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INTEGRATION OF COMPONENTS OF THE MECHANISM OF REALIZATION OF PRIORITIES OF SCIENTIFIC AND INTELLECTUAL POTENTIAL OF AGRI-FOOD COMPLEX

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Abstract

Agricultural science has a large number of completed developments that can significantly improve the efficiency of production and there is a need for mechanisms for their implementation. The purpose of the article is to clarify the methodological provisions of the assessment of scientific and intellectual potential, and identify priorities of such an activity, as well as substantiate scientific and methodological foundations of formation of the mechanism of implementation of the priorities found. The article summarizes the approaches to the assessment of innovations. Key indicators of the knowledge economy are adapted to assess the scientific and intellectual potential of the agri-food complex. In the study, the calculation of specific indicators of efficiency and effectiveness of the scientific and intellectual potential was made, and trends were revealed in the influence of the increase research expenditures on increasing the innovative activity. The analysis of statistical information showed that differentiation of the regions of the Russian Federation in terms of the level and effectiveness of innovative development is increasing, which indicates the need to strengthen the mechanisms of regulation of innovative development. The study discusses the features of the use of interrelated mechanisms of scientific and intellectual potential of the agri-food complex. It is proposed to increase the effectiveness of the institutional environment through the formation of regional centers of forecasting and scientific and technical policy. The directions of transformation of the Russian institutional environment and innovative infrastructure which allow applying the specified mechanisms in agri-food complex at the regional level are offered in the article.

Key words**:** *scientific and intellectual potential, agri-food complex, innovation activity, effectiveness evaluation, implementation mechanisms, management strategy, food safety*

INTRODUCTION

The state of the agri-food complex to a high degree determines the state of the country's economy, since it is closely linked economically with other sectors of the national economy. Agrarian science has a large number of completed developments that can significantly improve production efficiency. However, the massive promotion of innovations in the farms proceeds rather slowly, resulting in a fact that significant part of domestic developments remains unclaimed every year and the current level of development of innovative processes in culture is estimated as ambiguous. In the area of agrarian science fruitfully working in recent years despite serious economic difficulties, a large number of high-quality scientific products are created, and avant-garde cultural producers, coping with unfavorable economic factors, master progressive technologies. The current negative situation and the drop in demand for scientific-technical and high-tech products have determined the delay in the development of innovation process.

The tasks of creating an effective market for innovative products in the agri-food sector as well as effective mechanisms for stimulating demand for it, along with enhancing competitiveness and ensuring food security, are the most important in the development of innovative activities in the domestic agri-food complex [23].

Successful implementation of the strategic objectives of development of the agri-food sector in the context of integrated transformations is impossible without a mechanism to increase the level of

competitiveness of domestic producers in an increasingly competitive environment [20]. The world theory and practice proved that the most effective adaptation mechanism in market conditions is the mechanism based on the system interaction of innovative development tools. The formation and implementation of such a mechanism in the practical activities of enterprises of the cultural sector is currently an indispensable condition for entering the world markets. Along with this, modern realities show that the trend of export success and the appearance of foreign companies in the domestic agri-food market bring not only new opportunities, but also form quite real threats to the loss of competitive positions of domestic production [18]. An effective tool for protection and building up of competitive potential can be an innovative policy of farmers, which requires constant systemic adaptation in the dynamic factors of the market environment [4]. In this case, there is an objective need for continuous improvement of the mechanism for implementing the innovation potential and as one of its main components, the scientific and intellectual potential of the agri-food complex. In addition, it is necessary to adjust its main elements and levers, the nature of the interaction of which should be based on the results of continuous and comprehensive monitoring of the market for cultural raw materials and food. The economic growth is benefic for a country as it is closely related to the increase of wealth, wellness and living standard. The economic growth is a complex concept and for this reason a system of specific indicators is required to be used for a profound analysis [19].

The object of the research is the scientific and intellectual potential of the subjects of innovation process in the agri-food complex.

The purpose of the article is to assess the current level of innovation activity of entrepreneurial structures of agri-food production and substantiate the scientific and methodological foundations for the formation of the mechanism for implementing the scientific and intellectual potential of the agri-food complex subjects.

At the present stage of development of the agri-food complex, the dynamic development of its main areas is impossible without creating an effective mechanism for innovative development of agri-food structures. In developed countries, the degree of competitiveness of the economy as a whole, its individual sectors, business entities, as well as goods and services, is determined precisely by the level of innovation in production and management. The development of the innovation sphere is closely interconnected with the intensification of investment activity, which forms the fundamental basis of scientific research and implementation of innovation projects.

Innovative development of culture is constrained by imperfection of the existing system of encouraging innovation, an effective mechanism for the transfer of science to production. Particular important in the field of innovation and investment support for culture is budgetary and administrative state support, namely, the state institutional structure, quantitative and qualitative measures of national support: federal and regional, foreign economic support measures [25].

The problem of growing investment in culture is a key to developing the competitiveness of the Russian economy. To improve the effectiveness of innovation policy, it is advisable to study forms of state participation and substantiate conceptual theoretical and practical proposals for the development of state support for innovation. The organizational and economic mechanism with an insufficiently developed system of planning and coordinating of basic and applied research leads to an incomplete use of innovative potential of cultural production [6]. At the same time, in Russia, some sectors are building up the potential for innovative development, their products are being exported. Among such industries can be distinguished poultry, beet and pig. At present, despite the growth in the introduction of innovative technologies, there is still a limited nature of their distribution and availability of sales to only a small number of

large cultural producers. In accordance with the Strategy for Scientific and Technological Development of the Russian Federation, approved by Decree of the President of the Russian Federation dated December 1, 2016 No. 642, the current stage of development is characterized by the presence of both competitive advantages and unresolved problems that hinder the scientific and technological development of the country [21].

MATERIALS AND METHODS

Currently, preparations are underway for the creation of research and educational centers, integrating the capabilities of universities, academic institutions, and high-tech companies. The first such a center was established in the Belgorod region, it would bring together scientists and representatives of the business community, who are actively involved in the development of biotechnology in the "smart" agri-industrial complex [3].

At the same time, there are significant differences among scientific and educational organizations in terms of performance indicators and work efficiency, uneven distribution of research potential throughout the country [13]. According to the Strategy, the problems of insufficient coordination of the functioning of research and development institutions with branches of the economy impede the scientific and technological development of Russia. In accordance with the Program “Digital Economy of the Russian Federation”, approved by the decree of the Government of the Russian Federation of July 28, 2017 No. 1632-r., as well as by the Decree of the President of the Russian Federation of May 7, 2018 No. 204 “On the national goals and strategic objectives of the Russian Federation for the period up to 2024 "the task is to increase the domestic costs of the development of the digital economy at the expense of all sources (by share in the gross domestic product of the country) at least three times compared with 2017; the creation of sustainable and secure information and telecommunication infrastructure for high-speed transmission, processing and storage of large amounts of data that is accessible to all organizations and households; the use of primarily domestic software by government agencies, local governments and organizations. The promising areas of the Program are following: “Smart City”, “Transport and Logistics”, “culture”, “Healthcare”, “State Management”, “Energy”, “Industry”, “Construction”. By 2024, it is planned to allocate 521 billion rubles.

In the studies of Andryushchenko S.A., the priorities for the implementation of the scientific and intellectual potential of the - food complex on the basis of the materials of the National Projects "Science" are highlighted [17] and “International cooperation and export” Federal Scientific and Technical Program for the Development of culture for 2017–2025 Resolution of the Government of the Russian Federation of August 25, 2017 N 996 "On Approval of the Federal Scientific and Technical Program development of culture for 2017-2025, the State Program for the Development of culture and Regulation of cultural Products, Raw Materials and Food Markets (as amended on February 8, 2019) [9]: Development and transfer of innovations, Diffusion of innovations, Biologization of technologies used in culture, Creating conditions for attracting credit resources, Updating the fleet of cultural equipment, Effective use fixed assets and investments, growth in production in the food industry [2].

In modern conditions, the assessment of innovative potential is one of the main tools for studying the effectiveness of public administration in the innovative development of culture and agri-food complex of Russia [11]. It is well known that an effective system of management of innovative development requires a sound system of performance indicators in comparison with its performance.

Measuring and assessing the scientific and intellectual potential as an integral part of the innovation potential of the agri-food complex is closely linked to the production potential of the national economy as a measure of its effectiveness [10]. The scientific and

intellectual potential is a relatively stable and independent unit in the Russian economy, since it is formed on the basis of the supply and demand of world markets for the results of intellectual labor.

The knowledge economy is the source of the sustainable development of society by overcoming the fundamental limitation of the economy — non-renewable resources. The main inexhaustible resource is ideas and creativity. A resource, in principle, unlimited and inexhaustible, in the knowledge economy is ideas as a result of human creativity. The human capital factor is the most important source of economic growth; it substantiates the role of education, science, and health care, which previously erroneously belonged to non-productive activities. In general, the transition to sustainable development of society based on the knowledge economy is understood as transition to the economy of the fifth and sixth technological order.

The prospects for the development of the scientific and intellectual potential of culture and agri-food sector as a whole are determined by the laws of scientific and technological progress, the theory of cycles, the theory of economic development of J. Schumpeter, as well as theories of economic growth, theories of post-industrial, information society and the knowledge economy, etc.

In the study of methodological approaches to the analysis and evaluation of scientific and intellectual potential, there are significant differences [16].

A number of sources suggest a resource approach [14]. It is based on the idea of scientific and intellectual potential as a combination of natural, material, financial, and information resources. This approach expresses the ability of an economy to master and use knowledge in order to effectively manage the economy.

RESULTS AND DISCUSSIONS

To increase the effectiveness of the implementation of the scientific and intellectual potential of agri-food complex, it is necessary to conduct a preliminary analysis of strengths and weaknesses, analysis of opportunities and threats when introducing the results of scientific and intellectual activities. Based on the adaptation of the theory of systems to the organization of management of the scientific and intellectual potential of the agri-food complex, a comprehensive review of informational, scientific, design, technological, production, marketing, economic, managerial and social components is proposed, ensuring their mutual influence and complementarity in order to ensure the synergy and the end goals of innovation activities of enterprises [12]. Table 1 presents the data of Rosstat on the dynamics of indicators of costs for technological innovations and the effectiveness of innovation activities as an example - the development of new products and the number of patents obtained [24].

They show that in 2008-2016 despite the growth in the cost of technological innovation, including that in agri-food sector, innovation activity remains low, and there are significant imbalances in some industries.

Table 1. Indicators of the cost of technological innovation and performance of innovation activities of the Russian Federation in 2008-2016

Indicator	2008	2009	2010	2011	2012	2013	2014	2015	2016
Costs for technological innovation, total (million rubles)	276.2	358.8	358.8	733.8	904.5	111.2	1,211.9	1,203.6	1,284.6
Costs for technological innovation of agricultural enterprises, (million rubles)	12.18	10.84	8.76	12.56	16.90	29.97	25.86	25.02	23.96
Developed new food items	1167	-	-	528	400	364	392	214	192
Received patents and copyright certificates	722	-	-	735	724	755	751	741	738

Source: Rosstat data.

To assess the effectiveness of innovation development based on the knowledge economy, it is also important to take into account demand indicators: import substitution of technological services, as well as technologies in general; the number of organizations performing research work, as well as those engaged in the development of innovative technologies; funds spent by the organization on internal research and development; the amount of advanced technology used at the production level; technological innovation costs [8]. In addition, it is necessary to take into account also the proposals of knowledge, among which are: Universities, graduating specialists of different levels; organizations working with graduate or doctoral students; the number of personnel engaged in research activities; share of patents granted; number of employees with a degree; the number of innovative technologies created by the company.

An indirect reflection of the demand for innovative products is the number of applications for patents and inventions and, accordingly, the statistics of their issuance, as well as the value of developed and used advanced production technologies.

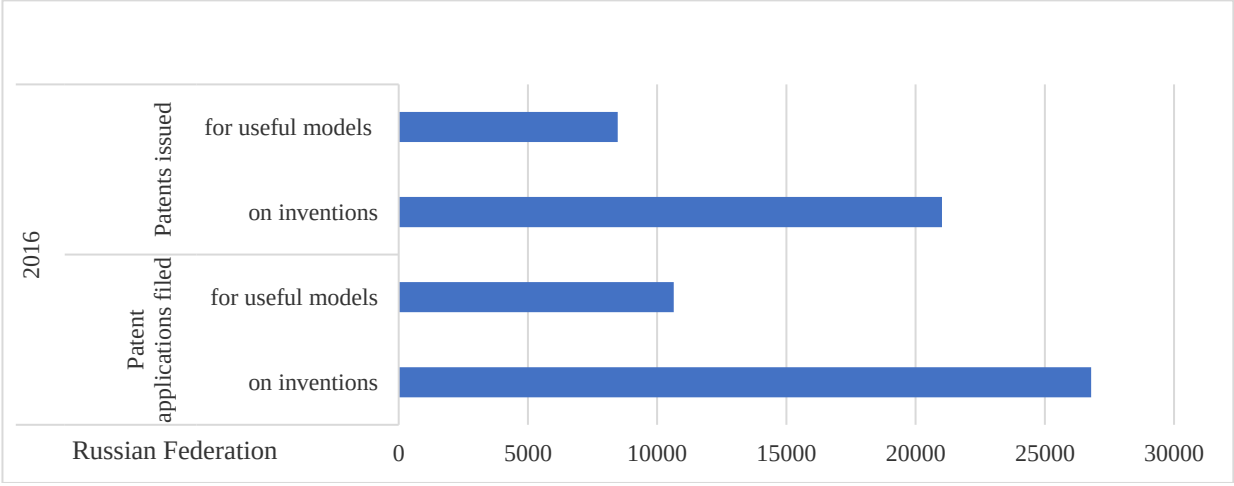

Fig.1. Filing of patent applications and issuance of patents in the Russian Federation in 2016
Source: Own determination.

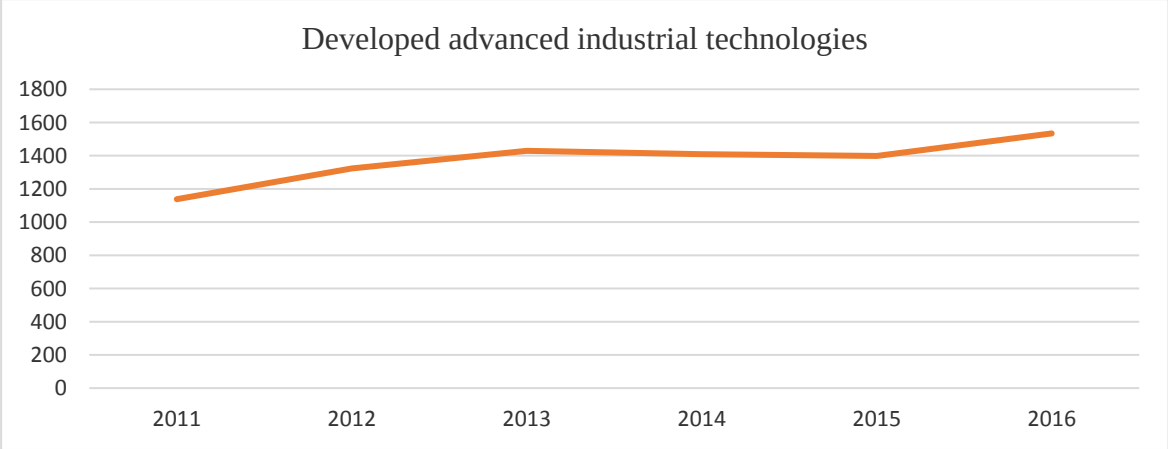

Fig.2. The dynamics of the number of developed advanced production technologies in the Russian Federation in 2011-2016
Source: Rosstat data.

According to Figure 1, it can be seen that the figures for filing and issuing patent applications for inventions are 2.5 times higher than those for applications for utility models.

Analysis of Figure 2 shows that, in Russia as a whole, the indicator “Developed advanced production technologies” has an upward trend

line, while the indicator fell from 2013 to 2015, and in 2016 compared to 2015, the increase was 10% The indicators of the scientific and intellectual potential performance include such indicators as: developed advanced production technologies; the number of used advanced manufacturing technologies; the ratio of the number of advanced production technologies to the number used; number of patent applications filed; coefficient of inventive activity (the number of domestic patent applications for inventions filed in the Russian Federation, per 10 thousand people. population). And also the Information and statistical material "The effectiveness of research and development". The indicators of the effectiveness of scientific and intellectual potential include: the degree of innovativeness of organizations (the share of innovative products in the total volume of sales of organizations implementing innovations),%; number of advanced production technologies created per R & D organization, units on the organization; the number of advanced production technologies created per 1 thousand people employed in R & D; the number of advanced production technologies created by 1 billion rubles, and domestic R & D costs.

The paper proposes the calculation of specific indicators of efficiency and effectiveness of scientific and intellectual potential.

Table 2 and Figure 3 show the dynamics of internal research expenditures (million rubles) per employee engaged in research and development.

Table 2. The internal research costs per employee engaged in R & D in the Volga Federal district of the Russian Federation, for 2005-2016, million rubles

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Republic of Bashkortostan	0.17	0.24	0.34	0.42	0.46	0.53	0.67	0.86	0.88	1.00	1.01	1.11
Mari El Republic	0.18	0.30	0.52	0.80	0.55	0.73	0.74	0.83	1.06	0.57	0.71	0.60
The Republic of Mordovia	0.19	0.24	0.35	0.40	0.54	0.58	0.65	0.74	0.96	1.10	0.83	0.86
Republic of Tatarstan	0.21	0.29	0.35	0.43	0.43	0.49	0.65	0.76	0.85	1.02	0.96	1.03
Udmurtia Republic	0.24	0.22	0.33	0.27	0.37	0.30	0.39	0.58	0.70	0.60	0.69	0.61
Chuvash Republic	0.11	0.15	0.33	0.44	0.48	0.69	0.90	0.93	1.10	1.15	1.06	1.03
Perm Krai	0.32	0.39	0.53	0.62	0.73	0.76	0.83	0.95	1.18	1.11	1.18	1.36
Kirov region	0.20	0.22	0.26	0.33	0.46	0.53	0.53	0.61	0.64	0.76	0.82	0.87
Nizhny Novgorod Region	0.30	0.36	0.46	0.54	0.60	0.77	0.91	1.09	1.04	1.47	1.64	1.88
Orenburg region	0.22	0.25	0.44	0.53	0.50	0.51	0.59	0.62	0.72	0.79	0.68	0.50
Penza region	0.20	0.20	0.22	0.26	0.31	0.40	0.58	0.67	0.81	0.62	0.63	0.81
Samara Region	0.31	0.39	0.41	0.44	0.55	0.62	0.92	1.02	1.13	1.13	1.37	1.23
Saratov region	0.16	0.17	0.26	0.34	0.37	0.47	0.56	0.65	0.57	0.70	0.68	0.82
Ulyanovsk region	0.32	0.35	0.43	0.50	0.59	0.68	1.14	1.22	1.23	1.25	1.70	1.71

Source: Rosstat data.

According to the results of the analysis, it is clear that the largest share of the internal expenditures on scientific research per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016 holds the Nizhny Novgorod Region, the Ulyanovsk Region, the Perm Krai, the Samara Region, the Republic of Bashkortostan, the Republic of Tatarstan.

Table 3 and Figure 3 show the dynamics of the proportion of the population engaged in research and development in the total number of people employed in the economy in the Volga Federal District in 2005-2016.

Table 3. Share of employees engaged in research and development in the total number of employed in the economy in the Volga Federal district in 2005-2016, as a percentage

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Republic of Bashkortostan	0.47	0.44	0.45	0.44	0.42	0.43	0.46	0.45	0.47	0.47	0.46	0.46
Mari El Republic	0.30	0.16	0.14	0.06	0.06	0.05	0.06	0.05	0.06	0.08	0.07	0.09
The Republic of Mordovia	0.28	0.27	0.27	0.33	0.31	0.23	0.24	0.24	0.25	0.24	0.25	0.24
Republic of Tatarstan	0.81	0.79	0.73	0.71	0.71	0.73	0.73	0.75	0.72	0.66	0.65	0.62
Udmurtia Republic	0.27	0.26	0.21	0.22	0.19	0.20	0.27	0.19	0.22	0.23	0.22	0.25
Chuvash Republic	0.24	0.18	0.12	0.19	0.17	0.16	0.17	0.23	0.23	0.24	0.23	0.27
Perm region	1.01	0.86	0.78	0.73	0.75	0.75	0.75	0.77	0.81	0.84	0.92	0.86
Kirov region	0.29	0.27	0.29	0.28	0.27	0.25	0.26	0.28	0.26	0.29	0.29	0.28
Nizhny Novgorod Region	2.88	2.68	2.52	2.43	2.38	2.38	2.35	2.40	2.46	2.37	2.42	2.52
Orenburg region	0.09	0.09	0.10	0.10	0.10	0.09	0.09	0.08	0.07	0.07	0.10	0.15
Penza region	1.04	1.05	1.06	0.98	0.91	0.93	0.96	0.89	0.84	0.86	0.92	0.74
Samara Region	1.55	1.57	1.47	1.29	1.35	1.34	1.04	1.15	1.11	0.86	0.73	0.56
Saratov region	0.57	0.54	0.49	0.45	0.42	0.41	0.40	0.39	0.42	0.40	0.46	0.47
Ulyanovsk region	1.31	1.25	1.16	1.20	1.23	1.26	1.14	1.15	1.18	1.19	0.90	0.87

Source: Rosstat data.

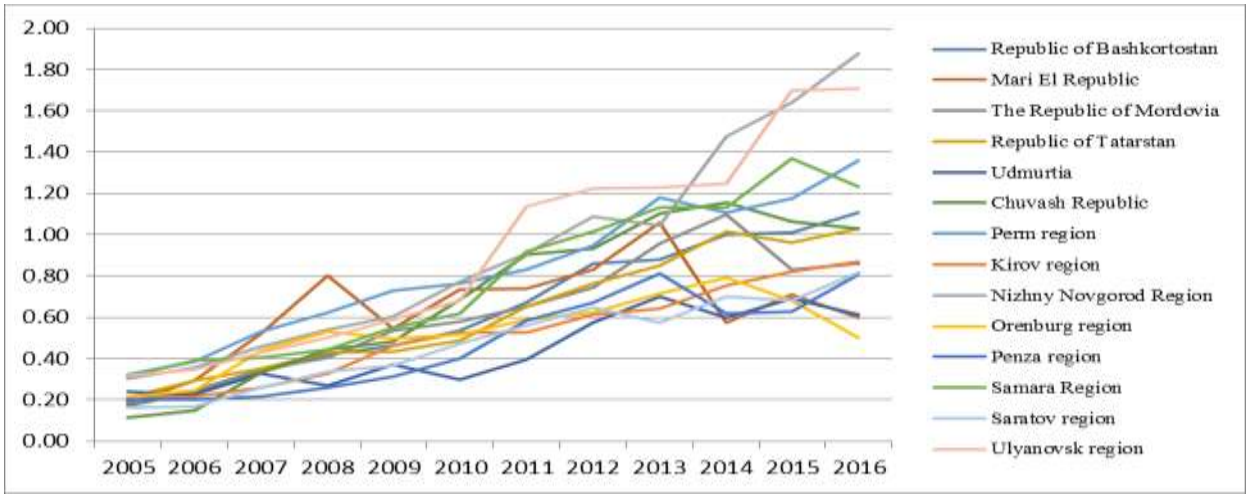

Fig.3. Dynamics of the the internal research costs per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016 (million rubles)
Source: Own determination.

The analysis shows that the highest value of this indicator is typical for the Nizhny Novgorod Region, the Ulyanovsk Region, the Perm Territory, the Penza Region, and the Republic of Tatarstan.

Table 4 and Figure 4 show the dynamics of the share of patents per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016.

The analysis shows that the largest share of the number of patents granted per employee engaged in research and development is typical for the Republic of Mari El, the Republic of Bashkortostan, the Chuvash Republic, the Orenburg region, the Republic of Tatarstan.

Table 4. The number of patents granted per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Republic of Bashkortostan	0.05	0.07	0.05	0.06	0.08	0.06	0.05	0.07	0.06	0.06	0.09	0.06
Mari El Republic	0.08	0.19	0.14	0.48	0.57	0.48	0.31	0.45	0.53	0.51	0.41	0.19
The Republic of Mordovia	0.02	0.05	0.03	0.02	0.04	0.03	0.04	0.03	0.04	0.04	0.07	0.04
Republic of Tatarstan	0.04	0.07	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.07	0.07	0.05
Udmurtia	0.06	0.12	0.07	0.07	0.12	0.08	0.04	0.06	0.05	0.06	0.06	0.05
Chuvash Republic	0.05	0.12	0.10	0.10	0.12	0.10	0.10	0.09	0.10	0.08	0.10	0.08
Perm region	0.03	0.05	0.04	0.04	0.05	0.04	0.03	0.04	0.03	0.03	0.03	0.02
Kirov region	0.04	0.06	0.03	0.04	0.04	0.05	0.03	0.03	0.04	0.04	0.05	0.03
Nizhny Novgorod Region	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Orenburg region	0.11	0.14	0.07	0.08	0.08	0.11	0.12	0.10	0.11	0.13	0.07	0.06
Penza region	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02
Samara Region	0.02	0.04	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.04	0.04
Saratov region	0.03	0.07	0.04	0.05	0.06	0.05	0.05	0.06	0.05	0.04	0.04	0.03
Ulyanovsk region	0.03	0.07	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.02	0.05	0.03

Source: Rosstat data.

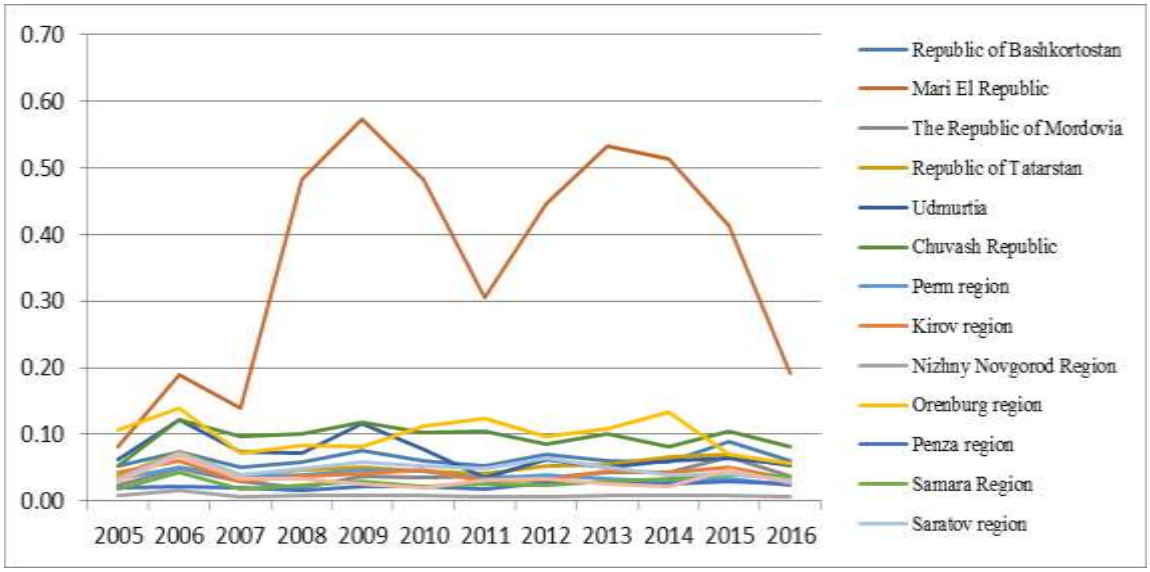

Fig. 4. Dynamics of the share of the number of patents issued per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016.
Source: Own determination.

Table 5 and Figure 5 show the dynamics of the number of developed advanced production technologies per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016.

The analysis shows that the highest value of the number of developed advanced production technologies per employee engaged in research and development is typical for the Republic of Mari El, the Udmurt Republic, and the Republic of Mordovia. In financial terms, in 2017 the volume of innovative

goods, works, and services of cultural enterprises amounted to 22.2 billion rubles, of which 14.9 billion rubles were accounted for livestock and 6.5 billion rubles for crop production. The share of innovative products in the total volume of goods shipped and work performed in the agri-food complex was 1.4% (in industrial production - 8.4%).

Table 5. The share of the number of developed advanced production technologies per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Republic of Bashkortostan	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mari El Republic	0.000	0.002	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.011
The Republic of Mordovia	0.010	0.014	0.009	0.004	0.002	0.009	0.008	0.007	0.005	0.006	0.010	0.008
Republic of Tatarstan	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.003	0.002	0.003	0.005	0.005
Udmurtia	0.001	0.001	0.001	0.001	0.003	0.002	0.003	0.011	0.013	0.011	0.014	0.010
Chuvash Republic	0.000	0.000	0.007	0.006	0.007	0.008	0.004	0.005	0.002	0.004	0.002	0.003
Perm region	0.001	0.001	0.001	0.001	0.002	0.002	0.003	0.002	0.001	0.002	0.002	0.003
Kirov region	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nizhny Novgorod Region	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.002	0.002	0.001
Orenburg region	0.000	0.002	0.002	0.006	0.001	0.005	0.000	0.002	0.003	0.001	0.000	0.001
Penza region	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.004	0.006	0.006	0.002	0.000
Samara Region	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.003	0.002	0.003
Saratov region	0.001	0.002	0.003	0.004	0.002	0.003	0.003	0.005	0.004	0.004	0.002	0.002
Ulyanovsk region	0.000	0.001	0.001	0.000	0.001	0.001	0.002	0.004	0.005	0.004	0.000	0.006

Source: Rosstat data.

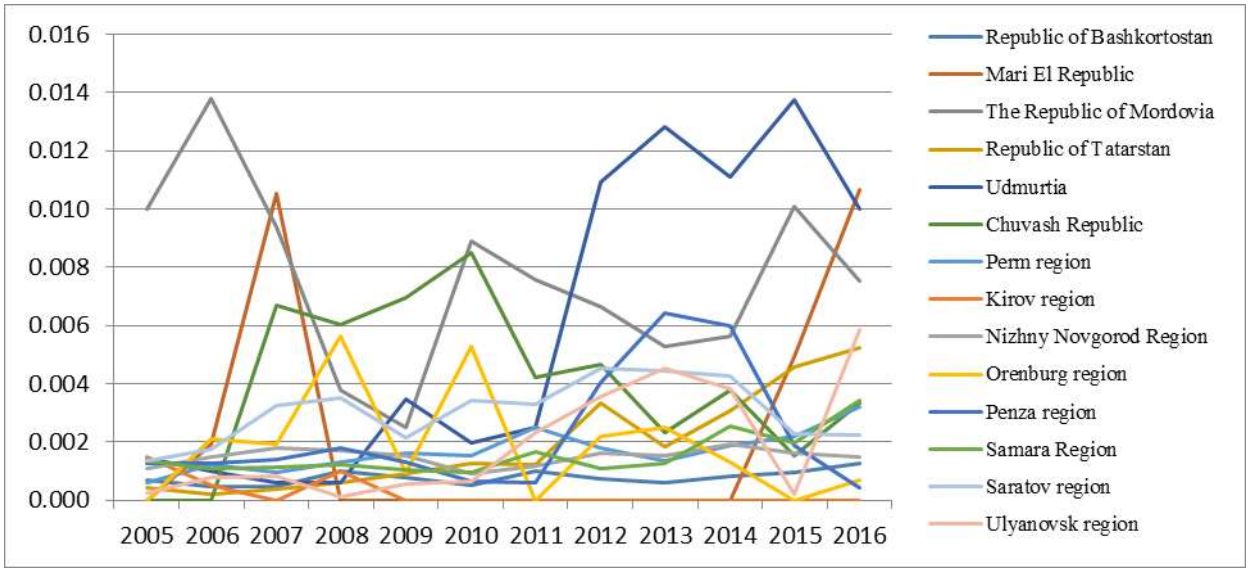

Fig. 5. Dynamics of the share of the number of developed advanced production technologies per employee engaged in research and development in the Volga Federal District of the Russian Federation for 2005-2016.
Source: Own determination.

This indicator differs significantly from statistics of European countries. In Europe, about one tenth of cultural production falls into the category of "innovation" (Spain -

12.7%; Denmark - 11.6%; the Netherlands - 9.2%). The cost of technological innovations in the cultural sector in 2017 was estimated at 15 billion rubles, their share in the total volume of products shipped was equal to 0.9% (Netherlands - 8.5%, Norway - 2.4%, Denmark - 1.9 %, Spain - 1.3%). In the cost structure of technological innovations, investments in the purchase of machinery and equipment dominate - 50.3%, another 17.7% go for engineering, 12.9% for research and development. As for the sources of financing, the innovation activity in the Russian agri-food complex is mainly implemented at the expense of the own funds of enterprises (59.3%), in second place are loans and borrowings (39%). The contribution of other sources is minimal: total budget support provides only 1.1% of the cost of technological innovations (including 0.5% from the federal budget, 0.6% from regional and local budgets), foreign investment - 0.5% [5]. One of the key factors of weak innovation activity in culture is the low level of transfer of innovations to production, when it is necessary to use not only new technology, but also scientific developments implemented in technological processes. In particular, about 60% of breeding achievements recorded by the State Varietal Commission are accounted for by Russian developments, the remaining 40% by foreign ones, Russian institutions and companies continue to register their breeding achievements, however, over the past few years, the share of Russian varieties has decreased. So, if in 2011, 77.4% of breeding achievements registered in the state register were Russian, then in 2016, there were 73.3%, and in 2017 - 71.7%. In the ranking of countries in terms of innovation (Global Innovation Index 2017), Russia was in 43rd place, rising five places compared to 2016. The first three places in the ranking are Switzerland, Sweden and the United Kingdom. In the United States, China, Germany, and other powerful economies of the world – there are hundreds and thousands of breeding companies. There are less than 20 breeding companies in Russia for which breeding is a business. For example, many cultural holdings buy innovative technologies abroad and do not want to invest in a national scientific school of development. Thus, the annual share of the cost of technological innovations in the Belgorod region does not exceed 1%. The exception is one of the largest Russian agroholdings, Agro TERRA, which in 2018 only tested 26 varieties and 9 crops in terms of efficiency under conditions of organic farming. These are cereals, legumes, flax and side rats. Also were tested 12 technologies of biological plant protection [1]. Another reason for the lack of innovative activity is the low level of remuneration of research workers and the problems of reproducing highly qualified personnel. In particular, the average monthly wage of education workers in the Belgorod region in 2017 was about 23 thousand rubles. Similar work, for example, in the countries of Eastern Europe (Czech Republic, Poland) is estimated at 1.5-2.5 thousand Euros, and in Germany 3.5 thousand Euros. The most important factor hindering innovation activity in the agrarian sector of the economy is the insufficient level of development of the system of state regulation of the processes of planning, creating and implementing innovations, in particular, grant support for scientific research. It is noteworthy that the existing grant system in Russia does not take into account the research organizations of the AIC at the appropriate level. In this case, due to the consequences of sanctions, Russia in the 2017 innovation rating was in 26th place below Poland, Malaysia and Italy. To a large extent, the narrowing of the degree of implementation of innovative projects in the cultural sector in recent years is due to the insufficient level of funding for research and development and practical development. An analysis of the sources of ensuring the innovation activity of business structures shows that innovations were financed mainly from their own sources, the share of which is about 52.9%, 1.0% from the state budget, 0.3% and 0.4, respectively. % domestic and foreign investments were attracted, 0.1% - funds from local budgets. One of the main reasons for the low level of use of the

innovation potential is the lack of financial support for the development and production of innovations, the imperfect structure of their sources and the mechanism for placing investments in scientific and technological development facilities. In this connection, an objective need arises to develop effective schemes for advancing and allocating financial resources in the agri-food sector, aimed at increasing innovation potential and enhancing the introduction of innovations of a diverse nature [15].

The strategic objective of the mechanism of innovative development of enterprises of the agri-food complex is the realization of scientific and intellectual potential both in the direction of the ability to realize existing opportunities for innovative development and in activating hidden opportunities that are not currently used. A critical review of the scientific literature made it possible to identify three methodological approaches that scientists identify when studying the nature and composition of the innovation potential: - resource - the availability and level of provision with appropriate types of resources for the implementation of innovative transformations; - diagnostic - the ability of resources constituting the innovative potential to achieve the set development goals; - effective - the ability of the resources of economic entities to create and implement innovations in activities and obtain the corresponding socio-economic effect. When forming a model for the implementation of the scientific and intellectual potential in the agri-food complex, it is advisable to explore the goals and principles, mechanisms, tools, competencies and motivation of the entities carrying out these processes (Fig. 6).

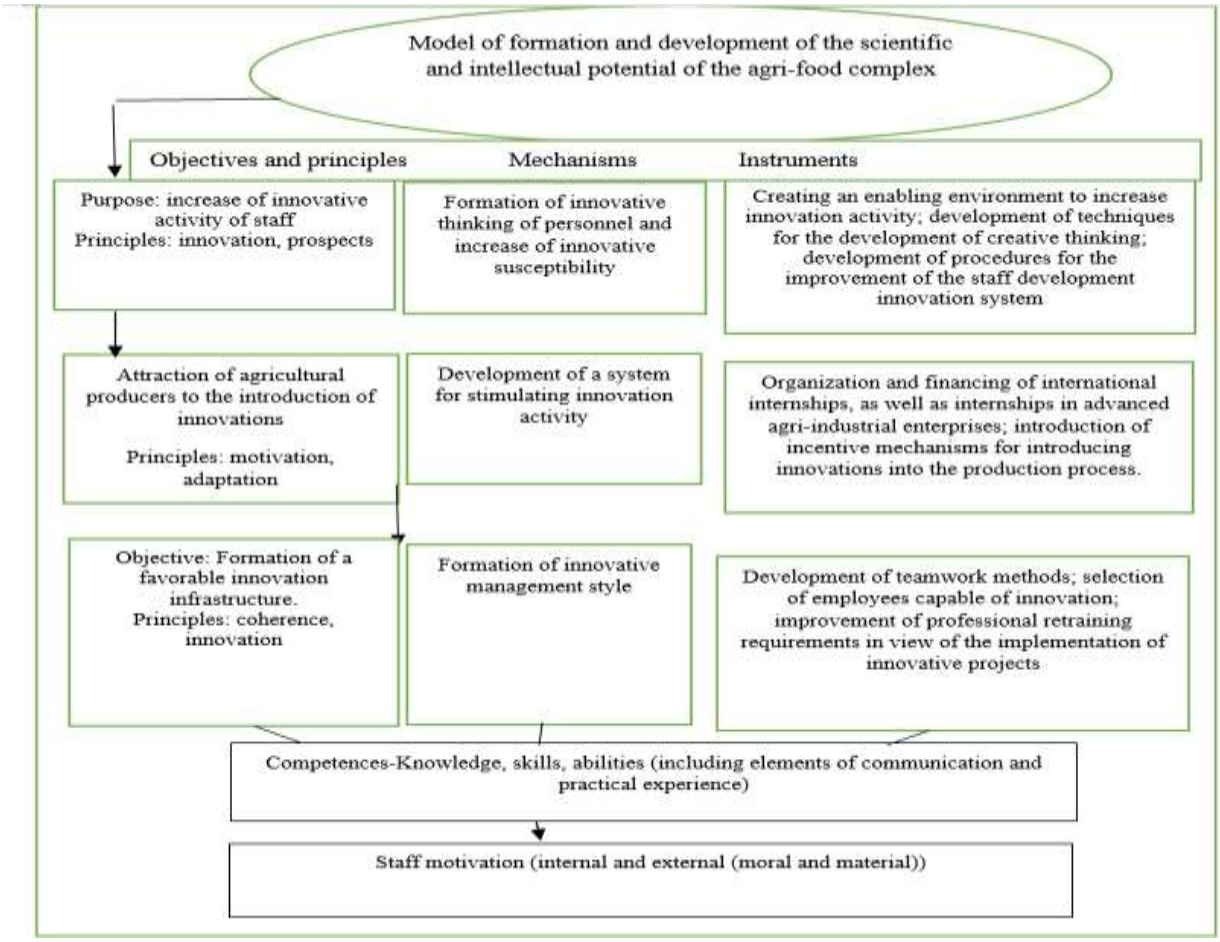

Fig.6. Model of formation and development of the scientific and intellectual potential of the agri-food complex
Source: Own determination.

The strategic goal of the implementation mechanism of the scientific and intellectual potential in the context of interaction with other components is to increase the level of competitiveness and increase the value potential of business structures, manifested in the final effective indicators of business value as an object of sale and purchase on the market [26].

As a result, the problem of developing and implementing strategies, methods, tools and practical measures for the implementation of innovation activities, which in the aggregate are implemented as part of the innovation development mechanism of enterprises, is becoming increasingly topical.

The study proposed a set of interrelated mechanisms for the implementation of the innovation scenario of the development of the agrarian economy of a region, allowing integrating the necessary functions of the individual components of the regional innovation subsystem and increasing the efficiency of its functioning:

(i)the mechanism for formation of technological platforms (creation of promising commercial technologies, new products and services; attracting additional resources for research and development based on the interrelated participation of business, science, the state, civil society); improvement of the regulatory framework in the field of scientific, technological and innovative development);

(ii)the mechanism for the implementation of the "innovation elevator" (coordination of innovation activities in the region; formation of the databases on promising innovation projects; organization of channels for the "transfer" of projects from one development institution to another; the "docking" of research and development with business);

(iii)the mechanism for adjusting federal and regional target programs (ensuring consistency and consistency of target programs at various levels; integrated use of measures and resources embedded in these programs);

4) the mechanism of formation and functioning of federal and regional development institutions (creation of conditions for the formation of the infrastructure of the regional innovation subsystem, providing access to enterprises operating in priority sectors of the economy to the necessary financial and information resources; creation and development of regional development institutions; organization of interaction between federal and regional development institutions) [22].

Table 6. The tasks of implementation of the mechanisms of the scientific and intellectual potential of the agri-food complex

Mechanism	Tasks for implementation of the mechanism
Mechanism for the formation of technological platforms	creation of promising commercial technologies, new products and services; attracting additional resources for research and development based on the interrelated participation of business, science, government, civil society); improvement of the regulatory framework in the field of scientific, technological and innovative development
Implementation mechanism "innovative elevator"	coordination of innovation activities in the region; the formation of databases for promising innovative projects; organization of channels for the "transfer" of projects from one development institution to another; "Docking" of research and development with business
Adjustment mechanism of federal and regional targeted programs	ensuring consistency and consistency of target programs at various levels; integrated use of measures and resources embedded in these programs
Mechanism of formation and functioning of federal and regional development institutions	creation of conditions for the formation of the infrastructure of the regional innovation subsystem, providing access to enterprises operating in priority sectors of the economy, to the necessary financial and information resources; creation and development of regional development institutions; organization of interaction between federal and regional development institutions

Source: Own determination

In the National Project "Science" a significant place is given to the innovative development of culture, including specific tasks for the creation of agri-bio-techno-parks and seed breeding, breeding centers and other research and production units (Table 6).

As a mechanism for transferring the results of scientific research, the calendar of events of the program provides by 2024 the formation of a set of measures for targeting government customers to the purchase of high-tech and innovative products created on the basis of Russian technologies. In the agri-food complex these are not only state bodies and enterprises, but also agri-industrial companies (cultural holdings) [7]. At the regional level, in our opinion, there should be Regional projects to promote the use of high-tech and innovative products within the regional product clusters and competitiveness programs provided by the national project "International Cooperation and Export", which can be used as a mechanism to support the development and transfer of innovations, and essentially form the network structures of horizontal innovation management.

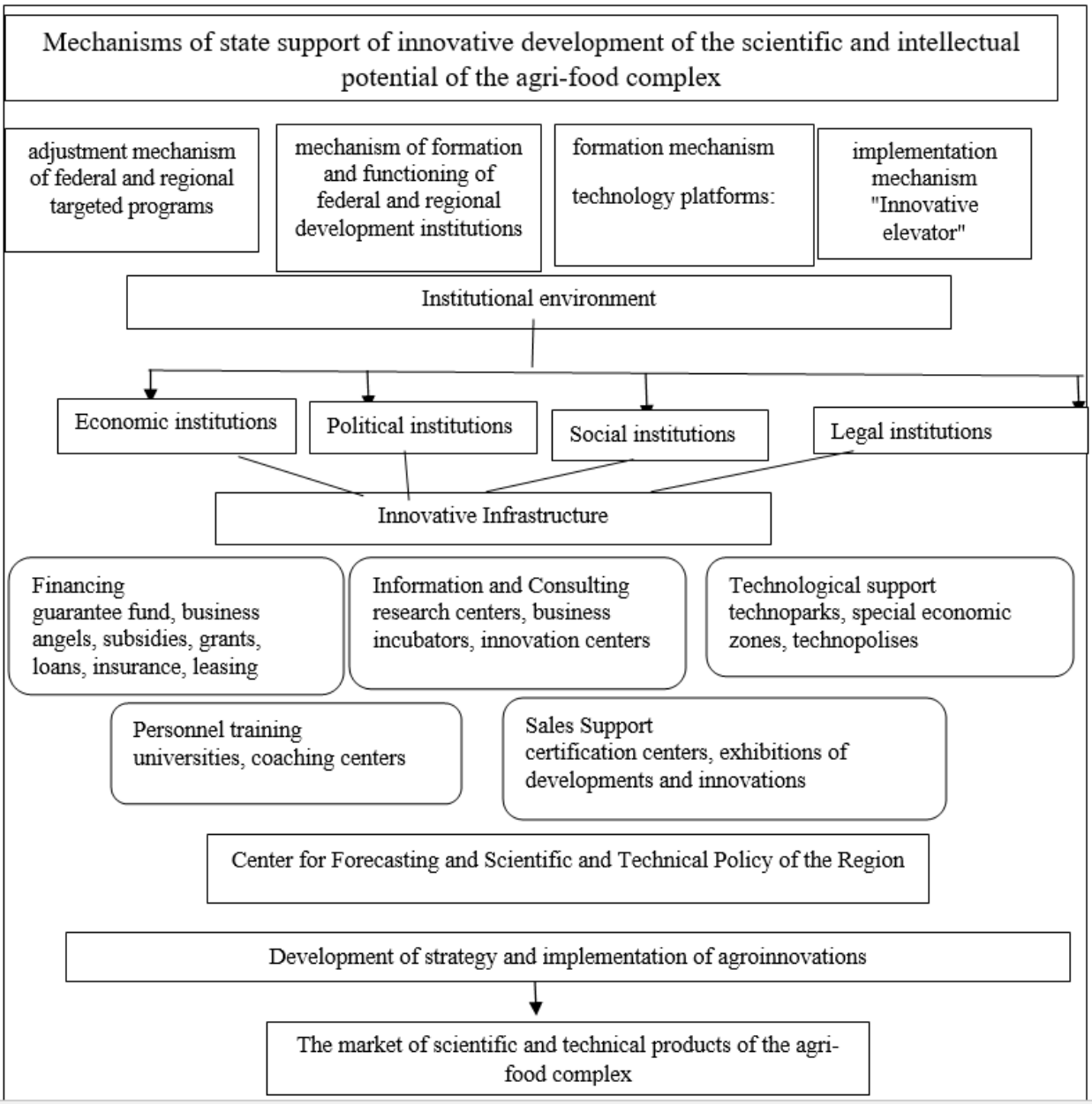

Fig.7. The mechanism for implementation of the priorities of the scientific and intellectual potential of the regional agri-food complex
Source: Own determination.

The paper substantiates the scientific and methodological foundations of formation of the mechanism for implementation of the scientific and intellectual potential of the agri-food complex subjects through the set of components of the innovation orientation of the development of agri-food formations, as well as the infrastructure of the innovation market, methods and principles for implementing the state innovation policy, tools for activating innovative transformations in the industry Fig.7.

CONCLUSIONS

The considered mechanisms of state support for the innovative development of the scientific and intellectual potential of the agri-food complex are implemented through the prism of the institutional environment and the innovation infrastructure of the regional agri-food complex. The Center for Forecasting and Scientific and Technical Policy of the region proposed for creation is called upon to carry out forecasting, strategic planning, programming, quoting, lending, subsidizing, leasing, legal regulation, monitoring, and formation of clusters. The activities of this Center, in our opinion, are aimed at overseeing the cultural organization for introducing innovations, organizing and conducting monitoring of the innovation infrastructure to track popular innovations, and concluding an agreement on cooperation for introducing innovations into cultural organizations. Cultural producers will have the opportunity to develop and implement innovations, since this Center will provide them with complete information on possible types of support and methods of their interaction with organizations of the innovation infrastructure. Innovative infrastructure gains access to all cultural organizations and farmers who need innovation of all forms. The state represented by the Center, by developing the innovation infrastructure, on the one hand, contributes to the activation of innovation in the cultural sector, and on the other hand, it ensures the demand for development and innovation, that is, it provokes the diffusion of innovations, establishes relations between the real economy and science.

These areas of work are implemented on the principles of public-private partnership through the formation of the state order with its support and further reimbursement of part of its value in accordance with the efficiency obtained from the introduction of innovations and scientific and technical products. The efficiency and effectiveness of innovation activities under the influence of the proposed mechanisms for managing the scientific and intellectual potential of the agri-food complex can be expressed in qualitative and quantitative characteristics. These criteria include: effective use of state support funds allocated for the implementation of national projects "Science" and "International Cooperation and Export" in the cultural sector of the constituent entities of the Russian Federation, the achievement of food production and export targets, the realization of the innovative potential of businesses, improving product competitiveness, and performance of economic entities of the cultural sector, the rising cost of business entities, ensuring food security of the country.

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