



## THE STATE OF INNOVATIVE ACTIVITY IN THE AGRO INDUSTRIAL COMPLEX OF RUSSIA

Yusuf A. MALKANDUEV<sup>1</sup>, Marina T. TEKUEVA<sup>2, 3\*</sup>, Salikh A. BAYZULAEV<sup>4</sup>,  
Rita H. KUSHBOKOVA<sup>5</sup>

<sup>1</sup> Professor, Doctor of Chemical Sciences, Professor of Kabardino-Balkarian State University Named after Kh. M. Berbekov, Nalchik, Kabardino-Balkarian Republic, Russia,

<sup>2</sup>Kabardino-Balkarian State University named after HM Berbekov, Nalchik, Kabardino-Balkarian Republic, Russia,

<sup>3</sup> Advisor to the Academy of Natural Sciences,

<sup>4</sup>Associate Professor, Candidate of Economic Sciences, Associate Professor and Head of the Department of Economics and Finance of Kabardino-Balkarian State University Named After H.M. Berbekov, Nalchik, Kabardino-Balkarian Republic, Russia.

<sup>5</sup>Associate Professor, Candidate of Economic Sciences, Associate Professor of Economics and Finance of Kabardino-Balkarian State University Named After H.M. Berbekov, Nalchik, Kabardino-Balkarian Republic, Russia

**\*Corresponding Author**

**Email:** tekueva.m@mail.ru

### ABSTRACT

*The article considers the importance of innovative development of the Russian agro industrial complex as an indispensable condition for importing substitution in the agro-food market. Disclosed about the current state of the agrarian sector in Russia, including state regulation and information and consulting support. The foundations for the creation of an innovative system in the agro-industrial complex of Russia based on the sectoral structure, system-forming participants and infrastructural elements, the improvement of the technology transfer mechanism, brief foreign experience reviews. It is addressed to researchers, teachers and students of agricultural and economic universities, as well as managers and specialists of enterprises of the agro-industrial complex.*

**Keywords:** Innovative Development, Agro-Industrial Complex, Innovative Potential, Innovation Policy

### INTRODUCTION

The Selsk farm is a special and specific environment with which no other branch of the economy can be compared. It includes large-scale production, extensive rural areas, the system of science and education and all those interested in agrarian topics. All of them need to receive and exchange information that with the help of informatization, can turn into a fundamentally new means of transferring innovations to the most diverse consumers, fulfilling the function of the motor of the economy. Today, we have a unique opportunity to extract the different effects at all levels of management and unite the information network of all participants of the agro sphere like many of producers and consumers of innovations. And, as Sharma (2018) declared the synthesis and assaying of the biological potential of new agrochemicals have received considerable interest in the recent years.

The innovative way of development is the only acceptable way to ensure the competitiveness of the Russian agribusiness sector and, moreover, a real opportunity to survive in the global economy. The domestic economy is experiencing a chronic technological lag, for which it is necessary to pay a high price. This was the case during the First and Second World Wars,

when Russia paid the lives of its soldiers on the battle for supplied weapons and other goods by considering the outcome of these wars. And at the end, after the Victory, the country remained due to the allies.

Suvorov *et al.*, (2018) studied the electrochemical and electrostatic decomposition technologies as a means of improving the efficiency and safety of agricultural technologies. Technological gap in agriculture throws our farmers back in terms of yield Sel'hoz'kultkr crops and livestock productivity, which will inevitably affect the economy of the industry. Overcoming this lag is possible first of all due to the widespread use of various innovations - in technology, management and production methods, processing and sale of products. The possibility fact in principle is evidenced by the experience of advanced agrarian enterprises successfully competing in world markets. And innovation and innovation serve as the means of overcoming the economic crisis.

## METHODS AND MATERIALS

During the research, methods such as analysis and synthesis were used. The materials of the research are chosen according to the studies of well-known economic scientists of different countries of the world and statistical data.

### *Main part*

The factors influencing the innovative development, according to the nature of the impact on this process, are divided into restrictive (restraining innovative development) and expansionary (stimulating innovation process). Factors that stimulate the innovative development of the agro industrial complex include: the availability of natural resources, significant scientific and educational potential, a capacious domestic food market, the ability to produce environmentally safe natural food and the transition to a market-based mode of management. The factors are hampering the development of innovations in the agro-industrial complex include: the shrinking of the domestic demand for food, the reduction of state support for the agricultural sector and the state financing of scientific and technical programs, high interest rates on loans, the lack of innovative infrastructure, the financial difficulties of organizations, AIC in the field of innovative management (LV Grishaeva, 2008). As restrictive factors, it is necessary to note the departmental disunity and weakening of the scientific potential of agrarian science. In particular, the domestic agrarian science is characterized by: a high degree of complexity of the organizational structure and departmental disunity (more than 20 ministries and department participates in solving problems of the agro-industrial complex), the diversity of forms of scientific, technical and innovative activity; significant share in scientific research of problems that have a regional, sectoral, inter-sectoral character; a long duration of research of some problems of agro-industrial complex in the field of innovative management. The innovative factors in the agro industrial complex are influenced by the factors shown in Figure 1.

Analyzing the possibilities of determining the potential for innovative growth and development, among the strengths of today's state of innovative development of the agro industrial complex can be identified: political stability in Russia, providing opportunities for coordination, targeted agrarian policy; the availability of innovative capacity and the number of others: existing scientific institutions, world-renowned scientific schools, the system of



vocational training and retraining of personnel; implementation of a policy of information openness and intensive development of the Internet communication system, including the implemented state program for providing Internet access for rural schools; availability of industrial centers with a developed infrastructure production on the basis of which in the shortest possible time, perspective technical and technological solutions for the agro sphere can be based; favorable overall ecological situation, which determines the high potential attractiveness of the village as a zone of ecologically clean production of food products, recreation.

**Negative trends include:**

- 1) legal - the absence of a federal regulatory framework that regulates the processes of innovative development in the agro industrial complex (a law on innovation policy in the agro-industrial complex is needed); large "White spots" of agrarian and civil law, which, on the one hand, do not regulate many processes in agriculture, on the other - there are needs both in the law and in the creation of targeted departmental programs that stimulate the introduction of innovations;
- 2) information - lack of a single information space of agro innovations and insufficient integration of potential consumers in it; low information culture of the bulk agricultural producers; archaic organization of the information space, extremely limited use of online tools, lack of unified and public databases, expert systems; deep dependence on priority software products, weak interest of agribusiness and agrarian science structures in the development of new software tools, including interaction with movements grouped around FSP, other groups supporting the principles of licenses of GNU, BSD and the use of open codes;

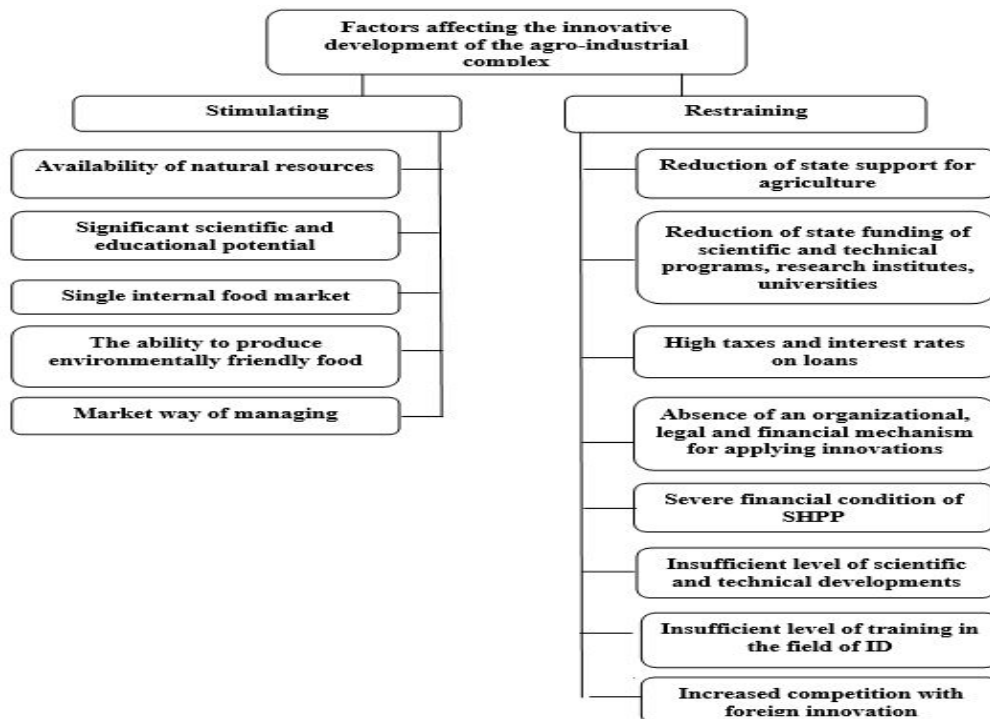


Figure 1. Factors influencing innovative development in the agro-industrial complex (Golubev, 2015)

- 3) organizational - increasing the gap between science and production due to their organizational disunity; "Consumer" orientation of investment in the social sphere of the agro industrial complex, oriented to "patching holes", rather than on development, not related to the comprehension of prospects, the implementation of tasks of mobilizing the capabilities of the regions, the use of competitive advantages; insufficient efficiency of the existing structure of production with a small share of production with high added value; lack of innovative ideology as a whole; significant differences in the socio-economic potential of municipalities; disunity between the scientific research institutes of the agro-industrial complex and university science, the extremely low participation of the universities, which are the leading agents of innovation activity worldwide, in the processes of introduction of innovations in the agro-industrial complex;
- 4) technological - increasing lagging behind the standards of developed countries in technology, infrastructure development, which reduces the competitiveness of products produced by the agro-industrial complex; low technical equipment in agriculture, inefficient employment in rural areas;
- 5) Infrastructural - the decline of the infrastructure that existed in the Soviet period to support innovation activities with the slow creation of new forms (mechanisms for providing scientific institutions with materials, resources, and supporting for international relations); underdevelopment of the innovation transfer infrastructure, their implementation, performance monitoring;
- 6) financial - lack of incentives for the implementation of scientific-
- 7) technical and innovation activities and low innovative activity of organizations; Low demand for innovation from business; creating a situation in which scientific research and development is not needed by the country's economy; the predominance of investors' orientation towards the primary investment of resources in short-term, non-innovative projects of organizations, which creates a real threat of the loss of innovative opportunities in the economic system of the agro-industrial complex; low level of salaries for scientists and specialists; Inadequate understanding by all participants of the process of the financial aspects of the commercialization of innovations; underdevelopment of the market of technological innovations; staffing - lack of innovators; insufficient general level of education in rural areas.

All mentioned problems are summed up in the inconsistency of innovation process in the agro industrial complex in the structure of modern agriculture in Russia, which has its own specifics, (Golubev, 2015), features of agricultural production (IG Ushacheva et al., 1990), (Concept of the development of agrarian science and scientific support of the agro-industrial complex of the Russian Federation for the period up to 2025 since 2007): the multiplicity of types of agricultural products and products of its processing, a significant difference in the technologies of their cultivation and production; significant dependence of production technologies in agriculture on the emerging natural and weather conditions; (MTTekueva et al., 2017), a large difference in the production period for certain types of agricultural products and products of its processing; high degree of territorial disunity of agricultural production and significant difference of individual regions in terms of



production; different social level of agricultural workers, requiring much more attention to train and raise their skills and organization of postgraduate education.

They can be presented in the form of a pyramid of problems of innovative development, the narrowest place of which is the promotion of innovations in production (figure 2) (Golubev, 2015).

The model of the innovative development of the agro-industrial complex in the most general form (figure 3) (Golubev, 2015) is represented by the production of a demanded innovative product of research institutes, universities, other established manufacturers of scientific products, as well as best practices, a system for selecting innovations and transferring them to agricultural production.

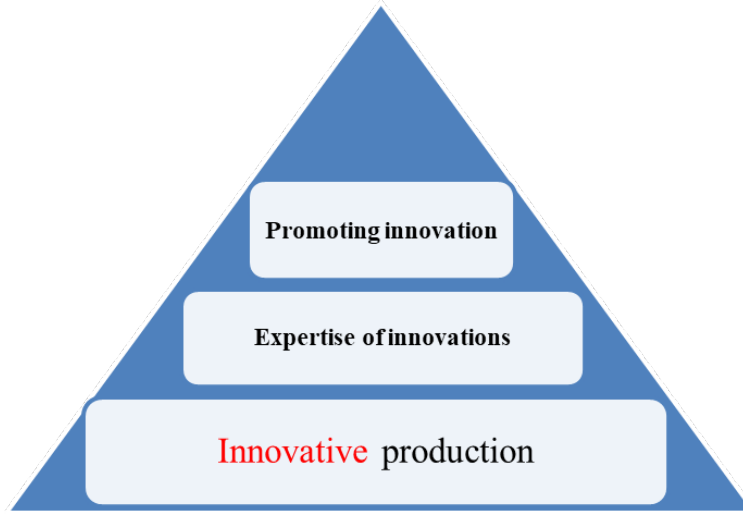


Figure 2. Pyramid of innovative promotion

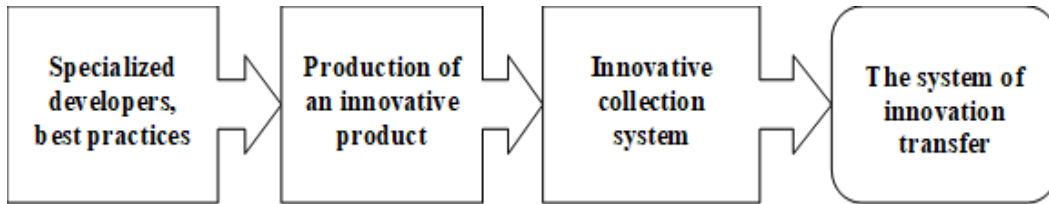


Figure 3. Model of the system of innovative development of the agro industrial complex

Each of the links has their special weak points. In particular, the biggest problem of modern agrarian science and production is a weak coincidence of the interests of the producer and consumer of innovations. In addition, we can highlight the specific problems of innovators of the agro industrial complex:

- Research institute problems - lack of skills, managerial personnel in the field of commercialization of intellectual resources; the lack of demand for scientific developments that are in demand abroad; the work of the SRI on itself, a weak influx of young forces into science; problems remain that the existing system of scientific support for new market conditions and the multifaceted nature of agriculture do not correspond;
- Problems of higher educational institutions of the agricultural profile are the complexity of the output of innovative products to the domestic and foreign markets; banal low



financial support of scientific works; low pay of scientists-developers (ten times lower than that of Western colleagues); the outflow of young scientists (the lack of a state motivational mechanism for securing promising young scientists in higher education), the lack of coordination of research in higher education institutions, and a weak material and technical base. So are the global technologies that support the transfer of production (although, to a lesser extent, than the scientific research institute);

- Problems of best practice - the lack of a mechanism for replicating innovations, the PR of the unique methods and forms of production created by the enterprises of the agro-industrial complex themselves, which make a better possible function and develop effectively.

The most characteristic features of innovative development are: the multiplicity of forms and relationships of agricultural producers with innovative formations; the isolation of the majority of agricultural producers at all levels - from organizations that produce scientific and technical products, to enterprises that implement it; lack of a clear and scientifically sound organizational and economic mechanism for transferring scientific achievements to production and, as a consequence, a significant backwardness of the industry in the development of innovations in the APP.

Agricultural production is characterized by specific innovations. In terms of the subject and scope of application in the agro-industrial complex, there are four types of innovations: selection and genetic; technical, technological and production; organizational, managerial and economic; social and environmental.

Obviously, the first type of innovation (breeding - genetic) is inherent only in the agriculture. The new varieties and hybrids of agricultural lands are new breeds, types of animals and crossbreeds of poultry, plants and animals resistant to diseases, pests and unfavorable environmental factors (AP Berdashkevich, GK Safaraliev, 2003).

The risk of financing scientific and production results, the risk of a temporary gap between costs and results and the uncertainty of the demand for innovative products do not interest private investors to invest in the development of agriculture. This situation is aggravated by specific factors to agriculture, such as increased capital intensity of renewal material and technical base, limited own sources of accumulation to achieve a qualitatively new level of organization and technology, and also traditional backwardness in agriculture (Golubev, 2015).

Nevertheless, the course of the innovation process in the agro industrial complex of Russia can be characterized as extensive, i.e. sluggish. Although in the pre-reform period there was a certain tendency to increase the efficiency of land use and increase production of agricultural products.

The indicators of productivity (technological efficiency of agricultural production): the yield of agricultural crops and the productivity of animals are an evident productive indicator of the course of the innovation process.

An analysis of these data showed that the gross output of agriculture in comparable prices as a cumulative index of technological efficiency over the pre-reform years in the growth has naturally grown which was the result of the intensification of production on the basis of scientific and technological progress.



Agrarian reform has stimulated the search for new organizational structures that ensure accelerated development and adoption of innovations. By the end of the twentieth century, 37 techno-parks, 7 agro techno parks, 120 research and production systems and other innovative formations were formed in the agro-industrial complex of Russia (IRMikitaeva, MTTekueva, 2015; Golubev, 2015).

However, in the future, the absence of measures of state protectionism, massive bankruptcy of farms and unclaimed production of scientific developments led to the curtailment of the created innovation infrastructure in the agro-industrial complex. Moreover, in 55 regional management bodies of the agro-industrial complex even the services ensuring the development of scientific and technological progress, innovation and information activities, propagation of scientific achievements and best practices were abolished. As a consequence, the management of scientific and technical policy in these regions has become an unsystematic one (the Concept for the Development of Agrarian Science and Scientific Support of the Agro-Industrial Complex of the Russian Federation until 2025 since 2007).

The financing of the regional agencies of the AIC for the development of the results of scientific and technical activities and the implementation of innovative programs were completely discontinued.

At present, the flow of foreign technologies in Russia suppresses the development of the national innovation policy and creates a real danger in the form of dependence on foreign developments. The agrarian sector of the Russian economy still has an unfavorable situation, including in the scientific and technical sphere, which is explained by low investment opportunities for agricultural producers to activate innovative activities.

Development and innovations mastering are constrained by the following problems: low profitability of production; reduction and aging of the machine and tractor fleet (MTP), simplification of technologies; low level of prices for agricultural products, limited sales of products, inaccessibility of the bank loans, high payable accounts; poor adaptation of agricultural machinery enterprises to market conditions; problems of demographic character and staffing; high bank rates for loans of the agribusiness; the disruption of communication with scientific agricultural organizations ; lack of information infrastructure.

A sharp rise in prices for agricultural machinery led to the depreciation of the depreciation fund, and the insolvency of agricultural producers caused a decline in demand for machinery. The sharp rise in prices for industrial resources (fuel, lubricants, electricity) caused an increase in the cost of mechanized work by 30-45% or more, insufficient public investment in research and development, small funds to stimulate development, inadequate legal protection and also slow down the development and implementation of innovative projects.

Currently, the key problem in the development of enterprises and branches of the agro industrial complex is not the low level of material (federal and regional) support, how many ineffective use of allocated funds, the low level of qualifications of specialists who make and implement decisions on production development, extreme limitations in the scope of innovation.

Financing of Russian science as the main generator of innovation for many years remains at the level of 1% of GDP, the EU spends almost 2%, the USA - more than 2.5, Japan - more than



3, Finland - 3.5%. If these relations do not change, it will be difficult to solve the tasks that are set for the agro-industrial complex.

The presented data show that the volume of financing of scientific research and its real growth are insignificant and do not correspond to the innovative model of economic development (Golubev, 2015). The spending dynamics on science is not correlated with the strategic priority of building an innovation system by developing fundamental and applied science, supporting large scientific and technical projects and promising technologies, creating incentives for innovation.

The most unfavorable impact on the development of the innovation process in the agro-industrial complex is the low level of effective demand for scientific and technical products. The lack of own funds in the most agricultural producers, accompanied by limited budget sources of financing and the practical inability to obtain borrowed funds for innovation, does not allow them to develop new technologies (Golubev, 2015).

The weak link in the formation of the innovative market of agribusiness is the study of the demand for innovation. When selecting innovative projects, their economic expertise is not carried out, development efficiency indicators are not calculated, and schemes for promoting the results obtained in production are not worked out. Every year, up to 40-50% of completed scientific and technical developments remain unclaimed, which is a consequence of the lack of an effective organizational and economic mechanism for managing innovation activity in a market that encourages the developer to create innovative projects, and the consumer to use them.

The difficulty in conducting a detailed analysis of the current state of innovation in the agricultural sector of the agro industrial complex is due to the lack of accounting for this type of activity in such quantities and indicators as is done in industry. In particular, agricultural and processing enterprises do not keep records of innovations being mastered. There is no similar accounting in the scientific and technical sphere (RF, 1998).

It is established that the decrease in the volume of production of agricultural products is directly connected with the fall of the technical equipment of agricultural producers. This factor mainly affects the sharp decline in arable land in circulation, compared to 1990 it decreased by 35 million hectares. ICC in agricultural organizations has decreased (the load on the machine operating in agribusiness, increased over the past 10 years, 2-3 times), up to 80% of the cars have exhausted their service life and require increased by 30-50% the cost of maintaining it in working condition (Golubev, 2015) (IRMikitaeva, MTTekueva, AVTemiraeva, 2015). A high degree of wear and tear of the equipment leads to the fact that 20% of its presence does not participate in field work. Therefore, simplified technologies are applied, optimal terms of work are violated, 25-30% of grain, 40-45% of potatoes and vegetables, and up to 30% of sugar in harvested beets lost. A sharp decline in the purchasing power of agricultural producers led to a crisis in the domestic agricultural machinery industry, which repeatedly reduced the production of all types of machinery and equipment. The reliability of new agricultural machinery in the last decade has decreased by 1.5-2 times. The repair and maintenance base of the agro-industrial complex is losing its technological level and moving away from agriculture. More than 50% of its capacity has changed the profile of its specialization.





The paradox of technical and technological backwardness of agricultural production in the case of strong agricultural science in the country is explained not only by the lack of funds for farmers to upgrade the ICC, but also by the extremely weak integration of research activities not fully focused on the creation and use of modern technologies, the formation of a technology policy and the lack of conducting network of NTP achievements introduction in agricultural production. The overwhelming majority of scientific developments settle in different kinds of reports and recommendations, not reaching directly to agricultural producers.

In industrialized and agricultural countries, up to 85% of GDP growth, including in agriculture, is formed due to new knowledge being realized in science-intensive technologies. The added value per agricultural worker in our country at the beginning of the century was \$ 2037. In the United States, it was \$ 623,000, in the United Kingdom it was 19, and in Germany \$ 14,000. Thus, in Russia this figure ranged from seven to ten times lesser than in developed countries.

The dependency of agriculture on foreign countries in the scientific and technological respect is growing. For example, the share of foreign varieties in the total sowing of vegetable crops is 90%, sugar beet - 82, corn - 60%. About half of the purchases of pedigree cattle are foreign purchases. According to agricultural machinery, this figure is about 70%. And in order not to turn our enterprises into assembly shops of agricultural machinery from import components, we must pay the closest attention to education and science and to the introduction of the results of their activities in production.

There are 55 agricultural universities in the country, which produce an average of about 100,000 specialists a year. In the framework of integration processes, it is necessary to form innovative educational and scientific production structures, agrarian and technological parks, and demonstration sites for science-intensive agricultural technologies (Golubev, 2015).

It is important to create a favorable legal environment for the commercialization of research results both for universities and for research institutes to establish new businesses and innovative business - structures.

Agrarian science currently has sufficient potential, capable of ensuring the implementation in the agricultural sector of an active innovative policy. In this regard, there is a need to take urgent measures to increase the efficiency of the use of the scientific and technological potential of the industry.

In recent years, despite the rather difficult economic situation of the AIC and its enterprises, the innovative processes in the industry have gradually become more active. This is especially true for the group of the most advanced agricultural enterprises of the country, which are actively developing in the production of innovations, while the absolute majority of enterprises implementing scientific achievements achieve significant improvements in production and economic indicators. First of all, it is clearly visible on the example of the yield of agricultural crops and productivity in livestock. Comparison of the indicators with the average data for the whole country shows a significant difference, which reaches 2-3-4-fold levels. In addition, if in the advanced farms there is a tendency to increase such indicators, then on average for all other enterprises they decrease.

The domestic experience of using the results of R & D by agricultural producers shows that the current trend in the development of innovative processes in agriculture should be assessed as



highly contradictory. On the one hand, agrarian science has been successfully operating in recent years, despite serious economic difficulties and produces a significant amount of high-quality scientific products, advanced farms and also while overcoming the negative situation (usually external character) organizes the development of innovations (Golubev, 2015). At the same time, unfortunately, this does not happen in the agrarian and industrial complex. The current economic situation, a sharp decline in effective demand for scientific, technical and science-intensive products led to a reverse trend and a delay in the development of the innovation process.

All problems associated with the practical use of achievements and agricultural producers are forced to solve the most independency in the absence of effective assistance from the state. Therefore, the innovative potential of the agro industrial complex is used within a few percent (for comparison: this figure in the US exceeds 50%).

The main purpose of the state innovation policy during this period should be, on the one hand, to preserve, to the maximum extent, the accumulated scientific and technical potential and, on the other, to develop the necessary infrastructure and develop mechanisms that stimulate the development of the innovation process.

To create and replicate innovation, not only developed science, production (capable of perceiving its achievements) and the consumer of its products are needed, but also incentives encourage people to create and introduce innovative acts (financial means, favorable social conditions, etc.), depending on level of development of the society and its orientation to the scientific and technical progress (Golubev, 2015). If this orientation is positive, then innovation forms an innovative system that includes all the components of the structure of the innovation process: large companies that are able to invest significant funds in the development of research and development, bring their results to mass production, upgrade equipment, etc.; small innovative business with specific forms of its financing (risk capital), service organizations; the state with its legislative base, scientific and technical policy aimed at regulating and stimulating the innovation process using legal, economic, organizational means; the market of new technologies, providing the innovative system with feedback and demand for innovative products.

Innovative development adequate to the forthcoming scales and tasks of scientific and technical transformation of agricultural production is possible if there is a properly organized and effectively functioning innovative system of the agro-industrial complex (Golubev, 2015), representing a set of interacting organizations participating in the process of creating and developing innovations with resource and institutional support for innovative process in the agrarian sphere.

Its system-forming principle is the reproduction of agro innovations and the mastering in the mass practice of more advanced methods of agricultural production, which in their totality determine the innovative development of agriculture. The latter, in turn, presupposes the existence of a set of interrelated support measures, the task of which is to create favorable conditions for the passage of all stages of scientific and technical renovation of production.

The provision of innovative development of the agro industrial complex consists of two blocks: resource and institutional (Figure 4) (IV Kurtsev, 1978).



The essence of the innovation system can be described as an integral set of interacting social institutions and organizations that make the transformation of scientific knowledge into new types of competitive products and services in order to ensure social and economic growth.

The main elements of the innovation systems are:

subsystem of generation of scientific and technical knowledge (scientific organizations, universities, small innovative enterprises, individual developers);

a subsystem of increasing the perception of innovation; subsystem of innovation transfer;

subsystem of application and use of scientific and technical knowledge (sphere of innovative activity);

subsystem of support and dissemination of innovations (state support for innovation, innovation infrastructure, venture capital, etc.).

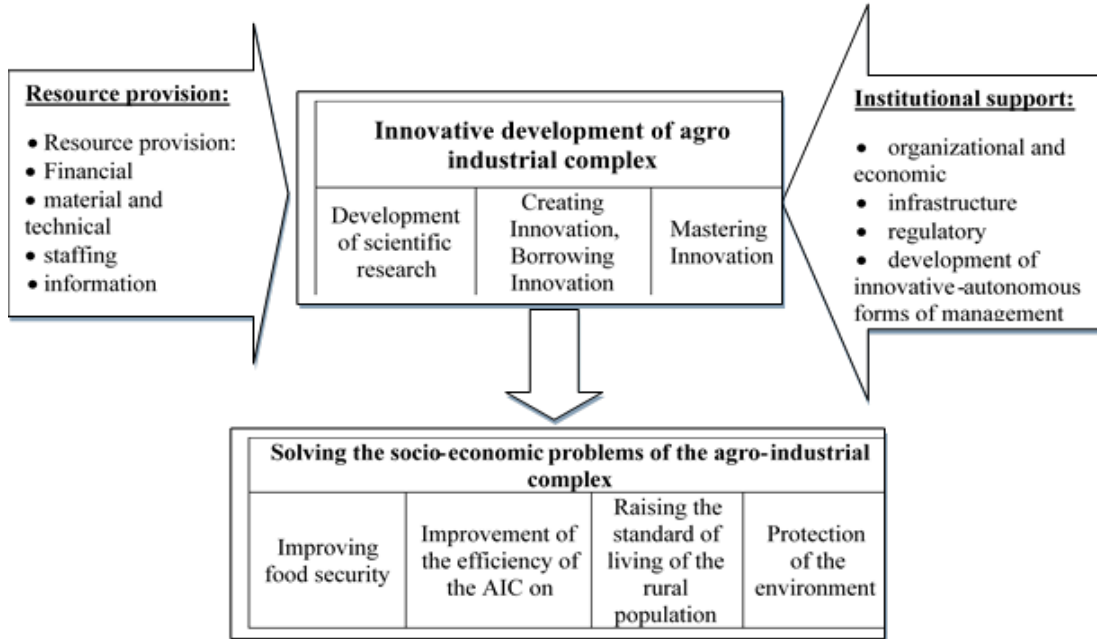


Figure 4. Providing innovative development of agro-industrial complex (Golubev, 2015)

The main conditions for the creation of an efficiently functioning innovation system in the Russian Federation should be (VF Fedorenko, DS Bucklagin, EL Aronov, 2007): the stability of the system of public management of R & D; formation of effective state innovation policy, its legal and resource support.

The solution of this task assumes: development and adoption of a long-term strategy of innovative development of the country and its regions; legislative support of scientific, innovative and educational activities; guaranteed state funding of scientific and innovative activities in priority areas; assistance in the inflow of capital into the innovation sphere; participation of science, industry and business in innovation policy; interaction between the center and the regions in the process of developing and implementing innovative policies.

The problems of financing scientific and innovative activities deserve special attention.

## CONCLUSION

In order to transform the existing scientific and technical potential in the country into an efficient factor of economic development, it is necessary to move on a policy of integrated support of the innovation process.

At the same time, the first priority is the creation of favorable financial, economic and legal conditions for the formation of the domestic innovation system. Otherwise, in the very near future, Russia's scientific, technical and innovative potential will be virtually lost.

Special attention is required to involve direct agricultural producers in the active innovative activity. So far, the requirements for strengthening the innovative character of the development of the agro-industrial complex and the activities developed in the administrative structures that are being formed in the bodies of state power at the federal and regional levels do not penetrate the production sphere. The managers and specialists of the farms remain aloof from the innovative strategy of development proclaimed by the leaders of various ranks. Often they do not know what is done by the leaders. The strategic course is poorly supported at the farm level by financial, material and technical resources and by measures of organizational and economic security. The main task of developing the innovative system of the agro industrial complex is to ensure the innovation process, primarily in the economic chain, with the integrated implementation of all necessary measures.

### *Summary*

Based on the conducted research, you can make the following entries. At the regional level, it is advisable to pass laws of the subjects of the Russian Federation on innovative development and develop appropriate sectoral programs that can be supported from the federal budget following the results of open tenders. At the same time, it is necessary to create the basic elements of the system of innovative development of the agro-industrial complex - regional ICS, demonstration sites, agro techno parks, etc.

The system of innovative development of the industry should be supported at the municipal level, where administrative and organizational support is provided to the specific enterprises and individual projects.

In general, the interaction of government authorities at all levels with agricultural enterprises, subject to the creation of an institutional environment, should constitute the construction of a sustainable functioning of the domestic agro-industrial complex on an innovative basis.

The main result of the implementation of these measures should be the mass use of advanced technologies and large-scale business participation in the practical development of innovations.

Thus, innovative development is the basis for import substitution, which allows Russia to withstand in the conditions of global competition and ensure the food security of our state.

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