

## FORMATION AND DEVELOPMENT OF CLUSTER ACTIVITY IN RUSSIA'S AGRICULTURE

**Dmitriy Valerevich SERDOBINTSEV, Ivan Sergeevich NOVIKOV,  
Elena Aleksandrovna ALESHINA**

Volga Scientific-Research Institute of Economics and Organization of Agro-Industrial Complex (VRIEOaic), Sector of Development of Integration and Cooperation, 12 Shekhurdina Street, Saratov, 410010, Russian Federation, Phones: +79042424332, +79003149666, +79172056574, E-mails: serdobintsev@mail.com, novicovis@yahoo.com, aleshina-80@mail.ru

**Corresponding author:** novicovis@yahoo.com

### **Abstract**

*The purpose of the paper was to analyze the current state of development of cluster activity in the agro-industrial complex (AIC) of Russia, to identify the main constraints and to develop proposals for enhancing the formation of clusters. In preparing the article, there were used information from the Ministries of Economic Development and Agriculture of the Russian Federation, the Russian and European cluster observatories, scientific works of domestic scientists on the topic. The following methods of scientific research were used: statistical-economic, monographic, abstract-logical, design-constructive. At present, the active processes of developing cluster activities are underway in the Russian agro-industrial complex. But not all of the initial set of registered projects for creating clusters in the agro-industrial complex were implemented. It is revealed that the main constraints on the wide spreading of clusters are: methodological flaws, non-optimal segregation of duties at the public and private levels, underdevelopment of the regulatory framework, the lack of a common mechanism of formation and a model of cluster functioning at the regional level. In order to compensate for these shortcomings, a mechanism of formation (order) and a model (organizational structure) of the functioning of agro-industrial clusters are proposed. The introduction of the mechanism of cluster formation, due to the savings from optimization of costs and processes of commodity circulation, will allow to reduce the cost of production and increase the efficiency of economic interactions of enterprises.*

**Key words:** agriculture, cluster activities, current status, Russia

### **INTRODUCTION**

Improving the efficiency and competitiveness of enterprises on the basis of the cluster approach in the last decade has received wide coverage in scientific papers. This trend is due to a number of advantages of clusters compared to traditional methods of production and commercial interaction - reducing the costs of turnover, eliminating duplication of functions and the overall synergistic effect [12] for each of the participants, due to broader and more comprehensive integration [1].

These advantages are determined by the two-tier organizational structure of the production cluster, which consists of 2 main elements: the core - the main producing, processing and marketing enterprises, and the satellites - ancillary enterprises, supplying additional

goods, works and services for the cluster core [23].

In the structure of scientific theories, the theory of cluster development is one of the main directions and schools of the Theory of Regional Economic Growth, and belongs to the section of the New Forms of the Territorial Organization of Production, which is usually divided into 3 scientific schools: American, British and Scandinavian [8]. However, it can be noted that the concept of a cluster is mainly used by representatives of American scientific thought, while the rest, despite the fact that they resort to territorial groupings of enterprises of various industries, still try to use other terms. Representatives of Britain in their studies mainly focus on investments and financial flows in production associations. Scientists from the Scandinavian countries prefer the topic of innovation and

education, directly linking the competitiveness of states with their research and educational potential [14]. Among the representatives of the American school, perhaps the most significant are the works of Michael Porter "The Competitive Advantage of Nations" (1990) and "Competition" (1998), where, through the lens of his Rhombus of competitive advantages, he examines the relationship between cluster partnership and the competitiveness of firms, industries and national economy [15,16]. Other representatives of the American school are [4, 9, 18, 20 ], while developing the theory of production clusters, they emphasize the regional essence of clusters, and then they will be followed by diversification and access to the next levels. In recent years, many researchers have paid attention to the social importance of agro-industrial clusters (by including small businesses in the composition and development) to improve economic well-being and improve the quality of life of the rural population [5, 6,7, 13, 22].

Due to the positive international experience of developed countries (EU, USA), where clusters have become a natural stage in the evolution of production organization methods and developing countries (China, Argentina, etc.), where they are the main way of achieving world-class development and entering international markets [19], cluster methods began to take root in the Russian land. The result of these processes has been the increasing mention of clusters in various bills, concepts, and investment programs at the federal and regional levels [11]. For example, in the Concept of the long-term socio-economic development of the Russian Federation for the period up to 2020, the term "cluster" is mentioned 20 times in a different context. And among the works of Russian scientists, the works of [14] devoted to the history of development, the definition of the essence and the main differences of clusters from other forms of integration and cooperation. At the same time, research into various aspects of cluster formation in the agroindustrial complex, which are considered in the works of [1, 2, 3 and others ].

However, despite the growing popularity, the widespread clustering in the agro-industrial complex is constrained by the problems of the lack of uniform theoretical and methodological foundations and conceptual and categorical apparatus, legislatively established organizational and legal form and, accordingly, insufficient state support. At the same time, if the inclusion of cluster projects supported at the federal level in recent years has already been sufficiently developed, the lack of a single mechanism for the initial formation of clusters at the regional level is today the main deterrent to their widespread use in agriculture. At the same time, the peculiarities of the state regulation system limit the possibilities of management and support with regard to informal associations, and also create the need to direct the activities of clusters to the legal mainstream and to develop mechanisms for bringing clusters to the form of formalized structures. Therefore, at the present stage of development, the main role in solving the tasks of ensuring effective functioning and enhancing the competitiveness of enterprises belongs to the development of the optimal organizational and economic mechanism of formation and the cluster functioning model, which makes the topic put on the research particularly relevant and timely.

## MATERIALS AND METHODS

In preparing the article, information from the Ministries of Economic Development and Agriculture of the Russian Federation, the Russian and European cluster observatories, the works of Russian and foreign scientists on the cluster topic, materials of research organizations from different countries of the world were used. In the study of theoretical and methodological aspects of the various organizational and economic elements of the development of cluster activities used monographic and logical methods. The study of the current state of implementation of cluster initiatives in the agro-industrial complex of Russia was carried out on the basis of statistical and economic analysis, as well as by comparing the results of work using the comparative analysis method.

Determining the directions of development and structuring the organizational and economic mechanism for the formation of regional agro-industrial clusters was carried out using the abstract-logical and computationally-constructive methods.

## RESULTS AND DISCUSSIONS

As a result of research, we found that in Russia for more than 10 years the mechanisms of state regulation and budget financing of the development of cluster activities in the agro-industrial complex and other sectors of the economy have been actively developing. A lot of work has been done on the formation of methodological and legislative bases for the development of cluster activities and support of already formed and formalized clusters.

A start was made in 2006–2007, when Michael Porter with a group of scientists from the Russian Center for Strategic Research was assigned to conduct a study of Russia's competitive advantages. According to the results, the paper “Competitiveness at the Crossroads: Choosing the Future Direction of the Russian Economy” was published, where, based on a study of various industries, clusters were proposed in the metallurgical, timber and oil and gas sectors of the Russian economy [17]. In fact, the authors paid attention only to the country's raw materials, but they ignored the presence of large agricultural areas, a favorable climate and other opportunities for the development of the agricultural sector.

For the above reasons, the Ministry of Economic Development of Russia was engaged in all of the cluster development activities at the initial stages. In 2008, Methodological recommendations were developed for the implementation of cluster policy in the constituent entities of the Russian Federation and the List of programs for the development of pilot innovation territorial clusters was approved. Later in 2013, the Rules for the distribution and provision of subsidies for the implementation of activities envisaged by the development programs of the pilot clusters were adopted. Initially, in 2013, the total amount of

subsidies for development programs for 25 cluster projects in 19 regions of the country identified through competitive selection amounted to \$ 40.9 million. Then, in 2014, the volume of state support increased to \$ 65.8 million, but in 2015, due to the crisis in the economy, cluster financing decreased by half. At the same time, about 70% of the allocated funds were directed to the development of cluster infrastructure. In 2015, these clusters produced products in the amount of \$ 32.8 billion, which is a third more than the figure for 2013. (*In the Ministry of economic development in 2016 will expand the program of support of territorial innovation clusters. Retrieved from <http://economy.gov.ru/minec/about/structure/depino/20160220>*) [10]. Now the Ministry of Economic Development to focus attention on promising areas is starting a new format of subsidizing cluster initiatives in the form of the Priority Project “Development of innovative clusters-leaders of world-class investment attractiveness”. But at the same time, the list contains clusters that specialize mainly in engineering, pharmaceuticals, petrochemicals, electronics, nuclear and biotechnologies, and not a single agro-industrial cluster.

At the next stage, from 2015, the Ministry of Industry and Trade joined the Ministry of Economic Development and Trade, as the new Federal Law “On Industrial Policy” designated the formation of industrial clusters as one of the main tools for the territorial development of industry. Similarly, the Ministry of Industry and Trade adopted the Rules for granting subsidies to industrial cluster members and selected 8 cluster projects in the fields of electronics, engineering and instrumentation, but also none of the sectors of the agro-industrial complex. Also in 2015, the Ministry of Health adopted the Law “On the International Medical Cluster”, and also began the formation of a number of scientific and educational medical clusters. And the Ministry of Energy plans to create coal-energy and coal-chemical clusters that produce products that are in demand on world markets,

and Gazprom Oil forms a cluster of oil refining processes.

It must be said that such increased interest in clusters caused a rapid growth in the development of cluster projects. By 2013, the Ministry of Economic Development of Russia had already registered about 221 cluster projects in 58 of 83 regions or in 70% of the territories. At the same time, by industry, the largest number (41 clusters or 19%) was in the field of agriculture. But these were only promising projects. At the same time, according to the data of the European Cluster Observatory in 28 countries of Western and Eastern Europe, 2101 clusters already functioned in various sectors of the economy with a total of 42 million employees. At the same time, 11.5% of them operate in the agro-industrial complex, employing 4.5 million people [19].

Few time later, only some of the announced cluster projects in the Russian agro-industrial complex could be realized in practice. So, in 2018, the Russian Cluster Observatory marks only 4 operating clusters in the agro-industrial sector: The Cluster of Aquaculture and Fisheries (Astrakhan Region - 37 participating enterprises), the Food Cluster (Republic of Tatarstan - 20 enterprises), The Milk Cluster (Vologda Region - 58 enterprises) and Agro-industrial cluster (Novgorod region - 22 enterprises). And the Ministry of Agriculture of Russia itself speaks of targeted support for only 2 clusters - this, in addition to the Aquaculture Cluster in the Astrakhan Region, is also the Cluster of Agrarian Engineering in the Altai Territory (22 enterprises) (*The Ministry of agriculture of Russia held a meeting on the «all-Russian field Day» in the Altai region – the Ministry of agriculture of Russia.* [21]. However, the Ministry of Agriculture of Russia, like many other departments, has not yet consolidated any cluster projects at the legislative level, has not developed methodological support and has not created working groups for the development of cluster activities, entrusting all regions or private initiatives.

At the same time, in most regions of Russia, all clustering activities are concentrated in the

Cluster Development Centers (CDCs), which were organized in 19 regions in 2010–2013. They are very similar to each other in terms of the creation history, the organizational structure, the circle of tasks to be accomplished, the goals set for the work and the functions performed. This is explained by the fact that all CDCs were created for the purpose of including in the List of pilot development programs for territorial clusters of the RF Ministry of Economic Development, where one of the conditions for obtaining state support was the presence of a specialized organization engaged in cluster development. At CDCs, cluster projects are implemented in all sectors at once, including and in the agro-industrial complex. Moreover, even if some projects failed to qualify and receive federal funding, the regions continue to support them.

One of such few examples of the real formation and functioning of the agro-industrial cluster in the regions of Russia is the confectionery cluster of the Penza region “Union of Penza confectioners”. In order to identify problems and develop general recommendations, we investigated the experience of creating and developing the activities of this cluster, by means of on-site interviewing of employees of participants in the confectionery cluster. This industry was chosen to create a cluster, because the Penza region produces 30% of all confectionery products of the Russian Volga region, consisting of 8 regions (Republic of Kalmykia and Tatarstan, Astrakhan, Volgograd, Samara, Saratov and Ulyanovsk regions). At the beginning, when developing the concept of a confectionery cluster, the Central Design Bureau had to resort to the help of a specialized company from Moscow, which had already developed several similar projects in other regions of the Russian Federation. During the organizational period for the creation of a cluster, the work of the CDCs consisted in organizing a constituent assembly of the cluster and signing cooperation agreements between the CDCs and confectionery enterprises, as well as with research and educational institutions. The

most difficult and long time was the organization of work directly with the confectionery enterprises. The work was complicated by the fact that confectionery enterprises that are competitors, without much desire, took part in the formation of the cluster, since not fully understood the essence and purpose of the cluster itself. In the future, in order to unite and establish contacts between the participants of the CDCs, joint participation of confectionery enterprises in food fairs was organized. This event gradually had a strong impact on the participating companies, which noted all the advantages of such joint performance on the market, which allowed them to conclude a number of contracts for the supply of products and establish business relations with each other. For the following exhibitions, the participants of the cluster also decided to act as a united front, with the aim of which CDCs was developed a single trademark of “the umbrella brand” - “Penza confectionary yard”. As a result of such joint work, close contacts were established between exhibitions and excursions between confectionery enterprises, which by now allow them to organize joint deliveries of products to remote regions of Russia and enter into contracts for the purchase of industrial raw materials in larger volumes at attractive prices to optimize costs. Today, the confectionery cluster includes about 50 enterprises of the region engaged in the production of powdery and sugary confectionery. The largest anchor enterprises of the cluster are Miroslada LLC, Severyanin LLC and Bekovsky RPK Oktyabr LLC, with annual economic turnover of about 21, 9 and 4 million USD, respectively.

The cluster satellites that ensure the development and implementation of innovations, technologies and equipment are research organizations in the region - research centers at the Penza State Agricultural Academy and the Penza State Technological Academy, Technology Commercialization Center, Penza Regional Innovation Support Fund.

The educational satellites that provide training and retraining of personnel for enterprises of

the cluster include several educational institutions, some of which also provide scientific research:

- Penza State Agricultural Academy;
- Penza State Technological Academy;
- Penza Cossack Institute of Technology;
- Penza State University;
- Penza College of Food Industry and Commerce;
- Other Colleges of various profiles from areas of the Penza region.

In addition to the CDCs, the coordination, management and support of the cluster's activities are carried out by a number of ministries and departments, the Penza Regional Chamber of Commerce and the Penza Region Development Corporation. The study of the work allowed to schematically represent the system of governance of the confectionery cluster (Figure 1). The cluster development plans for the future envisage the implementation of a number of investment projects: organizing the production of caramel 2.2 thousand tons per year with a volume of investment of 4 million USD, the creation of production of 2.9 thousand tons of jams worth 2.7 million USD construction of a distribution center with a warehouse of 5 thousand square meters. The implementation of these projects will allow confectionery enterprises in the region to increase their share in the Russian market from 3.27% in 2012 to 15% by 2020, which makes it possible to look with confidence to the future prospects of the confectionery industry of the Penza Region.

Thus, it can be stated that at the moment active processes of cluster formation are going on in the Russian agro-industrial complex. At the same time, an important role in the organizational and economic mechanism belongs to a private-state partnership and a clear division of tasks between the state and enterprises, thanks to which it is possible to optimize the process of formation and functioning of agro-industrial clusters.

But many ambitious projects were not implemented or partially implemented. For example, in the Ulyanovsk region, the cluster project “New Village” was supposed to ensure the development of production and improve

the living conditions of agricultural workers. The cluster project included a modern settlement of 100 houses with a developed infrastructure (medical, educational, sports and shopping and entertainment facilities), a research center, 140 modern mini-farms for the production of livestock and plant products, meat processing, dairy and feed mills. And the

Penza Region Development Corporation was preparing for signing an investment agreement with a German company to establish an agro-industrial cluster in the region - a large association for the storage and processing of grain, the production of animal feed, bakery and pasta.

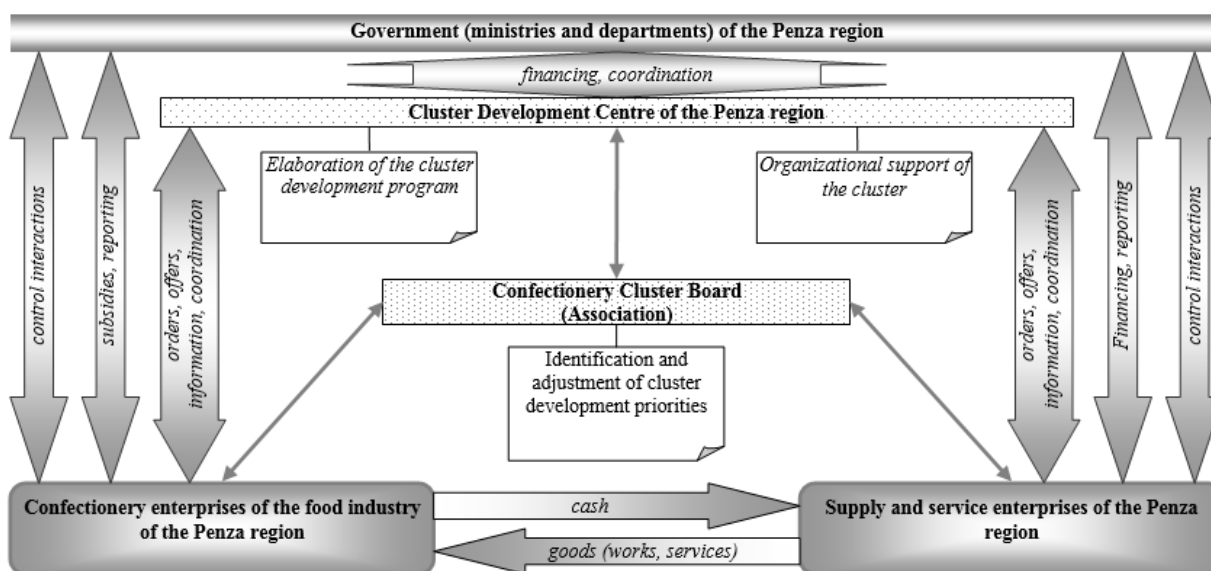


Fig. 1. The control system of the confectionery cluster of the Penza region  
 Source: Compiled by the authors.

One of the reasons was the fact that not enough attention is paid to the method of detecting protoclusters. When developing programs and choosing cluster specialization, no research is done on localization and competitiveness of industries. Almost all developments are made on the basis of expert methods. The issues of the initial formation of clusters, their bringing under the adopted normative acts on state support of development programs are not sufficiently worked out. And to be included in the list of state support, it only need to comply with the requirements - the presence of the manager of the organization, the overall development program, several investment projects, etc. At the same time, existing protoclusters based on holdings with a developed production core (agriculture, processing, sale) can be ignored. And for a full cluster, they lack some satellites. However, some of them even have their own research centers, financial and credit, educational, and supplying organizations.

Our researches of practical work on the development of cluster activities in the agro-industrial complex made it possible for us to identify some characteristic features and disadvantages:

- The lack of a unified mechanism for the formation of agro-industrial clusters with the division by the main organizational and economic elements and the distribution of the main tasks at the state and private levels. Therefore, various tasks are not developed and executed by those organizations, which leads to confusion or decision-making.
- The absence of a universal model of functioning of agro-industrial clusters, dividing the participating companies into the core and satellites of the cluster and distributing the main commodity-cash flows. As a result, many of the necessary organizations are missing from the cluster structure, and some are served in an inappropriate functional group of enterprises.
- Lack of specialized legislation and by-laws in the field of formation and functioning of agro-

industrial clusters, at the federal and regional levels. Therefore, there is a non-optimal legislative activity that does not quite meet the needs of enterprises and the CDCs leading to the reproduction of non-performing documents.

-Insufficient methodical study of all stages of development of cluster activity even within the CDCs, as a result of which all initiative groups have to literally “grope for a path”.

-When selecting industries for the formation of clusters, methods for determining competitiveness and identifying potential clusters are not used, which is why industries and areas of clustering are often not quite right.

-Lack of funding, due to which many announced expensive and labor-intensive

activities are not implemented, with the result that the real work simply does not work, which does not allow businesses to be interested.

-A single cluster policy at the federal level has not been formed - almost all actions for the development of cluster activities are either pin-point or depend only on the initiatives of regional authorities.

In order to compensate for these shortcomings, we have formed an organizational-economic mechanism for the formation of regional agro-industrial clusters with a functional subdivision of tasks at the state and private levels on economic and organizational elements (Figure 2).

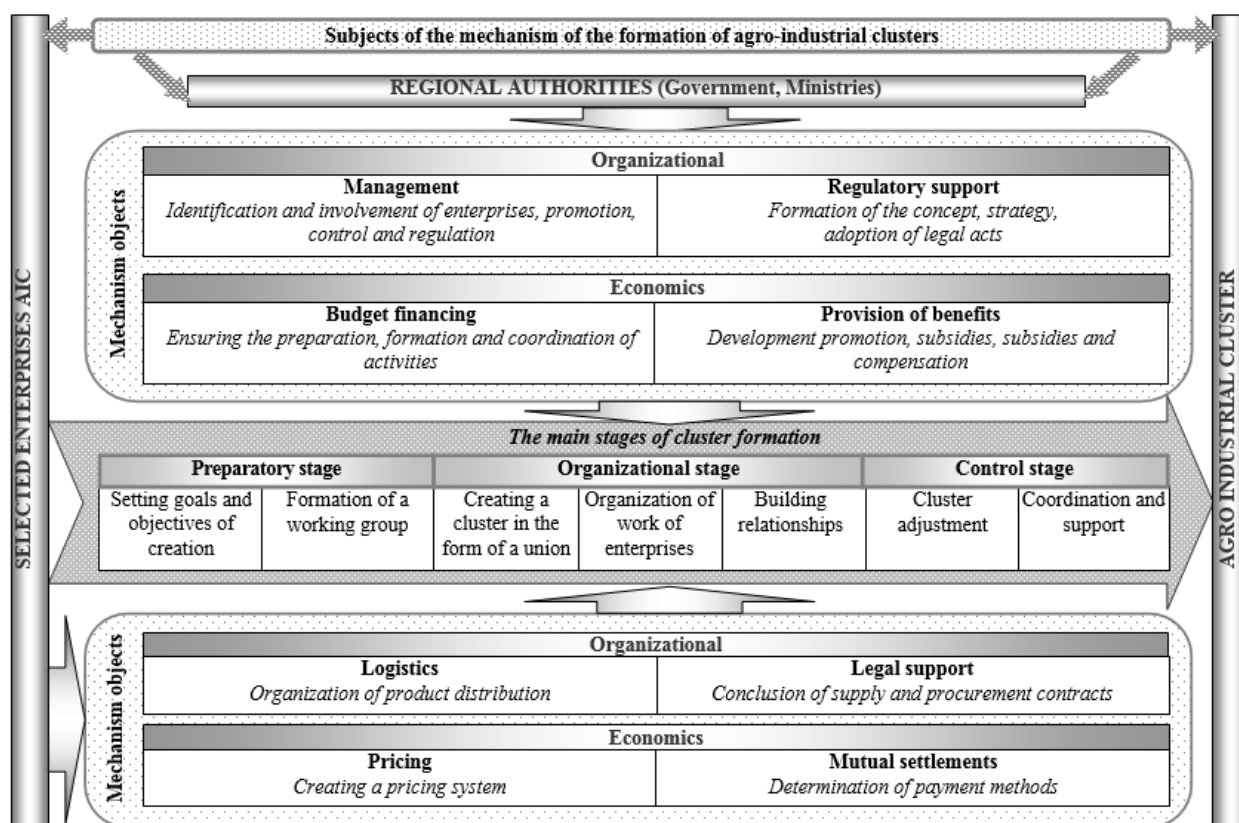


Fig. 2. The organizational and economic mechanism for the formation of regional agro-industrial clusters  
 Source: Compiled by the authors.

This is due to the fact that the solution of the large-scale task of forming clusters is impossible on the single initiative of market participants, and must also be carried out at all levels of legislative and executive power. However, the main initiative should come

from potential members of the cluster, and the administration should provide full support, especially at the initial stages, by promoting the benefits and designing the cluster. In order to further develop research, develop practical recommendations and consider the

initial stages of cluster formation in the agro-industrial complex, the cluster construction procedure in the agro-industrial complex was

structured, in which the main performers and their activities were singled out (Figure 3).



Fig. 3. Main events, order and participants in the formation of agro-industrial clusters  
 Source: Compiled by the authors

The choice of performers is determined by the range of tasks to be accomplished, assigned to these bodies of state power by the relevant regulatory and legal acts. At the same time, the creation of Cluster Development Centers is also required in other regions for the widespread activation of cluster activities. At the same time, the created CDCs will not limit its activities only to the framework of one branch of the economy, since It will be a single organization for the integrated development of clusters, which makes expedient its formation at regional ministries of economic development.

As a result, we have developed a organizational-economic model of functioning of the agro-industrial cluster, including the corresponding set of agribusiness companies, which is presented in Figure 4.

The organizational structure of the agro-industrial cluster is determined by the factor of the presence in the region of the necessary number of certain enterprises and other related industries.

When forming a cluster, it is especially important to organize interactions with satellite enterprises supplying diverse types of goods (works, services).



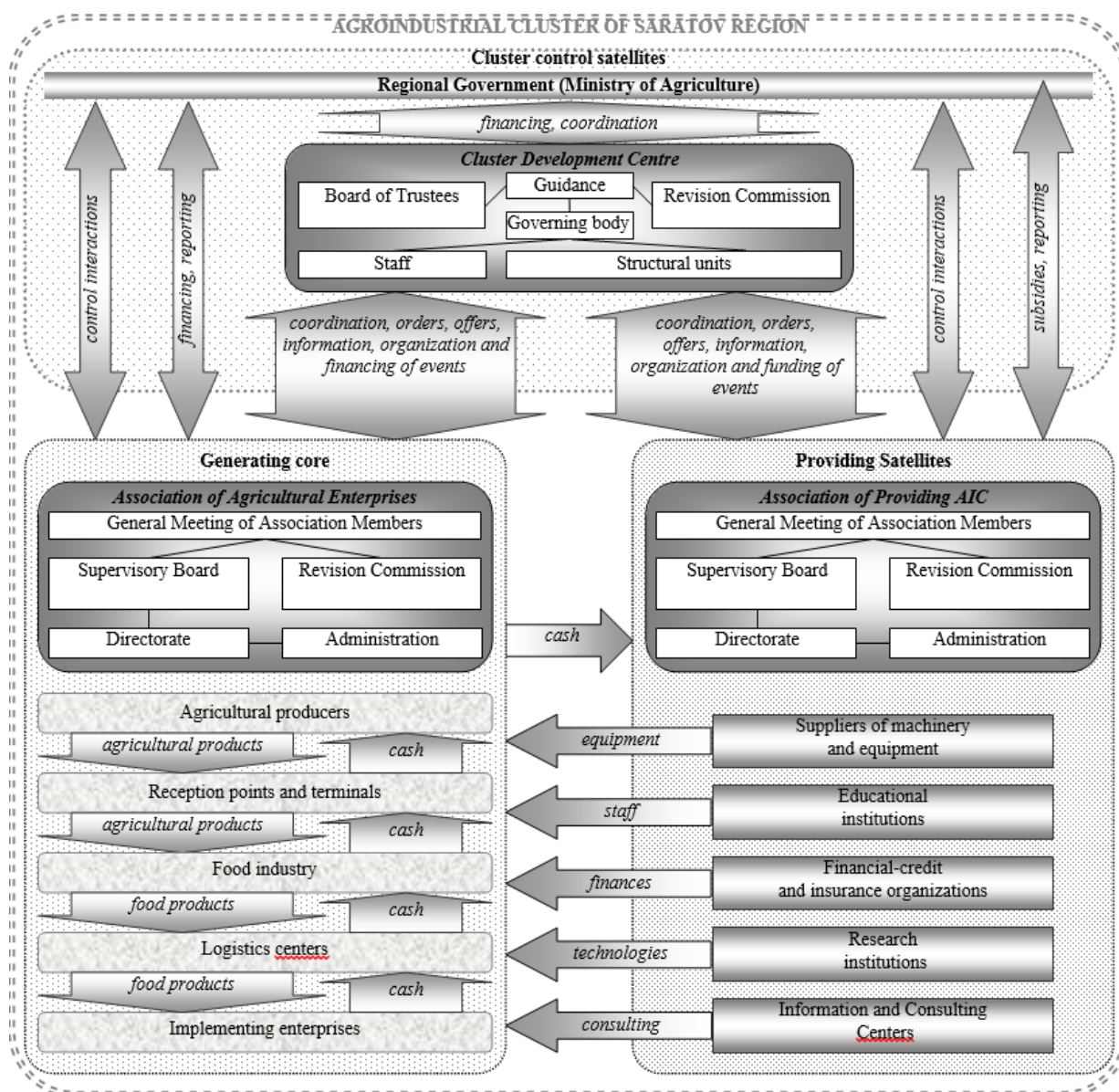


Fig. 4. Organizational-economic model of the agro-industrial cluster of the Saratov Region  
 Source: Compiled by the authors

For example, in one of the typical agrarian regions of Russia - the Saratov region there is a significant number of supply and service enterprises, which allows us to freely form a satellite belt around the cluster core. Development, coordination and support of ongoing projects for the creation of agro-industrial clusters are the prerogatives of the Ministry of Economic Development and the Ministry of Agriculture, in order to ensure effective and coordinated tasks that require the formation of a cluster development center. The task of staffing is solved by the presence of a sufficient number of educational institutions, such as the Saratov State

Agrarian University named after N.I. Vavilov, colleges and a network of vocational schools. The development and implementation of scientific innovations will be provided by many specialized research institutions. Based on this set of enterprises, a universal organizational structure of the agro-industrial cluster was created using the example of the Saratov region - Figure 5. At the same time, depending on the specialization of future clusters, the core of this structure will be filled with enterprises of various AIC subcomplexes: grain products, meat products, dairy products, etc.

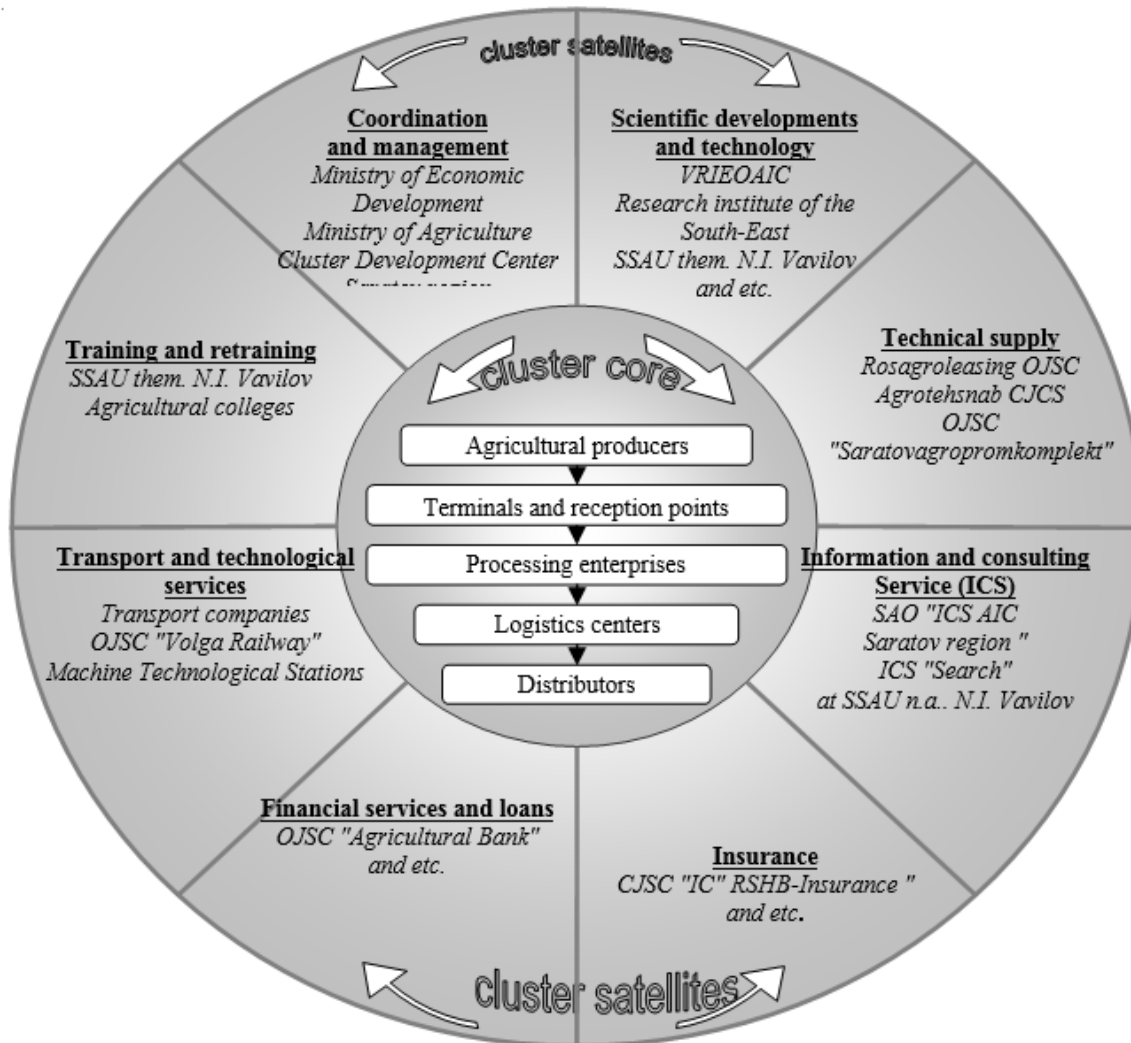


Fig. 5. Possible structure and composition of the agro-industrial cluster on the example of the Saratov region  
 Source: Compiled by the authors

Also, as part of our research, model projects of a number of documents were developed, such as the regional Concept and the Target Program for the Development of Agro-Industrial Clusters until 2030, the Charters of the Cluster Development Fund and Associations of Agro-Industrial Clusters, as well as agreements on cooperation between enterprises. These developments will significantly simplify and accelerate the implementation of cluster policy in the regions, significantly saving the financial and time resources created by the Cluster Development Centers.

## CONCLUSIONS

As a result, it can be noted that currently in Russia there are active processes of

clusterization of various sectors of the economy. The agro-industrial complex, where over the past 10 years dozens of cluster projects have been developed, is not far behind. However, studies of the development of cluster activity allow us to say that, despite the initial surge of interest in agro-industrial clustering, not many clusters were realized in practice. As of today, out of 41 agro-industrial clusters (the leader in the EU - Greece has 36 clusters), only 6 actually work, which corresponds to the level of Belgium (5 clusters in the agro-industrial complex). One of the reasons for this situation was the not fully understood essence of the clustering processes, the neglect of the principles and methods of building cluster structures. The main difficulties include: the lack of a unified methodology for identifying competitive

industries (protoclusters), a mechanism for forming and a model of cluster functioning, a non-optimal distribution of powers at the public and private levels, not always a reasonable choice of enterprises of the participants, as well as not enough developed regulatory framework. Nevertheless, the existing isolated examples of functioning clusters demonstrate all the advantages of these structures, confirming the correctness of the chosen direction of development of the agro-industrial complex.

The developed organizational and economic mechanism of formation and the order of development of cluster activity will allow optimizing and speeding up the process of creating clusters. The proposed organizational and economic model of functioning of the agro-industrial cluster, reflecting the main commodity-cash flows and the organizational and legal forms of the participants, will make it possible to more accurately design the structure of future clusters. Formation of the organizational structure and a certain standard set of enterprises will also help to save resources during preparatory clustering work. This will increase the feasibility of cluster projects at least twice, from today's 14.6% to 29.2%.

The widespread proliferation of clusters in the agro-industrial complex of Russia will contribute to increasing the efficiency and competitiveness of participating enterprises. And the presence of successful agro-industrial enterprises by creating jobs and increasing tax deductions will be the basis for improving the economic standard of living in the countryside. And given that agricultural production and consumer cooperatives are among the important participants in the clusters, the development of cooperation will contribute to the restoration of the IFH - peasant (farmer) and personal subsidiary farms. It was precisely small forms of management that were the basis for the survival of rural residents during the period of economic reforms of 1990–2000 and the provision of food to the population. In this case, one should take into account the main final effect from the development of cluster production - increasing the provision of

consumers with food products in the required volumes and quality. Expanding the range, including through new and innovative types of products produced by clusters, will help to increase customer satisfaction, and ultimately improve the quality of life of the entire population of the country.

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