Formation and development of clusters in the Russian regional agro-industrial complex

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Abstract. The article considers the cluster approach as an innovative technology for managing the regional economy of Russia. The results of the Russian and foreign scientists research in the cluster formation theory and practice are presented. The strategic model for innovative dairy cluster as a special form of relationships has been developed based on these scientific provisions. The basic principle is the innovative component of processing organizations of the regional dairy sub-complex together with consideration of socio-economic peculiarities of the Nizhny Novgorod region. This model turns to be very effective and can be used in designing the agro-industrial sector of the country's economy at the regional level.

1 Introduction

The ongoing reforms in Russia's agriculture have led to a state of crisis characterized by such phenomena as significant destruction of productive forces, the production potential of commodity producers weakening, misbalance of economic relations, loss of food security and a low quality of life of people in rural areas [3, 4, 12].

Globalization and global economic crisis clearly demonstrate correlation and interdependence of the world economies. Competition in these conditions has extremely escalated to become international even on the level of the Russian province. In this connection, M. Porter theory of competitive advantages, has gained its acceptance worldwide, including the theory of economic clusters having a considerable practical application [2, 11, 14, 15].

Cluster initiatives have received the most successful development in the European Union: Austria, Great Britain and Germany, as well as in the countries of the Central Eastern Europe - particularly in Slovenia [18].

Typology proposed by certain authors [1] is the starting point of clusters' classification:

- a new industrial district (with flexible specialization);
- nodal area (economic activity of one or several large corporations centering around the region);

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- an industrial partner- platform (subsidiaries of transnational corporations produce high- or low-tech goods, while receiving subsidies from the state);
- state center district (economic activity is directly related to public investments).

The cluster approach is a fairly new tool for agricultural production in Russia, and has recently gained an increasing popularity.

Obviously, Russia cannot remain outside the civilized development and not take advantage of the cluster approach (Table 1), both in the agro-industrial complex and in other sectors of the economy. Russian experience in the development of clusters study has shown that certain steps are being taken by the federal authorities in the Russian Federation for implementation of cluster policy. In 2006, the Center for Strategic Research (CSR) has initiated the project supposing introduction of the results of investigation conducted by the Institute for Strategy and Competitiveness of the Harvard Business School [18].

Table 1. Advantages of the cluster approach [19].

Advantages of the cluster approach
1. Geographic concentration
2. Specialization
3. Plurality of economic agents
4. Competitiveness and cooperation
5. Acquisition of the necessary “critical mass” within the cluster volume
6. Viability
7. Involvement into the innovative process

2 Materials and Methods

The following essential characteristics or criteria can be singled out in the definition of the term “agro-industrial cluster”. Firstly, the cluster, especially in its mature, developed state, presents a system, being a concealed one at that. This system is the more effective the more holistic it is, and the greater is the synergetic effect from its application. At the same time, the more open the system is, the more capable it is of development and self-development. The existence of correlation between all forms of farms, both large-scale agricultural organizations and small economic entities, is the initial and fundamental prerequisite for the cluster process in the entire Russian agriculture. This correlations need to be strengthened, and it can be fulfilled in almost any agricultural territory. With the cluster development and growing of its multifunctional character, the systemic nature of the cluster will increase and, as a consequence, the efficiency of its links grows as well. The existing correlations between the categories of entities (forms of economic management) in Russia today are the natural prerequisite for the establishment of agricultural clusters and launching of the cluster process in agriculture as a whole.

Only those entities are advisable to be designated as clusters, which are based on innovative technology and close, multilevel technological cooperation, rather than traditional relationships based on the labor division.

Only a self-managed and integral organizational form, managed through small impacts can be designated as a Cluster. The behavior of subjects within the clusters is determined by economic interests, rather than by the administrative instrument of cluster management, which should be almost none. At the same time, self-organization, self-management and its organization prevails not only in the management of the agrarian cluster, that is management with the emphasis on the “self-” notion, which, if appropriate, experiences active involvement. A lot of Russian regions, in particular, Samara, Tambov, Kursk, Penza and other regions, have declared their intention to establish clusters. For several years running Samara holds the Economic Forum “Samara Initiative: the Cluster Policy – as the Basis of

Innovative Development of Innovative Economy". Samara region is discussing the automobile cluster as the already existing model. The strategy of socio-economic development of the region provides for the agro-industrial cluster establishment, which could involve several sub-clusters: meat products, grain products, dairy products, fruit and vegetable, oil, potato and sugar beet. The agro-industrial cluster of Tambov region will include the following clusters by the sectors: grain, sugar beet production and processing, oil and rape, fruits and vegetables, meat. The positive aspect of the clusters in Tambov region is deep processing of raw materials envisaged within the process.

Alongside with the external positive trend in the agrarian (agro-industrial) clusters formation in Russia, it is necessary to note some negative aspects of this trend:

- lack of clear understanding of the "cluster" concept;
-formal inclusion of research institutes and universities in the cluster structure, which does not guarantee fostering of their innovative processes;
- establishment of mutually beneficial relations between the clusters is not envisaged [9 17].

The following most characteristic features of a cluster create their competitive advantages for operating of the organization in an independent mode:

- correlation between the companies, specialized vendors, service providers, as well as related companies;
- common activity of correlated companies, vendors, organizations and their complementarity [8, 16];
- horizontal and vertical links;
- combination of industries producing finished products [6];
- high economic efficiency of public and private investments, simultaneously extending to many organizations [13];
- available preconditions for cluster participants competitiveness level increase and their competitive advantages achievement [10, 20];
- increased internal availability of specialized production factors, labor forces and information;
- a higher degree of public goods admission;
- high innovation activity of all cluster members [5];
- favorable internal conditions for the new businesses formation;
- favorable location as the most important factor of competitive advantages in the global economy [7, 21].

The comparative analysis carried out for clusters, territorial-production formations of the Soviet type and vertically integrated associations for their most significant properties makes it possible to identify both the features of their similarity as well as the differences between them. Herewith, in both cases, analyzed is a combination of industries and productions, correlated, interdependent and mutually complementary (Table 2, 3).

Table 2. Main similar features of a cluster and a territorial - production formation of the Soviet type.

Main similar features	Cluster/ territorial- production formations	Main differences	Cluster/ territorial-production formations
Basic integration process, main characteristic features	Combination of industries, correlation, interdependent and mutually complementary character /combination of production process, correlation, interdependent and mutually complementary character	Property form	Private /public
Character and links direction	Horizontal and vertical links / Horizontal and vertical links	Type of the instrument formation	Market/ planned

Approach economic efficiency to evaluation	Dissemination of effect from investments to many companies of the cluster/efficiency of the entity on the whole, but not its separate parts	Succession in establishment of new production	Spontaneous, with the definite coordinating role of state and large corporations /in compliance with technical and economic substantiation and plan
Role of the territory	Cluster is a group of geographically neighboring correlating companies /industrial complex is united by the territory	Basis of production combination	Combination alongside with orientation to the final market product/combination for the purposes of complex use of the resources
The location role	Location is an important factor of competitive advantages /economic effect occurs due to the beneficial transportation and geographic location	Resources provision	Long term contractual relationships establishment /on the basis of limits
		Prices coordination	Market planned
		New business formation	The most favorable conditions/ Absence of business
		Role in the competitive struggle	Provides a high level of competitiveness/absence of competitive media

Table 3. Main features of difference between a cluster and a vertically integrated association.

Main features	Cluster	Vertically integrated associations
Production structure	Coordinating committee manages independent organizations working out mutual development targets	Centralized management, corporative cooperation
Production type	Flexible specialization, based on innovative development	Specialization for production of separate types of products
Cooperation of the participants	Both formal and informal	Formal
Competitive opportunities	Realized on the territory of one region	Both inside the region, and beyond it
Territorial concentration	Interregional	Intraregional, and Interregional
State regulation	Aimed at the cluster and its participants	Aimed at the industries and organizations
Employment of population	Significant transfer of labor forces	Insignificant transfer of labor forces
Economic indicators	For the industry forming the cluster	Industrial

An emergence of the synergistic effect is witnessed within the cluster. Its essence is as follows: specialization of cluster participants helps to reduce the cost of production and increases labor productivity. All this leads to an increase in the production profitability, and its effect and scale contribute to the competitive advantages of the cluster structure.

There are three forms of agro-industrial clusters in the Russian economy, which reflect their development:

-Interregional - economically active structures within Agro-Industrial Complex sectors, forming around scientific research and educational institutions;

-production chains, built on a vertical basis, where the production process forms a cluster core (the chain: vendor - processor - marketer - buyer);

- industries at a high aggregation level (food clusters or sectors community (agro-industrial cluster)).

The main elements of the agro-industrial cluster at the regional level are the centers (nuclei) subordinated to each other. The structural core of the agro-industrial cluster is usually represented by a large processing enterprise, which in the process of its activity proves the prospect of the further development. The strategy of innovative cluster development of the agro-industrial complex is applicable in the Nizhny Novgorod region, one of the Russian regions, for the following reasons:

- large total share of structural and depressive industries in the agro-industrial complex;
- high proportion of agricultural production using extensive direction in the industrial structure of the region.

It is necessary to complete 4 stages for a competitive cluster establishment and effective development (Table 4).

Table 4. Nonfinancial reporting form "Report: aspect "Materials".

Stages of establishment and effective development of a competitive cluster
1st stage – analysis and diagnostics of the cluster establishment preconditions: - Marketing research; - Incentives study of the possible participants; - Capital and resources study.
2nd stage – cluster structure development: - Potential participants detection; - Cluster operation principles determination; - Development of Regulations and Rules; - Search for personnel potential; - Further development prospects.
3rd stage – cluster formation: - Management structure formation; - Powers division; - Production structure formation (cluster composition, new production facilities organization); - Cooperation norms and rules formation.
4th stage - efficiency and cluster development strategy evaluation: - Efficiency evaluation (economic, social, budget, innovative); - Correlation between the set goals and reached results; - Further development prospects.

3 Results

All this has predetermined the project of organizational and legal structure of the dairy cluster model in the Nizhny Novgorod region established on the principles of a non-profit partnership (Fig. 3). This model includes both the producers of agricultural products (agricultural organizations, peasant farms, personal part-time farms), and the processing organizations (Knyagininsky Sukhoye Moloko, OJSC, Moloko, OJSC). The Coordinating Council will manage the cluster activity. The cluster also includes scientific institutions, banks and governmental agencies to provide this cluster with the personnel, scientific developments, financial resources and state support, respectively. This structure will use the scale effect based on the innovative component of the leading company (Moloko, OJSC) in the production and processing of milk in the region. It may happen that not all processing organizations of the region will participate in this cluster model on the first stages. Most often, this will be due to misunderstanding of the cluster concept by the processors.

Economic efficiency determination of the processing organizations in the cluster can be calculated using the analytical program "INEC-Holding" on the basis of drawing up a business plan and economic efficiency calculation for this investment project along the UNIDO methodology.

Economic efficiency is one of the decisive criteria for making a decision on its implementation at all stages of the project fulfillment as a whole. The efficiency of this project was carried out according to the methodology of UNIDO, which is recognized by domestic and foreign investors. The following local criteria are used for assessment of economic efficiency of this method:

NPV – net present value;
PP – payback period;
PI – profitability index;
ARR – average rate of return;
IRR – internal revenue rate;
MIRR – modified internal revenue rate;
D – average weighted life cycle of the project.

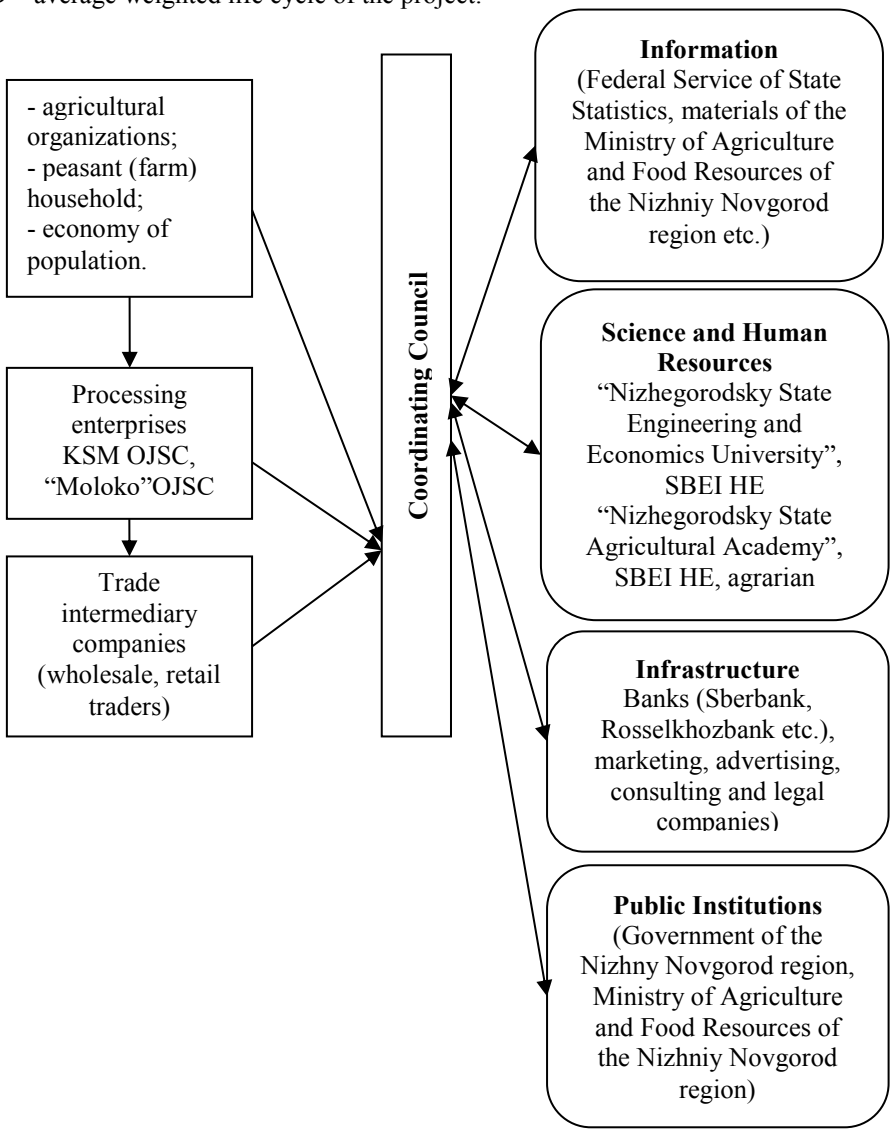

Fig. 2. Project of the dairy cluster structure in the Nizhniy Novgorod region.

The net present value (NPV) and the payback period are significant indicators for this method. The net present value is a value equal to the difference in the results and costs for the settlement period, reduced to one, usually the initial year, taking into account the discounting of results and costs. Over time, under the influence of inflation and competition, the real purchasing power of money changes: for both the investor and the innovator, "today" and "tomorrow" money is not equivalent. A measure of compliance in this case is a discount coefficient, leading the financial indicators calculated for different periods of time to comparable values.

NPV ≥ 0 the project shall be efficient, under NPV ≤ 0 non-efficient.

$$NPV=Ar–Az=\sum_{t=1}^{t} Rt\ at - \sum_{t=1}^{t} Zt\ at\ max \quad (1)$$

Ar – money inflow of the capital;
Az – money outflow of the capital;
T – accounting period;
Rt – results in financial terms, gained from the inflow within the t period;
Zt– expenditures due to the project implementation within the t period;
at – discount coefficient at the return rare.

$$PP = \frac{-In(1-\frac{Az}{Rt}qt)}{\ln(1-qt)} \quad (2)$$

The payback period (PP) is one of the most common indicators for assessing the efficiency of investments. It is a time interval, beyond which the net present value (NPV) becomes a positive value, i.e. payback is achieved in the period when the accumulated positive current value becomes equal to the negative current value of all investments. In other words, the payback period is the number of years needed to recover the invested capital (Frolova O.A., 2011).

4 Conclusions

The present advantages of the cluster approach have been highlighted following the studies carried out by the authors:

- Clusters are based on the established stable system of distribution of new technologies, knowledge, products, the so-called technological network, which, in its turn, is based on scientific research;
- Cluster organizations have additional competitive advantages due to the ability to minimize the costs of implementing innovations;
- Cluster structures are very important for the development of small economic entities in the agro-industrial complex, as their participation facilitates the access to the capital of processing enterprises. Besides, this structure promotes an active exchange of innovative ideas and transfer of knowledge from scientists to entrepreneurs;
- Small economic entities in the cluster (flexible business structures) allow the formation of innovative points of economic growth in the region.

But there are also major problems hampering the development of agrarian clusters in Russia, which make it possible to assert that it is impossible to form a system of agrarian clusters without an accurate definition of a "cluster" concept, without the Concept and Strategy for the development of agrarian clusters elaboration, without the development of innovation and implementation cluster.

The cluster approach can be very effective in research and designing the agro-industrial sector of the economy in the country at the regional level. The interdependence and correlation of various organizations and industries through the formation of stable vertical and horizontal links, the use of modern innovations and new information technology, the use

of public private partnership principles - all this can allow the domestic agro-industrial complex to reach a competitive level of production.

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