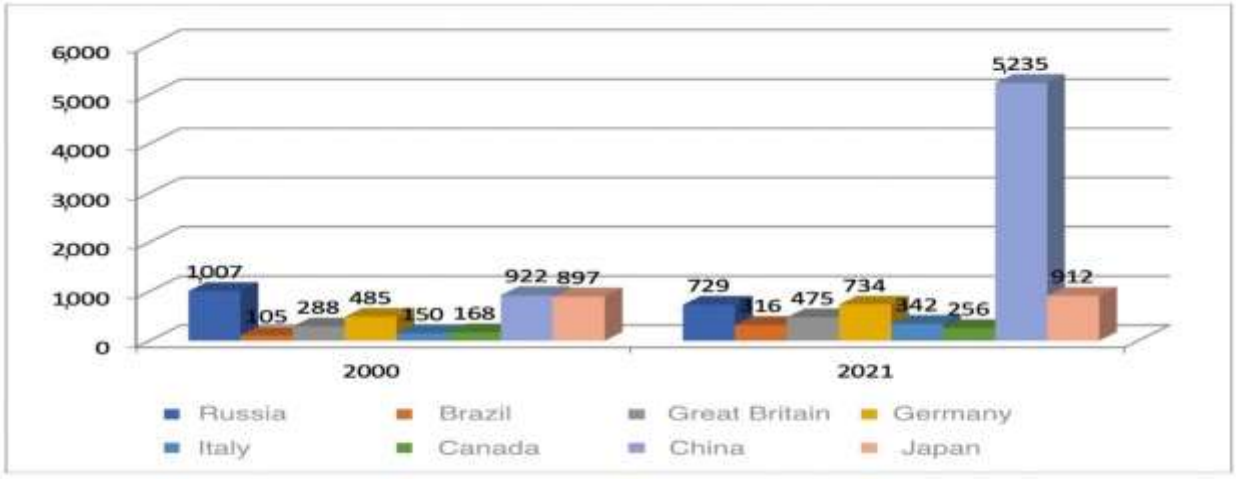

Fig. 1. Cross-country comparisons of the indicator «Personnel engaged in research and development», thousand person-years; full time equivalent
Source: Own calculations based on data [7].

The figure shows that the largest number of researchers is characteristic of China, which may be due to both the demographic situation and the level of scientific and technological development of the country.

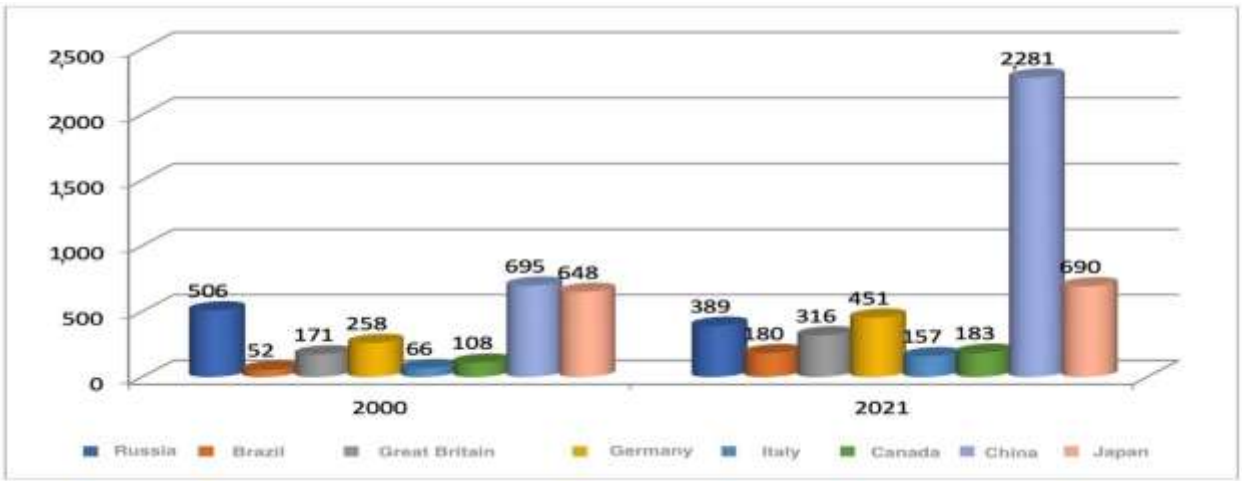

Fig. 2. Cross-country comparisons of the indicator "Number of researchers by country, thousand person-years; full time equivalent
Source: Own calculations based on data [7].

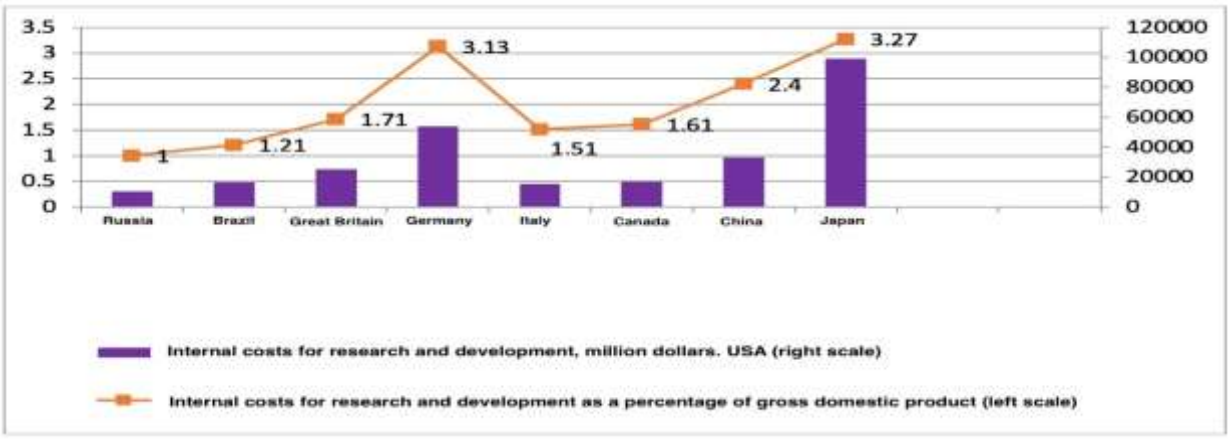

Fig. 3. Cross-country comparisons of domestic R&D expenditure indicators (2021).
Source: Own calculations based on data [7].

The largest number of researchers is in China, Japan, Germany, Russia and Italy. In some countries, there are disproportions between scientific and intellectual potential and internal costs for scientific research, which indicates insufficient economic and technological efficiency (Figs. 2 and 3).

Table 1. Strategies for the development of scientific and intellectual potential and innovative activity of foreign countries

Strategies	Main Components	Countries
Creation of national innovative agricultural systems	Development of innovative entrepreneurship in small and medium-sized businesses	Czech Republic and Slovakia, Romania, Chile, Baltic countries
	Integration of the functions of scientific and educational institutions	Czech Republic, Latvia
	Improving the structure of R&D organization in the public sector	Poland, Bulgaria, Lithuania
Creation of an optimal structure of an innovative agricultural system	Expanding forms of financing innovative activities in agriculture	Sweden, Norway, UK, USA, France, Denmark
	Stimulatingbasicresearch	UK, Sweden
	Planning of investments for the tasks of innovative development	Israel, Finland
Creation of investment relationships in agricultural sectors	Creating investment relationships to improve the efficiency of agricultural production	USA, Norway, Ireland
Increasing the effectiveness of the science-agribusiness relationship	Attracting funding and regional budgets	Germany, France, Finland
	Stimulation public and private investments within the country in scientific developments	Israel, Finland
Creation of state programs to finance innovative enterprises engaged in R&D for government organizations	Expanding government R&D funding programs	USA, China, UK, Japan
Payment of subsidies compensating 50% of costs when creating innovative products and technologies	Subsidiary support for innovatively active enterprises	Belgium, Brazil, Canada, USA, Austria, Germany, France, Sweden, Japan
Belgium, Brazil, Canada, USA, Austria, Germany, France, Sweden, Japan	Insurance of risks of agricultural production	USA, Japan

Source: Own determination.

The development of scientific and intellectual potential in the agri-food complex of advanced countries is based on investment activity that ensures the intensification of agricultural production in terms of economic, technological, and social efficiency [1].

In addition to government support, private investors, corporations, and firms are also involved in scientific research in agriculture. According to statistics, the introduction of technologies into production requires a threefold investment of financial resources compared to the cost of scientific research.

Table 1 presents a systematization of foreign experience in strategic directions for the development of scientific and intellectual potential.

A comparative analysis of the strategic directions for the development of the scientific and intellectual potential of economically developed countries has revealed their diversity. Recommended models and development vectors can be used in the process of preparing state programs for the development of scientific and intellectual potential and stimulating innovative activity in the agricultural sector of the economy.

CONCLUSIONS

The article examines positive foreign experience in the formation and development of the scientific and intellectual potential of the agri-food complex. The assessment of the development of scientific and intellectual potential was carried out on the basis of cross-country comparisons of indicators of the number of researchers and internal expenditures on scientific research and development. Empirically, disproportions have been identified between the number of researchers and internal costs of scientific research, which indicates an insufficient level of economic and technological efficiency. The experience of developing the scientific and intellectual potential of the agri-food complex of economically developed countries is systematized, strategic directions and mechanisms for stimulating the innovative and investment development of scientific and intellectual potential are proposed.

The practical significance of the research results lies in increasing the efficiency of agricultural production based on the development of scientific and intellectual potential.

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