

THE ROLE OF FINANCIAL STIMULATION OF INNOVATION IN THE PERIOD OF ECONOMIC REFORMS IN CENTRAL ASIAN COUNTRIES**Olimjonov Odil Olimovich**

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Abstract: This article examines the key directions of innovation promotion in Central Asian countries, focusing on funding mechanisms and priority sectors. The study is based on statistical data from 2020 to 2025 and evaluates regional trends in innovation-driven development. Particular attention is given to the role of government policies, private sector participation, and investment flows in shaping innovation activities. The findings identify both challenges and opportunities for strengthening innovation ecosystems across the region.

Keywords: innovation, innovation development, investment, financing, Central Asia, technology, economic growth, digital transformation, research and development (R&D), public policy, private sector, sectoral diversification.

РОЛЬ ФИНАНСОВОГО СТИМУЛИРОВАНИЯ ИННОВАЦИЙ В ПЕРИОД ЭКОНОМИЧЕСКИХ РЕФОРМ В СТРАНАХ ЦЕНТРАЛЬНОЙ АЗИИ**Олимжонов Одил Олимович**

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Аннотация: В данной статье анализируются основные направления стимулирования инноваций в странах Центральной Азии, включая механизмы финансирования и приоритетные отрасли. Исследование основано на статистических данных за 2020–2025 годы и направлено на оценку тенденций инновационного развития региона. Особое внимание уделяется роли государственной политики, участию частного сектора и инвестиционным потокам в формировании инновационной активности. Полученные результаты позволяют выявить ключевые проблемы и перспективы развития инновационных экосистем в регионе.

Ключевые слова: инновации, инновационное развитие, инвестиции, финансирование, Центральная Азия, технологии, экономический рост, цифровая трансформация, научные исследования (R&D), государственная политика, частный сектор, диверсификация отраслей.

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Annotatsiya: Ushbu maqolada Markaziy Osiyo mamlakatlarida innovatsiyalarni rag‘batlantirishning asosiy yo‘nalishlari, moliyalashtirish mexanizmlari va ustuvor tarmoqlari tahlil qilinadi. Tadqiqot 2020–2025 yillar oralig‘idagi statistik ma’lumotlarga asoslanib, hududdagi innovatsion rivojlanish tendensiyalarini baholaydi. Shuningdek, davlat siyosati, xususiy sektor ishtiroki va investitsiya oqimlarining innovatsion faoliyatga ta’siri o‘rganiladi. Natijalar Markaziy Osiyo mamlakatlarida innovatsion ekotizimni rivojlantirish uchun mavjud imkoniyatlar va muammolarni aniqlashga xizmat qiladi.

Kalit so‘zlar: innovatsiya, innovatsion rivojlanish, investitsiya, moliyalashtirish, Markaziy Osiyo, texnologiya, iqtisodiy o‘shish, raqamli transformatsiya, ilmiy-tadqiqot (R&D), davlat siyosati, xususiy sektor, tarmoqlar diversifikatsiyasi.

INTRODUCTION

Innovation has become a central pillar of economic growth and competitiveness in the modern global economy. In an era characterized by rapid technological change, digital transformation, and increasing globalization, countries are compelled to strengthen their innovation capacities to sustain long-term development. According to the World Bank, economies that actively invest in research and development (R&D), technological advancement, and human capital tend to achieve higher productivity and resilience to external shocks. Similarly, the OECD emphasizes that innovation-driven policies play a critical role in enhancing economic diversification and reducing dependency on traditional sectors.

In the context of Central Asia, innovation promotion has gained increasing attention as countries seek to modernize their economies and integrate into the global economic system. Nations such as Uzbekistan and Kazakhstan have initiated comprehensive reforms aimed at

developing innovation ecosystems, supporting startups, and expanding digital infrastructure. However, as highlighted by the Asian Development Bank, the region still faces challenges including limited financial resources, institutional inefficiencies, and uneven sectoral development. These conditions necessitate a deeper analysis of innovation financing trends and sectoral priorities, which this study addresses by examining the experience of Central Asian countries over the period 2020–2025.

LITERATURE REVIEW

Innovation is widely recognized as a key driver of economic growth, productivity, and competitiveness. According to the OECD and the World Bank, countries that invest in research and development (R&D), digital technologies, and human capital tend to achieve more sustainable economic development. However, the UNESCO notes that developing and transition economies, including those in Central Asia, often face constraints such as limited funding, weak institutional frameworks, and low R&D intensity, which hinder innovation performance.

In the Central Asian context, studies by the Asian Development Bank and the International Monetary Fund highlight uneven progress in innovation development across countries. Kazakhstan has advanced relatively faster due to stronger infrastructure and investment capacity, while Uzbekistan has recently accelerated reforms to promote entrepreneurship and digital transformation. Meanwhile, Kyrgyzstan and Tajikistan remain more dependent on traditional sectors, with limited diversification into high-tech industries. The United Nations Development Program emphasizes that effective innovation promotion in the region requires stronger policy coordination, increased investment, and a shift toward knowledge-based sectors.

METHODS

This study applies comparative and statistical analysis methods using secondary data from international organizations such as the World Bank, UNESCO, OECD, and national statistical agencies. The analysis focuses on funding trends and sectoral distribution of innovation investments between 2020 and 2025.

RESULTS

The results of this study reveal clear trends in the scale and structure of innovation financing across Central Asian countries over the period 2020–2025. Overall, innovation expenditures in the region have shown a steady upward trajectory, reflecting growing governmental commitment to modernization and economic diversification. However, the level

and pace of growth differ significantly among countries, with more resource-rich economies demonstrating higher investment capacity. In addition, the distribution of innovation funding across sectors highlights the continued dominance of traditional industries, although there is a gradual shift toward technology-oriented fields such as information and communication technologies (ICT) and digital innovation.

Table 1. Innovation Expenditure in Central Asian Countries (2020–2025)¹

Billion US dollars (USD)

Country	2020	2021	2022	2023	2024	2025
Uzbekistan	0.3	0.4	0.6	0.8	1.0	1.3
Kazakhstan	1.2	1.4	1.6	1.9	2.2	2.5
Kyrgyzstan	0.1	0.1	0.2	0.3	0.3	0.4
Tajikistan	0.0	0.0	0.1	0.1	0.2	0.2
Turkmenistan	0.2	0.3	0.3	0.4	0.5	0.6

Above given Table 1 presents the dynamics of innovation expenditure in Central Asian countries between 2020 and 2025, measured in billion US dollars. The data indicate that Kazakhstan consistently leads the region in terms of total innovation spending, increasing from 1.2 billion USD in 2020 to 2.5 billion USD in 2025. Uzbekistan shows the most rapid growth rate, with expenditures rising from 0.3 billion USD to 1.3 billion USD over the same period, reflecting intensified reform efforts and increased public investment in innovation. In contrast, Kyrgyzstan and Tajikistan maintain relatively low levels of funding, although gradual increases can be observed, suggesting incremental improvements in their innovation systems. Turkmenistan demonstrates moderate growth, largely driven by state-led investments in strategic sectors. Overall, the table illustrates both the positive trend of increasing innovation financing and the persistent gap between countries in the region.

Table 2. Sectoral Distribution of Innovation Investments in Central Asia²(in %)

¹ World Bank (2025), UNESCO Science Report (2024).

² National Statistics Agencies (2025).

Country	Leading Sector	Share (%)	Trend
Uzbekistan	ICT & Digital Economy	38%	Growing
Kazakhstan	Energy & FinTech	42%	Stable Growth
Kyrgyzstan	Agriculture Tech	33%	Moderate
Tajikistan	Hydropower	47%	High Priority
Turkmenistan	Gas & Chemical Tech	50%	Dominant

Table 2 illustrates the sectoral distribution of innovation investments, expressed as a percentage of total innovation funding. The results show that the largest share of investments is concentrated in energy-related sectors in resource-rich countries. For instance, Kazakhstan allocates a significant portion of its innovation budget to energy and financial technologies, while Turkmenistan focuses primarily on gas and chemical technologies, accounting for around half of its total innovation investment. Uzbekistan, on the other hand, directs a growing share of resources toward ICT and the digital economy, which constitutes approximately 38% of its innovation portfolio, indicating a strategic shift toward modernization and diversification. In Kyrgyzstan, innovation investments are largely concentrated in agricultural technologies, reflecting the country's economic structure, whereas Tajikistan prioritizes hydropower due to its natural resource base. These findings suggest that sectoral priorities are closely linked to each country's economic specialization, while also highlighting emerging efforts to diversify into more advanced and technology-driven industries.

DISCUSSION

The findings of this study highlight both progress and structural imbalances in innovation development across Central Asian countries. The steady increase in innovation expenditures indicates that governments are placing greater emphasis on modernization and technological advancement. In particular, countries such as Kazakhstan and Uzbekistan demonstrate a more proactive approach by expanding funding and introducing policy reforms aimed at strengthening innovation ecosystems. However, the observed disparities in funding levels

suggest that economic capacity remains a key determinant of innovation performance, with less-developed economies facing constraints in scaling up their investments.

Another important aspect revealed by the results is the sectoral concentration of innovation investments. The dominance of energy, extractive industries, and resource-based technologies in countries like Kazakhstan and Turkmenistan reflects their existing economic structures. While this approach may enhance efficiency within traditional sectors, it also limits the potential for broader technological diversification. In contrast, Uzbekistan's increasing focus on ICT and the digital economy signals a strategic shift toward more knowledge-intensive industries. Nevertheless, the transition toward high-tech sectors across the region remains gradual, indicating the need for stronger institutional support, improved infrastructure, and greater private sector involvement.

Furthermore, the study underscores the critical role of government policy and regional cooperation in fostering innovation. Despite ongoing reforms, challenges such as limited research capacity, weak linkages between academia and industry, and insufficient access to finance continue to hinder innovation development in several countries. Addressing these issues requires comprehensive policy frameworks that encourage entrepreneurship, attract foreign investment, and support human capital development. In this regard, enhanced collaboration among Central Asian countries could facilitate knowledge sharing, resource optimization, and the creation of a more integrated regional innovation system.

CONCLUSION

In conclusion, this study demonstrates that Central Asian countries are gradually strengthening their innovation systems through increasing financial investments, policy reforms, and strategic prioritization of key sectors. The analysis of data from 2020 to 2025 shows a clear upward trend in innovation expenditures across the region, although the scale and effectiveness of these investments vary significantly among countries. Kazakhstan remains the regional leader in terms of total funding, while Uzbekistan exhibits the most dynamic growth, reflecting its active reform agenda and focus on digital transformation. At the same time, countries such as Kyrgyzstan and Tajikistan continue to face structural constraints, including limited financial resources and lower levels of institutional development, which restrict their innovation capacity.

The sectoral distribution of investments further reveals that innovation activities are still largely concentrated in traditional and resource-based industries, particularly in energy and extractive sectors. While this aligns with the existing economic structure of several countries,

it also highlights the need for greater diversification into high-tech and knowledge-intensive industries such as information and communication technologies, biotechnology, and advanced manufacturing. Expanding the role of the private sector, improving access to finance, and strengthening research and development infrastructure are essential steps toward achieving this transition. Moreover, enhancing the quality of education and fostering human capital development will play a crucial role in sustaining long-term innovation growth.

Overall, the findings suggest that although meaningful progress has been made, the innovation landscape in Central Asia remains uneven and faces several persistent challenges. To fully realize the region's innovation potential, governments should adopt more comprehensive and coordinated policy approaches that integrate financial support, institutional reforms, and international cooperation. In particular, regional collaboration among Central Asian countries could serve as a powerful mechanism for knowledge exchange, capacity building, and the development of a more cohesive innovation ecosystem. By addressing existing gaps and leveraging emerging opportunities, the region can move toward a more diversified, competitive, and innovation-driven economic future.

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