

## **ANNOTATION**

**for the dissertation work of PhD doctoral student M.I. Dabylova  
in the specialty 6D051700 – Innovation Management  
on the topic: “Organizing of interaction  
between universities and the business environment in innovation activities”**

The relevance of the research topic is обусловлена the transition of the economy to an innovation-driven development path and the need to ensure effective interaction between science, education, and business. In Kazakhstan, the commercialization of scientific results and their implementation in the real sector of the economy is one of the key tasks. The research topic is closely related to the Law of the Republic of Kazakhstan “On Science and Technological Policy”, the Concept for the Development of Higher Education and Science in the Republic of Kazakhstan for 2023–2029, as well as state programs aimed at developing the national innovation system. Kazakhstan’s position in the Global Innovation Index indicates that its innovation potential is not fully utilized. According to data published by the World Intellectual Property Organization, Kazakhstan ranks 119th in terms of scientific and technical publications, 136th in software expenditures, and 112th in venture capital investment. The level of university–industry research collaboration also remains low, with Kazakhstan ranking 115th on this indicator. Interaction between higher education institutions and business structures is mostly carried out within individual research projects or grant programs, while effective mechanisms for its systematic organization and management are not sufficiently developed.

The purpose of the research is to improve the mechanisms for organizing the interaction between higher education institutions and the business sector in innovation activities in the Republic of Kazakhstan, and to develop recommendations taking into account regional characteristics.

The object of the research: the system of managing innovation activities within the framework of organizing the interaction between higher education institutions and the business sector in the Republic of Kazakhstan.

The subject of the research: organizational and economic mechanisms, as well as management tools aimed at increasing the efficiency of organizing the interaction between higher education institutions and the business sector in innovation activities in the Republic of Kazakhstan.

Research objectives:

1. To analyze the theoretical concepts of innovation activity management.
2. To analyze models for organizing the interaction between higher education institutions and the business sector.
3. To study effective international practices in managing the organization of interaction between higher education institutions and the business

sector in innovation activities, and to identify ways to adapt them to the conditions of the Republic of Kazakhstan.

4. To analyze the system of institutional support for organizing the interaction between higher education institutions and the business sector in the Republic of Kazakhstan and to determine its structural elements.

5. To identify barriers to organizing the interaction between higher education institutions and the business sector in innovation activities.

6. To analyze the current state of the level of scientific development in the regions of the Republic of Kazakhstan.

7. To develop a model for organizing the interaction between higher education institutions and the business sector in the Republic of Kazakhstan and to formulate recommendations for its regulation.

The research is based on systemic, institutional, and result-oriented approaches. Quantitative analysis employed economic-statistical methods and cluster analysis (DBSCAN) to assess the level of innovative development of regions. Qualitative analysis was conducted using ATLAS.ti software, which made it possible to identify the key factors of interaction. The results were systematized based on SWOT analysis.

The scientific novelty of the dissertation research lies in the comprehensive consideration of the problem of managing the organization of interaction between higher education institutions and the business sector in innovation activities, as well as in proposing scientifically grounded solutions:

1. Based on theoretical and empirical research, an author's definition of the concept of "innovation activity management" is proposed.

2. Based on the results of quantitative analysis, the regions of the Republic of Kazakhstan are grouped according to innovation indicators using a cluster method, and recommendations are developed for organizing the interaction between higher education institutions and the business sector in innovation activities, taking into account the specifics of each group.

3. Based on qualitative analysis, the institutional features of organizing interaction between higher education institutions and business in innovation activities are identified, and corresponding recommendations are proposed.

4. A regional model for managing the organization of interaction between higher education institutions and the business sector in innovation activities is developed.

The recommendations and model solutions developed during the dissertation research are aimed at application in the processes of organizing innovation activities of higher education institutions and establishing effective partnerships with business structures. The proposed management mechanisms make it possible to increase the efficiency of commercialization of scientific results, improve the assessment of the market potential of projects, and ensure the effectiveness of innovation initiatives. The results of the research can be used in the formation and improvement of regional innovation policy. Systematic

coordination of the interaction between higher education institutions and the business environment, development of innovation infrastructure, and enhancement of the economic impact of scientific developments have significant practical importance.

Scientific provisions submitted for defense:

1. Innovation activity management is defined as a multi-level system of influence that is continuously improved and ensures the achievement of innovation outcomes through the efficient allocation of resources in the process of organizing the interaction of the market, the state, and science.

2. Based on regression and cluster analysis, groups of regions were identified according to the level of regional innovation development, and corresponding recommendations were developed:

- Group 1 – “Innovation cores”: regions with a relatively well-formed and stable innovation potential;

- Group 2 – “Regions with low innovation development”: regions with low innovation potential and a weak institutional base;

- Group 3 – “Regions with distinct innovation development trajectories”: regions characterized by specific structural and functional features. Taking into account the characteristics of each group, recommendations were developed for organizing the interaction between higher education institutions and the business sector in innovation activities.

3. Based on the systematization of qualitative analysis results, recommendations were proposed at three levels to improve the organization of interaction between higher education institutions and the business sector in innovation activities:

- “Transformation level” – aimed at improving internal efficiency and eliminating weaknesses;

- “Development and scaling level” – focused on growth pathways and leveraging opportunities;

- “Sustainability level” – aimed at forming a stable operational system and reducing costs.

4. A regional model for managing the organization of interaction between higher education institutions and the business environment in innovation activities was developed. Taking into account the territorial characteristics of the Republic of Kazakhstan, the process of implementing innovation activities by each participant of the Triple Helix was integrated with the stages of management theory: planning, organization, motivation, and control.

The analysis of the theoretical foundations of innovation management has shown that classical concepts of innovation management are, under modern conditions, fully compatible with the models of Triple Helix, open innovation, and mission-oriented policy. It has been substantiated that the concept of innovation management is broader than traditional innovation management, as it is not limited to intra-organizational management but also encompasses

institutional interactions at the regional and national levels, policy instruments, and innovation infrastructure.

The main models for organizing the interaction between higher education institutions and the business environment in innovation activities have been systematized, and their content and conditions for effectiveness have been identified. The analysis revealed that the Triple Helix model, based on the interaction between universities, business, and government, serves as the leading framework, and its elements play a significant role at each stage of the innovation process. It has been substantiated that, at the regional level, the Triple Helix model acts as a strategic coordination mechanism for the formation of an innovation ecosystem, where universities function as technological integrators, business as a generator of demand, and the state as a regulatory and coordinating actor.

The analysis of international experience demonstrated the decisive role of government support, commercialization infrastructure, and the entrepreneurial function of universities, highlighting the need to adapt these practices to the conditions of Kazakhstan. The experience of these countries confirms the effectiveness of mechanisms such as result-oriented funding, acceleration of technology transfer, support for startup ecosystems, and the institutionalization of university–business partnerships in innovation management.

The analysis of Kazakhstan's innovation ecosystem showed that, despite its institutional formation, there are systemic issues such as weak university–business linkages, low levels of commercialization, and persistent regional disparities. The research findings indicate that insufficient coordination among elements of the innovation infrastructure and the underdevelopment of communication mechanisms slow down the market entry of scientific results. In addition, the low level of business sector participation in R&D and the insufficient development of applied research have been identified as key factors limiting the economic returns of the innovation system.

It has been established that the Republic of Kazakhstan has developed a regulatory and legal framework that ensures institutional interaction between higher education institutions and the business environment in innovation activities. Legislation in the field of science and technological policy, legal acts related to the commercialization of scientific results, as well as entrepreneurial and tax legislation, constitute the legal foundation for the development of university–business cooperation.

It has been proven that in the Republic of Kazakhstan the interaction between higher education institutions and the business environment in innovation activities has been formed as a multi-level management system. This structure ensures the interconnection between strategic, executive, operational, and implementation levels, covering the full innovation cycle from state policy to the commercialization of scientific results. The conducted analysis revealed systemic

issues such as insufficient coordination between these levels, duplication of functions, and weak information exchange mechanisms.

The long-term dynamics of scientific and innovative development in the Republic of Kazakhstan generally demonstrate a positive trend. Expenditures on R&D, the number of scientific organizations, the number of researchers, as well as indicators of publication and patent activity show gradual growth. This confirms the institutional formation of the national innovation system and the steady strengthening of scientific potential.

Within the framework of quantitative analysis, the level of innovative development of regions was assessed, revealing significant disparities among them. Regression modeling identified the key factors influencing innovation activity and provided an analytical basis for differentiating regional policy.

Key factors influencing the interaction between higher education institutions and the business environment in innovation activities were systematized. Word cloud analysis showed that the main issues in collaboration include financial constraints, institutional barriers, imperfect legal regulation, weak market orientation, and challenges in effectively transforming scientific results into business applications. The analysis also revealed that universities possess strong scientific potential and educational resources; however, these do not fully align with business needs, and a communication gap persists.

During project implementation, the need to increase the share of applied research, improve financing mechanisms for innovation projects, and strengthen institutional support instruments was identified. The results substantiate the necessity of enhancing financial incentives, improving the legal and institutional environment, and introducing market-oriented management approaches to effectively develop interaction between higher education institutions and business.

A total of 9 scientific papers have been published on the topic of the dissertation, including 4 articles in international journals indexed in the Scopus database, 2 articles in journals recommended by the Ministry of Science and Higher Education of the Republic of Kazakhstan, and 3 papers in the proceedings of international conferences.

The research results have been tested at international and national scientific and practical conferences. In addition, the author participated in the Erasmus+ ENINEDU international project and applied the research findings within this project.

The practical significance of the results is confirmed by their implementation: acts of implementation have been provided by Daedalus Mind Projects LLP and the Caspian University of Technologies and Engineering named after Sh. Yessenov.

**Keywords:** innovation, innovation activity, innovation management, university–business collaboration, innovation activity management.