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INNOVATION FINANCING MECHANISMS FOR ENTERPRISES IN UZBEKISTAN: CURRENT STATE, SYSTEMATIC ANALYSIS, AND STRATEGIC DEVELOPMENT DIRECTIONS



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Abstract: This article provides a comprehensive and systematic analysis of the current state of innovation financing mechanisms for enterprises in the Republic of Uzbekistan. The research identifies key challenges in funding innovation projects within the manufacturing sector, including excessive reliance on internal financial resources, limited attraction of foreign investments, and constrained access to commercial bank loans. Particular attention is given to the unequal distribution of R&D (Research and Development) expenditures across sectors and regions, which exacerbates territorial disparities in innovation performance.

Using empirical data from 2019–2023, the study examines the dynamics of innovation expenditures, the pace of technological adoption, industrial innovation activity, and changes in funding structures. The findings underscore the need to diversify financing sources, expand public-private partnership mechanisms, and implement digital monitoring systems for innovation projects. This article offers a robust methodological and practical foundation for enhancing the national innovation ecosystem, accelerating technological transformation, and guiding strategic policymaking for sustainable economic development.

Key words: innovation activity, financing mechanism, R&D expenditures, technological innovation, investment sources, industrial enterprises, public-private partnership, diversification, economic stability.

INTRODUCTION

In the current era of intensified global economic competition and rapid technological transformation, the advancement of enterprises' innovation activity has become a strategic priority in national economic development policy. Innovation plays a vital role in increasing production efficiency, expanding export capacity, generating new employment opportunities, and ensuring long-term competitiveness. However, innovation processes are inherently associated with high risks, substantial financial requirements, and extended return cycles, making it essential to continually improve the efficiency and sustainability of innovation financing mechanisms.

In Uzbekistan, recent years have seen the implementation of comprehensive policy measures aimed at fostering science, education, and the digital economy. President Shavkat Mirziyoyev's "Innovative Development Strategy for 2022–2026" sets an ambitious goal of positioning the country among the top 50 in the Global Innovation Index. Despite these efforts, an analysis of statistical indicators highlights persistent structural weaknesses in the national innovation financing system. These include a declining number of industrial enterprises, uneven distribution of R&D expenditures across sectors and regions, a limited inflow of foreign investments, and an excessive reliance on internal financial resources by enterprises.

This paper provides a comprehensive analysis of the current state of innovation financing mechanisms in Uzbekistan, particularly during the 2019–2023 period. The study focuses on trends in R&D spending, the evolution of the number of innovative enterprises, the allocation of resources for technological, marketing, and

organizational innovations, and the key institutional constraints hindering effective financing. Based on the findings, the paper also presents strategic recommendations to enhance the efficiency and resilience of the innovation ecosystem in Uzbekistan.

In recent years, Uzbekistan has pursued a policy aimed at increasing industrial output, creating decent jobs, developing entrepreneurship, construction, and innovations. This includes monitoring and evaluating the implementation of these policies based on statistical indicators, as well as improving the investment and business environment and creating the necessary conditions for the development of entrepreneurial entities (2022).

On January 24, 2020, President Shavkat Mirziyoyev declared the year 2020 as the “Year of Science, Education, and Digital Economy” in his address to Parliament. He stated: “Science and education are extremely important for enhancing the intellectual and moral potential of our youth and society as a whole. Societies that cannot promote science suffer from regression and backwardness.” The President further emphasized: “We have set ourselves the goal of joining the ranks of developed countries, and we can only achieve this through accelerating reforms and relying on science, education, and innovation (2020).”

Uzbekistan’s current policy on science, technology, and innovation (STI) is defined by Presidential Decree No. PD-165, adopted in July 2022, which approved the “Strategy for Innovative Development of the Republic of Uzbekistan for 2022–2026.”¹ The strategy outlines ambitious goals and plans for improving the national STI system. The primary objective is to bring Uzbekistan into the top 50 countries in the Global Innovation Index by 2030. To achieve this, it is necessary to increase gross domestic expenditure on research and development (GERD) from 0.2% of GDP to 0.8% by 2023, improve excellence in scientific activities, and strengthen linkages between education, science, and industry (2022).

Based on the data presented in Figure 1, we can observe a decline in expenditures on research and development (R&D) as a percentage of gross domestic product (GDP) in recent years. Such a reduction in R&D spending may negatively impact the country’s long-term economic growth and competitiveness. Research and development are critical drivers of innovation and technological advancement, serving as key factors in boosting productivity and stimulating economic development.

The decrease in R&D expenditures may also indicate an insufficient level of investment in education and research, which in turn can lead to a shortage of skilled workers and researchers—ultimately hindering the development of innovative activities within enterprises. For the country, it is crucial to recognize the long-term benefits of investing in R&D and to allocate sufficient resources to support research initiatives. This would help stimulate technological progress, attract foreign investment, and ultimately contribute to sustainable economic growth.

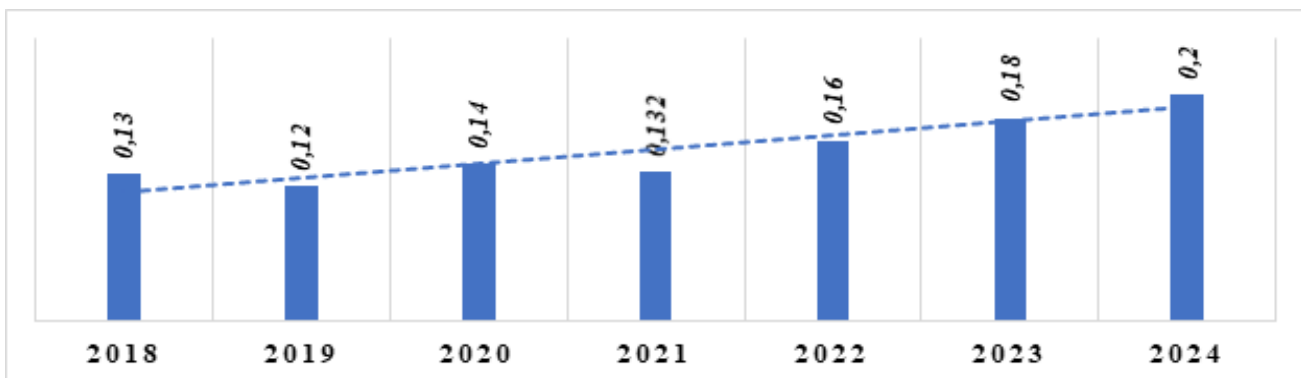


Figure 1. R&D expenditures in Uzbekistan as a percentage of GDP (2018–2024). (Compiled by the author as part of the research process).

Taking into account the potential benefits of investing in R&D activities, it is of particular importance for Uzbekistan to reconsider increasing expenditures on research and development as a percentage of its gross domestic product (GDP). This includes investing in education and research, supporting innovative startups and entrepreneurs, and establishing policies and incentives to stimulate private sector investment in R&D. Such investments would position Uzbekistan as a competitive player in the global economy and contribute to long-term sustainable economic growth and national prosperity. As a result of the implementation of the “Innovative Development Strategy of the Republic of Uzbekistan for 2019–2021,” significant achievements have been made in stimulating innovation and technological progress across key sectors of the economy and society, including agriculture, energy, construction, education, and healthcare (July 6, 2022).

¹ <https://www.lex.uz/uz/docs/-6102462>

In particular, Uzbekistan improved by 44 positions in the Global Innovation Index ranking (which evaluates countries based on 81 indicators) between 2015 and 2023; annual budget allocations to innovation and science have tripled compared to 2018, reaching 1.5 trillion UZS; the number of young researchers increased from 6,500 in 2018 to 10,800 in 2022, showing a 1.5-fold rise; the number of specialized institutions for financing innovation (innovation funds, venture organizations, etc.) increased to 28 over the past four years. In addition, during the 2019–2021 period, government funding for science tripled, the number of young researchers significantly expanded, and targeted institutions to support innovation financing were established. To continue this progress, in 2024–2025, the Cabinet of Ministers of the Republic of Uzbekistan approved a “Roadmap” for the implementation of the innovative development strategy (March 13, 2024).

This roadmap outlines the improvement of institutional mechanisms for state support of innovation, expansion of co-financing mechanisms for research projects with the private sector, and the development of an innovation ecosystem through cooperation with international financial institutions. However, the level of commercialization of scientific and innovative developments in the real sector of the economy remains relatively low. There is still a lack of strong linkages between science, education, and industry. To accelerate innovation-led development and expand the application of advanced technologies across all sectors of the economy, the current strategy outlines a range of targeted priorities aimed at enhancing human capital, scientific infrastructure, and innovation capabilities.

As noted by the President, “This year, 1.5 trillion UZS has been allocated to science and innovation – nearly six times more than in 2017. As a result, 18 new scientific fields have been launched, including nanotechnology, biotechnology, and digital geology. Next year, 1.8 trillion UZS will be allocated to science and innovation.” During 2018–2021, a total of 102.4 billion UZS was invested to establish eight technoparks, business incubators, accelerators, and innovation pilot sites across various regions. In 2022 alone, 29.5 billion UZS was allocated for the development of youth technoparks. These modern platforms are designed to accelerate the development and commercialization of scientific and technical projects by highly qualified specialists.

Despite recent advancements, a significant decline in the number of industrial enterprises has been observed in Uzbekistan in recent years. According to official data, as of March 1, 2025, a total of 56.8 thousand industrial enterprises are operating across the country. This indicates a noticeable decrease compared to previous years. The reduction in the number of industrial enterprises is linked to the structural composition of the economy and the competitiveness of industrial sectors. This trend can also be attributed to insufficient financing of innovation activities. Currently, one of the key drivers of economic development—innovation—is not adequately supported with financial resources, which negatively impacts the growth and modernization of the industrial sector.

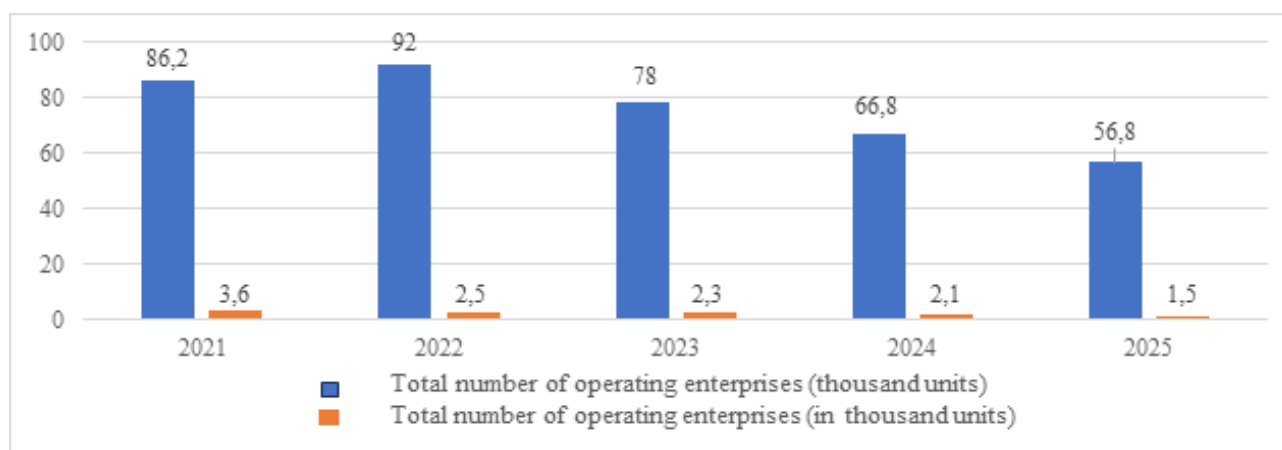


Figure 2. Number of operating and newly established industrial enterprises in our Republic (2021–2025).

In particular, the implementation of modern technologies in production processes and the interest of business entities in executing innovative projects are declining due to the insufficiently effective functioning of financing mechanisms. Moreover, the economic efficiency and competitiveness of existing industrial enterprises also contribute to this trend. In recent years, along with a decrease in the number of enterprises, their economic activity and production volumes have also diminished. This, in turn, directly affects employment levels, export performance, and the overall share of industry in the gross domestic product (GDP).

An analysis of this trend shows that the decline in the number of industrial enterprises is especially pronounced in certain sectors. For example, in 2025, the largest share among operating enterprises is found in the food production sector (11.6 thousand enterprises or 20.5%). Other notable sectors include the production

of non-metallic mineral products (8.0 thousand or 14.1%), clothing manufacturing (5.7 thousand or 10.1%), the manufacturing of fabricated metal products excluding machinery and equipment (4.6 thousand or 8.0%), and furniture manufacturing (3.9 thousand or 6.9%) (see Figure 2).

These data highlight the need to increase the volume of financing, improve the credit system, and strengthen state support measures to ensure economic stability and promote the innovative development of industrial sectors.

LITERATURE REVIEW

Kenneth Arrow (1962) identified information asymmetry as a central problem in financing innovation. Investors often lack sufficient information about innovative projects, making them reluctant to provide funding due to perceived risks. Because innovation outcomes are uncertain, public support and risk-sharing mechanisms are necessary. Bronwyn Hall (2010) and Josh Lerner emphasized the role of both public and private sectors in financing innovation. They advocated for a diversified mix of financial instruments—venture capital, grants, tax incentives, and public–private partnerships. A well-developed, segmented financial infrastructure is vital to support R&D and innovation. Stiglitz and Weiss (1981) argued that moral hazard and adverse selection lead to credit rationing in innovation financing. High-risk innovative firms are often excluded from traditional lending due to a lack of collateral and information asymmetry. Specialized financial tools—such as innovation bonds or government guarantees—are needed to finance innovation effectively. The National Innovation Systems approach, developed by Freeman, Lundvall, and Nelson (1992), views innovation not as an isolated activity within firms but as an outcome of interactive learning among institutions—universities, industry, and government. Effective innovation financing requires institutional coordination and strategic alignment across sectors.

RESEARCH METHODOLOGY

The issue of financing innovation has been widely studied in the international academic community, where theoretical and empirical studies have emphasized the role of financial systems in promoting technological development and economic competitiveness. Classical innovation theory, proposed by Joseph Schumpeter, defines innovation as the driving force of economic development and underlines the critical role of credit in enabling innovative entrepreneurship. According to Schumpeter (1934), without access to finance, the process of “creative destruction” that drives growth would not be possible.

ANALYSIS AND RESULTS

Investments play a crucial role in enabling small enterprises and microfirms to engage in international operations. Foreign investments are often sought as a solution to financial constraints, offering access to capital that might not be available domestically. Financial divisions of foreign corporations tend to allocate funds to short-term investments with the objective of securing high returns, thereby reinforcing material incentives. Such investments are typically backed by private entrepreneurial capital and, in some cases, involve the issuance of proprietary securities or the acquisition of foreign financial instruments.

Table 1. Distribution of investments in fixed capital by sources of financing in the Republic of Uzbekistan (as of 2019–2023, in trillion UZS). (Prepared based on data from the statistics agency under the President of the Republic of Uzbekistan).

Indicators	2019	2020	2021	2022	2023
Total investments in fixed capital	41,5	202	245	269,9	356,1
Including					
Centralized investments:	8,1	39,3	44,8	41,5	49,8
Budget funds	2,8	13,1	21,5	20,9	23,2
Foreign loans guaranteed by the Republic of Uzbekistan	3,9	22,5	17,3	15,2	22,4
Water supply system development fund	-	1,9	2,9	2,9	2,1
State targeted funds	-	-	-	-	-

Funds from the Reconstruction and Development Fund	1,4	1,8	3,1	2,5	2,1
Decentralized investments:	33,4	162,7	200,2	228,4	306,3
Enterprises' own funds	12,7	51,9	71,3	84,5	83,4
Population funds	1,7	18,5	22,2	25,8	29,9
Foreign direct investments and loans	14,1	28,7	30,1	37	65,1
Commercial bank loans and other borrowed funds	4,9	28,5	19,5	21,1	13,5
Unsecured and other foreign investments and loans	-	35,1	57,1	60	114,2

According to Table 1, investments in fixed capital in Uzbekistan significantly increased between 2019 and 2023 – from 41.5 trillion soums in 2019 to 356.1 trillion soums in 2023. This demonstrates a consistent growth in financial resources directed toward the economy. In particular, government-financed investments grew from 8.1 trillion soums in 2019 to 49.8 trillion soums in 2023. Budget allocations increased from 2.8 trillion to 23.2 trillion soums, indicating the state's growing financial commitment to infrastructure and social development projects. Foreign investments and unsecured loans are also on the rise, reflecting an increasing level of openness in Uzbekistan's economy.

Going forward, supporting innovative projects, improving the banking credit system, and creating a favorable environment for foreign investors are considered key factors for further increasing investment volumes. R&D expenditure represents a crucial component of innovation and progress across various sectors. These expenses include costs related to discovering new knowledge, developing new products or processes, and enhancing existing ones. They cover wages, social insurance, equipment, and other related expenditures. Analyzing all these costs thoroughly and systematically is essential to understanding the real scope and impact of innovation-driven activities.

Table 2. R&D Expenditures (in million UZS).

—	2019	2020	2021	2022	2023
Total	589 577,7	824 708,5	946 484,2	1 369 908,2	1 301 012,1
Of which: current expenditures	582 582,3	811 145,5	923 679,6	1 329 354,8	
Including:					
Labor remuneration expenditures	364 609,6	501 824,7	545 247,0	751 701,2	740 852,0
Including for employees engaged in scientific research and development	269 257,7	391 992,3	386 212,1	473 694,5	459 981,1
Social insurance contributions	74 682,20	88 308,6	99 271,0	108 097,2	134 873,0
Expenditures on equipment	18 303,80	45 988,2	66 640,7	186 615,1	180 244,8
Including:					
Allocations for fixed assets	9 101,7	26 625,0	25 236,8	48 217,0	47 783,7
Depreciation of fixed assets and intangible assets	19 735,6	32 333,2	32 995,3	44 417,0	53 182,3

Based on the data from Table 2, it can be observed that in recent years, expenditures on R&D (Research and Development) activities in Uzbekistan have significantly increased. Between 2019–2023, the amount

allocated to R&D—scientific research and experimental design—grew substantially. In 2019, R&D expenditures amounted to 589.6 billion UZS, reaching a peak of 1.37 trillion UZS in 2022. However, in 2023, a slight decline was observed, with expenditures totaling 1.3 trillion UZS. The majority of R&D spending consisted of current expenditures, which increased from 582.6 billion UZS in 2019 to 1.33 trillion UZS in 2022. Labor remuneration costs followed an upward trend as well, growing from 364.6 billion UZS in 2019 to 751.7 billion UZS in 2022, although they slightly decreased to 740.9 billion UZS in 2023. Salaries paid to employees directly involved in research and development rose from 269.3 billion UZS in 2019 to 473.7 billion UZS in 2022 but dropped to 459.9 billion UZS in 2023. Social insurance contributions have steadily increased, from 74.7 billion UZS in 2019 to 134.9 billion UZS in 2023. Investments in equipment experienced the most significant changes, increasing from 18.3 billion UZS in 2019 to 186.6 billion UZS in 2022, before slightly declining to 180.2 billion UZS in 2023. Overall, while R&D investments showed consistent growth from 2019 to 2022, some categories experienced reductions in 2023. These fluctuations may be attributed to economic factors, changes in budget allocation strategies, or shifting policy priorities. In Uzbekistan, funding allocated to R&D activities by source of financing significantly increased over the period 2019–2023 (see Table 3). In 2019, the total amount of R&D funding stood at 589.6 billion UZS, reaching a peak of 1,369.9 billion UZS in 2022. However, in 2023, this amount slightly declined to 1,336.1 billion UZS. This indicates a modest decrease in financial support for scientific projects compared to 2022.

Table 3. R&D Expenditures by sources of financing (in million UZS).

(Prepared based on data from the statistics agency under the President of the Republic of Uzbekistan).

Indicators	2019	2020	2021	2022	2023
Total	589 577,7	824 708,5	946 484,2	1 369 908,20	1 336 141,90
State budget funds	390 788,4	524 252,6	591 421,7	752 605,90	732 470,60
Off-budget fund resources	25 076,7	24 660,0	23 247,4	171 092,30	83 507,00
Own funds	151 485,50	199 679,40	267 715,10	362 543,90	423 763,10
Customer funds	20 085,1	75 880,5	61 940,40	81 025,00	90 162,90
Foreign sources	2 142,00	236	2 159,60	2 641,10	6 238,40

In terms of regional distribution, the largest amount of R&D funding in 2023 was allocated to Tashkent city, totaling 828.7 billion UZS, which accounts for nearly 62% of the total national expenditure (Table 4). This is primarily due to the concentration of research institutes, higher education institutions, and innovation centers in the capital. Tashkent region and Navoi region also ranked among the leading regions, receiving 196.2 billion UZS and 190.2 billion UZS, respectively. Notably, in Navoi region, funding increased from 58.3 billion UZS in 2019 to 190.2 billion UZS in 2023, indicating a growing focus on scientific activities in the area.

The regions that received the least funding were Jizzakh, Syrdarya, and Surkhandarya, with 2.2 billion UZS, 3.6 billion UZS, and 7.3 billion UZS allocated in 2023, respectively. These regions remain underfunded in terms of scientific activity and require additional resources and targeted programs to enhance their scientific and innovation potential.

Overall, while R&D funding has generally increased over the years, some regions experienced a decline in 2023. The data show that the majority of funding is concentrated in the capital and major industrial centers, while some regions receive insufficient attention. This underscores the need for a more balanced and regionally inclusive approach to fostering innovation across the entire country.

Table 4. Expenditures on R&D activities conducted independently, by region (in million UZS).

	2019	2020	2021	2022	2023
Republic of Uzbekistan	589 577,7	824 708,5	946 484,2	1 369 908,2	1 336 141,9
Republic of Karakalpakstan	9 989,5	18 357,4	18 689,4	25 243,1	16 313,5
Andijan	3 429,4	5 593,2	7 885,5	12 426,7	4 630,3
Bukhara	11 570,5	23 708,7	21 119,5	30 010,6	31 474,3

Jizzakh	1 424,7	792,7	2 493,3	900,0	2 188,5
Kashkadarya	2 829,4	2 474,0	2 434,5	3 987,4	7 730,6
Navoi	58 272,9	72 936,4	106 130,3	176 865,8	190 154,6
Namangan	8 424,9	1 136,3	3 599,2	6 014,0	8 111,1
Samarkand	16 102,5	9 254,8	18 309,7	100 847,2	27 558,3
Surkhandarya	740,6	958,7	2 644,1	6 160,4	7 299,1
Syrdarya	930,1	983,7	4 454,2	3 820,0	3 570,3
Tashkent	65 402,8	87 454,9	131 759,8	183 074,4	196 156,8
Fergana	6 516,5	19 733,0	20 722,1	4 011,2	5 220,9
Khorezm	4 352,9	3 744,1	4 714,5	17 089,3	7 070,0
Tashkent city	399 591,0	577 550,6	601 528,1	799 458,1	828 663,6

In the entrepreneurial sector of Uzbekistan, several key institutions serve as intermediaries in the implementation of innovative projects. These institutions include the Chamber of Commerce and Industry of Uzbekistan, Free Economic Zones, and Small Industrial Zones. The Chamber of Commerce and Industry plays a crucial role as an intermediary organization supporting the growth of the entrepreneurial sector and providing essential services. The primary objectives of the Chamber include promoting market-based principles, developing tools for managing innovations such as production timeliness and quality standards, and enhancing the capacities of enterprises. This includes facilitating international study visits and supporting the development of human capital.

Moreover, the Chamber offers specialized services to assist small and medium-sized enterprises (SMEs) in identifying and acquiring advanced technologies. Additionally, in accordance with Presidential Decree No. DP-15 dated January 23, 2023, several measures were introduced to further support entrepreneurial entities: micro, small, and medium-sized enterprises are admitted to Chamber membership free of charge, exempted from entrance and membership fees, and granted full access to Chamber services as stipulated by law, except for certain paid services; facilitation of cooperation among industry enterprises; the Chamber is empowered to submit direct proposals to the Prime Minister regarding improvements to the business environment.

This decree represents a significant step towards fostering a favorable business climate in Uzbekistan and supporting the growth of micro, small, and medium-sized enterprises. Exempting businesses from membership and entrance fees, as well as granting access to Chamber services free of charge, is expected to reduce the financial burden on small businesses and enhance their access to necessary resources for growth and development. Furthermore, fostering cooperation among enterprises enables small businesses to leverage the strengths of their peers, promote knowledge sharing, and advance innovation.

Table 5. Expenditures on R&D activities carried out independently by funding sources and in the context of the entrepreneurship sector.

Indicators	2019	2020	2021	2022	2023
Total	178 584,9	307 531,6	301 054,8	417 064,1	256 814,9
Total state budget funds	52 458,7	79 640,4	67 956,2	78 041,7	5 610,4
Extra-budgetary fund resources	1 390,0	58,3	2 311,8	1 953,3	207,1
Own (personal) funds	113 120,0	158 199,4	204 679,0	302 800,0	246 345,4
Customer funds	11 545,6	69 550,8	25 107,8	34 269,1	4 652,0
Foreign source funds	70	82,7	1000	-	-

According to the data presented in Table 5, funding allocated for R&D activities carried out independently by the entrepreneurial sector in Uzbekistan underwent significant changes during 2019–2023. Total expenditures initially stood at 178.6 billion UZS in 2019, peaking at 417.1 billion UZS in 2022, before declining to 256.8 billion UZS in 2023. Within the structure of funding sources, government budget allocations were relatively substantial

in earlier years, reaching 79.6 billion UZS in 2020. However, by 2023, this figure had drastically dropped to only 5.6 billion UZS. In contrast, self-financing (personal funds) showed steady growth – from 113.1 billion UZS in 2019 to 302.8 billion UZS in 2022 – before declining slightly to 246.3 billion UZS in 2023. The role of foreign sources in R&D financing remained minimal, with funding peaking at only 1.0 billion UZS during 2019–2021 and nearly disappearing in subsequent years. These trends underscore the need for stable and diversified R&D investment mechanisms.

CONCLUSION

Based on the analysis of the current state of innovation financing mechanisms in the Republic of Uzbekistan, key problems, trends, and opportunities have been identified, enabling the formulation of conclusions and scientific-practical recommendations. The research thoroughly examined statistical indicators from 2019 to 2023, funding sources, the structure of R&D expenditures, regional disparities, entrepreneurial sector activity, and the priority directions of state policy. Furthermore, the necessity of improving Uzbekistan's innovation ecosystem was substantiated using international experience and theoretical frameworks, including those of Schumpeter, Arrow, Hall & Lerner, Stiglitz–Weiss, and the National Innovation System (NIS) model.

From this analysis, several conclusions and proposals have been developed to enhance the effectiveness of innovation financing, ensure sustainable economic growth, and accelerate technological modernization. Between 2019 and 2023, over 85% of investments in fixed capital were financed through decentralized sources, indicating an increasing role of the private sector, yet reflecting a gradual decline in government financial participation in innovation. Although R&D expenditures increased from 589.6 billion UZS in 2019 to 1.3 trillion UZS in 2023, they remain at only 0.3–0.4% of GDP, which is significantly lower than in developed economies. Regional disparities are also stark: in 2023, around 62% of R&D funds were concentrated in Tashkent city, highlighting insufficient funding in other regions and limiting inclusive innovation development.

In the entrepreneurial sector, state budget allocations for R&D were only 5.6 billion UZS in 2023, meaning that innovation projects are largely implemented using private or limited internal resources. Despite increased R&D spending, the share of innovative products and their contribution to exports remains low, indicating weak commercialization of research results. Furthermore, foreign investment in R&D is virtually absent, revealing that Uzbekistan's innovation infrastructure is still unattractive to international capital. On the positive side, R&D activities carried out by higher education institutions increased from 106.7 billion UZS in 2019 to 299.9 billion UZS in 2023, demonstrating a growing role of universities in scientific activity. Additionally, the number of young researchers grew from 6,500 to 10,800, although financial support mechanisms for their projects and startups remain underdeveloped. These findings expose systemic challenges and structural imbalances that hinder the full realization of the country's innovation potential.

Dominance of internal financing sources, low commercialization levels, regional disparities, and limited foreign capital are among the key constraints. Although the role of universities and young researchers is rising, these gains are not sufficient without targeted, sustainable policy actions. Therefore, to improve the efficiency, inclusiveness, and sustainability of innovation financing mechanisms in Uzbekistan, the following strategic recommendations are proposed: expand and diversify funding sources by attracting venture capital, issuing innovation bonds, and engaging private investors; establish regional R&D funds and scientific grant systems to support innovation across all provinces; strengthen public–private partnership mechanisms through joint financing and government-backed grants or loans; promote the commercialization of research by increasing the number of incubators, accelerators, and technology transfer offices; create legal and financial incentives to attract foreign investment in the R&D sector; enhance integration between science, education, and industry through “university–enterprise” models; develop a unified digital platform to monitor innovation activities in real time; and allocate specialized financial instruments, such as seed funding and targeted grants, for young scientists and early-stage startups. This scientific study has conducted a comprehensive assessment of Uzbekistan's innovation financing mechanisms for enterprises, revealing that despite certain advancements in recent years, significant institutional and regional disparities persist.

The low commercialization of innovation and lack of foreign investments remain major obstacles. The analysis justifies the need for modernization of the innovation ecosystem, based on international theories from Schumpeter, Arrow, Hall & Lerner, Stiglitz–Weiss, and the NIS model. Strategic measures such as diversifying funding sources, establishing regional R&D funds, enhancing public–private cooperation, and supporting young researchers through targeted financial tools are critical. The results and recommendations of this research can serve as a robust foundation for strengthening Uzbekistan's innovation potential, advancing technological transformation, and achieving long-term sustainable economic growth, as well as supporting national innovation policy and evidence-based decision-making.

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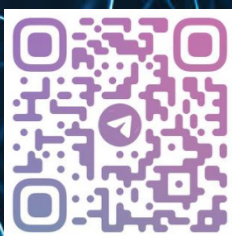
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