



INTERRELATIONSHIP BETWEEN SPECIALIZATION AND CLUSTERIZATION PROCESSES IN INDUSTRIAL SECTORS: THEORETICAL AND PRACTICAL APPROACHES

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Abstract

This article analyzes the theoretical foundations and practical aspects of specialization and clustering processes in industrial sectors. It highlights the opportunities to increase the efficiency of industrial enterprises, ensure targeted use of resources, and enhance competitiveness through specialization.

Keywords: Specialization, clustering, industrial sectors, industrial policy, innovation, competitiveness, regional development, infrastructure, economic integration.

Introduction

Today, globalization processes, increased competition and the need for effective resource management are leading to a new stage of reforms in industrial sectors. From this point of view, specialization of industrial enterprises and organization of their association in the form of clusters are emerging as an important factor in increasing economic efficiency, rational use of local raw materials, introduction of innovations and ensuring regional development. By studying the interrelation of specialization and clustering processes, their practical application and theoretical foundations, broad opportunities are created for the sustainable and competitive development of industry in the national economy.

The study of the interrelation of specialization and clustering processes in industrial sectors is of not only theoretical but also high practical importance. In particular, currently, within the framework of state programs aimed at the development of industry in the territorial and sectoral areas, the activities of special economic zones, technoparks and cluster-shaped integrated industries are expanding in Uzbekistan. However, practical analysis shows that in many cases, the level of specialization in industrial enterprises is insufficient, the cluster elements are not interconnected, and the efficiency is low.





Literature review

In order to understand and analyze this situation in more depth, classical studies in the field of economic geography and industrial economics, in particular, Alfred Marshall's "Principles of Economics" (1890), serve as an important theoretical basis [3]. In his work, Marshall deeply analyzed the role of specialization in increasing production efficiency and the influence of geographical proximity on the formation and development of industry. In his opinion, the concentration of enterprises and industries in certain regions - that is, clustering - brings economic advantages through the exchange of experience, flexibility of the labor market, and common use of infrastructure. Unfortunately, in today's practice, these theoretical principles are not fully taken into account, which directly affects the effectiveness of industrial clusters in Uzbekistan. A number of researchers who have studied the processes of clustering and specialization in depth have emphasized the role of these processes in increasing the competitiveness of national and regional economies. In particular, M. Porter [4] in his research showed that clusters are a decisive factor in stimulating innovation through an environment of internal cooperation and competition, and scientifically substantiated the emergence of clusters as a fulcrum of economic growth, while A. Saxenian [5] assessed the impact of knowledge exchange and social capital within clusters on innovation processes. Researchers such as Ketels and Asheim & Gertler [6] emphasized that cluster efficiency depends on regional innovation potential, infrastructure and institutional environment. Based on these approaches, modernization of production technologies is carried out, which in turn serves to expand the product market. Therefore, it is advisable to organize research institutes within the cluster structure, along with manufacturing enterprises, suppliers of material resources and service organizations. This serves to accelerate the innovative development of industrial sectors and increase their competitiveness. The experience of developed countries shows that the role and importance of clusters in the effective use of research results in textile industry enterprises, increasing competitiveness and achieving economic efficiency are important. In particular, in the experience of North America, the European Union, India, China and Japan, cluster activities in the textile industry are recognized as a strategic priority. In these countries, clusters not only strengthen cooperation within the industry, but also play an important role in increasing innovative development and export potential. The importance of cluster activities has been widely studied in a number of scientific studies, and their impact on the development of various industries and sectors has been comprehensively assessed. Studies by Sumei Zeng and Jinding Bao show that innovation cooperation and knowledge exchange processes in clusters are important





drivers for enhancing the innovative capacity of enterprises and making them competitive [8], while researchers such as Jili Du and Peng Hao have found that horizontal and vertical linkages within clusters, in particular value chain collaboration and the degree of geographical concentration, can have a positive impact on indicators such as energy efficiency [9]. In addition, studies by Yuanyang Teng and co-authors evaluate the digital transformation of clusters based on a comprehensive approach and find that the interaction of upstream and downstream participants and their integration through a digital platform are important [10]. They also analyze the state of the digital communication network in clusters before and after transformation and show that the formation of a digital ecosystem has a significant impact on cluster efficiency. These studies confirm that modern clusters are formed and developed not only on the basis of geographical proximity, but also through innovative cooperation, digital infrastructure, knowledge and technology exchange. Therefore, a comprehensive approach is required to regulate cluster activities, taking into account these factors.

Clusters are directly related to the level of development of innovative activity, and in order to ensure their balanced development, it is necessary to consider the following key links:

- innovation cooperation - the exchange of knowledge, experience and technologies between enterprises accelerates innovation processes and contributes to the emergence of new ideas;
- digitization and technological innovations - digital transformation increases the efficiency of enterprises in the cluster and contributes to the further expansion of innovative activity;
- geographical proximity and agglomeration effect - the geographical proximity of enterprises and research institutions within the cluster strengthens innovative cooperation;
- Institutional support - the policy of the state and other organizations for the development of clusters, financial and consulting services stimulate innovative activity;
- development of markets and new products - clusters increase the opportunities for creating new products in accordance with market requirements and strengthen export potential.

Methodology

The main criteria for studying industrial clustering are the degree of specialization of industries and localization indicators. These criteria determine the degree of concentration and close cooperation of production processes in a given territory.





Specialization is the focus of enterprises on a specific type of product or technological process, and localization is the degree of concentration of this production activity in a specific geographical area. These indicators play an important role in assessing the industrial structure formed in the form of a cluster, since they reflect the internal stability, interconnectedness and competitiveness of the cluster in the market.

Based on these criteria, the methodology for assessing clustering was developed by Ye. Risin and Y. I. Treshevsky, who in their research proposed an approach based on a comprehensive analysis of the geographical concentration of production industries, the degree of specialization and inter-sectoral interconnection. This methodology determines the existence or possibility of formation of an industrial cluster, the effectiveness of its territorial composition and structure. At the same time, this approach allows us to assess the interconnectedness of enterprises within the cluster, their place in the technological chain, and the possibilities of cooperation. Such comprehensive analyses are of great practical importance, especially in clustering policy and regional economic planning.

$$K_{lm} = \frac{v_{ir} \cdot v_{is}}{v_r \cdot v_s} \quad (1)$$

In this: K_{lm} - localization coefficient; v_{ir} - production volume of regional industry i ; v_{is} - The volume of products of the republic's industry; v_r - regional product volume of the region; v_s - gross industrial output.

Or,

$$K_{pp} = \frac{v_{ir} \cdot P_r}{v_{ic} \cdot P_s} \quad (2)$$

In this: K_{pp} - per capita GDP; P_r - mintaqah aholisi soni; P - The population of the republic.

Thus, the main principle of production clustering is to rely on localization and concentration processes. The economic efficiency of concentration is analyzed through changes in the share of industrial sectors and their output in the total industrial output, based on the mutual compatibility and compatibility of existing production technologies.

Analysis and results

Today, the introduction and development of a cluster system in the industry of the Andijan region is of great economic importance. The effect of clustering is especially noticeable in industrial enterprises specializing in the processing of agricultural raw materials. In such clusters, there is an opportunity to increase economic efficiency through specialization of production. The effectiveness of specialization depends, first of all, on the technical qualifications and professional competencies of personnel



participating in the production process. These factors contribute to the high-tech organization of the production process and increased labor productivity. For example, the results of clusters operating in the textile industry are assessed by their share in the total volume of industrial products produced in the region. This indicates the strategic importance of the cluster not only in the local economy, but also in the entire regional industrial system. The level of specialization also plays an important role in the activities of “Sakhovat Tekst” LLC operating in the region, and it is manifested as a key factor in increasing production efficiency (Table 1).

$$K_{ixt} = \frac{\frac{V_{TQ}}{Y_{XM}}}{\frac{Q_t}{T_{TQ}}} = \frac{0,245}{0,145} = 0,59 \quad (1)$$

In this: K_{ixt} - coefficient of specialization; Q_t - volume of output created by network enterprises; T_{TQ} - hududning to‘qimachilik mahsulotlari hajmi; V_{TQ} - the volume of regional textile products; Y_{XM} - volume of regional industrial output.

Table 1 Performance indicators of textile clusters

Indicators	2015-y	2017-y	average (2015-2017)	2021-y	2022-y	2023-y	2024-y	average (2021-2024)	correlation
Until the clatterization				After clustering					
Specialization coefficient (technical competence of employees)	0,67	0,63	0,65	0,58	0,52	0,56	0,59	0,56	86,54
diversification coefficient (set of technologies)	0,33	0,37	0,35	0,42	0,48	0,44	0,41	0,44	125,00
Profitability ratio	26,6	19,4	23,00	17,1	18	19,5	19,4	18,50	80,43

According to the table, the main indicators used to assess the efficiency of textile clusters - the specialization coefficient, the level of diversification and profitability - clearly demonstrate the impact of clustering. In particular, after clustering, the specialization level decreased by 13.46%, from 0.65 to 0.56. This can be explained by the difference in personnel competence or the addition of new enterprises to the system. At the same time, the diversification coefficient increased by 25%, from 0.35 to 0.44, indicating an expansion of the technological base and an increase in the range of products. However, the decrease in the profitability indicator from 23% to 18.5% is associated with investment costs and the formation of infrastructure at the initial stage of the cluster. In general, as a result of clustering, technological innovation and an increase in the range of products are observed, but systematic and targeted management is necessary to achieve high efficiency.

Thus, the economic indicators of the enterprise during clustering have improved somewhat. Although clustering has yielded positive results at the technological level,



there are problems with human capital and financial efficiency. It is recommended to pay attention to the following in strategic development:

- Increasing human resources capacity (competence centers, training)
- Measures to optimize costs and increase profitability
- Continue to introduce innovative technologies.

Based on the above results, the clustering results were as follows (Table 2).

Table 2 Performance indicators of textile clusters

Indicators	Before clustering (average 2015-2017)	After clustering (average 2018-2024)	Change (percentage)
Specialization coefficient (technical competence of employees)	0,65	0,56	-13,85%
Diversification coefficient (technology mix)	0,35	0,44	+25,71%
Profitability rate (percentage)	23,00	18,50	-19,57%

Thus, although specialization and profitability have decreased in the enterprise, technological concentration has increased significantly. This indicates that technological unity and cooperation within the clusters have increased.

Based on the above, in order to ensure the economic efficiency of the enterprise, the SWOT Analysis based on the data in Table 3 is as follows

Table 3 SWOT analysis of economic performance of textile clusters performance indicators

Strengths <ul style="list-style-type: none">- Improved technological concentration (concentration coefficient +25 percent)- Increased efficiency of cooperation and resource sharing within clusters- New innovative technologies introduced	Weaknesses <ul style="list-style-type: none">- Reduced employee competence (-13.85 percent)- Reduced profitability (-19.57 percent)- Underdeveloped professional development system
Opportunities <ul style="list-style-type: none">- Development of human resource development programs- Attracting foreign investment and expanding exports- Automation of production based on digital technologies	Threats <ul style="list-style-type: none">- Lack of technical skills- Slow adaptation to market demand- High cost of components- Rising energy and raw material prices



Conclusions and Recommendations

Thus, the activities of the Sakhovat Teks LLC cluster are characterized by a number of strengths, including improved technological concentration and increased efficiency of cooperation within the cluster, as well as the introduction of new innovative technologies. However, there are also weaknesses, such as a decrease in the competence of employees, a decrease in the level of profitability, and the slow development of the professional development system. Also, threats such as a lack of technical skills, slow adaptation to market demand, high prices for components, and rising energy and raw material prices can negatively affect the sustainable development of the cluster. Increasing the human resource capacity of the enterprise is necessary, including increasing the competence of employees through the training of qualified specialists and the introduction of continuous professional development programs, attracting investments, namely foreign investment, and paying special attention to expanding export potential, and increasing efficiency through the expansion of digital technologies, automation and digitization of production

References

1. Decree of the President of the Republic of Uzbekistan dated January 28, 2022 No. PF-60 "On the Development Strategy of New Uzbekistan for 2022-2026".
2. Decree of the President of the Republic of Uzbekistan dated January 22, 2025 No. PF-6 "On Additional Measures for the Development of the Processing Chain in the Textile and Garment and Knitwear Industry".
3. Marshall, A. (1890). Principles of Economics, London: Macmillan, 271-290 bet. Porter, M. E. (1990). The Competitive Advantage of Nations, New York: Free Press, p 113-130.
4. axenian, A. (1994). Regional Advantage: Culture and Competition in Silicon Valley and Route 128, Cambridge: Harvard University Press, p 45-60.
5. Ketels, C. H. M. (2013). Clusters and Regional Development: Critical Reflections and Future Research, Regional Studies, 47(8), 119-133, p 120-125.
6. Martin, R., & Sunley, P. (2003). Deconstructing Clusters: Chaotic Concept or Policy Panacea, Journal of Economic Geography, 3(1), 5-35, p 10-20.
7. Jurayev, Sh. (2018). "O'zbekiston sanoat klasterlari: iqtisodiy asoslari va rivojlanish yo'nalishlari", Iqtisodiy tahlil va boshqaruv, 2(15), 45-52.
8. Sumei Zeng a, Jinding Bao b Analysis of the effects of digital transformation of enterprise clusters on innovation performance in the context of "Internet+". Systems and Soft Computing 7 (2025) 200270





9. Jili Du, Peng Hao Firm clustering, agglomeration externalities and energy efficiency: Evidence from Chinese industrial enterprises. *Energy Economics* Volume 145, May 2025, 108451
10. Yuanyang Teng, Jianzhuang Zheng, Yicun Li, Dong Wu “Optimizing digital transformation paths for industrial clusters: Insights from a simulation” *Technological Forecasting and Social Change* Volume 200, March 2024, 123170
11. Marifovich, M. M. (2023). THE EFFECT OF PRODUCT DIVERSIFICATION ON THE ECONOMIC EFFICIENCY OF INDUSTRIAL ENTERPRISES. *Deutsche Internationale Zeitschrift für Zeitgenössische Wissenschaft*, (68).
12. Mukhtarov, M. (2023). WAYS TO INCREASE THE ECONOMIC EFFICIENCY OF TEXTILE INDUSTRY ENTERPRISES BASED ON PRODUCT DIVERSIFICATION. *Economics and Education*, 24(5), 274-278.
13. Marifovich, M. M. (2022). MEANS TO INCREASE EFFICIENCY IN INDUSTRIAL PRODUCTION. *Confrencea*, 6(6), 104-107.

