

# New Approaches to Cluster Development in the Context of Industrial and Innovative Development of the Republic of Kazakhstan

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**Abstract.** The article considers features, approaches, institutional conditions of cluster development in the context of industrial and innovative development of the Republic of Kazakhstan. The purpose of the study is to work out new approaches to cluster development within the framework of the State Program of industrial and innovative development – 3. The methods of scientific research, statistical data and economic and mathematical modelling were applied in the work. As a result of the given study the possibility of merging clusters and special economic zones was evaluated, the role of clusters in the development of territories was outlined. The empirical basis of the analysis was the results of the study conducted in the framework of the research "Improvement of the policy of state regulation of accelerated clustering of industrial regions", carried out under the grant funding by the Ministry of Education and Science of the Republic of Kazakhstan.

## 1 Introduction

Over the ten years of implementation of the policy of active industrialization in the manufacturing industry of the Republic of Kazakhstan, there has been outstripping growth in industrial production. Manufacturing output has grown by 3.5 times. Gross value added in manufacturing increased from 2 trillion tenge to 7 trillion tenge. There have also been significant improvements in all key manufacturing indicators (investment in fixed capital, foreign direct investment, labour productivity and exports). Taxes from manufacturing increased 2.9 times over the years of industrialization.

The set of support measures reflected in the State Program for Accelerated Industrial and Innovative Development and the State Program for Industrial and Innovative Development – 2 made it possible to classify these programs as effective sectoral program documents.

At the present stage, in the context of the implementation of the State Program for Industrial and Innovative Development – 3, much attention is paid to the introduction of elements of Industry 4.0. A set of measures related to technological development, expansion of production, increase of exports, development of automation and digitalisation,

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as well as introduction of elements of Industry 4.0 with technological, market and management readiness are considered as a priority. Among the criteria, there are initiatives aimed at developing cluster initiatives and ensuring digital synergy.

A comparative analysis of state mechanisms to stimulate cluster development in world practice and the EAEU countries showed the wide use of China's experience in Kazakhstan's reality. A comparison of approaches reflected in the Program "China Manufacturing 2025" and the State Program for Industrial and Innovative Development of the Republic of Kazakhstan until 2025 showed that the cluster initiative plays a huge role in the accelerated industrialization of the country. But in this case it should be noted that financing mechanisms for the implementation of the concept of industrial clusters in the country have not yet been formed. A deep gap arises between the priorities declared at the national level and the real actions.

The following problematic issues in the cluster development were identified: inter-departmental disunity of cluster policy, underdeveloped mechanisms of inter-regional and inter-subject (stakeholder) interaction, inconsistency of horizontal and vertical strategic planning documents, insufficient and fragmented support mechanisms, scantily reliable statistical data for decision-making, lack of own resources at the regional level to implement the cluster policy. No effective model for coordination of activities of the intended cluster participants has been created, the set of tools for cluster support remains very limited.

The aim of the proposed study is to work out new approaches to cluster development within the framework of the State Program for Industrial and Innovation Development – 3.

In order to achieve this aim, the following tasks were solved:

- a set of publications in the field of cluster initiatives development has been analysed,
- a retrospective review of program documents in the field of cluster development in the Republic of Kazakhstan was conducted, and the possibility of merging clusters and special economic zones was identified,
- an impact of clusters on the development of territories was evaluated.

## 2 Research methodology

The research array on cluster technology development can be divided into several groups.

The first group of researches is devoted to the issues of defining the essence of clusters and cluster policy, assessing its impact on regional economic development. Variants of definitions were proposed by Markov L. S., Kurmashev V. B., Nizkovskiy A. Yu., who came to the conclusion that "cluster policy is used as a generalizing name for various ways to support and create network associations of enterprises". [1]. Furre H. emphasizes the importance of the impact of clusters on the economy and, therefore, the need for a comprehensive study of such a concept as cluster policy and its components [2].

The second group of researches is devoted to the problem of selecting criteria for cluster classification. The study of Nikonova M. N. [3] should be highlighted separately. The study is an analytical review of the current set of documents, definitions, key institutional factors and concepts that define cluster policy. Kutsenko E. S. analyses the characteristic features of a successful cluster, the correspondence of pilot innovation clusters to these features [4].

The third group of researches is devoted to the issues of regional development support and stimulation of cluster initiatives. In particular, we should note the study of Emets M.I. and Purgin A.S. [5], Turgel I.D. and Bozhko L.G. [6, 7] etc. These studies consider the concepts of special economic zones, territorial development zones and territories of

advanced socio-economic development, history of creation and evolution, raise the issues of their functioning, problems and prospects of creation.

The fourth group of researches noted that clusters of research companies and institutes have a number of positive externalities [8].

The fifth group of researches is devoted to the problems of modernization of special economic zones from the perspective of the cluster approach. The theoretical foundations of the cluster approach in the organisation of special economic zones are reflected in the studies of D. Peter [9], M. Amity, B.S. Javorcik [10], etc.

Thus, after reviewing the five identified approaches, it can be noted that there is a fairly large experience in the study of cluster policy at the national and regional levels, as well as the options for classifying clusters have been developed. At the same time, the issues of the role of clusters in the industrial and innovative development of regions remain insufficiently studied.

General scientific methods of enquiry (methods of scientific research analysis, statistical data, economic and mathematical modelling) have been used in the research process. The documents of the legislative authorities, regulatory legal acts of the Republic of Kazakhstan provided the information base for the research.

### **3 Identification of cluster development approaches in the Republic of Kazakhstan**

In Kazakhstan, the idea of cluster development has been identified as the main method of economic diversification. For Kazakhstan, the cluster approach is a rather new tool. However, its use is starting to occupy one of the main places in the country's innovation development strategies.

In March 2005, Kazakhstan launched a project to assess the competitiveness of existing and potentially promising sectors of Kazakhstan's economy and make recommendations for their development. The outcome of the multi-stage selection process is seven "pilot" clusters, which are currently being implemented with a view to real competition in the global market.

In general, government measures to support clusters in the Republic of Kazakhstan are linked to the country's overall development strategy. A set of key state programs, defined by the Nation's 100 Concrete Steps Plan, is aimed at accelerating the technological modernisation of the country's economy.

A new stage in the development of cluster initiatives is outlined in the State Program for Industrial and Innovative Development – 3, whose innovative approaches include an emphasis on efficient manufacturing enterprises oriented towards saturation of the domestic market with quality products and exports; a transition from fragmented state support instruments to a system of comprehensive development incentives; a transition from sectoral prioritisation to identification of specific priority products; integration into global value chains through targeted recruitment of foreign investors; development and promotion of individual Kazakhstan brands in foreign markets.

There are 13 special economic zones (SEZs), 23 industrial zones and 16 social and entrepreneurial corporations operating in the Republic of Kazakhstan. In terms of scale of activity, special economic zones play the most important role for economic development. More than 700 member companies have registered in all special economic zones and industrial zones. Of these, 180 are already active, while the rest are at different stages of development – from the design stage, to raising finance, to construction and production itself. In addition, special economic zones and industrial zones provide additional employment in the country, with more than 24,000 job opportunities.

In order to strengthen the potential of cluster initiatives, it is proposed to develop them within the existing 13 SEZs. As international practice shows, free economic zones can be part of a cluster. In turn, interacting clusters can be parts of SEZs. A similar merger process may serve as the beginning of formation of a new type of zones – cluster zones. The mechanism of merging clusters and special economic zones is presented in the table.

**Table 1.** Merging clusters and special economic zones in the Republic of Kazakhstan

Cluster	Special economic zone	Specialisation	Operational period
Metallurgical	Saryarka SEZ	metallurgy, metalwork	2011-2036
	Aktau Sea Port SEZ	metalwork, instrument making	2002-2028
Petrochemical	Pavlodar SEZ	petrochemicals	2011-2036
	National Petrochemical SEZ Industrial Technopark	petrochemicals	2007-2032
Chemical	Chemical Park Taraz SEZ	Chemistry	2012-2037
Textile and industrial	Ontustik SEZ	Textiles	2005-2030
Building materials production	Astana – New City SEZ	construction, industry	2001-2027
	Qyzyljar SEZ		2019-2044
Transport logistics	Khorgos Eastern Gates SEZ	trade, logistics	2011-2035
Tourist	Burabay SEZ	tourism	2008-2017
	TURKISTAN SEZ	tourism, construction	2018-2043
Intelligent and innovative	Innovation Technology Park SEZ	IT innovation, instrument making	2003-202
	Astana – Technopolis SEZ	IT innovation, industry	2017-2042

Among Kazakhstan's SEZs, knowledge-based industry clusters can be identified as having high potential as a formation base.

Using the potential of SEZs should provide favourable opportunities for the development of knowledge-based industry clusters. They should launch the process of cluster development, provide a full cycle of production of high-tech finished products from strategically important sectors of the national economy with high added value. Knowledge-based industry clusters may be formed only by combining science with technological production.

The synergy effect of the development of cluster initiatives is proposed to be assessed through the dynamics of key statistical indicators in the area of cluster activities, the nature of changes that have occurred and the forecast values obtained in connection with them.

Statistical data describing the development of the metallurgical cluster in Karaganda region of the Republic of Kazakhstan, where the Saryarka SEZ has been established, were used for the analysis.

Kazakhstan's mining and metallurgy sector accounts for about 7.3% of GDP and 24.7% of industrial production. Kazakhstan is among the top ten countries in terms of mineral potential and has historically been one of the key players in the global mining and metallurgy sector.

The cluster leader is ArcelorMittal, which is the world leader in steel production and holds leading positions in major steel markets worldwide, including sectors such as automotive, construction, appliances and packaging.

Development of a metallurgical cluster has a significant impact on the social and economic development of both Karaganda region and the country as a whole. Availability of clusters in the territory is beneficial primarily due to attraction of investments, including foreign ones. Analysis of investment in fixed capital of the mining and metallurgy sector in

the Republic of Kazakhstan has allowed to identify three stages: a gradual growth in the investment volume up to 2011, a sharp decline, and then, starting from 2017, another period of growth.

The positive dynamics of such an important indicator as the turnover of organisations in specific types of economic activity should be noted. According to forecast values, this indicator shows an upward trend and by 2021 will reach 1 671 860 million tenge.

Clusters are first and foremost an association of organisations. Each organisation is a taxpayer, so when talking about the beneficial effects of clusters on the financial sector of the region, it is necessary to analyse directly the tax deductions.

It should be noted a steady annual increase in the volume of taxes, fees and other payments to the budget of the Republic of Kazakhstan. According to the forecast model, by 2021 this indicator will be 334,057 million tenge, which is 39,554.9 million tenge higher than in 2018.

An additional positive effect of creating the cluster, which should be noted, is the increase in the number of new job opportunities. Provision of the region's population with jobs solves problems of both unemployment and purchasing power of the region's residents. The number of employees of organisations participating in metallurgy cluster of the Republic of Kazakhstan is 32,958 people (20% of population of Temirtau city in Karaganda region).

One of the most important components of any cluster is the academic organisations. Thanks to the targeted work of the cluster science centres in a specific area of activity, their positive impact on the overall innovative activity of organisations in the region can be noted.

By bringing together enterprises from different fields (from industry to research centres), clusters have a synergetic effect on such areas of socio-economic development as finance, industry, labour market and innovation activity.

## **4 Conclusions**

The following conclusions can be drawn from the study.

1. Interest in the development of cluster initiatives and their impact on territorial development has led to the creation of a variety of methodologies for studying clusters, depending on their distinctive features. There are 5 groups of researches that reflect the accumulated experience in the field of cluster study. It has been revealed that the issues of the role of clusters in industrial and innovative development of the regions have not been sufficiently studied yet.
2. At the present stage, full support for regional development and cluster initiatives is of particular importance for Kazakhstan. This system of support includes a combination of various legislative, administrative, financial and economic measures. At the same time, special economic zones could become the key institutional link integrating these measures. The use of the cluster approach will boost socio-economic development of cluster-based regions and increase the competitiveness of the territory as a whole.
3. In order to assess the synergy effect of cluster creation, it is proposed to pay attention to changes in such areas as finance, industry, labour market and innovation. It is proved that the synergy effect of the emergence of clusters can be assessed through the dynamics of key statistical indicators in the area of cluster activities, the nature of changes that have occurred and the forecast values obtained in connection with them.

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