COMPLEX METHODOLOGY OF INNOVATIVE DEVELOPMENT OF INDUSTRY IN KASHKADARYA REGION

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Abstract. *The article scientifically studies the complex methodological foundations of innovative development of industry in the Kashkadarya region. In the course of the research, the economic geographical features of regional industrial development, the transformation of the production structure, and the impact of innovative factors on industrial efficiency were analyzed based on a systematic approach. Using mathematical modeling, forecasting, and statistical analysis methods, the long-term development prospects of industrial production were assessed, and the stages of investment activity, clustering, and the introduction of innovative technologies were justified.*

Keywords: *Kashkadarya region, industrial development, innovative development, complex methodology, regional economy, clustering, mathematical modeling, forecasting, industrial infrastructure, sustainable development.*

In the current conditions of globalization and increasing competition, the innovative development of industrial sectors is one of the main factors ensuring the stability of the regional economy. World experience shows that the modernization of industry, the expansion of high-tech production and the implementation of scientific and technical achievements in practice contribute to the increase in the economic potential of regions, the strengthening of production efficiency and competitiveness. In this regard, the study of industrial development not only in terms of individual sectors, but also on the

basis of a regional, systemic and integrated approach is emerging as an urgent scientific and practical issue.

Industry is one of the leading sectors in the economy of the Kashkadarya region, and its innovative development is of great importance for the socio-economic development of the region. The natural resource potential of the region, labor resources and production infrastructure create favorable conditions for the innovative development of industry, but the effective use of these opportunities requires a scientifically based comprehensive methodology. In this regard, this article presents scientific conclusions aimed at developing comprehensive methodological approaches to the innovative development of the industry of the Kashkadarya region, assessing development prospects based on mathematical modeling and forecasting methods, and improving regional industrial policy.

In the formation of methodological foundations for the innovative development of the industry of the Kashkadarya region, first of all, a deep analysis of the economic geographical characteristics of the region is of great importance. The natural resource potential of the region, the territorial location of production, the composition of labor resources and the transport and logistics infrastructure directly affect the formation and development of industrial sectors. In this regard, in the process of innovative development of industry, there is a need to place production sectors taking into account territorial specialization, effectively use resources and strengthen the internal connectivity of the economic space.

The transformation of the structure of industrial production is one of the important directions of innovative development of the industry of Kashkadarya region. The gradual transition from traditional raw material-oriented industries to high-value-added, processing and technologically complex productions will serve to increase industrial efficiency. In this process, the formation of industrial clusters, the development of cooperation and integration between

enterprises, as well as strengthening cooperation between research institutions and production entities are the main factors in the formation of an innovative environment.

The use of mathematical modeling and forecasting methods in the integrated methodology of innovative development of the industry of Kashkadarya region is of significant scientific and practical importance. With the help of these methods, the dynamics, stages of development and prospects of industrial production are quantitatively assessed and the possibility of making strategic decisions based on various scenarios is created. Through statistical analysis, trend models and identification of the relationship between indicators, scientific conclusions are developed aimed at improving regional industrial policy, determining investment priorities and ensuring innovative development.

During the research, the limitations of traditional economic and economic geographical approaches to the development of industry in the Kashkadarya region were identified and the need to combine them with the innovative development paradigm was scientifically substantiated. In particular, it was found that assessing industry solely on the basis of production volumes or sectoral composition cannot fully reveal the internal mechanisms of regional development, and an improved methodology was developed based on an integrated approach.

The conceptual basis of the improved methodology is the interpretation of the regional industrial system as a multifactorial, dynamic and open system. In it, natural resource potential, quality of labor resources, transport and logistics infrastructure, scientific and innovative environment, environmental constraints and market factors are assessed in an interdependent manner. This approach made it possible to identify macro- and meso-level imbalances in the innovative development of regional industry.

A comprehensive methodological model for innovative development of industry in the Kashkadarya region

Methodological block	Main content	Evaluation criteria	Impact on regional development
Natural resource block	Mineral raw materials, energy and water resources potential	Resource reserves, utilization rate	Determines industrial location and industry specialization
Economic geographical block	Transport, logistics, territorial location	Transport costs, market proximity	Increases regional competitiveness
Innovation block	Introduction of technologies, R&D, innovations	Technological level, innovative activity	Forms high-value-added industries
Territorial and structural block	Clusters and small industrial zones	Degree of cooperation, specialization	Strengthens regional industrial integration
Ecological block	Environmental impact and sustainability	Ecological capacity, resource efficiency	Ensures sustainable industrial development

Forecasting and modeling block	Long-term industry forecasts	Growth rate, investment volume	Provides scientific justification for strategic planning

The improved comprehensive methodology addressed the issue of optimizing the territorial structure of industry based on a systemic-structural approach. Functional and territorial connections between large industrial enterprises, small industrial zones, industrial clusters and service infrastructure were analyzed. This formed a scientific basis for increasing the level of internal cooperation of the regional industry and accelerating the diffusion of innovations.

One of the important aspects of the improved methodology is the active use of cartographic modeling. Based on ArcGIS technologies, the location of industrial sectors, territorial specialization, and the level of innovative activity were visually and analytically assessed. As a result, the practical significance of the methodology in territorial planning and investment decision-making has significantly increased.

This methodology allowed for an interrelated analysis of the macro (regional), meso (districts and cities) and micro (individual industrial entities) levels in assessing regional industrial development. This approach served to identify differences in interregional industrial development and develop mechanisms to mitigate them through innovation.

The innovative, territorial-structural and ecological blocks of the model are aimed at bringing the industry to a qualitatively new level, providing for the formation of high-value-added production through the introduction of technologies, the development of clusters and small industrial zones, and ensuring environmental sustainability. The forecasting and modeling block

improves strategic planning by scientifically assessing long-term prospects for industrial development, identifying growth rates and investment directions. As a result, this complex methodological model serves to strengthen regional industrial integration, ensure sustainable economic growth, and create a scientifically based mechanism for the innovative development of the industry of the Kashkadarya region.

The results of the study showed that limiting oneself to traditional approaches in assessing the process of innovative development of industry in the Kashkadarya region cannot fully reveal the complex and multifactorial features of the regional industrial system. Therefore, the comprehensive methodology proposed in the article allows for a systematic analysis of regional industrial development based on natural-resource, economic-geographic, innovative, territorial-structural, environmental, as well as forecasting and modeling blocks, and is distinguished by its high scientific efficiency in identifying internal mechanisms of industrial development and regional imbalances. This approach serves to assess the territorial location, specialization and mutual integration of industrial sectors on a scientific basis.

The implementation of the proposed methodological model will create a solid scientific basis for improving regional industrial policy, wide implementation of innovative technologies, development of industrial clusters and small industrial zones, and ensuring efficient use of resources. As a result, the possibilities for developing long-term strategies for innovative development of the industry of the Kashkadarya region, increasing regional competitiveness and ensuring sustainable economic growth will expand, and this comprehensive methodology will be manifested as a universal scientific approach that can be effectively used in scientific research and practical planning processes for the development of regional industry.

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