Methodological Aspects of Forming the Vegetable Micro-Cluster, and its Influence on Sustainability of the Industry

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Abstract
This article defines the possibilities of using the cluster approach in vegetable and potato cultivation, by forming vegetable micro-clusters, which, unlike the ones used today, require the formation of a favorable institutional environment for innovative development of the industry. It has been substantiated that cluster development of vegetable and potato cultivation is the basis of sustainable development of rural territories, resolving the social and economic problems and development of local self-government. The main role in stabilizing the business sector belongs to the infrastructure support in the market of the region.

Keywords: Vegetables, Cluster, Methodology, Institutional Arrangement; Infrastructure
INTRODUCTION

The financial crisis has exacerbated a number of problems associated with the state support for the agrarian sector, state regulation of prices for the resources of monopolized suppliers, and the price tyranny of agricultural products dealers in the unformed market infrastructure of the agricultural and industrial complex. As a consequence, the quality of agricultural food products is affected, and they lose their competitive positions.

In general, in the Omsk region processing is performed with insufficient depth, as the region features:

- Insufficient refining capacity for processing grain (the average of 1.0 million tons of cereals is exported to other regions) and oilseeds;
- Surplus of crop production. The market is characterized by lower commodity prices compared to other regions (which may actually be a competitive advantage for further processing).

In order to maximize the internal needs of the region in the agro-industrial products, to create competitive businesses, to increase the investment attractiveness of agriculture, to shift the export of raw materials to the export of final products with high added value, and to ensure the contribution of the AIC of the Omsk region into increasing the domestic regional product, organizational prerequisites are formed for efficient development of the agro-industrial complex of the region through development of the agrarian cluster.

Issues of cluster approach to the development of agriculture are dealt with by the economists of the Siberian branch of the Russian Academy of Sciences Kundius, Mochalnikov, Dibirov, Dibirova, Stepanova GI, Pogodina, Serdobintsev, Chernyaev, Aleksandrova, Tutaeva, Mindrin, Romanov, and Arashukov. Formation and functioning of integrated economic entities in the food industry is studied by Sirotkina and Rublevskaya, while Koshkarev, Rusin, Malofeev, Osetrov study the development of integration in crops production on the basis of cluster organization, Glotko studies formation and development of cluster of horticulture, Gorelov studies poultry clusters, and Malenkov and Dreving study the clusters of the fisheries industry.

The study summarizes the existing approaches to the methods of forming vegetable micro-cluster, identifies the areas of efficiency, and assesses the influence of its operation in the Omsk region.

MATERIALS AND METHODS

In the research described in the article, the following main methods of research were used: monographic, economical and statistical, abstract and logical, and prediction.

The object of observation includes agricultural enterprises of various organizational and legal forms, involved in production of horticulture products. The in-depth studies have been performed on the materials of the Omsk region.
The subject of the research are the organizational-economic, management relations, theoretical, methodological and practical issues of improving efficiency of regional vegetable production on the basis of cluster development.

Agricultural cluster involves creating and consolidating the following main objects: land plots for cultivating vegetables and potatoes, as well as warehouses and production-and-distribution centers. The associating of enterprises in related sectors and the formation of a single added value chain on the territory of the Omsk region by increasing the amount of product and selling agricultural products through ensuring high-level processing of raw materials is regulated by the Concept of the Agrarian Cluster of the Omsk region [1].

In accordance with the theory of Michael Porter, professor at the Harvard Business School, a cluster is a group of geographically adjacent interconnected companies (manufacturers, etc.) and related organizations (educational institutions, public administration bodies, institutions of infrastructure) operating in a particular area, and characterized by common activities and complementary to each other [2]. Porter has stated that region's competitiveness should be considered not from the point of view of competitiveness of separate organizations, but from the point of view of competitiveness of clusters, i.e., associations of companies in various industries that are able to efficiently use internal resources. The economic literature identifies the characteristics of a cluster that is called by economists "the rule of four "C": Concentration of enterprises in the same or related industries in the same geographic location; Competitiveness of their products; Competition for obtaining and retaining clients; Cooperation with a high level of development [3]. The comparative characteristic of integrated structures is shown in Figure 1.

![Figure 1: The comparative characteristic of integrated structures functioning purposes.](image-url)
In Russian economic literature 3 types of clusters are distinguished, each of them emphasizing a particular priority of functioning:

- Regional (territorial) groups within the same or related industrial sectors (industrial clusters) are often related to scientific schools (research institutes, universities);
- Vertical production chains: narrow certain sectors, where adjacent stages of the production process form the core of the cluster (for example, "supplier – collector - marketer – consumer"). This category includes organizations that are formed around the parent companies;
- Large scale associations defined in relation to some (main) industry (agro-industrial cluster, chemical cluster) [4-6].

When the cluster approach based on the theory of transaction costs is used, the focus should be on assessing the possibility of funds saving resulting from long-term contracts (with suppliers, customers, etc.) that regulate joint activities. The total cost of organizations involved into cluster formation becomes more than the sum of their separate market values. This and other indicators are to be used for assessing the synergistic effect [7].

In the present paper, the authors addressed the third type of clusters with regard to vegetable and potato farming.

The external effects of the cluster include: increased income to budgets of various levels; improved socio-economic indicators of the region (employment, income, etc.); improved investment attractiveness of business entities (cluster formation and the entire region); increased amount of attracted investments, including foreign investments; improved environment; increased number involved in cluster formation of enterprises and organizations, including the proportion of small and medium-sized organizations.

The internal cluster effects are: increased production and diversification; differentiated costs and risks; improved efficiency of production; increased stability and sustainability of market position; reduced cost of acquisition and dissemination of knowledge and technology; high level of adaptation to the changes of external environment; increased share of intellectual products in the product of cluster formation; improved main indicators of production and economic and financial activities (revenue, sales volume, profit, profitability, capital productivity, output, material return, etc.) [7].

RESULTS

In the Concept of long-term socio-economic development of the Russian Federation for the period till 2020 approved by the Decree of the Government of the Russian Federation dated 17 November 2008 No. 1662-r [8], small rural businesses play an important role, which, in turn, is explained by their role in ensuring food supply security of each separate region and the entire country; particular attention should be paid to forming clusters at the micro level, at the level of personal subsidiary economies. Figure 2 shows the principles of cluster building in the sector of personal subsidiary economies required for implementation.

It is this sector of the economy that allows creating the general conditions for economic growth, is the guarantor of food supply security of the regions, and of stabilization of the
social sphere in rural areas. So, today there are more than 320 thousand personal subsidiary economies in the Omsk region, which, along with the major agricultural organizations, ensure food supply security of the region. In the total volume of agricultural production, the share of personal subsidiary economies is 50.8% [9]. Under the current circumstances, the relations between personal subsidiary economies and the institutions of infrastructure, academic institutions, state and municipal authorities may be considered in the framework of the cluster approach.

Figure 2: Principles of building clusters in the sector of personal subsidiary economies.

The stages of organizing the proposed by us competitive food cluster are shown in Figure 3.

Vegeculture is one of the important branches of agriculture. Vegetables contain vitamins, acids, proteins and other minerals that are essential for the human organism [10]. In vegetables cultivation, one should consider the specific features that are inherent only to this branch of agriculture:

1. The area where the economy is located, and its climatic conditions.
2. The fact that the varieties of vegetables feature high yield and quality, and the selling price. Despite the fact that implementation of most varieties is intended not only for increasing productivity, but also for ensuring adaptation to specific conditions of the region, some vegetable varieties can't be cultivated in certain economic areas.
3. Two production schemes are used: in the open and in protected soil (vegetables production in greenhouses). They are different technologically, and require different level and nature of capital investments and operating costs.
4. Increased requirements for crop rotation on the land used for vegetable crops. However, the introduction of fertilizers into soils where vegetable crops are being grown requires very strict observance of agrotechnical rules, and the amount of fertilizers is limited by the cultivation peculiarities of certain crops.
5. Vegetable products are perishable and poorly transportable, which is due to the specific biochemical structure of the crops and the presence of large amounts of water. In the process of vegetables harvesting and transportation, under the influence of temperature, a considerable loss of product weight occurs, as well as deterioration of its marketable condition and consumer properties.

Figure 3: The stages of a food cluster development.

Product safety and quality is affected not only by the methods of storing, but by the harvesting methods as well. Quite a considerable loss of vegetables occurs during harvesting (mechanical damage, the presence of large amounts of soil and weed residues). During the storage of tomatoes harvested by a combine harvester, within 12 hours the natural loss increases up to 3.3%, while the share of non-standard product is 37% [11].

6. Horticulture is a highly labor- and capital-intensive industry. Production of vegetables requires large amounts of labor and expenses. This is particularly true for the early varieties cultivated in greenhouses [12]. Cultivation of 1 ha of vegetable crops requires 600 to 800 work hours, which is 2-4 times more than for cultivating potatoes, and 35-40
times more, as compared to the production of grain. With that, labor input per area unit varies by the regions of cultivating vegetables and certain types of vegetable crops.

7. Production is concentrated in personal subsidiary economies. They account for almost 74% of crops and gross vegetables harvest in the country. In difficult conditions, people themselves try to provide basic food products, mainly vegetables, for themselves.

8. Production of vegetables in resource areas is to be established according to the demand of the processing industry: vegetables should be of high quality and should be delivered for processing evenly. In the resource areas, specialized farms are created that are located near the vegetable canning plants, and concentration of crops at these farms is high [13].

The ways of increasing the efficiency of vegetable production:

1. Increasing the yield of vegetable crops:
   - using highly productive varieties and hybrids of vegetable crops;
   - introducing organic and mineral fertilizers;
   - using chemical and biological means of plant protection against pests and diseases;
   - placing the vegetable crops on fertile and irrigated land

2. Reducing the cost labor in cultivation of vegetable crops:
   - introducing industrial technologies of vegetables cultivation and harvesting;
   - increasing the level of mechanization of handling operations;
   - Using progressive forms of work organization.

3. Reducing the cost of vegetables production:
   - Improving specialization and concentration of vegetable production;
   - Combining vegetable production in open soil and in greenhouses;
   - Reducing the cost of seeds and planting material, salary, and the cost of material resources;
   - Improving incentives.

4. Improving the methods of vegetables harvesting and sales:
   - Efficient channels for marketing vegetables;
   - Setting market prices for the product;
   - Improving vegetables quality and reducing vegetables losses during production and sales.

Reaching 70% of these measures is possible through expansion of the territory of the vegetable micro-cluster in the Omsk region. The entrance of an organization into the operating cluster creates the "entry barriers", which are economic and emotional factors, the "centripetal forces" that hold the organization inside the cooperation and integration structures, even if the income at the initial stage is insignificant [14].

According to the analysis and diagnostics of the conditions for forming a vegetable micro-cluster, we can say that during the period between 2012 and 2014, the Omsk region was the leading agricultural region of the Russian Federation, and second after the Altai territory in the Siberian Federal district.

At the beginning of 2015, agriculture provided 9.5 percent of the gross regional product (the average value in Russia is 3.8 percent), while manufacturers of food products, including beverages, provided about 20 percent in the volume of product of the region.
The region has maintained the existing level of providing essential food products, which allows participating in shaping the policy of import substitution both in the Omsk region and in the Russian Federation.

By the level of self-sufficiency in agricultural products, the Omsk indicators are higher than the national average, and are the following:

- potatoes – 127.1%;
- vegetables – 85.9%.

In the crop sector in 2014, the harvest included 3.1 million tons of grain (in 2013 – 3.4 million tons) with the average yield of 15.0 t/ha, 806.1 thousand tons of potatoes, and 249.4 thousand tons of vegetables of open soil and in greenhouses.

In 2013, most vegetables and potatoes were produced in personal subsidiary economies, in 2014 there was a structural change. Collective farms produced 22% of the vegetables harvest. According to the Ministry of Agriculture and Food of the Omsk region, industrial methods should produce not less than 35% of vegetables, in this case commercial entities will be interested in building logistics centers for sorting and storing vegetables, and vegetables from the Omsk region will get to commercial networks not only in autumn, but all year round [15].

For completion of the second phase, we developed a Draft Agreement, which we recommend for the participants of the "Omsk vegetables" sector of the "Agricultural Cluster of the Omsk region" for providing legal validity to their cooperation in forming and development of the micro-cluster.

In the third stage, the management structure (forming the Coordinating Council, task distribution and authorities between the Council and the members of the cluster) and the economic structure are organized. In our view, the cluster initiative should be carried out at the level of individual settlements, where the management has their own interests in development of the territory, and has sufficient legal, financial, administrative tools to influence the situation in the settlement. The vegetable micro-cluster will unite producers of potatoes and vegetables, the logistical distributive innovative center, trade organizations, infrastructure providers, and state bodies into a single management and control system, as shown in Figure 4.

It is necessary to carry out joint selection of the product assortment on the basis of the demand and joint planning of the production volume, which significantly improves the cost-effectiveness of the joint promotion of the products. One of the mechanisms of territorial self-organization, providing an opportunity to significantly improve product quality through the joint setting-up of necessary capacities for its processing and proper storage, is a cluster. The authors analyzed the vegetable micro-cluster of the Omsk region, incorporating into a single system of management and control the following enterprises: LLC "Sibagroholding", settlement Klyuchi in the Omsk district, LLC "Greenhouse Complex "Agrocultura", settlement Druzhino in the Omsk district, JSC "Greenhouse Complex" of Omsk, PFE of Kabdenov T. E., settlement Korshunovka in the Tyukalinsky district, LLC "Valkyria", Omsk, LLC "Siberian Flour", settlement Krestiki in the Okoneshnikovsky district, including small forms of business, as well as processing enterprises and the logistics innovative distribution agricultural center "Druzhino", settlement Druzhino in the Omsk district.
Currently, in developing long-term social and economic development strategies of their regions, regional governments require using the cluster approach, since it meets all requirements of agricultural production as an innovative investment model. The implementation of several investment projects was completed in 2015. The largest of these are construction of:

1. A greenhouse plant with the area of 2.4 ha, and an agricultural logistical center at the "TPC "Agrocultura" LLC.
2. The first phase of the logistics center at the "Siberian flour" LLC with the storage capacity of 1.9 thousand tons of potatoes and vegetables.
3. A logistical center at the "Voskhod" LLC with the total quantity of stored potatoes and vegetables of 4.4 thousand tons, with installation of a washing, sorting and packaging line.

In accordance with the Food Security Doctrine approved by the Decree of the President of the Russian Federation No. 120 dated January 30, 2010, the supply of own production greenhouse vegetables should not be less than 80%. In the Russian Federation, the recommended medical standard of vegetables consumption in the winter and in the spring should be 12 to 15 kg. In the Omsk region, production of
vegetables in greenhouses is 2.9 kg per capita, or 25% of the minimum required amount (as per 2011). In 2014, within the framework of sub-programs, measures of the departmental target program "Development of vegetable cultivation in greenhouses in the Omsk region" were implemented. Currently on the territory of the Omsk region greenhouse vegetables are produced at three agricultural enterprises: JSC "Teplichny", LLC "Sibagroholding" and ООО "TPC "Agrocultura" in the Omsk municipal district of the Omsk region. The total area of winter glazed greenhouses in 2012 was 19.4 hectares. Vegetables production in greenhouses by years varied between 4.8 and 6.7 thousand tons. The average yield is 27 kg/m. The yield is considerably higher at the farms that introduce innovative technologies [16].

By year 2020, the implementation of the mechanism presented in the Program will allow to:
1) Increase vegetables production in winter greenhouses up to 12.8 thousand tons in 2020; obtain 77.1 thousand tons for the entire period of implementation;
2) Increase the area of new generation winter greenhouses up to 17.4 hectares;
3) Increase the number of workers employed in vegetable cultivation winter greenhouses by 210 persons, as compared to 2012;
4) By year 2020, the growth of winter greenhouses vegetable production sales revenue will amount to 416,000,000 rubles [16].

By combining producers of vegetables and potatoes into a complete system, we consider it appropriate to create, within the vegetable micro-cluster, a specialized vegetables and potatoes collection point with necessary equipment and the possibility to detect product quality, which will improve the quality of vegetables and potatoes primary processing and storage, as well as to monitor implementation of these standards by creating these common standards. In 2015, support was provided for developing the production and processing of greenhouse vegetable products and potatoes, and for creating agricultural logistical and wholesale distribution centers. In order to maintain food security of the Omsk region, new agricultural enterprises are created and the existing ones are modernized. In 2015, the implementation of the investment projects continued for building a greenhouse complex for cultivating vegetable crops on an area of 1.4 ha at the peasant farm enterprise of private entrepreneur Mayer A. A. in the Omsk region.

For the purpose of promotion and sales of agricultural products without intermediaries, as well as for providing products reception, storage and processing centers, production and logistical centers are created:

– PC "Agro-Druzhino" in the Omsk region plans to build the vegetable and potatoes storage facilities for 10.8 thousand tons of simultaneous storage within the project of expanding the production areas of the logistics center (launched last year) with a vegetable store for 3 thousand tons and a vegetable processing line for 50 tons per day. In addition, LLC "Sibagroholding" will start in 2015 the construction of a storage facility for simultaneous storage of 10 thousand tons of potatoes and vegetables; the capital investment will be 157 million rubles.

Investments in the amount of 1.0 billion rubles are to be made into the development of a production and high-level processing facility for products of vegetables cultivation in greenhouses and potatoes:
- TPC "Agrocultura" LLC - for the construction of a greenhouse complex for cultivating vegetables and green crops on the area of 3 hectares in the Omsk region (400 million rubles).
- LLC "Sibagroholding" - for the construction of fresh potatoes high-level processing facilities in the Omsk region (577 million rubles).

In the framework of the vegetable micro-cluster, four kinds of synergistic effect may be distinguished. These are the effect of cross-flowing innovations in the micro-cluster, the effect of joint use of infrastructure, the effect of reducing the transaction costs and the effect of increasing the cash flow.

Knowledge cross-flowing is one of the most important benefits of the vegetable micro-cluster as a way of organizing production and distribution. Sharing knowledge significantly increases the overall competitiveness of micro-cluster, since new ideas, technologies, and projects become available for all participants of the micro-cluster, who, in turn, wish to use and refine the obtained knowledge, to create new competitive advantages, thus increasing the competitiveness of the micro-cluster in general. This way, the synergistic effect of innovations cross-flow is formed.

In 2015-2017, the following investment projects are to be implemented:

- Construction of a greenhouse complex for cultivating 1.5 thousand tons of vegetable and green cultures at TPC "Agrocultura" LLC. The total amount of the project will be 400.0 million rubles.
- Construction of a storage facility for simultaneous storage of 10.8 thousand tons of vegetables and potatoes at the "Agrodruzhino" PC. The total amount of the project will be 196.0 million rubles.
- Construction of a storage facility for simultaneous storage of 10 thousand tons of vegetables and potatoes at LLC "Sibagroholding". The total amount of the project will be 157.0 million rubles.
- Implementation of a project for high-level processing of potatoes at LLC "Sibagroholding". The processed amount will be 30.0 thousand tons of potatoes. The total amount of the project will be 577.0 million rubles.

An optimal balance is formed in the vegetable micro-cluster between the production, reproduction and marketing processes with development of the innovative components. In Figure 5, the vegetable micro-cluster is shown as a unity of the three economic processes and the three innovative processes. The innovative circuit of the micro-cluster.

The cluster approach has several advantages: significant stimulation of the regional economic development: improving the trade balance in the region, increasing employment, increasing tax payments to the budget, etc.; joining the basic innovations in a particular time period and in a certain economic space, and creating a system new knowledge and technologies cross-flow on this basis; the ability to use various sources of technological knowledge and relationships; increasing the spread of the "cumulative innovative product" across the network of relationships in the common regional economic space; and improving the product quality.
Figure 5: The vegetable micro-cluster as a unity of the three main economic and innovative processes.

Forming a vegetable micro-cluster in the territory of the settlement allows to better use the opportunities and the benefits of diversity in production of vegetables and potatoes, at the same time preserving the economic independence of all participants of the micro-cluster. The implementation of the cluster initiatives by the rural settlement activates reproductive, innovative and information-and-consulting support for production, including small farms, which will altogether increase the gross production of vegetables and potatoes with growing amounts of production and sales.

As a result of forming the vegetable micro-clusters in the territory of rural settlements of the Omsk region, an increase in production in agricultural organizations, peasant (private) farms, including individual entrepreneurs, is planned by year 2020: that of potatoes - up to 6 million tons, that of vegetables in the open soil - up to 5.2 million tons, that of greenhouse vegetables - up to 1.4 million tons; increasing the capacity of existing potato and vegetable stores to 3.5 million tons for simultaneous storage, and increasing production of canned fruit and vegetables - up to 11,597 million cans.

In addition, the effectiveness of the proposed system of measures will be manifested by the creation by year 2020 of over 1,400 jobs, and increasing wages of the workers employed in industry 1.8 times compared to the level of year 2009.

However, as we have already noted, one of the main features of vegetable micro-cluster is mutually beneficial participation on the basis of economic interests, its interindustry nature. In order to ensure parity of exchange, the transfer price in the micro-cluster is formed on the basis of actual sales prices. In this case, profit is calculated as follows:

\[
P = B - (Ca Sb Cd) \quad (1)
\]
Where P is profit;

B is the revenue from the sales of the final product of the micro-cluster to the consumer;
Sa, Cb, Cd are full costs of participants a, b, d.

Profit in the micro-cluster is distributed according to the formulas:
\[ Pa = \frac{P \times Ca}{Ca + Cb + Cd} \]  
\[ Pb = \frac{P \times Cb}{Ca + Cb + Cd} \]  
\[ Pd = \frac{P \times Cd}{Ca + Cb + Cd} \]  

The level of the transfer price is determined by summing the costs and the distributed amount of profit:
\[ Ptr = Ca + Pa \]

Thus, the relationship between the participants of the micro-cluster are focused on developing advanced technologies of production and processing vegetables and potatoes with preserving the conditions for mutually beneficial cooperation. And the advantage of the vegetable micro-cluster is that, unlike classical clusters of M. Porter which self-organize and start effectively functioning after 10 to 12 years; they actively organize themselves on the basis of economic interests and the needs arising by the innovative technologies, and start functioning efficiently from the first years of their existence.

Integration into the vegetable micro-clusters:

1) Allows to improve efficiency, competitiveness and sustainability of vegetable and potatoes cultivation;
2) Ensures production of ecologically clean products based on innovative technologies;
3) Has a positive effect on food security;
4) Has a positive effect on the process of converting vegetable and potato cultivation into a high-tech industry; and
5) Solves the complex of socio-economic problems, primarily of improving the quality of life of the population, reducing unemployment in rural areas.

However, the implementation of the proposed measures for developing vegetable and potato cultivation involves formation of an integrated regulatory framework focused on development and adoption of economically sound legislation and other normative documents focused on support for domestic producers, development of material and technical base, innovation, intensifying horizontal and vertical integration.

The main feature of the cluster is the combination of compulsory competition, integration, investment oriented at geographically specific location for obtaining regional synergies through reducing transaction costs [17]. Development of cluster forms of relations between farmers and their partners considerably reduces transaction costs, ensures the synergistic effect due to fruitful cooperation between the participants, the innovative nature of the used technology, and management practices.

In whole, transaction costs include the time and resources that are necessary to find buyers and sellers, the losses associated with incompleteness and imperfection of acquired information, the cost of negotiations, assessing the quality of the product,
measuring equipment, the costs of specifying and protecting property rights, the costs of opportunistic behavior and politicization. The joint production of vegetables inside the micro-cluster allows to save on costs for finding economic information, information about the partners, markets, and increases the efficiency of information exchange. At the same time, expenditures in the form of lost revenue and the risk of opportunism are reduced.

Analysis of transaction costs shows that on the average, they amount to 10% of the costs of primary production. Thus, reducing the transaction costs may increase the micro-cluster profitability to 5%.

Transaction costs account for over 25% of the expenses of the participants. The comprehensive approach reduces transaction costs by 11.6%. In relation to the studied agricultural enterprise, the annual cost reduction will be about 786 thousand rubles. Agricultural organizations of the Omsk region, in the whole, will reduce their expenses by 2802.17 million rubles. This will increase the profits of agro-industrial enterprises of the Omsk region by 6.9%. The promising areas for developing the micro-cluster capacity are the increasing of the level of processing the micro-cluster product, access to new markets (regions of the far Eastern part of the Russian Federation, Republic of Kazakhstan, Central Asia), establishing production in new product segments (development of new products, new formats and concepts of nutrition, developing product with ethnic specificity), and improving the efficiency of management of existing enterprises in the vegetable cluster.

DISCUSSION

Cities in Spain, Holland, Germany, America and even Japan have followed the pattern of creating agricultural clusters. They are different from usual vegetable warehouses and refrigerators, since they are located in the suburbs, which reduces the traffic load in big cities. Because of their large areas, they contain all products from vegetables and fruits to meat and milk, and for every product specific storage conditions are ensured. All manufacturers of products, which are also tenants, have the same conditions. And the buyers are guaranteed the same high quality products at low prices [18].

Throughout Russia, agro-clusters are formed for improving the efficiency of agricultural production.

In the context of resolving the agro-ecological and social problems of the rural areas, formation of competitive personnel potential in the Republic of Tatarstan provides for establishment of a competitive vertically integrated agribusiness cluster, which includes sub-clusters "Grain", "Sugar", "Fat", "Vegetable", "Potato", "Fruit", "Meat", "Dairy", "Aquaculture", and the innovation cluster "Eco-Food" [19].

In September 2014, a new generation agricultural cluster opened in Moscow. The agricultural cluster occupies the area of almost 85 hectares. The territory hosts several commercial buildings, warehouses, a workshop for ice production, a parking, and the area for cafes and restaurants. Here one can buy almost any food both wholesale and retail - from vegetables and fruits to confectionery. An area is allocated for wholesale trade of vegetables, fruits and meat from the trucks. It is a broad gallery where wholesale customers move with special trolleys and lift trucks [20].
In the Ryazan region, "potato-and-vegetable cluster" is formed in Kasimovsky, Klepikovsky, Spassky and Shilovsky areas. This will become a guarantee of satisfying the need for vegetables, and will provide the opportunity to sell locally cultivated products outside the region. The construction of storage and processing complexes for agricultural products (potatoes, carrots, onions and beets) has been organized on the base of LLC "AgroSoyuz Spassk". This complex is used for washing, filling and packaging vegetables for dispatching them for further sales [21].

Let us consider the creation of a closed technological chain from producing raw material to obtaining the finished product and delivering it to the consumer within the framework of the vegetable micro-cluster on the basis of the Omsk region.

The vegetable micro-cluster on the basis of signed contracts unites producers LLC "Sibagroholding" sett. Kluchi in the Omsk district, TPC LLC "Agrocultura", sett. Druzhino in the Omsk district, JSC "Greenhouse complex" Omsk, PFE of Kabdenov T. E. settl. Korshunovka in the Tyukalinsky district, LLC "Valkyria", Omsk, LLC "Siberian flour", sett. Krestik in the Okoneshnikovsky district, including small farms and producers, and a logistics distributive innovative agro center "Druzhino", sett. Druzhino in the Omsk district. The first phase of the logistics center includes a line for processing and packaging vegetables that allows to perform all necessary operations: sorting, washing, drying, grinding and packaging of 20 tons per shift, a distribution center and a warehouse for storing, processing and shipping vegetables and fruits. The amount for simultaneous storage is about 10 thousand tons. The company buys vegetables from local farmers: potatoes, carrots, beet, onions, sorts, washes, packs them, and sends to the food networks.

LLC "TPC "Agrocultura" is the largest greenhouse farm in the Omsk region. It is located in settlement Druzhino in the Omsk district. Its share in production of vegetables in greenhouses in the region is 65%. Here cucumbers and lettuce are grown on the area of 5.5 hectares of greenhouses. For better processing, a logistics center is created near the greenhouse facility (in simple words – a workshop for processing and storage of vegetables); the cost of the logistics center is about 130 million rubles. In addition to vegetables of own production, the new logistics center will process products from other farms and even foreign fruits. Within 24 hours, using imported equipment from Denmark and Germany, it will be possible to process, sort, and send for sales or storage up to 200 tons of vegetables and fruits. Products of LLC "TPC "Agrocultura" may be seen not only in Omsk, but in shops and supermarkets of Novosibirsk, Tyumen and other regions as well. The company supplies vegetables in original packaging to such trade networks as "Metro", "Lenta", and "Achan" [22].

The "Druzhino" agricultural center is a modern production complex. Its construction is performed in two phases: phase 1 was launched in 2014; phase 2 is scheduled to be launched in Q2 2015. Phase 1 is industrial premises with the area of 4,000 square meters, equipped with: refrigerating chambers with adjustable temperature from 0°C to +14°C, designed for short-term storage of up to 1,000 tons; ripening chambers (for ripening the unripe fruits taken in stores, warehouses or specially equipped chambers) for bananas with the capacity of over 100 tons [23]; an automatic complex for pre-sale preparation (washing, dry cleaning, polishing, packaging) for vegetables and fruits with the throughput capacity of 50 tons per day (equipment manufactured in Denmark, Holland, Germany: Ekko, Gillenkirch, Bizerba, Jasa, Waldyssa); filling equipment manufactures in Denmark, Switzerland and Germany: packaging on the substrate, automatic clipper, "House" or "Combi-package"-type packaging, sealed packaging –
“pillow-type packaging”, mesh bags sewn with a tape; own laboratory for incoming examination of products; a handling terminal allowing to process over 15 vehicles simultaneously. The second phase of construction is a vegetable storehouse for long-term storage of over 10 thousand tons of the product. The storehouse is scheduled for commissioning in 2015. It is planned to sell annually over 150 thousand tons of vegetables, fruits and greenery through the agricultural center. By the end of 2014, the company had sold about 50 thousand tons of "Druzhino"-branded fruit, vegetables and greenery to the consumers [24].

Creating major logistics centers where agricultural products will be stored and sold will guarantee sales for the manufacturers, reduce the purchase prices for the business, and increase production of competitive products [25].

Unlike LLC "TPC "Agrocultura" whose products are purchased by retail chains, vegetables produced at the PFE of Toksan Kabdenov are not yet in demand from retailers and wholesalers. The PFE was established in 1999. Now the entrepreneur has almost 1,000 hectares of land, of which one third is used for potatoes, beets, carrots and onion cultivated in the open soil. A part of the area is irrigated by modern American and German irrigation systems, which double the yield of vegetables. In 2014, the Federal Penal Service purchased 2,000 tons of potatoes; and 1,500 tons were sent to the Far East. The PFE has no opportunity to closely cooperate with retailer networks, since everything is bought through a tender, delivery should be year-round, which the farmer is not yet able to ensure. Often "grey" manufacturers win in tenders, which offer products of quite low quality. The farmers started working together with LLC "TPC "Agrocultura" for supplying their vegetables to the processing and storage workshop. Without the services of the center, T.E Kabdenov cannot effectively increase production.

Due to the sanctions introduced by Russia against western vegetables, farmers are afraid that they may be left without high-quality seed potatoes, which have been bought in Holland, and will be unable to perform strain renovation, which might affect the yield. The head of the Ministry of Agriculture noted that high-quality seed potatoes from Omsk will be available only after 2 years – they are being breaded at the "Agrocultura" greenhouse farm [22].

CONCLUSION

The analysis, carried out by the authors, indicates that it is necessary to reduce the influence of factors having the greatest adverse impact on the agri-food market of the Omsk region, which, according to experts, include competition from cheap imported products. This will be facilitated by the building of a vegetable micro-cluster, the expansion of which will contribute to improving market infrastructure, organization of direct marketing channels, reducing the outflow of existing staff from the rural areas, the increase of the gross regional product, more extensive use of innovations in the industry.

The problem of the absence of agro-industrial complex market infrastructure and, as a consequence, the shortage of processing capacities and a surplus in crop production have reduced the competitive position of agricultural food products. Development of agrarian cluster will create organizational preconditions for efficient market development. In accordance with the Concept of Agrarian Cluster in the Omsk region, mechanisms of high-level processing of vegetables and potatoes have been defined.
Concentration, competitiveness, competition and cooperation within the vegetable micro-cluster will ensure saving resources of each participant of the cluster.

Let us summarize the efficiency of the vegetable micro-cluster functioning, and assess its performance in the Omsk region up to year 2020. The results are shown in Figure 6.

* efficiency by year 2020

**Figure 6:** The synergistic effect of vegetable micro-cluster in the Omsk region.

Such features of the vegetable products as high requirements to crop rotation, and low transportability, concentration in personal subsidiary economies and gardening partnerships, as well as the fact that vegetables deteriorate quickly in normal conditions and require special conditions for long-term storage make this sector most attractive for assessing the micro-cluster efficiency. Such infrastructural setup will eliminate the obstacles to development of vegetable production, and increase the efficiency of vegetables and potatoes production.

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22. Sinyugin has been shown how Omsk will respond to the Western vegetables embargo. [http://www.omsk-news.net/economy/2014/08/13/36757.html](http://www.omsk-news.net/economy/2014/08/13/36757.html)


24. The first logistics agri-center has been opened in the Omsk region. [http://www.omskregion.info/item.asp?id=26559](http://www.omskregion.info/item.asp?id=26559)

25. They are going to build an agri-food cluster in Marushkino. [http://www.marunet.ru/novosti/marushkino/1708](http://www.marunet.ru/novosti/marushkino/1708)