



## The Formation of Agro-food Clusters as a Competitiveness Growth Factor

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### ABSTRACT

The article deals with the formation of agro-food clusters enhancing the competitiveness and sustainability of the regional economy. The author studies the development features of agroindustrial complex (AIC) of the region, its nature, and clarifies the economic content of the agro-food cluster concept, as well as defines the prerequisites and principles of clusters formation in the Russian AIC and identifies features of their functioning. It is proved that the development of agro-food clusters entails both socio-economic and environmental benefits due to the composite nature of the AIC and regional specificity. It is revealed that cooperation and integration, as well as the interaction of small, medium and large businesses are quite effective in the agricultural sector, because the different forms of management have their own unique niches, targeted at consumers with different income levels and quality requirements of food products. The composite nature of the AIC and the implementation of cluster policy should lead to the blurring of sectorial corporate and technological boundaries in a number of production sectors, as well as to reduction of price disparities, raising the prestige and productivity of agricultural jobs, development of social sphere of the village, the transition from technological structure to innovation aiming at the protection of the environment. The author proposes to merge large economic entities into agriindustrial cluster, while small and medium size companies - into agri-ecological cluster, based on the principles of organic agriculture production. This will contribute to both the sustainable development of rural areas and increasing the competitiveness of the region.

**Keywords:** Cluster, Competitiveness, Agroindustrial Complex, Region, Sustainable Development

**JEL Classifications:** R11, Q13, Q18

### 1. INTRODUCTION

Issues of food supply and food security in the contemporary world are becoming increasingly important. Thus, according to the US National Academy of Sciences, the Earth's population has grown over the last century so rapidly that today on the planet live about 14% of people who have ever inhabited the planet (Bradshaw and Brook, 2014). Such excess population worsens the human existence conditions and threatens hunger due to the lack of natural resources to produce the required amount of food. Data from the World Health Organization and the census of the population of the world has allowed predicting that while maintaining the current rate of population growth, by the beginning of the XXII century

the world population will grow to 11-12 billion people. The studies carried out at the University of Washington do not contradict the presented figures: By the end of the XX1 century the total number of inhabitants on the planet will be at least 9.5 billion, and very likely 12 billion. These data are close to the optimistic assessment of the UN (according to pessimistic scenario the total population on the Earth by the end of current century will exceed 15 billion people).

Meanwhile, this problem is not only socio-economic in nature. In the context of limited resources, including agricultural land and fresh water, the planet is experiencing a serious anthropogenic load. Deforestation, drainage of wetlands, forced intensification

of human economic activities lead to the extinction of tens and hundreds of species of plants and animals, depleting flora and fauna. The ongoing urbanization process leads to transformation of natural landscapes and environmental pollution.

The urbanization and the growing severity of environmental problems are typical not only for developed countries. At the moment this is a common occurrence, caused due to several socio-economic reasons (differentiation by level and quality of life of the population in terms of income, employment opportunities, comfortable infrastructure, services availability and quality, etc.). For the majority of the population the above factors upstage the environmental issues, because in reality only a small group of individuals with very high incomes are able to provide themselves a living away from the benefits of civilization without abandoning its technology achievements and comfortable conditions.

Russia, belonging to the developing countries, is in line with global trends. Data on population by regions of the Russian Federation (RF) confirm the trend towards the concentration of Russians in the major cities with population over one million. For example, the following pattern in terms of population was observed in the capitals of the Federal Districts (FD) as of January 1, 2015:

- 31.3% of the population of the Central Federal District (CFD) lives in Moscow
- 37.6% of the population of the Northwestern Federal District (NWFD) lives in Saint Petersburg
- 7.8% of the population of the Southern Federal District (SFD) lives in Rostov-on-Don
- 4.3% of the population of Privolzhsky Federal District (PFD) lives in Nizhny Novgorod
- 11.6% of the population of the Ural Federal District (UFD) lives in Yekaterinburg
- 8.1% of the population of the Siberian Federal District (SFD) lives in Novosibirsk
- 9.8% of the population of the Far-Eastern Federal District (FEFD) lives in Khabarovsk.

The tenth of the total population (11.9%) of the country lives in major economic and political centers of the RF having federal status (Moscow and Saint Petersburg). At that, the urban infrastructure, designed in the Soviet times, is not intended to provide services in the proper amount that causes transport and other disruptions. From the regional policy viewpoint, continued outflow of the population to megacities exacerbates existing ecological and socio-economic problems. Urban overcrowding and significant decline in rural population, accompanied by degradation of the remaining local population, indicate that for Russians the environmental issues are not currently paramount. In many ways, the directions of migration flows are determined by socio-economic and political conditions which in accordance with the U. Maslow pyramid provide basic needs, while eco-friendly natural environment at this stage of social development relates to the needs of the highest order.

That is why the population dynamics in the major cities of federal districts keeps growing. As of 01.01.2015 these cities were

included to the top 15 largest cities in Russia (with the exception of Khabarovsk, which occupies the 27<sup>th</sup> place with a population of 607343 people).

As is obvious from Table 1, the average monthly salary in the central cities with a population over one million people exceeds the average monthly salary in the federal district (except of Yekaterinburg). Taking into account the level of socio-economic development of the Russian hinterland this significantly increases the attractiveness and competitiveness of cities for migrant workers.

The inefficiency of the regional and agricultural policy is reflected in a low level of payment of agricultural labor (average monthly nominal wage of employees in agriculture amounted to 17724 rubles in 2014, while average wage in the economy was 32495, in food industry - 25081, coke and oil production - 75517; mining of energy minerals - 66780; the financial sector - 68565 ruble); its poor public image; social insecurity of persons engaged in the smallholders (SH); irreducible price disparity (in August 2015, the industrial product manufacturer price indices amounted to 113.2%, whereas on agricultural products - 101%); low productivity and high labor intensity due to moral and physical wear of fixed assets in the agroindustrial complex (AIC); huge power intensity (caused by both harsh climatic conditions of most regions of the RF and the use of outdated technologies and methods of agricultural production); low profitability of the agribusiness as well as the loss of traditions, customs and rural culture as a result of globalization that have led the country to a predictable result - displacement of the population from rural areas and urban congestion. Thus, in 1914-1917 urban population in the Russian empire amounted to 17%, rural population - to 83%; in 1959, this ratio has leveled off (52 and 48%, respectively) due to industrialization in the USSR and then began to increase steadily due to the outflow of residents from the village: From 1996 to 2008 - 73% and 27%, from 2009 to 2014 - 74% and 26%.

Continuing urbanization contributes to an uneven distribution of the population across the country, crowding of labor resources in the industrial and business centers and abandonment of agricultural land and the lands for other purposes. For example, the population density as of 1.01.2015 was:

1. In the CFD: Moscow - 4857.66; in the Kostroma Region - 10.87 people per km<sup>2</sup>
2. In the NWFD: In Saint Petersburg - 3711; in the Arkhangelsk Region - 2.01; in the Nenets autonomous district - 0.25 people per km<sup>2</sup>
3. In RF - 8.54 (overall Russia); in the sparsely populated Chukotka Autonomous Area - 0.07 persons per km<sup>2</sup>.

The necessity for decentralization and the creation of a number of small settlements with developed infrastructure and convenient transport accessibility rather than creation of just the regional centers - the so-called growth points, is long overdue need. This is a way to support clusters of different profiles (depending on the specialization of the region, its competitive advantages, the current interregional relations, market conditions and other external and internal prerequisites, market boundaries and trends).

**Table 1: The dynamics of population change in the largest Russian cities - the centers of Federal Districts for 2014-2015**

Position in rating	Cities	As of January 1, 2015	As of January 1, 2014	Population growth	The average monthly salary of employees in the city, rubles	The average monthly salary of employees in the federal district, rubles
1	Moscow (CFD)	12,197,596	1,210,8257	89,339	649,267	42,095
2	Saint Petersburg (NWFD)	519,1690	513,1942	59,748	43,407	37,385
3	Novosibirsk (SFD)	156,7087	15,47910	19,177	31,013	29,110
4	Yekaterinburg (UFD)	142,8042	141,2346	15,696	34,746	38,825
5	Nizhny Novgorod (PFD)	126,7760	126,3873	3887	37,022	25,732
10	Rostov-on-Don (SFD)	111,4806	110,9835	4971	30,308	25,293

CFD: Central Federal District, NWFD: Northwestern Federal District, SFD: Southern Federal District, UFD: Ural Federal District, PFD: Privolzhsky Federal District

Note that uniform redistribution of resources over the regions is impossible without the successful implementation of programs for sustainable rural development, which traditionally rely on the efficient functioning of AIC (because related activities providing diversification of the rural economy (e.g., tourism and, in particular, agro-tourism) will bring income provided availability of a developed service sector based on contemporary infrastructure. The vast majority of the RF subjects still lack such conditions).

The role of AIC in economic development of rural areas, regions and the country as a whole, its particular importance in the world economy in terms of global food problem confronting humankind, determines the need for new more effective forms of interaction between its sectors and actors. The transition from the old technological structure of AIC to innovation will allow solving the totality of socio-economic and environmental problems that are relevant to both the national security and regional policy aimed at smoothing differentiation between the territories and putting them on the path of sustainable development.

### 1.1. Literature Review

Various theoretical and methodological aspects of cluster development and competitiveness are reflected in the works of many scientists: G. Dolan, M. Porter, A. Pesenti, M. Peters, P. Reventlow, P. Samuelson, R. Waterman, A. Hoskins, T.R. Hedges, U. Butmaloiu, M.I. Gel'vanovsky, D.V. Grushevsky, P. Zavyalov, N.Ya. Kalyuzhnova, A.B. Koloshin, I.V. Pilipenko, A.N. Prazdnichnikh, V.I. Samarukha, A. Seleznev, R.A. Fatkhutdinov and others.

General-theoretical and theoretical-practical bases of clusters development in AIC was studied by V.P. Arashukov, E. A. Bogdanova, S.A. Boytsov, V.M. Volodin, A.V. Glotko, S.I. Gryadov, I.V. Kovaleva, M.A. Konakov, A.I. Kostyaev, L.A. Krokmal', V.A. Kundius, N.M. Morozov, A.A. Nastin, A.V. Naumkin, R.V. Nekrasov, E.A. Pekhutova, N.I. Popova, A.A. Primak, A.E. Romanov, I.A. Semayava, P.F. Sutygin, E.M. Tereshin, A.S. Khukhrin, and V.P. Cherdantsev.

However, despite a large number of works, the issue of formation and development of clusters in regional AIC still remains relevant. The model of cluster development needs to be improved taking into consideration natural and climatic, socio-economic and other features of the region.

## 2. METHODS

The research object of the current study is the process of formation and development of competitive agro-food clusters at the regional level. It is expected that the operation of cluster structures in the agricultural sector will result in increase of the competitiveness and sustainability of the regional economy. Therefore special attention is given to the organizational and economic relations arising in the course of management of cluster structures formation and functioning in the AIC. The AIC of the Republic of Buryatia (RB) and other regions of the Siberian Federal District (SFD) served the object under observation.

Scientific works of foreign and domestic scientists focused on the development of AIC, competitive growth of the entities during study at the meso-level (regions, industry sectors and clusters) as well as the issues on cluster development served the theoretical and methodological basis of the study. When carrying out survey, the author has also used legislative acts regulating the activities of AIC and socio-economic development of Russian regions, statistical data and materials of publications in scientific and periodical press and the Internet, methodological developments of the research institutes and higher educational institutions of the RB, Russian Academy of Agricultural Sciences and other research institutions. Achieving the goals and objectives of the study was provided employing the following scientific methods: Economic and statistical method, abstract logical method, monographic, systemic and situational analysis, scientific deduction and induction, and comparison.

## 3. RESULTS

The specific features of AIC make it necessary the state intervention in the development of agricultural production, including that in the framework of agro-food clusters. At the stage of reforms, which is characterized by liberalization of markets and the self-regulation of the agrarian sector, there was a significant decline in production, decline in agricultural output, the deterioration in the financial condition of agricultural producers, destruction of the social sphere of the rural areas and the degradation of villages.

Capital intensity of AIC, adverse climatic conditions in most of the Russian regions, the need to preserve traditional ways of life, customs, traditions, culture, ecology and the natural environment, low-elastic demand for food, and considerations on food security

predetermine the need for state support that is massively provided to agricultural producers in almost all developed countries. Trends of AIC development in the RB demonstrate that the role of state regulation of the agrarian sector is extremely important: Although the main indicators of agriculture and food industry development are still far from pre-crisis level, the dynamics pattern became positive after the implementation of a number of federal and regional support programs. In connection with Russia's accession to the WTO the amount of finance should be reduced, the state will have to diversify forms of support, transforming them so that they would meet the requirements of "green basket" package measures. Solving the problem on increasing the competitiveness of domestic producers is possible through the strengthening of the strategic management role in AIC and creation of new structures at higher level, which include integrated formations of agrarian innovation type clusters along with traditional forms of cooperation and integration.

Agro-food cluster is defined as the concentration of a critical mass of agricultural producers, food industry enterprises and their servicing infrastructure organizations operating in the agro-food and other markets in a comfortable business environment, supported by the authorities, while their relations are in equal measure cooperative and competitive in nature and give rise to synergistic ecological and socio-economic effect, enhancing the competitiveness of the territory. The formation of clusters in AIC is not only economic, but also socio-environmental factor and a prerequisite for the transition of the region to a sustainable development path as entails a number of effects resulting from the specific features of agricultural production. The effects from the functioning of agro-food clusters for regional socio-economic system are expressed in the increase of budget revenues, providing employment of the population, increasing its income, a synergistic effect in relation to interrelated industries, the promotion of products to interregional markets, the production of organic food, the ecologization of agriculture, meeting the needs of population in food products, the development of industrial and social infrastructure in rural areas, etc.

This results in increasing the competitiveness of the region that is formed under the effect of economic, social and environmental factors. In turn, the high competitiveness achieved by the region creates the necessary conditions for entering the path of sustainable development. In this case, the competitiveness of the region is considered as characteristics of the regional system able to attract the population (here urgent current needs of population come to the fore), while sustainable development is a process in which the socio-economic growth and environmental change are coordinated with each other, not contradicting but reinforcing present and future potential, preventing the deterioration of the situation in the long term (the vector is directed to the future causing responsibility to subsequent generations).

It is revealed that the development of agro-food sphere of the RB depends on the level of support provided by federal and regional authorities, essentially to a greater extent than in other regions, due to significant environmental restrictions for economic activities with reference to the "Baikal factor." From a regional perspective

the most promising areas will become dairy and organic production; the first to increase the level of food self-sufficiency and the share of AIC in gross regional product, the second as a way of greening agriculture, support Lake Baikal brand, which is one of the measures to enhance rural tourism and sustainable rural development. At that, the role of regional authorities is to provide financial, institutional, methodological, information and consulting assistance not only at the initial stage of cluster development, but in the future, as organic farming aims at securing populations in historical habitats, promotion of its health and preservation of world heritage - Lake Baikal. Whereas dairy sub-cluster acts as a means of achieving food security, source of jobs and tax revenues to regional and local budgets.

#### 4. DISCUSSION

At the present time, Russian AIC can be called inefficient and uncompetitive: During the period from 1990 to 2007, the size of the acreage steadily declined, in 2011-2013 the figures have improved somewhat, however, at the moment, the arable land occupies just 7% of the total land area of the RF that is one of the lowest rates among major agricultural countries. In terms of crop yield the Russian producers considerably inferior to the developed countries, gathering of 2.27 tons of wheat per hectare, which is lower than that in China by 2.1 times, in the USA - by 1.3 times, and in the EU - by 2.4 times. Russian livestock production since 2002 shows a steady growth due to the poultry and pork segments, however, the overall level of production has still not reached the 1990 figures. Such dynamics was due to state support of the meat industry, including that in the form of imports regulation through tariff and non-tariff measures, many of which were revised after the Russia's accession to the WTO. In general, the volume of domestic production of meat products yet does not cover the needs of the country, though Russia is gradually approaching the threshold corresponding to provision of the country with its own meat (85%) that is approved in the "Food Security Doctrine of the RF" (2010).

Unfortunately, in terms of the beef the situation remains the same: 62% of its total production accounts for smallholders, industrial beef production represents just over 32%, and this ratio does not change in recent years. Low share of industrial production has a negative impact on the competitiveness of Russian beef, and as a result it remains a by-product from production of milk. In general, agriculture and food industry still show slow growth, though inter-industry linkages and production chains are still not restored.

In recent years, key events that led to the transformation of Russian AIC were the accession of Russia to the WTO (2012) and the economic sanctions (since 7.08.2014), which include a temporary ban on the import of certain agricultural products, raw materials and food from countries that imposed sanctions against Russia.

The first event was perceived by the agribusiness rather negatively, as in accordance with the agreements it was envisaged to reduce the government support of agricultural producers from 9 billion USD in 2013 down to 4.4 billion by 2018. According to the survey conducted by EY Company, subsidizing the activities of AIC is the most significant form of state support: 71% of

respondents acknowledged that it has a positive effect on the business development, 56% indicated that they would not be able to achieve and (or) to maintain an required level of return in case of cancellation of state support measures in the near future.

This resulted in reduction of the share of companies positively evaluating the impact of state policy on the agricultural sector: From 65% in 2011 to 47% in 2013. The problem of insufficiency of financial resources of the companies in the industry has redoubled significantly due to the traditionally low profitability and high loan debt burden, adversely affecting the availability of bank financing (Ernst and Young Global Limited [EY], 2014).

It is difficult to assess unambiguously the effect of sanctions on the development of Russian agriculture. According to the optimistic scenario, this will result in increasing of investment, modernization of production, acceleration of the import substitution process by domestically produced products. The pessimistic scenario foresees a significant price shock and occupation of vacated niches by producers from the countries of the Customs Union and other states. In this case, the government actions are of local nature more bailout than stimulatory; it's about conjunctural political decisions indirectly related to the conducted agrarian policy.

At the same time, the effect of the sanctions is already perceptible: According to the current data of the Federal Customs Service, the import of foodstuffs and agricultural raw materials decreased in 2014 by 8% compared to 2013 (from 43164.5 to 39714.7 million USD). Statistics for the first half of 2015 is even more impressive - the decrease amounted to 37.7% (from 20286.1 in the first half of 2014 to 12629.3 million USD). Meat production shows positive dynamics (104.9% in the first half of 2015 to the corresponding period of 2014); the growth is provided mainly at the expense of pig and poultry production (while production of cattle decreased by 1%). Milk production during the same period decreased by 0.4%, however, milk production by the agricultural farms was more than 8.8 million tons (102% compared to 2014) while reducing cow population and increasing their productivity by 4.9%. The positive trend is still seen in production in food processing industry: The index of food production for the first half of 2015 amounted to 102%, including meat and meat products - 105.8%; dairy products - 103%; products of the milling industry, starches and starch products - 102.3%; vegetable and animal oils and fats - 99.6%; processing and preserving of potatoes, fruit and vegetables - 102.7%; and drinks - 98.3% (Russian Ministry of Agriculture 2015).

Against the backdrop of contradictory economic trends, social sphere of the Russian rural areas is not undergoing global change. Unsettled areas are still expanding; the population of more than 47000 villages amounts on average to just 3.6 people. Up to thousand rural settlements disappear from Russia's map each year. The analysis of Russian villages shows that more than 14000 villages have no population, and the population of 34000 (20%) villages equals to 1-10 persons (Miloserdov, 2007). Up to 80% of all poor people in the country live in rural areas, where agriculture is the strategic structure. The transition of labor from the industrial sector to smallholders had a negative impact

on the level of mechanization and automation of production, applied technologies, and workforce productivity. Two thirds of smallholders do not have the economic base for replacement. The living standard in rural areas in the regions with different climatic conditions differs dramatically; 45.4% of all total rural population gets income below the subsistence minimum, while 25% of population is below the deep poverty. According to Miloserdov, only the sustainable development of agriculture will help to solve social problems in rural areas.

Thus, it can be stated that:

- At this stage of development, Russian AIC is in dire need of government support.
- Its low competitiveness and inefficiency are caused by a number of factors, both natural (e.g., harsh climatic conditions) and invected (management forms and methods, organizational peculiarities of the agricultural production and agribusiness management, undifferentiated agricultural policy, not accounting for regional differences and competitive advantages/disadvantages). New forms for organization of activities and approaches are needed that would not interfere neither the creation of large vertically integrated structures nor functioning of small and medium-sized farms. Industrial and agricultural production, farmers, and smallholders must occupy their unique niche in the food market.
- The AIC is a complex industry, whose revitalization bears the synergistic acceleration effect, affecting both economic and social components of regional development. On the one hand, the growth of the agricultural sector increases the competitiveness of the regional economy, and on the other hand, it solves the problem of sustainable development of rural areas, preventing land abandonment, unequal distribution of human resources and the congestion of metropolitan areas, reducing the threat of food security and humanitarian disaster.

The area of the RF territory as well as the vast diversity of climatic, socio-economic and other conditions of regional development strengthen the role of regional authorities in the formation of agricultural policy. In this context, the primary task consists in creation of preconditions for the development of advanced forms of AIC management and the implementation of the agriculture diversification principle. Diversity supposes a rational combination of large, medium and small businesses, the widespread use of both cooperation and integration. These requirements are met by relatively new business pattern such as cluster.

The relationship between clusters and competitiveness was set yet by Porter, though later his concept was criticized. The opponents noted that:

- The differences in national cultures should have been highlighted stronger (Van Den Bosch and Prooijen 1992).
- Competitive advantage does not necessarily form a cluster, there are a lot of successful "lone stars" (Reinert, 1995).
- The role of macroeconomic factors of competitiveness is not entirely clear (Daly and Roberts, 1998).
- The model is static, there is no dynamism (Narula and Wakelin, 1998).
- To analyze the competitiveness, the sectors and clusters must

be strictly deterministic in terms of the production factors (Davies, 2002).

- The concept is ill-suited for the analysis of competitiveness of globalized small open economies (Bellak, 2003).

At the same time an important advantage of Porter's concept is its flexibility and consistency: It allows analyzing a wide range of phenomena by defining the coordinate system for conducting research that offers a possibility to choose different forms of best practices depending on the context. The idea of clusters is overarching and can be used for both service and industrial sectors of high-tech agglomerations and low-tech industries concentrations. In this context, the agricultural sector is no exception.

Many scholars tried to adjust the cluster concept to AIC, though research by A.S. Khukhrin A.A. Primak, A.E. Romanov, and V.P. Arashukov can be noted as first the most important works in the field of agrarian clusters. The analysis of different viewpoints allowed revealing the fact that almost all researchers believe that the formation of clusters in the agricultural sector will generate significant economic effect for both the association members and the region in which it is located.

The social effect of AIC clustering is highlighted by the researchers such as Romanov and Arashukov (2008), Tereshin and Volodin (2011), (Kundius, 2012), and Bogdanova, (2007). Environmental benefits from the creation of agricultural clusters are considered by Khukhrin et al., (2009); Romanov and Arashukov (2008); and Nastin (2011).

The availability of multiple definitions of the agricultural cluster suggests that the theory of agricultural clusters is at a stage of active formation. Boitsov and Kostyaev, (2009) argue that the cluster approach can be very effective while studying and designing the agroindustrial sector of economy at the regional and local levels; The interdependence and the associativity between enterprises and productions through the formation of sustainable vertical and horizontal links, the application of modern innovations and information technologies, use of public-private partnerships will enable agribusiness enterprises to reach a competitive level of production. Khukhrin goes even further calling the formation of agrarian clusters serious scientific and practical problem, whose solution influences the fate not only of agriculture, but also Russia as a whole.

Generalization of different viewpoints allowed us to suggest the following definition of agro-food cluster. Agro-food cluster is defined as the concentration of a critical mass of agricultural producers, food industry enterprises and their servicing infrastructure organizations operating in the agro-food and other markets in a comfortable business environment, supported by the authorities, while their relations are in equal measure cooperative and competitive in nature and give rise to synergistic ecological and socio-economic effect, enhancing the competitiveness of the territory (Figure 1).

As mentioned above, when forming agro-food clusters it is necessary to consider regional features. The systemic problems

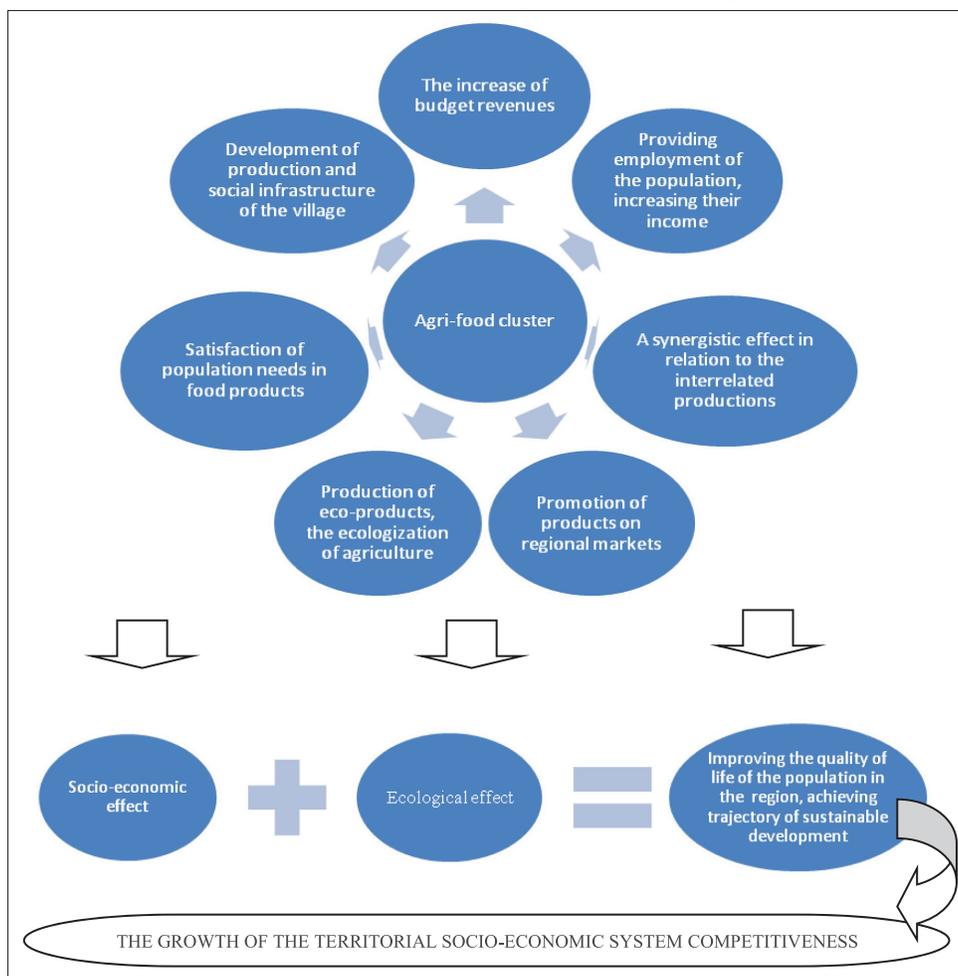
in AIC of the RB are generally the same as those of the Russian agribusiness:

- Adverse climatic conditions affecting the efficiency of agricultural production, price disparity, conservatism and inelasticity, subsidization and the need for state support.
- Lack of current assets, weak material and technical base, low workforce productivity and technical recourses, low agricultural productivity.
- The underdevelopment of the rural social sector, low average wages, low marketability of smallholders, weak logistics system, poor infrastructure.
- Outflow of population from rural areas: Ulan-Ude, the capital of the RB, is home to 43.3% of the region's population, while the number of inhabitants living in settlements with populations under 500 people, is 0.07%. The urban population in the RB as of 1.01.2015 amounted to 58.9%; while rural population was 41.1%. Taking into account the fact that Buryatia has traditionally been an agrarian-industrial region, we can recommend to the regional authorities to make adjustments in the Strategy for socio-economic development of the RB up to 2027 (currently in order to implement the Federal Law of the RF of 28.06.2014, No. 172-FZ the government of the RB has started to develop the Strategy for socio-economic development of the RB for the period up to 2030).

It should be noted that in terms of labor productivity, livestock productivity and yield of main agricultural crops of the RB are inferior to the neighboring Irkutsk Region, which has competitive advantages such as more wooded terrain, a higher average annual temperature and a slightly different soil composition, and electric energy, the cheapest in the country because of the location on the West coast of Lake Baikal. Over 330 rivers fall flowing into Lake Baikal, while just one river namely Angara flows out of the lake. At the same time, in Buryatia the so-called "Baikal factor" reduces the competitiveness of producers, restricts agricultural and other activities, and significantly increases the cost of production due to the huge costs of environmental protection measures. Three fourths of the water-collecting area of Lake Baikal (19 million hectares), which is a world heritage site (the lake satisfies all four natural criteria of the UNESCO World Heritage Committee), is located on the territory of the RB (UNESCO, 1996). Baikal protected area imposes special requirements on the management regime that entails the urgent need for greening the AIC. While in other regions of the RF the socio-economic benefits from clustering of AIC is of paramount importance, in the RB environmental effect plays no less important role. Currently, the Republic bears the higher costs related to the protection of Lake Baikal that negatively affects its competitiveness. A shift to other forms and methods of agricultural production, taking into account its uniqueness and competitive advantages, is able to give impetus to the development of both regional AIC and the regional economy as a whole.

In addition, the following may be related to the region peculiarities:

- Traditional pastoral way of life, which is consistent with the basic principles of organic agriculture.
- Orientation of the regional authorities on the development

**Figure 1:** Effect of agro-food cluster on regional development

of meat and dairy production (strategic goals and objectives of the AIC are defined in policy documents of the RB Government, such as the Concept of development of AIC and rural territories of the RB for 2009-2017 and for the period till 2020, state program "Development of AIC and rural territories in the Republic of Buryatia," etc.).

- Smallholders produce 84.3% of potatoes, 71.9% - of vegetables, 68.4% - of cattle and poultry for slaughter, 89.2% - of milk, and 31.9% of eggs. It is they who bear the main burden of ensuring the population with food. Seasonality which is typical of private household and the extremely low proportion of industrial agricultural production lead to lack of raw materials for food and processing industry. Food products manufacturers are forced to import meat and by-products in blocks, while milk from neighboring regions and foreign countries. As the result, the largest meat and milk processing enterprises in the RB are operating on imported raw material.
- The structure of Republic's self-sufficiency in terms of the main food is as follows: 50% - by meat and meat products, 70% - by milk and dairy products, 36% - by eggs, over 100% - by potatoes, and 80% - by vegetables. The RB imports about 30,000 tons of meat each year, 70,000 tons of milk and dairy products, 130 million eggs, 14,000 tons of vegetables and 2.8000 tons of fish. In accordance with the rational

consumption norms established by the Russian Academy of Medical Sciences, fulfillment and over-fulfillment of these norms is observed only for potatoes, bread and bakery products that testifies the unbalanced structure of food consumption that ultimately reflects on the health condition of the population.

- Average monthly wages of agricultural workers amounts to 55% of the national average; for a number of years, this ratio has not changed significantly.
- The availability of special economic zone for tourism and recreation "Baikal Harbor" and the special economic zones in the North-Baikal, Kabansky, Kyakhtinsky, Ivolginsky regions of the cities of Ulan-Ude and Severobaikalsk, as well as in Atsagat and Tunka valleys. According to forecasts, the development of tourism will lead to a significant increase in tourist flows (mainly from Asia-Pacific countries). This circumstance will lead to aggravation of the food security problem.

Given the specifics of the RB, creation of two subclusters in the AIC would be the most efficient solution to the problem:

- Agroindustrial subcluster, aimed at increasing self-sufficiency of the region in food, which would consist mainly of Agricultural Organizations (AO) and large peasant farms (LPF).

- Agro-ecological subcluster, focused on organic agricultural production and consisting of smallholders and small peasant farms (SPF).

Agroindustrial subcluster will solve the problems of food security, while agro-ecological subcluster will provide quality environmentally friendly products having a positive impact on public health and not degrading the environment. In general, the model of the agro-food cluster is presented in Figure 2. Large AO and the leaders of the food industry of the RB will constitute a core of agroindustrial cluster, while smallholders and small peasant farms involved in food processing will underlie the agro-ecological subcluster.

The business climate is largely determined at the macro level: Starting from the activities of international organizations (WTO, UN) and ending with regulatory legal acts at federal and regional levels. In this case meso-level is the governing body: The joint efforts of the regional authorities and coordinating council allow one to set the vector of the agro-food cluster development. At the micro level, the activity of the core is provided by many infrastructure organizations involved in financial-credit, advertising, insurance, venture capital, consulting, research, transport and logistics, and other activities.

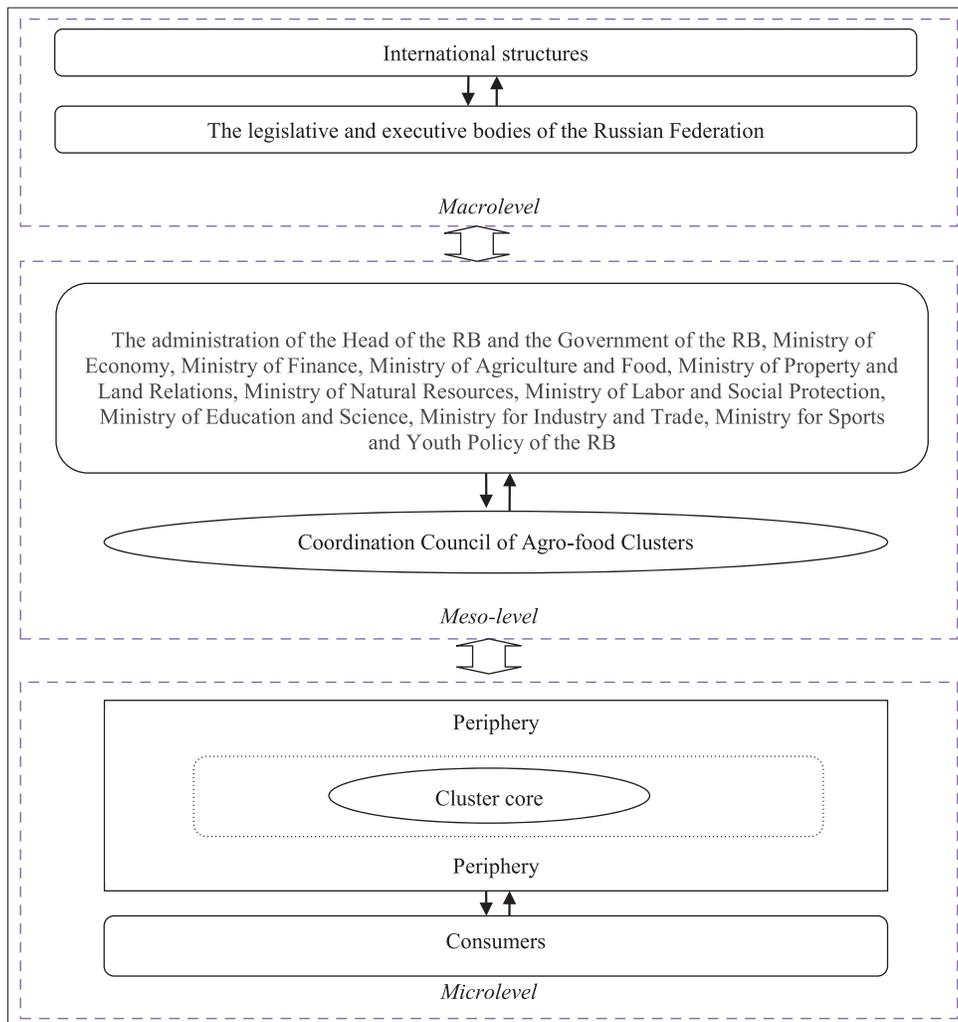
While establishing potential agroindustrial subcluster specializing in meat and dairy production (Figure 3), the following was taken into account:

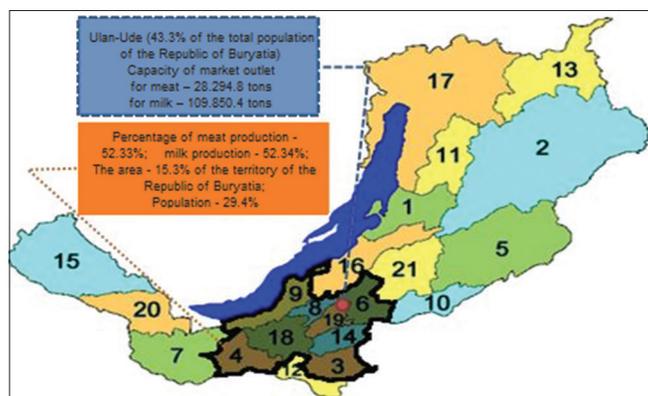
- Territorial zoning of the RB and the regional specialization
- The distance to the regional center as the main market
- Cattle population and productivity
- The availability of potential integrated structures of AIC, able to become regional economy engines and growth points.

According to Buryatstat (The Territorial Body of Federal State Statistics Service in the RB), the half of all meat and dairy produced in the RB falls to 1/7 part of the RB territory inhabited by less than a third of total population (Buryatstat, 2015). Thus, the formation of meat and dairy subcluster on the territory of Bichursky, Dgidinsky, Zaigraevsky, Ivolginsky, Kabansky, Muhorshibirsky, Selenginsky, and Tarbagataysky regions is justified and seems to be economically feasible.

Agroecological subcluster involves the development of organic agriculture (organic agritourism farms, especially along the road to Lake Baikal and Federal highways), for which there are factors of natural, technological, organizational, environmental and social nature. Given the “Baikal factor,” the low level of environmental pollution of several municipal districts, long-term reduction in the

**Figure 2:** Model of the agro-food cluster



**Figure 3:** Potential dairy and meat subcluster

Regions: 3 - Bichursky, 4 - Dgidinsky, 6 - Zaigraevsky, 8 - Ivolginsky, 9 - Kabansky, 14 - Muhorshibirsky, 18 - Selenginsky, 19 - Tarbagataysky.

amount of applied mineral fertilizers and plant protection agents, due to lack of current assets, the projected influx of tourists with high level of income, a large proportion of manual labor, we can say that the transition to organic agriculture for smallholders and LPF will be promising provided the support from the federal, regional and municipal authorities.

The division of AIC into industrial and organic sectors contributes to the development of cooperative and integration relations of both industrial agricultural production and ecological (organic) production, where the scale and size of competing organizations are quite important. At present, the regional AIC faces the task to produce a development strategy taking into account the management specifics in the Baikal region and accumulating the experience of various organization forms of agricultural production - from large integrated agricultural structures to family farm units and private subsidiary farming. Within the cluster structure suggesting effective interaction between large, medium and small size businesses, no contradiction arise between tendencies of integration and cooperation due to the lack of formal relations and a strict hierarchy among the participants. Distinctive properties of the cluster such as flexibility, mobility, adaptability, and economic independence of cluster elements, give the opportunity for competitive enhancement of all forms of cooperation, if they will be provided with a favorable business climate with situational use of various state support mechanisms and tools.

## 5. CONCLUSION

Considering all the advantages and disadvantages of cluster development as well as opportunities and threats, we can give the following recommendations:

To proceed from anthropogenic concept of AIC development towards sustainable development of the agricultural sector, implying integrated achievements of the following:

- Economic benefit, implicating growth of agricultural products and foodstuffs production, improving its effectiveness.
- Social return, implicating social development of rural areas, preservation of traditional way of life of multinational rural population.

- Ecological effect implicating the greening of agricultural production, maintaining sustainability of agricultural landscapes, production of eco-products, and preservation of Lake Baikal.

To transform the concept of “citizen of urban civilization” currently equivalent to the term of “townsman,” to the concept of “citizen of the world,” “part of the ecosystem” rather than “the top of the food chain”. This will require considerable reduction in the anthropogenic load, integration into the natural cycles and coexistence in symbiosis with them.

To convert disadvantages into competitive advantages: The greening of agriculture, refusal of the mineral fertilizers, chemical substances and growth promoting agents will allow producing environmentally friendly products. Note that in comparison with other regions, the contamination of soil, water and air in the RB is minimal due to a long period of limited economic activities in the territory because 80% of its area serves catchment basin of Lake Baikal. The low level of mechanization and automation of agricultural works and a high proportion of manual labor in this case increase the trust of consumers from metropolitan cities in European part of Russia and Western Europe.

To support agricultural producer in the context of Russia’s accession to the WTO, applying the socio-environmental federal and regional programs whose measures are permitted by the green cart initiative. To shift from state economic support to social and environmental support not prohibited by international law.

To distinguish support measures for industrial and environmental production: Industrial agricultural production should be oriented on mass-market, while organic production should be focused on the products quality and utility.

To create new forms of interaction between the subjects in AIC, namely agro-food clusters, combining elements of integration and cooperation, competition and support, bringing synergy ecological and socio-economic benefit.

The following points still remain unrevealed: Organizational and managerial structure of clusters, which are primarily informal associations; their functioning mechanisms and tools; the volume of state support and financing sources of cluster structures in the AIC. These issues can be studied in further research.

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