Formation of agro-industrial clusters in the North Caucasus

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Abstract. The article examines the regions of the North Caucasus in the context of the implementation of cluster projects. The functions and possibilities of clustering, the versatility of approaches to its definition in domestic and foreign publications are considered. Favorable preconditions for the formation of agro-industrial clusters in combination with agri-tourism (favorable natural and climatic conditions, operating agro-holdings, significant labor resources, rich cultural and historical heritage, etc.), as well as constraining factors (lack of a unified mechanism for the formation of regional agro-industrial clusters, insufficient activity of the business community in terms of generating ideas and implementing initiative projects, weak involvement of the population in dialogue with the business community and government authorities, etc.). A model of an interregional agro-industrial cluster has been proposed, the core of which will be agricultural holdings operating in the north-east of the Caucasus.

1. Introduction

State policy in Russia is aimed at ensuring the country’s transition to an innovative development trajectory. To implement this strategy, it is necessary to create a knowledge-based economic environment that will contribute to the sustainable dynamics of economic growth in the country, expanding the range of science-intensive products that have a high level of competitiveness in the domestic and foreign markets. It is supposed to use modern science-intensive technologies in all sectors, including the agricultural sector.

The current Food Security Doctrine was approved by the Decree of the President of the Russian Federation dated January 21, 2020 No. 20 “On Approval of the Food Security Doctrine of the Russian Federation.” According to this document, the state socio-economic policy should provide the population with agricultural products, raw materials and food that meet quality standards and safety requirements, in such volumes that will not contradict the rational norms of food consumption.

About \(\frac{1}{4}\) of the population of Russia (as of 01.01.2020) lives in rural areas. Fertile chernozem soils (over 40% of the world fund), a variety of climatic, geomorphologic, landscape conditions predetermine the paramount importance of creating highly efficient agro-industrial clusters in our country \cite{1}. This is especially true for agrarian-oriented regions, which include the regions of the North Caucasus. In general, the formation of agro-industrial clusters seems to be an adequate response to changes in geopolitical conditions (sanctions and other restrictions).
The North Caucasus is the southern macro-region of the Russian Federation, where there are conditions for the production of the most diverse and demanded agricultural products, and some agricultural crops can only be cultivated here. The presence of fertile chernozems in combination with favorable climatic conditions makes it possible to develop the agricultural sector here at a fairly high level. The economically active population of this macroregion with historically established labor skills provides additional opportunities for the intensification of agricultural production. The level of sustainable development of the regions of the North Caucasus will have a positive effect on employment of the population, quality of life, tourist and investment attractiveness, including the agri-food market.

2. Materials and methods
The theoretical and methodological basis of the study was the work of domestic and foreign researchers, stock and statistical data posted on the official Internet portal of Rosstat were used. Methods of scientific knowledge (observation, abstraction, analysis, synthesis, modeling) and principles (interaction, complementarity, relativity, optimality, conservation and development) were applied.

3. Specificity of the study regions
The policy at the level of individual constituent entities of the Russian Federation should correspond to the federal conceptual policy and is focused on sustainable regional economic growth in the long term through more efficient use of natural resource potential and human capital. The Concept of Long-Term Socio-Economic Development of the Russian Federation until 2020 highlighted the important role of cluster policy with an emphasis on interregional clusters in agriculture, electricity, transport, etc.

In the Strategy of Socio-Economic Development of the North Caucasus Federal District until 2025, the priority goal is the need to create conditions that ensure the advanced development of the most important sectors of the real sector of the economy in the subjects of this macro region, reduce the unemployment rate, and improve the quality of life of the population. The primary role in the implementation of the goals of this Strategy should be assigned to the agro-industrial complex as the most important sector of the economy, since most of the regions in the North Caucasus are predominantly classified as local. The agricultural sector accounts for about 22% of the gross regional product. The number of the rural population exceeds the same all-Russian indicator. Over the past three decades, it has steadily increased. According to official statistics, in 2019, in the total population, rural residents accounted for: in Chechnya - 63%, Ingushetia - 45%, Dagestan - 56%, Kabardino-Balkaria - 48%, in Karachay-Cherkessia - 57%, and in North Ossetia-Alania - 37%.

Agriculture of the North Caucasus is one of the most advanced in Russia. A quarter of Russia's grain is currently produced in the North Caucasus [2]. This dynamic has been taking shape here for almost three decades. Similar leadership positions were identified in the production of sugar beets and sunflowers, vegetables, fruits, berries and other agricultural products. According to official statistics, there are currently more than 8.5 million hectares of sown areas in the agriculture of the North Caucasus, which is about 11% of the sown area in Russia. Livestock has historically been the most important branch of agriculture in the North Caucasus. According to official statistics, the share of livestock in 2019 accounted for 36% of gross agricultural output.

The studied regions are represented by both plain and mountainous regions, which determine the possibilities for a wide variety of types of nature management [3]. In the north of the regions, a grain-livestock direction has historically formed. Fine-fleece sheep breeding, animal husbandry, agriculture (including terraced farming), gardening, vineyards, oilseeds and vegetable crops were very effectively developed here. In mountainous and high-mountainous regions, agricultural production was mainly based on beef cattle breeding and sheep breeding, and river valleys and gentle slopes were used for agriculture.
Despite the presence of favorable preconditions, the level of development of agricultural production in these regions is still not high enough and unprofitable for most producers. This is partly due to the collapse of the centralized system of public procurement of agricultural products, the instability of the macroeconomic environment, the lack of necessary conditions for the management of agricultural producers, a weak material and technical base, an insufficiently developed legal and institutional framework, etc. markets require the improvement of regional logistics systems. In a number of regions, there are no conditions for long-term storage of products, which forces manufacturers to sell them at reduced prices. The creation of cluster structures, which have proven to be highly effective, can change the situation for the better.

4. The essence of the cluster approach and foreign experience
The American business economist M. Porter introduced the concept of «cluster» into scientific circulation in 1990. He meant a cluster of closely spaced, interacting and mutually complementary companies, scientific and educational organizations, and government bodies in a certain area. Moreover, not all production associations can be called clusters, but only those that are capable of improvement and self-development [4].

Currently, in 28 countries of Western and Eastern Europe, about 2 thousand clusters are already operating in various sectors of the economy from industry to the tourism industry, and the number of employed personnel exceeded 40 million. Of these, the share of those employed in the agro-industrial complex accounts for about 12% [5]. In the economic systems of most developed countries of the world, agricultural clusters are represented by firmly integrated entities with their inherent specialized multifunctional character [6]. The maximum concentration of cluster systems is typical for France, Spain, Poland, Germany, Italy, Great Britain, Denmark, etc. Denmark, in particular, due to the cluster policy has reached a high level of international competitiveness of agriculture, ensuring an inflow of significant foreign investment. In addition, European cluster policy is more often focused on cross-border clusters.

5. The concept of development of agrarian clusters in the North Caucasus
Favorable geographical location, developed transport network, competitive enterprises, research centers, high population density, human resources and other advantages in most Russian regions allow the formation of effective clusters in the use of natural resources [7]. More than 200 cluster projects are already being implemented in 58 regions. In the North Caucasian Federal District, 17 cluster projects are being implemented, of which only 3 are in the agro-industrial complex [5].

The authors largely associate the effectiveness of clustering with agriculture and the food industry, due to the absence of pronounced corporate and technological barriers between them in many production sectors. As the experience of the developed countries of the world shows, the functions of the core of the agro-industrial cluster are performed by a large agricultural or processing enterprise, which becomes the center of attraction for small and medium-sized businesses, manufacturing, supply and sales enterprises, as well as market, research and innovation structures. Agro-industrial clusters should focus on environmental protection. The role of cluster structures in the development of rural areas cannot be overestimated [8-9].

In the regions of the North Caucasus, there are favorable preconditions for the formation of agro-industrial clusters, which to a certain extent will contribute to the modernization and intensification of regional agricultural production. Along with the dominant livestock industry here, priorities should also be given to agricultural and pharmaceutical, fruit and vegetable, grape and wine, dairy and other clusters [2; 3; 7; 10].

The formation of agro-industrial clusters in the North Caucasus can stimulate the development of not only agriculture, but also a number of related industries. The main emphasis should be on the already functioning cooperatives of enterprises. Since effectively operating agro-industrial associations of enterprises may well become the central link in the cluster formation mechanism and attract other participants in cluster structures. A key role in the creation of regional agro-industrial
clusters is assigned to enterprises that carry out production, processing, sale and service in various areas of the agro-industrial complex. For the full functioning of clusters, the assistance of research institutes and agricultural universities is necessary [11].

A model of an interregional agro-industrial cluster in the north-east of the Caucasus, in which the agricultural holdings OOO Sady Chechnya and OOO Sad Gigantic Ingushetia, can act as a nucleus can be proposed as an approximate model (figure 1).

![Figure 1. Model of an interregional agro-industrial cluster of Chechnya and Ingushetia.](image)

The first apple orchard in Chechnya was laid in 2009 on an area of 400 hectares, and in Ingushetia - in 2013 on an area of 250 hectares. The selection of apple varieties was carried out in accordance with the regional characteristics of the natural and climatic conditions. In the near future, agricultural holdings are planning to expand the sown area. Sady Chechnya specializes in the production of virus-free planting material for fruit and berry crops. It also provides for the establishment of an intensive type plantation with a full cycle of work, including a systematic analysis of changes in the chemical composition of soils, the establishment of support and drip irrigation systems, etc. A part of the cultivated area is allocated for an experimental variety testing plot. The products of Sady Chechnya are supplied to the Gudermes agricultural complex, which produces over 50 kinds of juices and canned food. An important role in the formation of the cluster will be given to innovative developments in research institutes and higher educational institutions. Advantages of the Ingush agricultural holding in the use of a drip irrigation system with the supply of mineral fertilizers. More than 15 immune varieties of apples are grown here, storage of products in large volumes (up to 6.5 thousand tons) is provided. Environmentally friendly products of agricultural holdings in Chechnya and Ingushetia are supplied to the largest cities in Russia (Moscow, St. Petersburg, etc.).

Clustering agro-industrial production requires the creation of a coordinating council of all stakeholders. Its functions are to ensure dialogue and coordination of interests of the parties (agricultural producers, processors, educational and research centers, investors, etc.). Involvement of local small-scale agricultural producers in clustering will also contribute to an increase in employment of the population of most of the mountainous and high-mountainous regions of the North-Eastern Caucasus.
State support for the project under discussion should be provided at the expense of regional and municipal executive authorities. One of the main principles of the effective functioning of a cluster is the observance of equal conditions for the integration of its constituent entities. The efficiency of agrarian clusters and the proposed model in particular, can increase manifold in synthesis with agroecotourism and other types of recreational nature management [12]. As world experience shows, the power of the tourist flow is almost always higher in companies that are part of the cluster structure than in those operating independently of it [13-15].

6. Conclusion
In the regions of the North Caucasus, favorable prerequisites have been identified for the formation of clusters of various specializations, in particular, agro-industrial, which presuppose the form of an interregional voluntary association of enterprises, organizations and institutions that are geographically close and functionally related in the production and sale of goods and services. Nevertheless, the regions under study are still classified as underdeveloped and depressed, which, to a certain extent, is a consequence of the insufficient activity of the business community in terms of generating independent ideas and implementing initiative projects and weak involvement of the population in dialogue with business and government.

Optimization of environmental management and socio-economic development of the studied regions on the basis of clustering, including interregional cluster projects, will allow to modernize the existing infrastructure and increase the employment of the population and the level of training: managers, land surveyors, marketers, etc. The introduction of cluster structures in agricultural environmental management involves taking into account foreign experience similar associations and domestic practice of building integrated formations. Analysis of domestic and foreign experience of clustering indicates the important role of public-private partnership in the formation of clusters, since this multiscale task does not accept individual initiatives of cluster members and requires an appropriate solution at all levels on the basis of both private and public resources.

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