Agro-industrial Clusters in the Russian Federation Economy: Features of Investment Attraction Analysis

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Abstract

The present article reflects the authors' views on the subject of different approaches to explore features of changes in the agrarian sphere of economy. It is focused that an objective basis for an essential reformation in the agrarian sphere of national economy is to ensure national food security. One of the best ways to change the form and ways of economic management, according to the authors, is to create agro-industrial clusters in Russia. The writers believe that agro-industrial clusters have the potential to become under the modern circumstances an adequate response in choosing future paths to reform agrarian sphere of the Russian Federation economy considering the common inner instability within the country as well as the constantly changing foreign-economic challenges, including food sanctions. The article also introduces some theoretical aspects of creating agro-industrial clusters in the system of national economy; main features of agro-industrial clusters are determined. Special emphasis is placed on the exploration of the different issues of investment attraction and investment climate of agro-industrial clusters based on soil and climatic diversity of a region along with historically established distinctive features of economic management. Additionally, the article demonstrates a development of the authors' hypothesis of an official functionally structured modelling of investment attraction of regional agro-industrial clusters depending on both the analysis of common investment potential together with investment risks and economic situation in a single agro-industrial sector. Moreover, the writers suggests regional ranking of forming agro-industrial clusters in terms of investment attraction and the existing cluster initiatives.

Keywords: *agro-industrial, investment attraction, investment potential.*

1. Introduction

Difficulties of the whole process to create an agrarian sphere within the RF economy persuade researchers to search for the ways and methods of solving the existing problems, including scientific and theoretical grounds to accept optimal solutions while reforming. Recently more attention has been given to agro-industrial clusters acting as a determinant of a stable development of the agrarian sphere of national economy. While the scientific society continues controversy about the grounds of creating agro-industrial clusters, the choice of optimal organizational and structural models as well as alternative investment sources, this economic phenomenon gradually occupies a niche in Russian practical economic management. In 2015, for instance, in Novgorod Region, which in Russia historically belongs to poor soil zone, a large-scale company called "Bristol, Ltd." has proceeded to implement the project on agro-industrial clusters (http://www.gks.ru/wps/, E-resource: Federal Service of State Statistics of RF). The Project has the support of regional government institutions. The investment volume of the project is calculated up to 620 million rubles. This agro-industrial cluster integrates within a single region not only in the sphere of agrarian industry, cattle breeding, including dairy and meet produce companies, but also simultaneous building such infrastructural assets as: housing, social and engineering structures. The creation of this particular agro-holding, like any other large-scale investment project, is graded. The start-up period, which will last until 2016, focuses mainly on plant-growing producing, cultivating, stocking and processing potato in particular. It should be noted that the potato in Russia, according to some unspoken rule, is considered "second bread" and despite the technological changes people continue to plant it in their personal subsidiary plots (PSP) and their suburban plots (so called dachas). In this case two specifications are of special interest. Firstly, Western economies lack such form of economic management as Personal Subsidiary Plots (PSP) and suburban plots (dachas), which are based on the right of private land ownership. (Maksimova, 2013) Secondly, potato planting on one's own land for individual consumption and surplus sale on the market can be regarded as one of the deep-rooted traditions in Russia concerning

land economic management, which is no longer used in the Western practice. For this reason, the focus of "Bristol, Ltd" to expand potato planting based on the climatic and soil opportunities is more than justified.

The issue to create clusters in agrarian sphere of national economy is not completely new. For example, zoning matters and specialization of economic activity, as well as integration ties formation depending on the dominant features in the production process in the agrarian sphere of land resources and environmental factors were given consideration even before market-style reforms both in theory and in action (Maksimova, 2015). In our modern conditions agro-industrial clusters can become the very field of dialectical development of agrarian relations, which will allow us to achieve solutions to the key tasks of expanded production, to attain guarantee for long-term national food security. Furthermore, local systems of regional agrarian clusters in periodical shock conditions of the RF agrarian economy affected by both endogenous and exogenous factors can be seen as stable development point for the whole system of national economy. Exogenous factors in modern conditions can influence seriously the heightened investment interest to agrarian sphere of Russian economy due to absolutely new "phenomenon": the policy of "sanction opposition" between Russian and Western economies. This phenomenon, which sprung up as a "product" of ill-explicable (from a common sense point of view) decisions of political institutions of the European countries, the USA and Russia, and on one hand, became a hindrance to further development of objective globalization process of agro-industrial markets. On the other hand, that phenomenon made relevant the necessity to solve problems of providing inner expanded production in the agrarian sphere of the RF economy. (Maksimova, 2015) Accordingly, the writers assume that the investigation of potential investment possibilities in the sphere of RF agrarian economy and the analysis of regional investment potential to create agro-industrial clusters presents a keen interest.

2. Materials and Methods

While writing this article as an outcome for intermediate research of forming agro-industrial clusters aspects depending on investment attraction analysis in various regions of Russia, the authors chose to use the following research methods: abstract-logical, monographic, analysis and synthesis method, along with the statistic and investment analysis methods. The informational support of this research is based on the data of the Federal Service of State Statistics, the RF Ministry of agriculture together with national and foreign reference and scientific literature. The data were processed with the help of software packages such as SPSS, Microsoft Office. Some single results of the research were presented at the Second Political and Economic Congress of the Commonwealth of Independent and Baltic States (May 2015, Moscow), at International and Regional Scientific Conferences (Russia: Moscow, Ufa; the Republic of Slovenia)

Theoretical and methodological approaches in the research of agro-industrial clusters in the economy system of Russia requires, in the first place, to define more precisely the basic definition – "agro-industrial cluster". The input in the economic turn, the common term "cluster" is usually referred to M. Porter (2005).

M. Porter (2005) associated this concept with geographical concentration of transactors, bound by one, and the same type of economic activity as one of the mechanisms of competitive advantages for such activity. However, initial sources determines essential characteristics of this particular definition were observed in the works of J. Thünen and A. Marshall. Long before using the term "clusters", J. Thünen researched the main principles of this economic concept. J. Thünen per se is the founder of the location theory (or the theory of production localization – *authors' editing*) by the example of agriculture. (Blaug, pp 299-302) Undoubtedly, many J. Thünen's theses on discovering the objective laws of localizing an agriculture production, which are formulated in his "Isolated State" in modern perception may seem quite abstract. Especially this concerns the issues on localization zones of agriculture activities around urban establishments because of the isolation from outer relations with an official economic model. It is important, however, that at present there is a relevance of the issue of production forces localization in agriculture as one of their determinant of stable development of rural regions.

A. Marshall focused his attention on the issues of production organization, which also indirectly concerns the essential cluster characteristics. (Marshall, 2010) Along with this, A.Marshall's algorithm to examine the advantages of organization may be presented in the form of a logical chain: natural organization of people in a society – the process of division of labor – specialization of an educational process – usage of the advances of the technological progress – territorial specialization of production (*authors' editing*). In Chapter 10 of his "Principles of Economics", where A.Marshall explores the issues of concentration of specialized industries in separate regions, he practically describes the essential characteristics of the category "cluster", although he is not using the very term "cluster" but "location" instead. (Marshall, 2010, p.257). Interestingly enough, A. Marshall, while studying production location issues, refers to agrarian sphere of Russian economy. In particular, he wrote: "In Russia the accretion of family groups up to the size of a rustic establishment generates the emergence of localized productions, along with this there are innumerous villages, each of

which produces only one kind of produce, or even a part of a produce".

Additionally, it is important that the main reasons for localized productions, both in the times of A. Marshall and in modern conditions, are first of all "natural conditions – character of the climate and the soil, richness in minerals and wall stone in the given region or within striking distance on land or in water" (Marshall, 2010, p.258). At the beginning of the 20th century based on the statistic method, B.S.Yastremskiy explored clusters in Russia. In particular, he determined the criteria to group different regions depending on the kind of activity: "in agricultural regions such criterion was land plottage, in cattle breeding – the amount of cattle" (Solvell, Lindqvist & Ketels, 2015). The issue of clusters in agro-industrial complex in their modern interpretation has relatively recently became the subject of analysis for many academic economists of Russia. For instance, in the last few years different aspects of agro-industrial clusters were studied in the works of A.M. Ableeva (Ableeva, 2013), V.V.Demichev (2013) and others.

Adapting the accumulated knowledge on the theory of clusters and the practical experience of economic management, the writes mark out the following chief features of forming modern agro-industrial clusters:

Firstly, production specialization in local economic regions depending on soil and climate conditions as well as geographical fatures of a region. Secondly, features of production organization based on large-scale specialized form of management. Thirdly, the differences in the criteria of specialization for agriculture and cattle breeding

Based on the above mentioned feature, the writers distinguish clusters resulting from a geographical and climatic formation of enterprises, suppliers and sales companies, inside of which there is a complete food production cycle, personnel training, making supplementary products. (Milyaev, 2014) Along with this, there is an emphasis on the competitive ratio in such integrated unification, which is important in the systematic analysis of investment attraction of agro-industrial clusters.

3. Investment Attraction of Agro-industrial Clusters

Despite the obviousness of investment attraction of the agrarian sphere of economy in modern conditions, practically the situation is not comforting. According to Russian Stats data for 2014 investment dynamic in the agro-industrial complex is still extremely low. For example, in the agriculture basic capital there is still 3,5 % of the investment overall scope in other branches of RF national economy. (Yastremskiy, 1920 & http://www.mcx.ru \\, E-resource: Official site of the Ministry of agriculture) While analyzing the issues of investment attraction of agro-industrial clusters, it is necessary to note that there is a single unified definition of this concept and there are unified criteria of investment attraction. Under investment attractions, the authors distinguish a set of characteristics of the development of regional agro-industrial complex as investment medium. This set of characteristics results from solvent demand for investment. Alongside with this, it is absolutely obvious that this concept has an unconditional context of subjectivism from the position of single investors. That means having one and having the same figures of economic and financial indices of a potential investment object, investment attraction of this object for various investors can be different.

According to the authors' approach, if we take regions as territories where potentially agro-industrial clusters can be established, this will give us an opportunity to zone regions in correlation with the amount of profit by investors from all the possible investments in the agro-industrial complex of economy in single regions. The writers provide us with a model of calculating investment attraction based on the use of information from an analytical research "Investment attraction rating in the regions of Russia", prepared by a rating agency "Expert PA" and being a part of an international group RAEX (Investment rating of the regions of Russia, 2015). This model is based on the analysis of two metrics: firstly, they are the metrics evaluating regional attraction for investors in a form of a rating assessment. Secondly, they are the metrics that characterize potential possibilities of forming agro-industrial clusters in a region as well as the development of regional cluster initiatives. By cluster initiatives the writers mean organizational arrangements to increase competitive ability of a region due to which it is suggested to ask for services of private companies, state institutions, and scientific research institutes, all of which in their aggregation would contribute to increase effectiveness of a local regional cluster.

From a mathematical point of view, investment attraction of agro-industrial clusters comes to a definition of an integral performance index, which is determined by a set of economic and financial indices, as well as indices of state, society, legislative, political and social development of a region. In an overall formalized approach this can look as follows:

IAR= F (IPR, IR, IEP), where IAR is investment attraction of a region, IPR is investment potential of a region, IR – investment risks, IEP – indices to economic progress of agro-industrial branch.

Investment potential of a regional agro-industrial cluster allows considering a whole set of objective conditions and prerequisites for investment (customer demand, main economic indices, offering resources, institutional conditions and so forth) and evaluating real possibilities to attract investment to the region. There are various approaches to define the

concept of investment potential of a region. The authors of this publication see investment potential as the ability of the region to satisfy the demand in investment resources without attracting borrowed funds, based on available production factors. Common investment potential of a region as well as investment attraction index are integral and are calculated based on 9 private potentials (before 2005 – 8 potentials). Each of these potentials in its turn also includes certain subsystem. Thus, there are following groups:

1. Natural resource indices group (overstated supply of main natural resource reserves);
2. Labor indices group (labor resources and their educational level);
3. Production indices group (cumulative effect of economic management of population in the region);
4. Innovation indices group (science development and application of scientific and technological advances in a region);
5. Institutional indices group (development degree of the leading institutes of the market economy);
6. Infrastructure indices group (economic and geographical position of a region and its infrastructural well-being);
7. Financial indices group (tax base, profitability of the regional companies and income of the population);
8. Consumption indices group (combined purchasing capacity of the population of a region);
9. Tourism indices group (touristy places, amenities, accommodation)

The second main index is investment risks. As a rule, it is a qualitative characteristic depending on a range of social, political, economic, financial, ecological and other factors. At present scientists mark out the following risk types (Investment rating of the regions of Russia, 2015):

1. Economical (a tendency in the economic development of a region);
2. Financial (equilibrium level of the budget of a region and a company's finances);
3. Social (the level of social tension);
4. Ecological (level of environmental pollution, including radiation);
5. Criminal (crime rate considering gravity of crimes, economic delinquency and crimes, concerning illegal drug traffic);
6. Management (quality of budget management, availability of programme and action oriented papers, level of infant mortality as an integral index of social service outcome).

Furthermore, the authors present three stages of calculation of investment attraction index of a region. At stage 1 of evaluation of investment attraction segments of each Russian region are estimated according to the nine kinds of investment potential as well as the indices of the six types of investment risks. At stage 2 all the regions are rated according to the value of combined investment potential or integral investment risk. Lastly, at stage 3 of comparative assessment of investment attraction each region receives an efficiency rating of investment attraction – an index determining a ratio of the integral investment risk level and the value of combined investment potential of a region. Based on such ratio each Russian region can be attributed to one of the 12 rating categories.

Apart from the main two indices several groups of indices that show the development of the agro-industrial complex in a region are also analyzed. Those groups of indices consider such factors of cluster development as competitiveness, the level of innovative activity, amount of highly qualified staff.

These indices are structured into the following groups:

1. Index to economic progress of agriculture of regions (agriculture produce, mil. rubles, plant growing produce, mil. rubles, cattle breeding produce, mil. rubles, agricultural produce per head, mil. rubles)
2. Financial indices (investment into the main capital in agriculture, agricultural companies turnover, mil. rubles)
3. Social and economic indices (amount of agricultural labor force, thousand people, specific weight of rural population)
4. Science and innovation development indices (availability of higher educational agricultural institutions)
5. Infrastructure development indices (retail trade turnover, mil. rubles, amount of agricultural companies, amount of transport and logistic companies in the region, availability of fertilizer production companies)
6. Region's investment rating

The authors believe that such model will enhance a more precise determination of forming cluster groups on the territory of the Russian Federation regions. It should be noted that the very methods of statistic clustering are one of the best to distinguish clusters and observe their development, as in this case we deal with a comprehensive approach that allows us to consider the maximum factors that influence the formation itself of agro-industrial clusters.

Such a model of investment analysis possesses certain restrictions on registration of specific climatic features and species diversity of agricultural produce. These restrictions, however, do not produce any negative effect since they are given proper account in other integral indices. Another assumption in the model is that the analysis is made not within the whole combination of RF regions, but rather in Federal Districts (Central, North-Western, South, Privolzhskiy, Northern

Caucasian, Ural, Siberia, and Far East Federal District). The writers suppose that this allows to minimize potential errors while analyzing investment attraction in the process of agro-industrial clusters formation.

Alongside with this, the discussed above structure functional model considers more essential factors and conditions of the production process in the whole technological chain starting from agricultural raw material production up to the end product, i.e. this model has its grounds in the main aspects management methodology of business processes in a cluster. In such a model all the technologically bound activities are implemented in a form of integrated production economic system. Cluster formation assessment at regional level meets more precisely the features that can characterize a territory agglomeration. Here such parameters as geographic proximity, technological community, infrastructure a retaken into consideration.

4. Research Results

After applying clustering analysis of indices of agro-industrial complex development of regions and rating assessment of investment attraction, we obtained the following results which are organized according to the Federal District of Russia.

Hierarchic clustering analysis of several variables used in our particular case visually demonstrated the possibilities of regions to form agro-industrial clusters. Hierarchic clustering is built on the assumption that large-scale clusters are divided into small-scale ones, which by-turn are subdivided into even smaller ones and so forth. Such an approach allows to more precisely compare indices of agro-industrial development with those of investment attraction of regions and discover obvious possibilities to create regional agro-industrial clusters with a high degree of investment attraction.

The analysis of each Federal District is summarized in a table of two column. In the first column has the name of a region. In hierarchical methods every single observation creates first of all its own separate cluster. At the first step two neighboring clusters combine. Then intergroup relations are built. When the primary report on already established relations is made, it is necessary to discern the very relations between indices that are the strongest. For this reason coupling constant is examined. By coupling constant we mean the distance between any two clusters which is determined based on the chosen distance measure but considering the provided value transformation. In our case it is square Euclidean distance, distinguished by means of standardized values. At the stage when the distance measure between the clusters increases in spurts, the process of aggregating into new clusters must be interrupted. Because otherwise the clusters to join together will be relatively far from each other and consequently will have a low index correlation. Such analysis algorithm allows to discover the amount of clusters that corresponds to a high correlation criterion. The annexed tables present the number of regions where agro-industrial clusters are created.

The values in the other column of the table show the number of correlation discovered in regions – the degree of clustering: the less is the value, the higher is the chance to form an agro-industrial cluster with a high investment attraction on the territory of that particular region. Equal values in the column are evidence of identical degree of index correlation in different regions. For instance, in Central District the most attractive region where integral relation is already established is Belgorod Region. Having massive indices for agro-industrial production, this region differs in developed infrastructure along with a high investment attraction. In such regions as Voronezhskaia, Ivanovskaia, Kostomskaia one can observe high potential to create clusters. Moscow being a city of federal importance also possesses, according to the analysis, a potential to form clusters. But this is an outcome of a large quantity of scientific organizations in the first place as well as the developed transport and retail infrastructure. A medium index of investment potential in this district is in its average values.

In the second Federal District – North-Western, the region with obvious cluster potential are the Republic of Karelia, Komi, Yamalo-Nenetskiy Autonomous District, Novgorod and Vologda regions. Saint Petersburg as well as Moscow has concentrated a huge number of scientific and educational institutions alongside with a developed infrastructure. Despite the low level of investment potential, the regions located below the polar circle retain the basis of their agriculture in deer breeding and other climate specific activities. These activities influence immensely the lifestyle of people living there, which is why the improvement of investment climate is considered to be a task of utmost priority to support the quality of life.

In the South Federal District the regions that stand out with their cluster potential are Krasnodar Region, Volgograd Region, and Rostov Region. Here the reasons of high indices are found in the positive effects the deep-rooted traditions of land economic management, developed infrastructure and fertile soil and climate. Great importance present the many specialized educational and scientific institutions, which train personnel for the regions of the agricultural complex. What is more, Krasnodar and Rostov Regions are those of ten most attractive regions from potential investment point of view. The regions such as Adygea, Kalmykia, and Astrakhan Region also demonstrated an essential potential of clustering, although the investment potential in those regions is below average.

According to the analysis of Privolzhsk Federal District, the Republic of Tatarstan, Bashkortostan, Saratov, Nizhniy Novgorod, Orenburg and Penza Regions besides the developed agro-industrial complex and high production indices, their investment potential is above average. Considering the fertile climate of the Federal District, wide range of higher educational institutions that train personnel to work in agro-industrial sector, it is worthwhile to provide over-all support for cluster initiatives and integration ties from state institutions and transactors.

In the Northern Caucasian Federal District, as the analysis show, the development of cluster initiatives is not enough. However, among the regions two transactors stand out – the Republic of Dagestan and Stavropol Region, which have the necessary infrastructure and possibilities to develop integration in the sphere of agricultural production.

The analyzed data from the Ural Federal District show that all the regions except Kursk region have their investment potential below average. Such regions as Sverdlovsk, Tyumensk, Chelyabinsk, apart from a relatively high level of investment potential, also possess developed agricultural infrastructure and high potential to form agro-industrial clusters of various specialization.

Territories of Novosibirsk, Irkutsk, Kemerovsk, Krasnoyarsk regions of the Siberian Federal District have grounds to create agro-industrial clusters due to high values of the main indices during the analysis as well as a high level of investment potential. These regions attract investors.

While analyzing the Far East Federal District it became obvious that the cluster initiatives in agriculture are at a low level of development. Average values of investment potential indicate main tasks to deal with in that region. Yakutia, Primorsk and Amursk regions possess the best opportunities in cluster formation. Specialized Universities, developed transport system distinguish these regions.

5. Conclusion

The results of the present research demonstrate that both in theory and in action the issues on agro-industrial clusters formation are up-to-date and require further consideration and development.

Based on the analysis investment attraction and potential possibilities of Russian regions, it can be claimed that, firstly, in a range of Russian regions there are cluster initiatives in the agro-industrial complex necessary to form agro-industrial clusters. High indices of infrastructure, production, investment attraction as well as climatic conditions compose a basis for a stable development. Secondly, such regions should be given prioritized consideration, especially when government institutions allocate financial resources for agricultural development of the Russian Federation economy. The suggested mechanism of allocation will help in creating agro-industrial clusters, whose stable development will become a growing point for a common economic development of separate regions.

The analysis of the modelling results has demonstrated that on the territory of the Russian Federation at present there is a process of formation of agro-industrial clusters of various specializations in 27 regions. The creation of regional agro-industrial clusters will allow on the whole to increase investment attraction both of branches and of regions. Moreover, the implementation in action the existing potential possibilities of now forming agro-industrial clusters will permit to provide national food security in the Russian Federation economy.

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Annex 1. The level of investment attraction of agro-industrial clusters in the regions of the Russian Federation Federal Districts.

Clusters of the South Federal District		Belonging to a cluster regions of the Central Federal District	
Clusters		Belonging to a cluster	
Region	Clusters 4	Area	Clusters 6
1: Adygeya	1	2: Belgorod	1
2: Kalmykia	1	3: Bryansk	2
3: Krasnodar	2	4: Vladimir	2
4: Astrakhan	1	5: Voronezh	3
5: Volgograd	3	6: Ivanovo	4

6: Rostov	4	7: Kaluga	2
		8: Kostroma	4
		9: Kursk	2
		10: Lipetsk	2
		11: Moscow	5
		12: Orel	4
		13: Ryazan	2
		14: Smolensk	2
		15: Tambov	2
		16: Tver	2
		17: Tula	2
		18: Yaroslavl	2
		19: Moscow City	6
Clusters of the North-Western Federal District		Clusters of Privolzhye	
Clusters		Clusters	
Region	Clusters 6	Region	Clusters 9
1: Kareliya	1	1: Bashkortostan	1
2: Komi	2	2: Mariy El	2
3: Nenetsk	3	3: Mordoviya	2
4: Arkhangelsk	4	4: Tatarstan	3
5: Kaliningrad	4	5: Udmurtiya	4
6: Leningrad	4	6: Chuvashia	5
7: Murmansk	5	7: Kirov	6
8: Novgorod	4	8: Nizhniy Novgorod	5
9: Pskov	1	9: Orenburg	7
10: Saint Petersburg	1	10: Penza	8
11: Вологодская	6	11: Ulyanovsk	5
		12: Samara	7
		13: Saratov	9
		14: Perm	5
Clusters of the Ural Federal District		Clusters of the Siberian Federal District	
Clusters		Clusters	
Region	Clusters 5	Region	Clusters 7
1: Kurganskaya	1	1: Altai	1
2: Sverdlov	2	2: Buryatiya	2
3: Khanty-Mansisk	3	3: Tyva	1
4: Yamalo-Nenetsk	4	4: Khakassia	2
5: Tyumen	5	5: Altai City	3
6: Chelyabinsk	5	6: Zabaikalskiy	2
		7: Krasnoyarsk	4
		8: Irkutsk	5
		9: Kemerovsk	5
		10: Novossibirsk	6
		11: Omsk	3
		12: Tomsk	7
Clusters of the Northern Caucasian Federal District		Clusters of the Far East Federal District	
Clusters		Clusters	
Region	Clusters 2	Region	Clusters 5
1: Dagestan	1	1: Sakha	1
2: Ingushetiya	2	2: Kamchatka	2
3: Kabardino-Balkariya	2	3: Primorsk	3
4: Karachay-Cherkessia	2	4: Khabarovsk	4
5: Northern Ossetia	2	5: Amursk	5
6: Chechnia	2	6: Magadan	2
7: Stavropol	1	7: Sakhalin	1
		8: Hebrew	2
		9: Chukotka	2

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