

Theoretical analysis of agricultural clusters in innovative economy

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Abstract. This article analyzes the theoretical aspects of clusters in the innovative economy and their management, including the increase in economic efficiency of agro-clusters as a result of the organization of the agricultural sector on the basis of "production - service - production - storage - supply - processing - sales" development of cluster services, increase in production and diversification of exported finished products as a result of improvements, the authors have developed a unique, new definition of the term "cluster". From a methodological point of view, the "face" of a cluster, its specialization and name are formed by the cluster core companies, and this is of fundamental importance. Companies that belong to one cluster core cannot access the core of another cluster, but can participate in another cluster at the second or third level of the cluster structure. As the companies in the cluster core produce the same type of products, competition between them will continue. A key feature of the cluster core is the competition between the companies that make it up, i.e. there is both competition and collaboration in the cluster core. As a result authors, proposals were made to improve the efficiency of clusters in Uzbekistan.

1 Introduction

The modern interpretation of cluster theory took shape in the 1980s. As a result, the founder of cluster theory is considered to be Michael Porter, a professor at Harvard Business School. According to him, "A cluster is a group of companies and related organizations that are territorially (geographically) adjacent to each other, interconnected, operating in a specific field, complementing each other in the pursuit of a common goal" [1].

This definition is now considered a classic definition of clustering. Porter's cluster theory was quickly recognized around the world, first in the United States and later in the Organization for Economic Co-operation and Development (OECD) as a conceptual basis for the development of competitive regional strategies and as a universal recommendation by the World Bank [2]. S.Stern, M.Delgado, G.Lindqvist, A.Saxenian, T.Anderson, S.Schwaag, E.Bergman, E.Feser, Ch.Ketels and other economists have done a lot of research on the theory of cluster formation and management turned [3-6].

The researcher LS.Markov is the scientist who best systematizes the various definitions of the term "cluster" in the economic literature of foreign countries, and we present them

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below [7-9]. An industrial cluster is a group of interconnected industries that act as buyers-suppliers or suppliers-buyers, in particular, general technology, procurement or distribution channels. A cluster is a group of enterprises belonging to the same industry and operating in close proximity to each other. Regional clusters are industrial clusters are geographically close firms. Clusters are a group of firms in the same industry located on a geographical area. A cluster is a concentration of firms that is able to exert synergistic effects due to geographical proximity and interdependence, although the number of employees is not significant. A cluster is a group of geographically interconnected companies (suppliers, developers, etc.), related management organizations (educational institutions, government) and complementary infrastructure companies operating in a specific area. Economic clusters are not only affiliated and supportive industries and institutions, but also interconnected and collaborating competitive institutions. A cluster is a large group of firms in a particular area of industry. A cluster is a group of firms that are connected vertically and horizontally, with a functional approach to the relationship between existing enterprises and institutions, ensuring quality as defined by the market as support. A cluster is a set of complementary (manufacturing or service) public, private and semi-public firms [10-12].

Clusters can be described as a network of interconnected firms (including specialized suppliers) in a value-added production chain. An innovation cluster is a set of highly industrialized and (or) service companies operating in the same market environment and with a high degree of cooperation [13]. Industrial clusters can be defined as a business group of nonprofit organizations whose group membership is an important element in increasing the competitiveness of enterprises and individuals. Regional clusters are industrial clusters that are geographically dense (usually in the central region) and have a common labor market [14-16].

A cluster is a similar type of business, although the tendency to be close to each other is not significant. The term "cluster" is closely related to the local or regional scope of the network. Many definitions of the process of development combine the concept of clusters as localized branches of specialized organizations, which are closely linked by trade. Regional clusters imply a geographically limited concentration of interconnected firms, and industries can be used as keywords for specialized concepts [17-20]. Clusters are the geographical concentration of firms engaged in similar and related activities [21].

Clustering, in the general sense, is the process of co-location of firms and other entities in a geographical area, as a process of cooperation. Establishing a functional place, close relationships, and trade unions to clearly define their surroundings is their collective competitiveness. Based on the analysis of definitions in foreign literature, we also give our own definition of "cluster".

2 Materials and methods

A cluster is a group of independent economic entities located in a certain area, competing with each other, cooperating and interacting, creating products in a single value chain. In addition to the clusters that serve the local market of the region, there may be clusters that export their products outside the region, ie to national and world markets. It should be noted that such export opportunities are, in our opinion, the most reliable indicator of the competitiveness of regional producers, as the conquest of national and world markets is the key to their competitiveness and competitiveness. Due to the strongest competition in the world market, the cluster that determines its role in the economy is the export of goods and (or) services to national and world markets as a key indicator of the level of competitiveness [10-14].

Theoretically, the structure of any cluster includes three main levels. First level or "cluster core"- is a manufacturing company, which includes firms operating in the local

market and leading companies exporting their products (goods or services) outside the region. They are the leading companies exporting their products (services) to national and world markets, ensuring the economic success of the entire cluster and attracting financial flows to the region. For this reason, such leading companies dominate the cluster [22-24].

The second level is the groups around the core of the cluster. It includes related companies that produce components, process equipment, materials, raw materials and more. At the same time, this group may include large, medium and small enterprises. In many cases, the emergence of small and medium-sized businesses in clusters is associated with the outsourcing of business processes of leading firms. It is known that small-scale production facilities are adaptable, they introduce innovations faster, in addition, the cost of production here is cheaper than the base enterprise. The role of big business in the formation of a cluster is to organize the development of small businesses and medium-sized enterprises on the basis of active cooperation and subcontracting [25-27].

For this reason, the cooperative relationships that emerge in the cluster are important for the survival and growth of small businesses. We can say that a cluster is a way to keep small business in the face of globalization. The third level is the service companies that make up the economic infrastructure of the cluster- Scientific, technical and service centers; financial and credit organizations; investment funds; higher, secondary special and secondary technical educational institutions; research organizations; community organizations; insurance and consulting companies and others. Thus, the cluster includes three levels of participants:

- 1) major companies
- 2) companies involved in economic activity
- 3) economic service companies (economic infrastructure).

It should be noted that the "face" of the cluster, its specialization and name are formed only by the cluster core companies, and this is of fundamental importance. Companies that belong to one cluster kernel cannot enter the kernel of another cluster, but in another cluster they can participate in another opportunity - at the second or third level of the cluster structure. As the companies in the cluster core develop the same type of products (goods, services), competition between them continues. From this point of view, the main important feature of the cluster core is the competition between the companies that make it up, that is, in the core of the cluster there is both competition and cooperation. The companies that make up the cluster core compete with each other for market share, but at the same time,

According to the laws of economics, the competition of companies in the core of the cluster forces them to improve. Competition in the cluster is maintained due to the fact that the companies in the cluster core produce the same type of product and the more enterprises in the cluster core, the stronger the competition between them. In order to win the competition, depending on the characteristics of the market, the companies entering the core of the cluster can strive to gain an advantage by reducing costs and prices, improving quality, attracting new buyers and entering new markets. The cluster does not restrict or cancel competition, does not prevent the entry of new participants, which helps to create new enterprises. Competition is equally important both within clusters and between groups.

At the same time, the companies that form the basis of the cluster can cooperate with each other, using their core competencies. By collaborating with other companies, they may also use resources and services that are not available to individual businesses. The main cluster companies can cooperate in such areas as, for example, training and retraining of employees, support of their interests in government agencies, funding of research, joint access to export markets. Thus, on the one hand, if there is competition in the cluster, on the other hand, cooperation is possible.

Cluster secondary and tertiary companies, even if they do not know it, are the "face" of the cluster, because they are the necessary components, without which the cluster core

companies can not work effectively. The interaction of companies in the cluster core with second- and third-tier companies is based on a value chain. R. Kaplinsky defines the concept of "expensive chain": the product of various services of the manufacturer - it is disposal before delivery to the final consumer and after use" (Kaplinsky R., 2002). In developing the theory of clusters, scientists mainly refer to industrial clusters, the core of which includes industrial companies that produce products that are exported outside the region. Service clusters, of course, are less studied and described than industrial clusters. In the future, we will pay special attention to them.

The most important feature of the cluster is also the wide range of participants. Finished goods companies are only a visible part of the existing structure. Along with them, the cluster includes suppliers of everything needed, including materials and equipment, as well as service companies. It should also include specialized banks, higher and secondary technical education institutions, including research centers. In addition, the most important participant in the cluster is the state, which is a representative of the regional government, which has the power to complicate life or, conversely, to create favorable conditions for the development of the cluster.

3 Results

Clusters As in the Silicon Valley (USA) and Bangalore (India) IT clusters, it contributes to the creation of new knowledge and encourages technological innovation, as well as new fashion (fashion industry) industrial clusters in Paris and Mumbai.

One cluster often creates or reinforces other clusters through the activities of enterprises in the value chain. This will reduce risk, facilitate access to industry or, in particular, better serve regional markets. A good example of this dominant effect can be seen in the optical cluster in Arizona, whose development has led to the formation of new clusters in areas such as plastics, aerospace, environmental technology, information technology and life sciences.

Clusters operating outside regional or national borders are different from groups within countries. For example, the McKinsey Global Institute found that more than 70% of exports from developing countries are concentrated in agriculture, mining, lighting, tourism, information and communication technologies, and retail trade.

Research by the Harvard Business School's Institute for Strategy and Competitiveness shows that the geographical types of export-oriented clusters reflect the strength of interconnectedness more than economic geography. On the other hand, local industrial clusters operate at the level of density of the whole economy, for local markets and are competitive in the region. They contribute to the growth of employment in the region, but wages, labor productivity and the level of innovation in them are lower than the regional average. In contrast, businesses in export-oriented clusters choose where to locate production to serve foreign markets. Such clusters provide relatively less employment.

A cluster approach to economic development is a good tool for regional analysis. The study of modern scientific literature of foreign countries (M.Porter, B.Feat, K.Ketels and others), the analysis of industrial clusters reveals a series of steps to determine which clusters exist in the regional economy, including the national economy and the national cluster. It can be said that it allows us to assess the weaknesses.

In accordance with the world community, Uzbekistan is also carrying out large-scale reforms aimed at providing the population with basic foodstuffs, strengthening the raw material base of the processing industry, improving the quality of agricultural products and export potential. As a result of reforms implemented during the years of independence,

there is a tendency to change the share of agricultural products in the country's GDP (Table 1).

Table 1. Main macroeconomic indicators of agricultural development in Uzbekistan.

Year	Annual growth rates of gross agricultural output (in %)	Share of agricultural in GDP (in %)
2000	103.1	34.4
2002	106.0	34.5
2004	108.9	30.8
2006	106.7	27.9
2008	104.5	21.9
2010	106.3	30.6
2012	107.2	32.6
2014	106.3	31.8
2016	106.3	32.1
2018	100.2	30.0
2020	102.8	28.2

During the years of independence, significant work has been done to reform agriculture. The introduction of advanced equipment and technologies in production has accelerated from year to year, increasing the efficiency of use of limited land and water resources. As a result of radical economic reforms and structural changes, the average annual growth rate of gross agricultural output in the period 2000–2020 has been growing. In particular, this figure was higher than the average of 5.5 % in 2000–2020 compared to previous years, and in 2020 it was 2.8 %.

If we analyzing clusters, introduced science, innovation achievements and advanced technologies in the field (Table 2), in particular:

Provision of resources for farmers in 23 clusters, processing and storage processes, and laboratory services were established on a scientific basis, but 123 clusters are not worked in this direction;

68 cluster has introduced water-saving technologies in the area, but water-saving technologies have not been introduced in 78 clusters;

mechanization levels were increased and technically accused, more than 850 resource-saucor high-yielding produced;

the attraction of direct investment funds increased by the cluster investments in the amount of 128 million US dollars;

The value-added chain has been created, large investment projects have been implemented, 34 projects for products were implemented (683,000 tons of 650 billion UZS), 2020-2021 new jobs were created in the regions in 2020-2021.

In particular, the analysis of industrial clusters allows:

- compare the development of economic activity in the region;
- identification of economic growth trends;
- identification of new industries in the region;
- assessment of the potential of cluster enterprises;
- developing and modifying a specific business development strategy;
- analysis of labor needs;

- Contribute to the establishment of sustainable business relationships;
- the state should pay special attention to enterprises that have the potential to grow in the implementation of regional industrial policy;
- simplification of the process of investor decision-making by investors based on the identification of underdeveloped value chains;

Determining which investments have the greatest potential for the region, ie the composition of investments that will ensure the sustainability of the region's development for many years.

Table 2. Analysis of agricultural clusters in the economy of Uzbekistan and forecast indicators.

Indicators	2020	2021	2022	2023	Growth (+/-)
Clusters (number)	86	146	163	245	+159
Attached land area ('000 hectare)	78.8	113.5	197	303	+224.2
Land area of land separated from the cluster ('000 hectare)	-	30.5	58	90	+71.7
Number of attached farms	7 851	9 868	12 350	15 600	+7 749
Farms land area ('000 hectare)	-	87	110	185	+124.5
Involved investment (million USD)	-	128	155	205	+205
Processing capacity ('000 tons)	554	841.8	1 450	2 950	+2 396
Coverage of processing steps (%)	-	15	25	35	+26
Created works ('000)	9.3	9.3	17.5	25.3	+14
Export volume (million USD)	72	75	250	500	+427

The development of clusters depends on investment in agricultural infrastructure (eg, irrigation, roads, transport, electricity and telecommunications), as well as in markets, agricultural economics, and research. Insufficient irrigation, distribution, storage and processing systems in agriculture hinder the development of production and the integration of the value chain. They minimize market opportunities and prevent new value-added participants (such as recycling companies) from entering the market and forming a value chain.

4 Discussion

Our research shows that clusters have many advantages in agriculture, in particular, creating a favorable environment for cooperation between firms, facilitating the spread of innovations and improving the competitiveness of the state in agriculture. Farmers and small business representatives can benefit from participation in agro-cluster activities. Collective action by cluster members is the mainstay of the agro-cluster, and is characterized by additional tasks performed by the government and the private sector (particularly farmers, industry and trade unions).

As a result of the analysis of the activity of fruit and vegetable clusters in the economy of Uzbekistan on the basis of data from the Ministry of Agriculture of the Republic of Uzbekistan, we came to the conclusion that in the coming years the following should be done:

1. In order to develop a strategy for the development of fruit and vegetable clusters, foreign consulting companies will be involved in each region on a tender basis (\$9 million), which will be funded by a grant from the JICA International Cooperation Agency;

2. The companies will involve experts such as experienced agronomists, technologists, marketers and identify prospects for the development of value chains in the region;

3. 53,000 hectares will be specialized in vegetable growing, 90,000 hectares in viticulture and 103,000 hectares in fruit growing (2022-2026);

4. Plantation, cultivation and processing projects will be developed in the territories;

In order to establish and expand new mechanisms for insuring the harvest of fruit and vegetable growers against natural disasters and other risks, a system of subsidizing 50% of the sum insured (fee) will be introduced. In our opinion, today there are the following problems in the contractual relations between fruit and vegetable clusters and farms of Uzbekistan:

- the obligations of the parties specified in the contracts concluded between fruit and vegetable clusters and farms are not fully fulfilled;

- As a result of insufficient supply of working capital to fruit and vegetable clusters, the contract is unilaterally terminated without full allocation of advance funds to farms;

- due to the fact that the clusters do not provide farms with quality, exportable seeds in the quantities specified in the contract and do not produce quality products;

- Procurement of products accepted by clusters on the basis of contracts at below market prices, as well as the fact that the final calculations are not paid in full;

- Penalties in the amount of 30% of the value of the products not delivered by farms and unreasonably rejected by the cluster, based on the price specified in the contract.

5 Conclusions

As a result of our analysis, we propose the following to solve these problems:

- to take measures to the extent that farms do not fully comply with the terms of the contract with the clusters, to the extent that the land attached to the farm is transferred to the district land reserve. In the selection of land plots in the district reserve, priority will be given to the cluster enterprise in the area;

- Allocation of unsecured loans to the clusters by the fund in the amount not exceeding 10%, ensuring the allocation by the clusters of subsidiaries in the amount of not less than 50% of the cost of production on the basis of contracts concluded with farms;

- Improving the knowledge and skills of growers, first of all, to provide them with quality seeds and varieties, the production of export-oriented products, the use of modern agricultural technologies;

- to ensure the purchase of products from the clusters in quantities not lower than market prices at the time of purchase, as well as the full payment of the final bills by the end of the harvest year;

- the imposition of fines in the amount specified in the contract in the amount of the full value of the products not submitted by farms, as well as products unreasonably rejected by the cluster;

- to take measures to apply additional premiums by clusters as additional incentives for producers to produce high-quality export products.

Earlier, in our work, we made proposals to increase the efficiency of agro-clusters. The results of our research in this article show the need to eliminate the existing gaps in the mechanisms of increasing the efficiency of agro-clusters.

Therefore, we believe that the economic efficiency of agro-clusters will certainly increase if the agricultural sector in our country is organized on the basis of "production - service - preparation - storage - supply - processing - sales" systems. As a result of the

implementation of these proposals to improve the organizational mechanism of agro-clusters. It is possible to develop cluster services, increase production and diversify the composition of exported finished products.

References

1. Kaplinsky R. (2002). The spread of the positive effects of globalization. What conclusions can be made on the basis of the analysis of the accumulation of costs? Preprint WP5 / 2002/03. M.: GU VSHE.
2. Romanenko E.A. (2019). Agroclusters are an innovative form of development of rural areas in Ukraine.
3. Sedova N.V. Agro-food clusters in the innovative economy. The world of the new economy. 1 (2013)
4. Mordovchenkov N.V., Nikolenko P.G., Klyueva Yu.S. Agrocluster as an innovative organizational and economic cluster. Azimuth of scientific research: economics and management. 1(10) (2015)
5. Bondarenko N.E. (2015). Innovative clusters: theoretical foundations and forms of organization. Bulletin of the Russian University of Economics G.V. Plekhanova, 2015, No. 5 (83)
6. Gamidullaeva L.A. (2015). Modeling the management system of an innovation cluster, *Creative Economy*, 2 (98), 225–236 (2015) <http://www.creativeeconomy.ru/journals/index.php/ce/article/view/122/>
7. Markov L.S. (2005). Economic clusters: concepts and characteristic drawings // Actual problems of socio-economic development: a look at young scientists: Sat. science. tr. / under ed. V.E. Seliverstova, VM Markova, ES Carnation. Novosibirsk: IEOPP SO RAN. Section. 1. C. 102–103.
8. Mirolyubova T.V. (2013). Legitimacy and factors of formation and development of regional clusters: monograph, TV Mirolyubova, TV Karlina, TY Kovaleva; Perm, 283p.
9. Ochilov, I.S. Fayzullaev Sh. (2019). Issues of public-private partnership and marketing in the economy of Uzbekistan. *Biznes-Expert*, pp. 23-29.
10. Ochilov, I.S. Improving the analysis of the effectiveness of agricultural clusters in the context of transformation and the digital economy. Monograph. Tashkent: Publishing house "Ozkitobsavdo Publishing Printing Creative House", 172 p., (2022)
11. Ochilov, I.S. (2022). Financial and economic analysis of agricultural clusters. Materials of the international scientific-practical conference "Agricultural production with science issues of integration and innovative development of education: problems and solutions". November 21-22, 2022, Tashkent: TGAU, 2022.- pp 395-405.
12. Ochilov, I.S. Some aspects of using the advanced pedagogical technologies in academic lyceums and vocational colleges. Open and Distance learning in the Digital Era: Towards a lifelong learning Society. Materials of the 16th Asian Association of Open Universities (AAOU) annual conference. Seoul, Korea, 2002. 165-166 pp.
13. Ochilov, I.S. Akhmedov, M.U. Economic issues in the management of educational institutions. Toolkit. Publishing house "Navroz", Tashkent: 65 p. (2015)
14. Ochilov, I.S., Karshiev, D.E. Economic issues of advanced training of managerial personnel. Toolkit. Publishing house "Navroz", Tashkent: 2016., 122 p.

15. Saidov M., Ochilov I., Yangibaev H. Cluster - An Innovative Structure Based on High Technologies in the Economy of Uzbekistan, *Solid State Technology* Volume: 63, Issue: 4, 205-212 (2020)
16. Saidov M., Ochilov I., Khasanov N, Muratova M. (2020). Peculiarities of Organization of Modern Clusters In Field of Fruit and Vegetable Production, *International Journal of Advanced Scientific and Technology*, Volume 29, 8, 3244-3253.
17. Isroilov B., Ochilov I. (2021). Improvement of Organizational and Economic Mechanisms of Organization of Vine Clusters. *The American Journal of Social Science and Education Innovations*, SJIF 5.857, DOI 10.37547 / TAJSSSEI, Volume 03 Issue 08, 27–33.
18. Isroilov B., Ochilov I., Turgunboev U. (2021). Organizational and economic issues of clusters in the digital economy. In the digital economy, it is important to organize accounting, reporting and auditing on the basis of international standards. *Proceedings of the Republican scientific-practical conference*. September 24. Samarkand, SamISI.- B 65-70.
19. W. Isard, *Methods of Regional Analysis: an Introduction to Regional Science*, 660 (1990)
20. T. Y. Kovalyova, *Bulletin of Perm University*, 4(11), 31 (2011)
21. C. Lin, Y. Ma, P. Malatesta, Y. Xuan, *Journal of Financial Economics*, 109(2), 517-534 (2013)
22. K. G. Mäler, F. Maler, *Environmental economics: A theoretical inquiry*, Routledge 241 (2013)
23. A. A. Migranyan, *Problems of the modern economy*, 1(21), 114-121 (2007)
24. T. V. Mirolyubov, *Bulletin of Perm University*, 3, 36-48 (2010)
25. N. A. Neustroyeva, *Russian business*, 10(232), 114-125 (2013)
26. M. V. Nikolaev, I. E. Egorova, *Problems of the modern economy*, 3/4(19/20), 117-128 (2006)
27. M. Porter, *The Competitive Advantage of Nations*, 371 (Free Press, New York, 1990)