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INSTITUTIONAL ASPECTS OF RESEARCH COMMERCIALIZATION IN KAZAKHSTANI UNIVERSITIES: PRACTICES AND CHALLENGES

The article examines the process of commercialization of scientific research in universities of Kazakhstan as one of the key factors in increasing the innovative potential and ensuring sustainable economic growth of the country. The main theoretical approaches to the transfer of knowledge and technology are analyzed, and various models and practices of commercialization applied in the global and Kazakhstani educational systems are presented.

The study is based on qualitative methods of analysis, including a review of scientific literature, official university reports and analytical materials. Based on these data, institutional features of Kazakhstani universities that affect their ability to commercialize scientific results are identified. Key barriers and enabling factors are identified, including an insufficient regulatory framework, limited staff competencies, and weak integration with the business community.

It is shown that despite the existing limitations, Kazakhstani universities have significant potential in the field of scientific and innovative activities. To implement it, systematic support from the state is needed, aimed at improving legislation, developing human resources and stimulating interaction between science and industry.

The work formulates practical recommendations for the development of state policy in the field of commercialization, including measures of financial incentives, institutional development and advanced training of specialists. The results obtained are of scientific and applied value for researchers, university staff, as well as for government bodies involved in the formation of strategies for scientific and technological development.

Keywords: science commercialization, technology transfer, innovative development, institutional maturity, institutional environment, economic growth, scientific developments.

Кілт сөздер: ғылымды коммерцияландыру, технологиялар трансфері, инновациялық жетілу, институционалдық дайындық, институционалдық орта, экономикалық өсу, ғылыми әзірлемелер

Ключевые слова: коммерциализация науки, трансфер технологий, инновационное развитие, институциональная зрелость, институциональная среда, экономический рост, научные разработки.

Introduction. Commercialization of scientific research is the process of converting scientific ideas and developments into marketable products and services that generate economic benefits. It includes licensing, creation of start-ups, patenting and strategic partnerships with businesses. In the conditions of the modern economy, saturated with technological breakthroughs, this process ensures sustainable innovation activity and contributes to the diversification of the economy.

First, commercialization increases the return on public investment in science. Second, it promotes job creation and the development of high-tech industries. In addition, it encourages universities to collaborate more closely with industry and allows students and teachers to be involved in entrepreneurial activities, which increases the practical significance of education.

This article is devoted to the analysis of the processes of research commercialization in universities of the Republic of Kazakhstan and the assessment of their contribution to the economic development of the country. The study is aimed at identifying institutional, organizational and practical mechanisms for the transfer of knowledge and technology in the academic environment, as well as determining the factors that contribute to or hinder the effective commercialization of scientific developments.

The aim of the study is a comprehensive study of the status, opportunities and limitations faced by Kazakhstani universities in the process of commercialization of scientific results, followed by an assessment of their long-term economic effect. To achieve this goal, the following research tasks were identified:

- to analyze the current state of commercialization infrastructure in universities of Kazakhstan;
- identify key barriers and internal institutional problems that impede technology transfer;

- assess the motivation and readiness of the research community to participate in commercialization;
- to determine the potential of universities in the development of knowledge-intensive sectors of the economy;
- propose directions for the development of the science commercialization ecosystem.

Methodologically, the work is based on a combination of qualitative and empirical approaches. As part of the study, a series of semi-structured interviews were conducted with representatives of commercialization offices of leading universities in Kazakhstan, which allowed to obtain primary data on real practices, problems and successful cases of technology transfer. The thematic analysis of the interviews is supplemented by a literature review covering both international sources (OECD, World Bank) and current research on Kazakhstan.

The results show that despite of institutional efforts to create technology parks, technology transfer offices, and implement grant programs, commercialization processes remain fragmented and irregular. The main limitations are related to the lack of motivational mechanisms for researchers, weak business involvement, a shortage of specialized personnel, and insufficient regulatory support. At the same time, individual universities are developing models that are approaching international practices, which indicates the high potential of the system, provided that it is further developed.

Thus, the structure of the article includes an introduction, a literature review, a main part with an analysis of the collected data, a discussion of the results and a conclusion with proposals for improving the practice of commercialization in the scientific field.

Literature review. The commercialization of scientific research is viewed as a central element in the transition from fundamental research to applied innovations that foster economic growth and technological independence [1][2]. These processes allow universities not only to strengthen their role in the national economy but also to become active participants in industrial development through the creation of spin-off companies, licensing agreements, and the attraction of external funding. Moreover, in the context of global competition, the ability to transform scientific results into market-ready products has become a key indicator of research system performance.

The importance of the institutional environment — including the regulatory framework, intellectual property protection, and organizational mechanisms — is emphasized in numerous modern studies [3][4]. Institutional conditions largely determine whether a university can unlock the potential of its innovations. Key factors include transparent procedures for licensing, income distribution, and researcher support. Without these mechanisms, even promising technologies are unlikely to reach commercialization. Research highlights that, without institutional trust and coordinated interaction between key ecosystem actors, science remains confined to laboratories and cannot generate real innovation.

Kazakhstan, as a country with a transitional economy, faces several barriers: insufficient regulatory support, a shortage of technology transfer professionals, and weak private sector involvement in research initiatives [2]. These issues limit universities' capacity to implement innovation strategies. However, universities engaged in international programs show better results due to access to global practices, knowledge exchange, and exposure to tested models in mature economies.

An empirical study involving 14 universities and 209 respondents identified both motivational drivers (flexible schedules, potential for monetization, professional recognition) and key barriers: limited commercialization competence, bureaucracy, and a lack of transparent profit-sharing mechanisms [5]. A distinct gap is observed between research-intensive universities and regional institutions, with the former showing greater readiness for technology transfer due to more developed infrastructure and human capital. The findings also underscore the importance of government support mechanisms such as subsidies for patenting and tax incentives for industrial partners.

In countries with similar institutional dynamics, universities increasingly adopt direct collaboration models with industry, rather than relying solely on internal technology transfer offices. Modern literature emphasizes that TTOs are evolving from administrative units into strategic bridges between academia and the market economy. Their effectiveness depends not only on legal frameworks but also on staff professionalism, the ability to develop intellectual property strategies, negotiate agreements, guide projects through all development stages, and advise researchers on licensing and startup activity [4][6]. In successful universities, TTOs also oversee acceleration programs and venture projects, assist in fundraising, evaluate market potential, and coordinate external partnerships — essential for institutions with limited commercialization experience.

The international experience of China, South Korea, and Singapore shows that successful

commercialization ecosystems rely on institutional trust, flexible governance mechanisms, and the integration of universities into national innovation policies [7]. These countries have made substantial progress through aligning scientific policy with economic priorities, strengthening the role of universities in industrial clusters, and creating favorable environments for university-based startups. Their experience highlights the importance of long-term strategies that address not only academia but also infrastructure, funding systems, and transnational cooperation.

The updated interpretation of the Triple Helix model suggests not only horizontal collaboration but also a hybridization of roles between universities, government, and business [1]. This is especially relevant for Kazakhstan, where institutional reforms from 2016 to 2024 have aimed to enhance research activity and promote practice-oriented science [6][8]. Universities are increasingly assuming not just educational, but also economic roles, participating in innovation policymaking and becoming platforms for entrepreneurial activity among students and faculty. However, these processes require stronger managerial capacity, more flexible funding models, and the integration of feedback mechanisms from industry and society.

Human capital becomes a critical factor — particularly the competencies of TTO staff in patent law, legal guidance, and innovation management. Recent studies show that strong project support and researcher involvement in entrepreneurial formats significantly reduce the risk of failed spin-offs [9][10]. In practice, this highlights the need for professional development programs for TTO employees, certification courses, international exchange initiatives, and the inclusion of commercialization topics in graduate and postgraduate education. Building a university-based entrepreneurial culture rooted in knowledge, collaboration, and innovation has become an essential part of Kazakhstan’s sustainable scientific and technological development.

Thus, to enhance the effectiveness of commercialization in Kazakhstan’s universities, it is essential to further develop institutional mechanisms, introduce entrepreneurship education programs, intensify industrial collaboration, and secure stable early-stage funding for innovation implementation.

Main part. The study aimed to identify the current state and mechanisms of research commercialization in Kazakhstani universities. To obtain empirical data, a qualitative method was used - semi-structured interviews that addressed both institutional and practical aspects. The interviews were conducted between January and April 2025 via Microsoft Teams, which allowed for wide geographical coverage and the inclusion of regional universities.

The study involved representatives from five universities, including national, research, and regional institutions with formally established technology transfer structures. A total of seven respondents were interviewed, primarily comprising staff from commercialization offices, project managers, patent specialists, and heads of research and innovation departments. Their professional experience ranged from three to twelve years, which enabled the study to capture a broad spectrum of practical expertise.

The interview structure consisted of 17 questions, grouped into five thematic blocks: introduction, current state, experience and mechanisms, barriers and opportunities, and conclusion. This approach ensured both data comparability and flexibility in respondents’ answers.

All ethical standards for conducting research were strictly observed. Before each interview, participants were informed about the objectives and content of the study, and their rights to anonymity and voluntary withdrawal were clearly explained. All interviews were conducted only with verbal consent from respondents and with permission to record audio. Transcripts were anonymized during data processing to ensure confidentiality.

The data analysis method included thematic categorization, comparison of responses across different types of universities, and the identification of recurring patterns as well as unique cases. Based on the collected data, an integrative table was compiled and interpretive insights were proposed to assess both the institutional maturity and practical implementation of research commercialization mechanisms.

Table 1 below presents key aspects research commercialization in Kazakhstani universities:

Table – 1

Key aspects of commercialization of scientific research

Criteria	Condition (based on interview)	Quantitative indicators
Institutional maturity	Partially formed, developed mainly in national and research universities	43% of respondents indicated the presence of a TTO with a project support function
The role of the university in commercialization	Often limited to the role of applicant, rare strategic support	Only 21% reported an active role in the post-patent phase

Researcher motivation	Low, academic KPIs dominate	78% noted that motivation for commercialization is absent or minimal
Support for researchers	Present in individual universities (expertise, accelerators, consulting)	36% noted the presence of internal acceleration programs
Student participation	Inconsistent, limited to one-off hackathons or project schools	19% of universities implement startup programs with the participation of students
Communication with business	Weak, mainly through one-off grants or external projects	61% indicated a lack of permanent communication channels
Methodological base and standards	There are no uniform national recommendations and practices vary	87% of respondents noted a lack of methodological support
Approach to Patenting and IP	Fixed, but without market prospects analysis	54% use patenting as a formal step without further implementation
Typical forms of support	Grants, government programs, sometimes participation in competitions for pre-investment tracks	72% mentioned internal competitions or programs from the NF
Main limitations	Limited autonomy, weak internal ecosystem, staff shortage	83% named the lack of qualified personnel as the main problem

** Compiled by the authors based on the interview results*

The results indicate that a fragmented and administrative approach to commercialization dominates in Kazakhstani universities. Despite the presence of technology transfer offices, only 43% of respondents reported having a fully developed infrastructure to support projects, and just one-fifth of universities provide assistance during the market entry stage.

The most critical issue identified was the lack of researcher motivation: the vast majority (78%) stated that academic publications remain the primary incentive, rather than practical impact. This is further evidenced by the low involvement of students (only 19%) in startup ecosystems and technology accelerators.

Respondents identified several key institutional barriers, including limited university autonomy, the absence of methodological standards, and a shortage of qualified personnel in intellectual property (IP) and commercialization. At the same time, a positive trend has emerged in the form of a growing number of acceleration programs and the gradual involvement of industry through targeted grants, particularly in technical and engineering universities.

Results. The results of the study revealed a heterogeneity of approaches to the commercialization of scientific research across universities in Kazakhstan. Although most of the surveyed institutions have established technology transfer structures, only 43% of respondents confirmed the existence of comprehensive internal mechanisms that support commercialization at all stages. Most universities limit their activities to submitting grant or patent applications, without providing active support for projects after intellectual property rights are registered.

The interview analysis showed that the key issue is low researcher motivation. As indicated by 78% of participants, academic productivity remains the primary focus, while participation in commercialization is not included in institutional incentive systems. This significantly reduces the engagement of academic staff and limits the transformation of research ideas into marketable solutions. Additionally, only 19% of universities reported active student involvement in startup programs and applied projects, suggesting an underdeveloped entrepreneurial culture within the academic environment.

One positive trend is the growing development of acceleration and incubation programs — 36% of respondents, particularly from technical universities, reported having such mechanisms. In some cases, participation in international accelerators (e.g., those supported by the Asian Development Bank and GIZ) has expanded access to venture infrastructure and enhanced the global visibility of Kazakhstani universities. Moreover, some institutions have introduced mentorship practices involving business representatives, helping universities to establish more sustainable ties with industry and better prepare researchers for market realities.

Differences were also identified based on the status of universities. National and research universities demonstrated higher institutional maturity and a more advanced understanding of technology transfer mechanisms. In contrast, regional universities often restrict commercialization activities to administrative reporting, without the necessary resource backing. This highlights the need for a differentiated approach in

shaping national policies aimed at supporting the university sector.

The analysis also revealed that the majority of universities lack a unified methodological framework and project support standards — a concern expressed by 87% of respondents. Institutions operate under regulatory uncertainty, developing their own ad hoc strategies, which are often not validated by practical outcomes.

Despite these constraints, a number of universities have shown consistent progress, including the successful launch of accelerators, university spin-offs, and licensing agreements. These cases represent growth points upon which successful practices can be scaled up across the higher education system.

Conclusion. The article analyzes the process of commercializing scientific research in Kazakhstani universities as one of the key mechanisms for transforming knowledge into economic value and ensuring sustainable development. The study identified institutional barriers, strengths and weaknesses of the existing infrastructure, and the degree of engagement of the academic community in applied scientific initiatives.

The main findings show that commercialization in Kazakhstani universities remains fragmented and depends heavily on the degree of institutional maturity. Only 43% of respondents confirmed the existence of full-fledged structures supporting project implementation, while the primary obstacles remain low researcher motivation, staff shortages, and the lack of a systematic methodological framework. At the same time, individual cases of success were identified — such as the development of accelerators, signing of licensing agreements, and participation in international partnerships — indicating the presence of potential growth points.

The scientific novelty of this research lies in the empirical assessment of the factors influencing commercialization performance, based on data collected through interviews with Kazakhstani universities. For the first time, an analysis was conducted comparing different university types (national, research, regional) in terms of institutional maturity, level of involvement, and availability of technology transfer mechanisms.

The results confirmed the achievement of the research goals and objectives — the article describes the functioning mechanisms, internal and external barriers, and outlines the conditions under which universities can act as active players in the innovation economy. The conclusions may be applied in practice: for developing university science strategies, designing training programs in intellectual property management, formulating KPIs for research staff, and establishing regional technology transfer platforms.

The practical significance also lies in the potential to scale successful cases and integrate universities into national and international innovation value chains. Particular value is added by the chosen research methodology — the qualitative approach makes it possible to account for contextual factors relevant to a country with a transitional economy.

Promising areas for future research include: the development of an institutional readiness index for commercialization in Kazakhstani universities; the study of the role of venture capital in technology transfer; building an econometric model to measure the impact of university innovations on regional development; and analyzing the long-term social and technological effects of commercialization in education and healthcare.

In addition, attention should be paid to the need for improving the legal framework governing the distribution of rights to intellectual property created within universities. Another promising area is the development of a national digital platform that consolidates information on research projects, patents, and commercialization opportunities. State support should focus not only on funding research but also on supporting transfer processes, assisting project teams, and promoting international collaboration. The involvement of Kazakhstani universities in global scientific and innovation networks can significantly increase the export potential of research and integrate the country into international scientific and technological value chains.

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REFERENCES

1. De Amaral M., Cai Y. The Triple Helix Model and the Future of Innovation: A Reflection on the Triple Helix Research Agenda // *Triple Helix Journal*. – 2021. – №8(2). – P. 217–229. – doi:10.1163/21971927-12340004.
2. Kenzhaliyev O., Ilmaliyev Zh., Tsekhovoy A., Moch B. Triyono, Kassymova G., Alibekova Zh., Tayauova G. Conditions to facilitate commercialization of R&D in Kazakhstan // *Technology in Society*. – 2021. – №67. – P. 1–8. – doi:10.1016/j.techsoc.2021.101792.
3. Belitski M., Aginskaja A., Marozau R. Commercializing university research in transition economies: Evidence from Kazakhstan, Belarus, and Azerbaijan // *Research Policy*. – 2019. – №48(3). – P. 601–615. – doi:10.1016/j.respol.2018.10.011.
4. Brantnell A., Baraldi E. Understanding the roles and involvement of technology transfer offices in commercialization // *Technovation*. – 2022. – №115. – P. 1–17. –doi:10.1016/j.technovation.2022.102525.
5. Sitenko D., Sabyrzhan A., Gordeyeva Y., Temirbayeva D. Commercialization of R&D and opportunities for the development of academic entrepreneurship in Kazakhstan // *Problems and Perspectives in Management*. – 2025. – №22(3). – P. 146–161. – doi:10.21511/ppm.22(3).2024.12.
6. Moldashev K., Sakhimbek B. Issues in university and industry collaboration: results of a stakeholder survey // *Higher education in Kazakhstan*. – 2024. – №4(48). – P. 96–105. – doi:10.59787/2413-5488-2024-48-4-96-105.
7. Kuzior A. et al. Impact of university–industry R&D collaboration on innovation transfer and startup performance // *Problems and Perspectives in Management*. – 2024. – №17(3). – P. 164–181. – doi: 10.14254/2071-8330.2024/17-3/9.
8. Alibekova G., Mynbaeva E., Kozhakhmetova A. Innovation and Technology Commercialisation Factors in Kazakhstan // *SEEJPH*. – 2025. – №26(1). – P. 2433–2442. – URL: <https://www.seejph.com/index.php/seejph/article/view/4170>.
9. Kirihata T. Impact of technology transfer offices on university spin-off bankruptcy // *Journal of Technology Transfer*. – 2024. – doi:10.1007/s10961-024-10129-y.
10. Halilem N., Diop B. Meet me at the backdoor: A multiple case study of academic entrepreneurs bypassing their technology transfer offices // *Research Policy*. – 2025. – №54(2). – P. 1–17. – doi:10.1016/j.respol.2024.105156.

REFERENCES

1. De Amaral M., Cai Y. The Triple Helix Model and the Future of Innovation: A Reflection on the Triple Helix Research Agenda // *Triple Helix Journal*. – 2021. – №8(2). – P. 217–229. – doi:10.1163/21971927-12340004.
2. Kenzhaliyev O., Ilmaliyev Zh., Tsekhovoy A., Moch B. Triyono, Kassymova G., Alibekova Zh., Tayauova G. Conditions to facilitate commercialization of R&D in Kazakhstan // *Technology in Society*. – 2021. – №67. – P. 1–8. – doi:10.1016/j.techsoc.2021.101792.
3. Belitski M., Aginskaja A., Marozau R. Commercializing university research in transition economies: Evidence from Kazakhstan, Belarus, and Azerbaijan // *Research Policy*. – 2019. – №48(3). – P. 601–615. – doi:10.1016/j.respol.2018.10.011.
4. Brantnell A., Baraldi E. Understanding the roles and involvement of technology transfer offices in commercialization // *Technovation*. – 2022. – №115. – P. 1–17. –doi:10.1016/j.technovation.2022.102525.
5. Sitenko D., Sabyrzhan A., Gordeyeva Y., Temirbayeva D. Commercialization of R&D and opportunities for the development of academic entrepreneurship in Kazakhstan // *Problems and Perspectives in Management*. – 2025. – №22(3). – P. 146–161. – doi:10.21511/ppm.22(3).2024.12.
6. Moldashev K., Sakhimbek B. Issues in university and industry collaboration: results of a stakeholder survey // *Higher education in Kazakhstan*. – 2024. – №4(48). – P. 96–105. – doi:10.59787/2413-5488-2024-48-4-96-105.
7. Kuzior A. et al. Impact of university–industry R&D collaboration on innovation transfer and startup performance // *Problems and Perspectives in Management*. – 2024. – №17(3). – P. 164–181. – doi: 10.14254/2071-8330.2024/17-3/9.

8. Alibekova G., Mynbaeva E., Kozhakhmetova A. Innovation and Technology Commercialisation Factors in Kazakhstan // SEEJPH. – 2025. – №26(1). – P. 2433–2442. – URL: <https://www.seejph.com/index.php/seejph/article/view/4170>.

9. Kirihata T. Impact of technology transfer offices on university spin-off bankruptcy // Journal of Technology Transfer. – 2024. – doi:10.1007/s10961-024-10129-y.

10. Halilem N., Diop B. Meet me at the backdoor: A multiple case study of academic entrepreneurs bypassing their technology transfer offices // Research Policy. – 2025. – №54(2). – P. 1–17. – doi:10.1016/j.respol.2024.105156.

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ҚАЗАҚСТАН УНИВЕРСИТЕТТЕРІНДЕГІ ҒЫЛЫМИ ЗЕРТТЕУЛЕРДІ КОММЕРЦИАЛАНДЫРУДЫҢ ИНСТИТУЦИОНАЛДЫҚ АСПЕКТІЛЕРІ: ТӘЖІРИБЕ ЖӘНЕ СЫН-ҚАТЕРЛЕР

Аңдатпа

Мақалада Қазақстанның жоғары оқу орындарында ғылыми зерттеулерді коммерцияландыру үдерісі инновациялық әлеуетті арттырудың және елдің тұрақты экономикалық өсуін қамтамасыз етудің негізгі факторларының бірі ретінде қарастырылған. Білім мен технологиялар трансфертінің негізгі теориялық тәсілдері талданып, әлемдік және қазақстандық білім беру жүйелерінде қолданылатын коммерцияландырудың әртүрлі үлгілері мен тәжірибелері ұсынылған.

Зерттеу сапалы талдау әдістеріне, соның ішінде, ғылыми әдебиеттерге шолу, университеттің ресми баяндамалары және аналитикалық материалдарға негізделген. Осы деректер негізінде ғылыми нәтижелерді коммерцияландыру мүмкіндігіне әсер ететін қазақстандық университеттердің институционалдық ерекшеліктері анықталған. Нормативтік базаның жеткіліксіздігі, қызметкерлердің шектеулі құзыреті және бизнес-қоғамдастықпен әлсіз интеграцияны қоса алғанда, негізгі кедергілер мен қолайлы факторлар анықталды.

Қолданыстағы шектеулерге қарамастан, қазақстандық жоғары оқу орындарының ғылыми-инновациялық қызмет саласында айтарлықтай әлеуеті бар екені көрсетілген. Оны жүзеге асыру үшін заңнаманы жетілдіруге, кадрлық әлеуетті дамытуға және ғылым мен өндірістің өзара іс-қимылын ынталандыруға бағытталған мемлекет тарапынан жүйелі қолдау қажет.

Жұмыста коммерцияландыру саласындағы мемлекеттік саясатты дамыту, оның ішінде қаржылық ынталандыру, институционалдық даму және мамандардың біліктілігін арттыру шаралары бойынша практикалық ұсыныстар тұжырымдалған. Алынған нәтижелер ғылыми қызметкерлер, университет қызметкерлері, сондай-ақ ғылыми-техникалық даму стратегияларын қалыптастырумен айналысатын мемлекеттік органдар үшін ғылыми және қолданбалы құндылыққа ие болып табылады.

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ИНСТИТУЦИОНАЛЬНЫЕ АСПЕКТЫ КОММЕРЦИАЛИЗАЦИИ НАУЧНЫХ ИССЛЕДОВАНИЙ В УНИВЕРСИТЕТАХ КАЗАХСТАНА: ПРАКТИКА И ВЫЗОВЫ

Аннотация

В статье рассмотрен процесс коммерциализации научных исследований в университетах Казахстана как один из ключевых факторов повышения инновационного потенциала и обеспечения устойчивого экономического роста страны. Проанализированы основные теоретические подходы к трансферу знаний и технологии, а также представлены различные модели и практики коммерциализации, применяемые в мировой и казахстанской образовательной системе.

Исследование опирается на качественные методы анализа, включая обзор научной литературы, официальных отчетов университетов и аналитических материалов. На основе этих данных выявлены институциональные особенности казахстанских вузов, влияющие на их способность к коммерциализации научных результатов. Определены ключевые барьеры и благоприятствующие факторы, среди которых выделяются недостаточная нормативно-правовая база, ограниченные компетенции персонала, а также слабая интеграция с бизнес-сообществом.

Показано, что несмотря на существующие ограничения, казахстанские университеты обладают значительным потенциалом в области научно-инновационной деятельности. Для его реализации необходима системная поддержка со стороны государства, направленная на совершенствование законодательства, развитие кадрового потенциала и стимулирование взаимодействия между наукой и промышленностью.

В работе сформулированы практические рекомендации по развитию государственной политики в сфере коммерциализации, включая меры финансового стимулирования, институционального развития и повышения квалификации специалистов. Полученные результаты представляют научную и прикладную ценность для исследователей, сотрудников университетов, а также для органов государственной власти, занимающихся формированием стратегий научно-технологического развития.

