

INCREASING THE EFFICIENCY OF INSTITUTIONAL INTERACTION DURING THE TRANSFER OF INNOVATIONS IN THE AGRO-INDUSTRIAL COMPLEX

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Abstract

In order to form a new model of economic growth that ensures food security and sustainability of the agro-food complex, it is necessary to improve the institutional conditions for the development of digital technologies and high-tech products in agricultural production. The purpose of the article is to develop theoretical and methodological aspects of the institutional interaction of participants in the innovation process, as well as to create mechanisms for systemic innovation mediation that stimulates innovation activity. The article develops conceptual provisions for regulating the development of institutional interaction, assesses the innovative activity of some European countries and assesses the dynamics of indicators of the volume of state support for the agro-industrial complex in 2013-2020. Measures are proposed to increase the efficiency of communication interaction between the participants of the innovation process using the mechanism of innovation system mediation. The practical value of the results lies in the possibility of forming an innovative development strategy in the context of the introduction of digital technologies and science-intensive products as a vector of sustainable socio-economic development of Russia.

Key words: *agro-food complex, sustainability, science-intensive products, actors of the innovation process, institutional interaction, mechanism, systemic innovation mediation*

INTRODUCTION

In order to form a new model of economic growth that ensures food security and sustainability of the agro-food complex, it is necessary to improve the institutional conditions for the development of digital technologies and high-tech products in agricultural production. In achieving sustainable development and a balanced combination of its economic, social and environmental components, the decisive role belongs to public policy [1]. Innovations are a fundamental factor in increasing the competitiveness of the agricultural sector of the economy. Sustainable development on an innovative basis is implemented through a set of technological, managerial and socio-economic tools aimed at improving the economy and the standard of living of society [15]. The reform of the CAP (Common Agricultural Policy) substantiates the importance of the innovation component in

the development of scientific research in the agricultural sector of the economy [16, 17]. The Agricultural Knowledge and Innovation System (AKIS) has been established, which aims to connect agricultural production with the end consumer in order to ensure a more competitive and sustainable development of agriculture. Access to knowledge is provided by state programs of agricultural policy, which unite diversified research centers [5]. The key elements of support for farmers are advisory services (PRO-AKIS), related to social and environmental issues, which are integrated into AKIS. According to Labarthe, the purpose of AKIS is to provide knowledge transfer services to agricultural producers [11]. The stakeholders of the system are research organizations, universities, intermediary structures for the dissemination of knowledge, farmers, non-governmental organizations. AIS defines the importance of innovative solutions and emphasizes their social status. AIS, unlike AKIS, brings

together a wider range of participants, the entire network of public and private stakeholders [12].

According to the World Bank, the goal (NARS) is the creation and transfer of technologies that unite organizations for the development of agriculture [27]. The definitions of AKIS, AIS, PRO-AKIS and other research systems are not clear, and several public research systems coexist [18, 19].

Dockes et al. emphasize that differences in the functioning of agricultural systems in different countries hinder effective scientific research [3]. The political concept of innovation policy is controversial. Smits considers two approaches to innovation: the innovation approach and the macroeconomic approach. According to the macroeconomic approach, innovations are considered as a set of research and development works for further commercialization and obtaining material benefits. [23]. The innovative approach is based on interaction between stakeholders [6]. Edler, Fagerberg defines the innovation process as the generation of new ideas and their practical implementation [4]. The OECD in its regulations defines various forms of innovation: the development of high technology products, the modernization of old ones, service maintenance, new marketing and organizational approaches [14]. Gault used a systematic approach to statistically evaluate and measure innovation [8]. The institutional interaction of science, business, state, society is given much attention in foreign and domestic literature. The concept of an innovation spiral is widely used to study the stages of the innovation process, from the development of an idea to the implementation of innovations, taking into account the existing knowledge potential and the existing education system. Thus, in [22], a theoretical approach was applied to identify the features of the interaction of stakeholders in the process of introducing innovations in agriculture in North Macedonia. The authors presented the results of focus group discussions to assess the innovative potential of agriculture and identified such key factors of technological development as policy,

legislation, knowledge, innovation infrastructure. The authors noted that the education system in North Macedonia is not sufficiently adapted to effectively organize the transfer of knowledge and technology.

The predominance of small-scale agriculture with limited financial resources also hinders the transfer of knowledge and technology, as well as the production of innovative products on farms. From the point of view of agricultural producers, the development of strategies to support innovative production and technology transfer is urgently needed.

Summarizing domestic and foreign developments in the field of formation and functioning of agro-innovation systems, we can conclude that voluntary cooperation of all stakeholders of the innovation process is necessary: the state, universities, research institutes, venture enterprises, enterprises of the real sector of the economy. One of the fundamental factors in the creation of these collaborations is the issue of legal regulation. It is extremely important to create an appropriate regulatory framework that regulates this interaction at the federal, regional and sectoral levels [24,25]. The purpose of the article is to develop theoretical and methodological aspects of the institutional interaction of participants in the innovation process, as well as to create mechanisms for systemic innovation mediation that stimulates innovation activity.

MATERIALS AND METHODS

The methodological basis of the study was state legislative acts, regulatory documents, works of foreign and Russian authors on the subject of innovative development of the agro-food complex. In the course of the study, monographic, abstract-logical, analytical, economic-statistical, expert research methods were used. Regulatory and legislative acts, information from OECD, INSEAD, Global Innovation Index, Rosstat, National Research University Higher School of Economics, Deloitte Research Center and other sources were used as the information base of the study.

RESULTS AND DISCUSSIONS

The most authoritative ratings of innovative activity of the countries of the world are the Global Innovation Index of the consortium of Cornell University (USA), INSEAD Business School (France) and the World Intellectual Property Organization (Global Innovation

Index, hereinafter referred to as the GII). Switzerland topped the list. Together with it, Sweden, the USA, Great Britain, the Netherlands, Denmark, Finland, Singapore, Germany and the Republic of Korea entered the top ten [20].

Figure 1 shows the dynamics of innovative activity in some European countries.

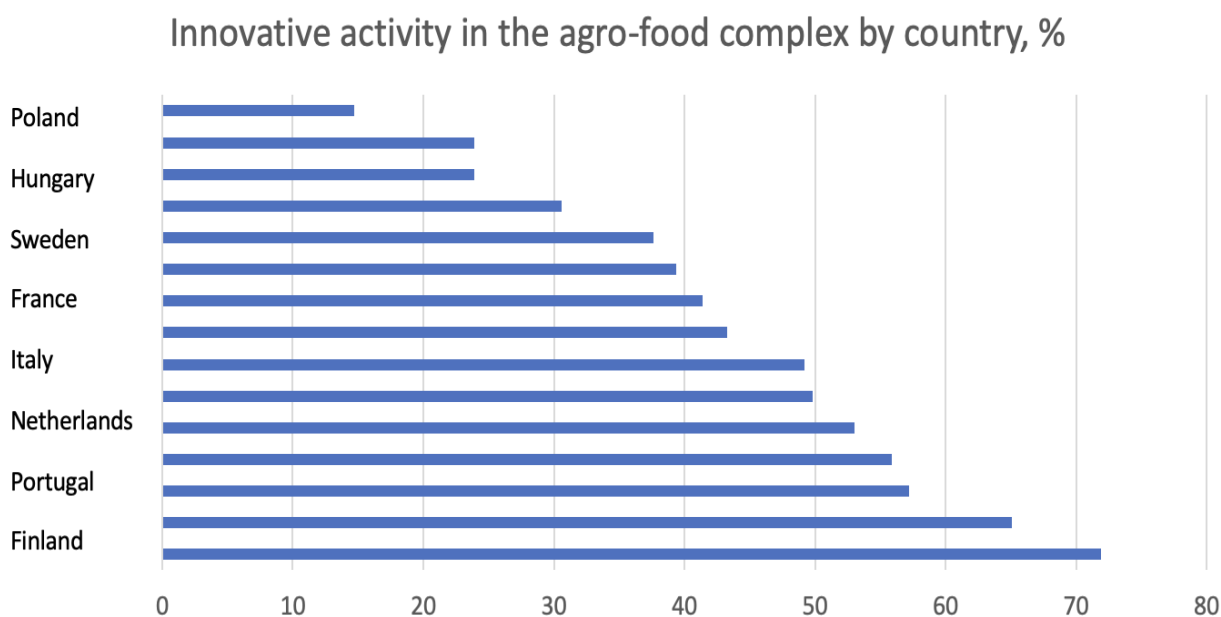


Fig. 1. Innovative activity in the agro-food complex by country
Source: Own calculations based on data [9].

The analysis shows significant differences in the level of innovative activity of different countries. For example, the Netherlands, Portugal, Finland have a value 3-4 higher compared to Poland, Hungary and Sweden. In foreign countries, up to 90% of GDP growth is achieved through the development of innovative and digital technologies and the formed mechanisms for bringing and implementing innovations to specific agricultural producers with an assessment of the corresponding effect.

According to Table 1, it can be seen that the index of crop production (in comparable prices) in farms of all categories amounted to 98.8% compared to the previous year.

The index of livestock production (in comparable prices) in farms of all categories in 2021 amounted to 99.6% compared to the previous year, compared to the level of 2017 -

104.8% (plan for 2021 - 105.5% compared to 2017).

According to Rosstat, in 2021, the index of agricultural production (in comparable prices) in farms of all categories amounted to 99.1% compared to the previous year, to the level of 2017 -104.5% (in 2020 - 105.4% to the level of 2017), which indicates a gradual increase in pace.

The data in the table testify to the positive dynamics and increase in the pace of agricultural production.

The paper proposes a mechanism for innovative systemic mediation, which makes it possible to increase the efficiency of interaction between institutions of government, science, business, marketing in the process of creating, implementing, distributing and commercializing domestic innovative solutions at a higher systemic level - federal, regional, industry [2].

Table 1. Dynamics of the main most important indicators of the State Program for the Development of Agriculture and the Regulation of Agricultural Products, Raw Materials and Food Markets of the Russian Federation, million rubles

| | 2018 | 2019 | 2020 | 2021 |
|---|-------|-------|-------|-------|
| Production index agricultural products farms in agricultural organizations, peasant (farming) farms, including individual entrepreneurs | 99.6 | 106.9 | 110.3 | 109.8 |
| Production index crop production on farms all categories (in comparable prices) by 2017, % | 98.5 | 105 | 105.7 | 104.3 |
| Index of livestock production in farms of all categories (in comparable prices) by 2017, % | 101.1 | 103 | 105 | 104.8 |
| Production index food products (in comparable prices) by 2017, % | 103.6 | 107.8 | 111.2 | 114.7 |
| Production index drinks (in comparable prices) by 2017, % | 101.7 | 106.8 | 108.4 | 117.7 |
| Profitability of Agricultural associations(including subsidies), % | 12.5 | 13.3 | 21 | 25.6 |
| Labor productivity index in % to the previous year | 103.3 | 106.6 | 99.9 | 100 |

Source: Own calculations based on the data from [13].

According to Howells, an intermediary is “an organization or body that acts as an agent or broker in several aspects of the innovation process between two or more parties” [10]. There is a large body of research on how external forms of intermediation drive innovation. Insufficiently high innovative activity of the region implies poorly developed institutional networks, low innovative susceptibility of agricultural enterprises, agricultural producers, the ability to evaluate new external knowledge, accumulate it and apply it to commercialization processes. The key management tools in the course of the digital transformation of the agro-food complex are the processes of knowledge accumulation in the course of interactions between the stakeholders of the innovation process [21, 26]. Collaborations of stakeholders of the innovation process at the regional level are a form of systemic innovation mediation. The main functions of this structure are monitoring the evaluation of the effectiveness of the functioning of stakeholders, searching for reserves for increasing efficiency, developing organizational, economic and social methods for stimulating innovative activity, planning and coordinating interaction between stakeholders of different levels, marketing support for the process of introducing finished package products into agricultural production.

The transition to digital transformation predetermined the emergence of virtual innovation intermediaries in the format of

bilateral platforms linking science and agricultural production. Systemic mediation in the agro-food complex will allow the formation of a certain innovative culture of the agricultural market - collaboration, the formation of which will increase the level of interpersonal and institutional trust in society. The key mechanisms for such development are: lending, issuing loans, leasing, issuing guarantees and sureties, and providing guarantees to export-oriented companies.

To improve the institutional environment, it is proposed to search for innovative mechanisms that reduce the level of transaction costs of economic agents for interaction.

To reduce transaction costs, the stakeholders of the innovation process in the agro-food complex should interact freely and safely. An example of a mechanism for secure interaction between participants and a reduction in transaction costs can be a blockchain platform for the synthesis and operation of smart contracts in the process of managing innovative developments and patents. Blockchain is a continuous sequential chain of blocks built according to certain algorithms and containing complete information about the stakeholders of the process, as well as about the available technological solutions. The data storage system ensures the security and transparency of ongoing transactions, openness to all involved stakeholders, as well as with other interested participants. The data storage system on the network nodes of users of the blockchain system makes the system

practically invulnerable to various information threats [7]. The generated registry will also allow tracking the life cycle of a packaged innovative solution in various sectors of agriculture. Smart contracts based on the blockchain platform can reduce the level of transaction costs of the subjects of innovation and are aimed at creating digital innovation assets and cryptocurrencies; identify stakeholders; confirm the authenticity of files, documents; to form databanks of innovative developments ready for implementation.

CONCLUSIONS

Increasing the efficiency of interaction between the stakeholders of the innovation process in the process of implementing the results of scientific activity is a fundamental factor in the formation of a new model of sustainable development of the agri-food complex in Russia. Measures are proposed to increase the efficiency of communication interaction between the participants of the innovation process using the mechanism of innovation system mediation. To reduce transaction costs, a mechanism for the safe interaction of stakeholders based on a blockchain platform for the synthesis and operation of smart contracts in the process of creating and implementing package solutions of finished innovative products is proposed. The development of innovative mediation in the region makes it possible to reduce the cost of innovation, set up sustainable innovation processes, connect these processes within a single chain of production, distribution, exchange and consumption of innovations in the region. The practical value of the results lies in the possibility of forming an innovative development strategy in the context of the introduction of digital technologies and science-intensive products as a vector of sustainable socio-economic development of Russia

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