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PROBLEMS.UZ

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Актуальные проблемы социальных и гуманитарных наук

**Ijtimoiy-gumanitar
fanlarning dolzarb
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SCIENCEPROBLEMS.UZ

IJTIMOIIY-GUMANITAR FANLARNING DOLZARB MUAMMOLARI

№ 1 (5) - 2025

АКТУАЛЬНЫЕ ПРОБЛЕМЫ СОЦИАЛЬНО- ГУМАНИТАРНЫХ НАУК

ACTUAL PROBLEMS OF HUMANITIES AND SOCIAL SCIENCES

TOSHKENT-2025

BOSH MUHARRIR:

Isanova Feruza Tulqinovna

TAHRIR HAY'ATI:

07.00.00- TARIX FANLARI:

Yuldashev Anvar Ergashevich – tarix fanlari doktori, siyosiy fanlar nomzodi, professor, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Mavlanov Uktam Maxmasabirovich – tarix fanlari doktori, professor, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Xazratkulov Abror – tarix fanlari doktori, dotsent, O'zbekiston davlat jahon tillari universiteti.

Tursunov Ravshan Normuratovich – tarix fanlari doktori, O'zbekiston Milliy Universiteti;

Xolikulov Axmadjon Boymahammadovich – tarix fanlari doktori, O'zbekiston Milliy Universiteti;

Gabrielyan Sofya Ivanovna – tarix fanlari doktori, dotsent, O'zbekiston Milliy Universiteti.

Saidov Sarvar Atabullo o'g'li – katta ilmiy xodim, Imom Termiziy xalqaro ilmiy-tadqiqot markazi, ilmiy tadqiqotlar bo'limi.

08.00.00- IQTISODIYOT FANLARI:

Karlibayeva Raya Xojabayevna – iqtisodiyot fanlari doktori, professor, Toshkent davlat iqtisodiyot universiteti;

Nasirxodjayeva Dilafuz Sabitxanovna – iqtisodiyot fanlari doktori, professor, Toshkent davlat iqtisodiyot universiteti;

Ostonokulov Azamat Abdukarimovich – iqtisodiyot fanlari doktori, professor, Toshkent moliya instituti;

Arabov Nurali Uralovich – iqtisodiyot fanlari doktori, professor, Samarqand davlat universiteti;

Xudoyqulov Sadirdin Karimovich – iqtisodiyot fanlari doktori, dotsent, Toshkent davlat iqtisodiyot universiteti;

Azizov Sherzod O'ktamovich – iqtisodiyot fanlari doktori, dotsent, O'zbekiston Respublikasi Bojxona instituti;

Xojayev Azizxon Saidaloxonovich – iqtisodiyot fanlari doktori, dotsent, Farg'ona politexnika instituti

Xolov Aktam Xatamovich – iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dotsent, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Shadiyeva Dildora Xamidovna – iqtisodiyot fanlari bo'yicha falsafa doktori (PhD), dotsent v.b, Toshkent moliya instituti;

Shakarov Qulmat Ashirovich – iqtisodiyot fanlari

nomzodi, dotsent, Toshkent axborot texnologiyalari universiteti

09.00.00- FALSAFA FANLARI:

Hakimov Nazar Hakimovich – falsafa fanlari doktori, professor, Toshkent davlat iqtisodiyot universiteti;

Yaxshilikov Jo'raboy – falsafa fanlari doktori, professor, Samarqand davlat universiteti;

G'aybullayev Otabek Muhammadiyevich – falsafa fanlari doktori, professor, Samarqand davlat chet tillar instituti;

Saidova Kamola Uskanbayevna – falsafa fanlari doktori, "Tashkent International University of Education" xalqaro universiteti;

Hoshimxonov Mo'min – falsafa fanlari doktori, dotsent, Jizzax pedagogika instituti;

O'roqova Oysuluv Jamoliddinovna – falsafa fanlari doktori, dotsent, Andijon davlat tibbiyot instituti, Ijtimoiy-gumanitar fanlar kafedrasini mudiri;

Nosirxodjayeva Gulnora Abdulkaxxarovna – falsafa fanlari nomzodi, dotsent, Toshkent davlat yuridik universiteti;

Turdiyev Bexruz Sobirovich – falsafa fanlari bo'yicha falsafa doktori (PhD), dotsent, Buxoro davlat universiteti.

10.00.00- FILOLOGIYA FANLARI:

Axmedov Oybek Saporbayevich – filologiya fanlari doktori, professor, O'zbekiston davlat jahon tillari universiteti;

Ko'chimov Shuxrat Norqizilovich – filologiya fanlari doktori, dotsent, Toshkent davlat yuridik universiteti;

Hasanov Shavkat Ahadovich – filologiya fanlari doktori, professor, Samarqand davlat universiteti;

Baxronova Dilrabo Keldiyorovna – filologiya fanlari doktori, professor, O'zbekiston davlat jahon tillari universiteti;

Mirsanov G'aybullo Qulmurodovich – filologiya fanlari doktori, professor, Samarqand davlat chet tillar instituti;

Salaxutdinova Musharraf Isamutdinovna – filologiya fanlari nomzodi, dotsent, Samarqand davlat universiteti;

Kuchkarov Raxman Urmanovich – filologiya fanlari nomzodi, dotsent v/b, Toshkent davlat yuridik universiteti;

Yunusov Mansur Abdullayevich – filologiya fanlari nomzodi, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Saidov Ulugbek Aripovich – filologiya fanlari nomzodi, dotsent, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi.

12.00.00- YURIDIK FANLAR:

Axmedshayeva Mavlyuda Axatovna – yuridik fanlar doktori, professor, Toshkent davlat yuridik universiteti;

Muxitdinova Firyuza Abdurashidovna – yuridik fanlar doktori, professor, Toshkent davlat yuridik universiteti;

Esanova Zamira Normurotovna – yuridik fanlar doktori, professor, O'zbekiston Respublikasida xizmat ko'rsatgan yurist, Toshkent davlat yuridik universiteti;

Hamroqulov Bahodir Mamasharifovich – yuridik fanlar doktori, professor v.b., Jahon iqtisodiyoti va diplomatiya universiteti;

Zulfiqorov Sherzod Xurramovich – yuridik fanlar doktori, professor, O'zbekiston Respublikasi Jamoat xavfsizligi universiteti;

Xayitov Xushvaqt Saparbayevich – yuridik fanlar doktori, professor, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Asadov Shavkat G'aybullayevich – yuridik fanlar doktori, dotsent, O'zbekiston Respublikasi Prezidenti huzuridagi Davlat boshqaruvi akademiyasi;

Ergashev Ikrom Abdurasulovich – yuridik fanlari doktori, professor, Toshkent davlat yuridik universiteti;

Utemuratov Maxmut Ajimuratovich – yuridik fanlar nomzodi, professor, Toshkent davlat yuridik universiteti;

Saydullayev Shaxzod Alixanovich – yuridik fanlar nomzodi, professor, Toshkent davlat yuridik universiteti;

Hakimov Komil Baxtiyarovich – yuridik fanlar doktori, dotsent, Toshkent davlat yuridik universiteti;

Yusupov Sardorbek Baxodirovich – yuridik fanlar doktori, dotsent, Toshkent davlat yuridik universiteti;

Amirov Zafar Aktamovich – yuridik fanlar doktori (PhD), O'zbekiston Respublikasi Sudyalar oliy kengashi huzuridagi Sudyalar oliy maktabi;

Jo'rayev Sherzod Yuldashevich – yuridik fanlar nomzodi, dotsent, Toshkent davlat yuridik universiteti;

Babadjanov Atabek Davronbekovich – yuridik fanlar nomzodi, dotsent, Toshkent davlat yuridik universiteti;

Normatov Bekzod Akrom o'g'li — yuridik fanlar bo'yicha falsafa doktori, Toshkent davlat yuridik universiteti;

Rahmatov Elyor Jumaboyevich — yuridik fanlar nomzodi, Toshkent davlat yuridik universiteti;

13.00.00- PEDAGOGIKA FANLARI:

Xashimova Dildarxon Urinboyevna – pedagogika fanlari doktori, professor, Toshkent davlat yuridik universiteti;

Ibragimova Gulnora Xavazmatovna – pedagogika fanlari doktori, professor, Toshkent davlat iqtisodiyot universiteti;

Zakirova Feruza Maxmudovna – pedagogika fanlari doktori, Toshkent axborot texnologiyalari universiteti huzuridagi pedagogik kadrlarni qayta tayyorlash va ularning malakasini oshirish tarmoq markazi;

Kayumova Nasiba Ashurovna – pedagogika fanlari doktori, professor, Qarshi davlat universiteti;

Taylanova Shoxida Zayniyevna – pedagogika fanlari doktori, dotsent;

Jumaniyozova Muhayyo Tojiyevna – pedagogika fanlari doktori, dotsent, O'zbekiston davlat jahon tillari universiteti;

Ibraximov Sanjar Urunbayevich – pedagogika fanlari doktori, Iqtisodiyot va pedagogika universiteti;

Javliyeva Shaxnoza Baxodirovna – pedagogika fanlari bo'yicha falsafa doktori (PhD), Samarqand davlat universiteti;

Bobomurotova Latofat Elmurodovna — pedagogika fanlari bo'yicha falsafa doktori (PhD), Samarqand davlat universiteti.

19.00.00- PSIXOLOGIYA FANLARI:

Karimova Vasila Mamanosirovna – psixologiya fanlari doktori, professor, Nizomiy nomidagi Toshkent davlat pedagogika universiteti;

Hayitov Oybek Eshboyevich – Jismoniy tarbiya va sport bo'yicha mutaxassislarni qayta tayyorlash va malakasini oshirish instituti, psixologiya fanlari doktori, professor

Umarova Navbahor Shokirovna– psixologiya fanlari doktori, dotsent, Nizomiy nomidagi Toshkent davlat pedagogika universiteti, Amaliy psixologiyasi kafedrasi mudiri;

Atabayeva Nargis Batirovna – psixologiya fanlari doktori, dotsent, Nizomiy nomidagi Toshkent davlat pedagogika universiteti;

Shamshetova Anjim Karamaddinovna – psixologiya fanlari doktori, dotsent, O‘zbekiston davlat jahon tillari universiteti;

Qodirov Obid Safarovich – psixologiya fanlari doktori (PhD), Samarqand viloyat IIB Tibbiyot bo‘limi psixologik xizmat boshlig‘i.

22.00.00- SOTSILOGIYA FANLARI:

Latipova Nodira Muxtarjanovna – sotsiologiya fanlari doktori, professor, O‘zbekiston milliy universiteti kafedra mudiri;

Seitov Azamat Po‘latovich – sotsiologiya fanlari doktori, professor, O‘zbekiston milliy universiteti;

Sodiqova Shohida Marxaboyevna – sotsiologiya fanlari doktori, professor, O‘zbekiston xalqaro islom akademiyasi.

23.00.00- SIYOSIY FANLAR

Nazarov Nasriddin Ataqulovich –siyosiy fanlar doktori, falsafa fanlari doktori, professor, Toshkent arxitektura qurilish instituti;

Bo‘tayeov Usmonjon Xayrullayevich –siyosiy fanlar doktori, dotsent, O‘zbekiston milliy universiteti kafedra mudiri.

OAK Ro‘yxati

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INNOVATION POTENTIAL AND TECHNOLOGICAL DEVELOPMENT IN UZBEKISTAN'S MANUFACTURING SECTOR: ENHANCING EFFICIENCY THROUGH AI-DRIVEN MANAGEMENT OF INNOVATIVE INFRASTRUCTURES

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Abstract. Innovative infrastructures are crucial for enhancing Uzbekistan's manufacturing innovation and technological growth. Effective AI-driven management systems are vital for boosting efficiency. This study examines the roles of high-tech, medium-tech, and low-tech industries in economic growth, emphasizing how AI, technological intensity, and government strategies drive industrial modernization and competitiveness.

Keywords: industry, management, artificial intelligence, innovation, innovative infrastructure, technology parks, technological development.

O'ZBEKISTONDA INNOVATSION INFRATUZILMALARNI BOSHQARISHDA SUN'IY INTELLEKT TEXNOLOGIYALARINI JORIY QILISH ORQALI TARMOQ KORXONALARINING INNOVATSION SALOHİYATI VA TEXNOLOGIK RIVOJLANISHINI OSHIRISH

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Toshkent davlat Moliya universiteti

Mustaqil izlanuvchi

Annotatsiya. Bugungi kunda innovatsion infratuzilmalar O'zbekiston ishlab chiqarish sektorining innovatsion salohiyati va texnologik rivojlanishini oshirishda muhim ahamiyat kasb etadi. Ularni zamonaviy texnologiyalar xususan sun'iy intellekt yordamida boshqaruv tizimini joriy qilish orqali samaradorligini oshirish dolzarb usullardan biridir. Ushbu maqolada sanoatda yuqori va o'rta-yuqori texnologiyali ishlab chiqarish hajmini oshirishda innovatsion infratuzilmalarning ahamiyatini oshirish bo'yicha ilmiy asoslangan tavsiyalar ishlab chiqilgan.

Kalit so'zlar: sanoat, menejment, sun'iy intellekt, innovatsiya, innovatsion infratuzilma, texnologik parklar, texnologik taraqqiyot.

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Introduction. At the present time the role of innovative infrastructures in driving industrial development has become increasingly significant. Current infrastructures serve as a focal point for fostering innovation, facilitating technology transfer for enhancing the competitiveness of manufacturing industry. Thus, in Uzbekistan within the period of undergoing significant economic transformation, introduction of effective management of innovative infrastructures should be a priority in achieving sustainable industrial modernization and integration into the global economy.

The manufacturing sector, as a focal point of Uzbekistan's economy, encompasses industries with varying levels of technological intensity. High-tech industries are considered as the primary drivers of innovation, medium- and low-tech industries play an equally important role for adapting and transferring new technologies. Unlocking the potential of these industries relies not only on their level of technological advancement but also on the adoption of effective management practices and supportive government policies.

Nowadays, various technologies such as artificial intelligence are being introduced in almost all spheres including management. AI-powered solutions facilitate data-driven decision-making, streamline resource allocation, and improve the operational efficiency of industrial enterprises. Adoption of AI provides a means to tackle persistent barriers to innovation, including restricted access to advanced technologies, a lack of skilled labor, and insufficiently developed infrastructure.

In recent years, the integration of artificial intelligence (AI) technologies has emerged as a transformative tool for managing innovative infrastructures. AI-driven solutions enable data-driven decision-making, optimize resource allocation, and enhance the operational efficiency of industrial enterprises. By leveraging AI technologies, Uzbekistan has the opportunity to overcome traditional barriers to innovation, such as limited access to advanced technologies, insufficiently skilled workforces, and inadequate infrastructure.

The use of artificial intelligence (AI) in managing technoparks has shown remarkable promise in improving operations and fostering high-tech manufacturing growth. This emerging approach highlights the potential for AI to reshape innovation ecosystems. A clear example is the Chungbuk Technopark in South Korea, which adopted AI-driven storage systems to improve efficiency. By increasing GPU utilization from 30% to 80%, the technopark not only optimized its data processing capabilities but also empowered local enterprises to create cutting-edge AI-enabled products and services. Such advancements are crucial for strengthening high-tech manufacturing in the region, where global competitiveness often hinges on technological sophistication. Meanwhile, the Gwangju Artificial Intelligence Industry Cluster Agency (AIICA) has developed an AI-centered ecosystem that provides vital support to startups and businesses. By offering tailored resources and infrastructure, this initiative has played a pivotal role in accelerating technological progress and reinforcing South Korea's position as a leader in AI innovation [1].

Current cases highlight the importance of AI-based management systems in technoparks. Beyond operational efficiency, they enable ecosystems where innovation thrives, directly contributing to the advancement of high-tech industries and the broader economy.

This study aims to analyze technological level of manufacturing sector of Uzbekistan and propose the increase of share high-tech manufacturing introducing effective management systems of innovative infrastructure to boost the integration of science, education and production.

Literature review. The role of innovative infrastructures, such as technoparks and science and technology parks (STPs), in driving economic growth cannot be overstated. These hubs serve as bridges between research and industry, fostering collaboration and enabling the commercialization of advanced technologies. Cooke et al. describe technoparks as engines of regional competitiveness [2; P.12.], while Etzkowitz and Leydesdorff [3; P.109-123.] emphasize their ability to create dynamic "triple helix" systems where academia, government, and

businesses work together. Such insights underline the importance of effective management systems to ensure these infrastructures fulfill their potential.

In recent years, the use of artificial intelligence (AI) in managing technoparks has gained traction as a transformative innovation. Brynjolfsson and McAfee highlight how AI systems can optimize decision-making, streamline resource allocation, and improve operational efficiency [4; P.17.]. Real-world examples demonstrate this impact: at Chungbuk Technopark in South Korea, AI has enhanced data processing and supported the creation of cutting-edge AI-powered products by local businesses [1]. Similarly, the Gwangju Artificial Intelligence Industry Cluster (AIICA) has developed a supportive ecosystem that accelerates innovation by providing startups with the infrastructure and tools they need to thrive.

The application of AI goes beyond operational efficiency—it is integral to high-tech manufacturing. Schwab [5; P.2.] argues that AI technologies are foundational to the Fourth Industrial Revolution, driving advancements in automation, robotics, and smart manufacturing. This is evident in the practices of Amsterdam Science Park and Skolkovo Innovation Center. These technoparks have leveraged AI to streamline operations, reduce inefficiencies, and accelerate the time-to-market for new products [6]. These examples highlight the strategic value of AI in enabling companies to remain competitive in a rapidly evolving global market.

For Uzbekistan, these global experiences provide valuable lessons. Abdullaev [7; P.14.] point to the challenges of limited infrastructure and inefficiencies in the manufacturing sector. Introducing AI-driven management systems could address these barriers, enabling technoparks to foster high-tech industries and boost economic productivity. By adopting strategies like those seen in South Korea, the Netherlands, and Russia, Uzbekistan can position itself as a regional leader in technological innovation.

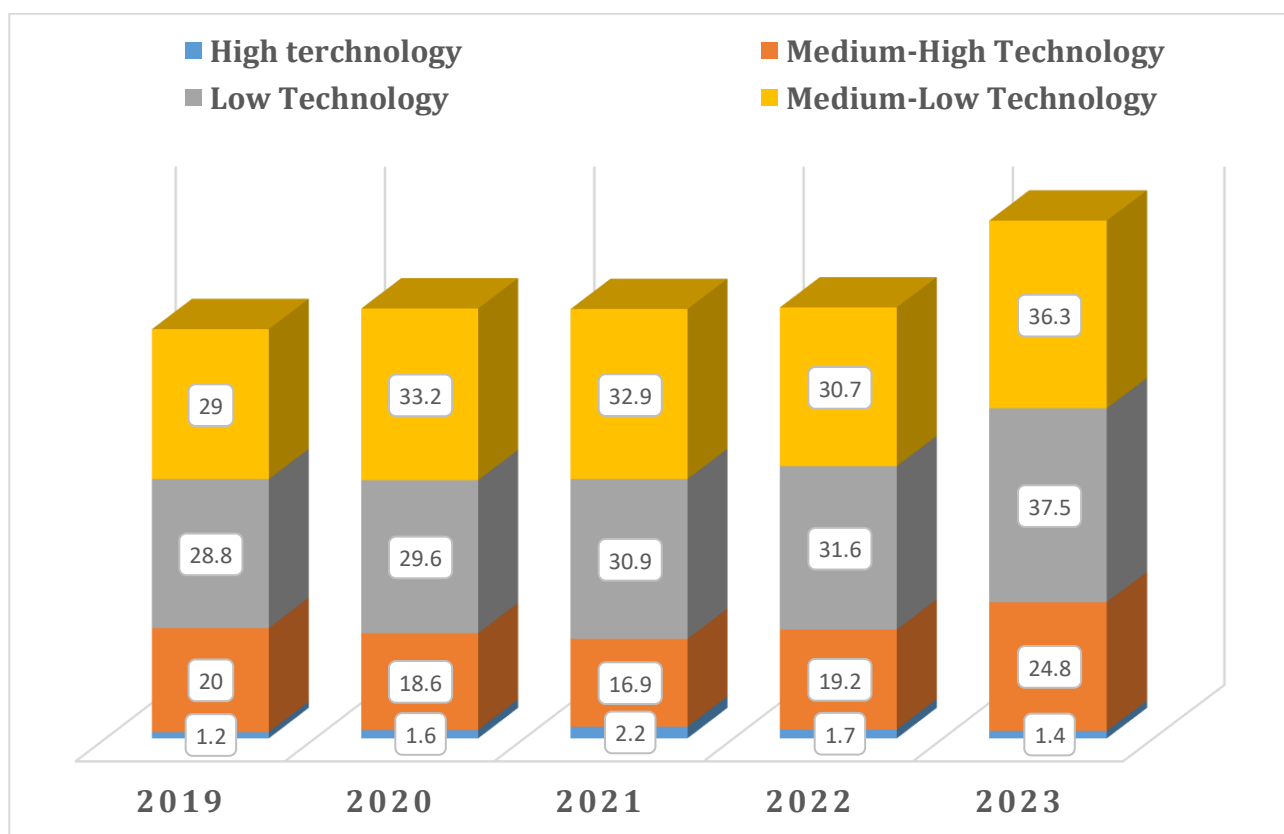
Main part. Uzbekistan's manufacturing sector has demonstrated significant growth in recent years, becoming a crucial component of the nation's economy. In 2023, the manufacturing output reached \$17.71 billion, contributing 19.49% to the Gross Domestic Product (GDP). This marks an increase from \$15.88 billion in 2022 and \$13.62 billion in 2021, where the sector accounted for 19.57% of GDP in both years [8]. Such consistent growth highlights the expanding role of manufacturing in Uzbekistan's economic landscape and the sector's potential for further development through modernization and technological integration.

Over the past six years, Uzbekistan has undertaken extensive efforts to develop and adopt legislative and regulatory acts aimed at strengthening and advancing the country's innovation ecosystem. During this period, 88 regulatory documents were approved, including 3 laws, 6 Presidential decrees, 28 Resolutions, 40 Directives, and 12 governmental decrees [9]. These measures have significantly contributed to Uzbekistan's progress in the Global Innovation Index, which evaluates 81 indicators — since 2015, the country has risen by 36 positions[10].

In addition, Presidential Resolution No. UP-165 dated July 6, 2022, "On the Approval of the Strategy for Innovative Development of the Republic of Uzbekistan for 2022–2026," was adopted, along with Presidential Decree No. PP-307 dated July 7, 2022, which outlines organizational measures for the implementation of this strategy. The primary goal of the strategy is to create conditions for the active development of startups and support large-scale

production projects through the gradual and systematic strengthening of the innovation infrastructure network.

Subsequently, progress in innovative development policy resulted in industrial sector introducing technologies in manufacturing process by increasing technological level of the industry. (graph 1). From the chart it can be clearly seen the distribution of technology levels in industrial production from 2019 to 2023. While there has been notable progress in the share of medium-high technology, which increased significantly from 18.6% in 2020 to 24.8% in 2023, the overall distribution remains skewed towards low and medium-low technology. These two categories collectively dominate with over 70% of the total share in 2023, highlighting a persistent reliance on less advanced production. Additionally, the share of high technology, despite its critical importance for innovation, decreased from 2.2% in 2021 to 1.4% in 2023, reflecting a concerning trend that underscores the need for stronger efforts to boost high-tech industries.



Graph 1. Technological level of production in Uzbekistan for the period of 2019-2023¹

Source: Agency of statistics

Technoparks play a vital role in boosting high-tech production by acting as bridges between research and industrial application. They help integrate the results of research and development (R&D) into production processes, enabling companies to adopt innovative technologies more rapidly. As catalysts for innovation, technoparks not only improve productivity but also create an ecosystem where cutting-edge advancements can thrive. This

¹ Data from Agency of statistics

synergy between research and industry is critical for driving high-tech manufacturing forward and ensuring long-term competitiveness.

Uzbekistan has made significant progress in building a foundation for its innovative ecosystem. Over the past years, the country has established 55 innovative infrastructures, with plans for further expansion [11]. These technoparks and science and technology parks (STPs) provide a framework for developing high-tech manufacturing capabilities. However, to unlock their full potential, there is an urgent need to implement efficient management systems. The current infrastructure base presents Uzbekistan with a unique opportunity to position itself as a regional leader in innovation. To achieve this, a strategic focus is needed to align technopark operations with national goals and ensure that they contribute effectively to economic modernization.

Artificial intelligence (AI) technologies offer a promising solution for addressing these challenges. AI-driven systems can optimize resource allocation, improve decision-making processes, and monitor project outcomes in real time. For example, predictive analytics enabled by AI can help technoparks identify trends, anticipate challenges, and adapt to changing market conditions more effectively. By integrating AI into the management of technoparks, Uzbekistan can significantly enhance their productivity and better integrate R&D outcomes into high-tech manufacturing. This approach not only maximizes the impact of existing infrastructure but also accelerates the country's transition to a knowledge-based economy, fostering competitiveness in the global market.

From the above, to quantitatively analyze the effectiveness of AI implementation, the following formula can be used:

$$E_{AI} = \frac{\sum_{i=1}^n W_i \times \left(\frac{M_{AI} - M_{baseline}}{M_{baseline}} \right)}{C_{AI}} \cdot 1$$

Where:

E_{AI} – AI efficiency in technopark management (dimensionless value indicating performance improvement per unit cost);

n – Number of operational metrics being evaluated (e.g., tenant satisfaction, resource utilization, operational cost reduction);

W_i – Weight assigned to each metric ($W_1 + W_2 + \dots + W_n = 1$), reflecting its relative importance;

M_{AI} – Measured value of a specific operational metric after AI implementation (e.g., percentage of resource optimization);

$M_{baseline}$ – Baseline value of the same metric before AI implementation.

C_{AI} – Total cost of AI implementation (e.g., software, hardware, and operational integration costs).

The proposed formula for evaluating AI efficiency in managing technoparks offers a practical framework to assess the tangible benefits of AI integration. By focusing on key performance indicators (KPIs) like resource utilization, tenant satisfaction, and cost savings, the formula provides a clear picture of how AI-driven systems contribute to operational

¹ Developed by the author

improvement. Importantly, the flexibility to assign weights (W_i) to different metrics allows technoparks to prioritize areas that align with their strategic goals. Normalizing the efficiency by the total cost of implementation (C_{AI}) ensures the results are both measurable and relevant to real-world decision-making. This makes the formula particularly useful for technoparks looking to optimize their management systems in a cost-effective manner.

The integration of artificial intelligence (AI) into technopark management systems shows immense potential for improving operations and fostering innovation.

To begin with, AI-driven resource allocation offers a way to make better use of shared facilities and infrastructure. For instance, predictive analytics could anticipate periods of high demand, ensuring smoother operations and fewer conflicts between tenants. Such improvements can lead to significant cost savings and enhanced tenant satisfaction, laying the groundwork for sustained growth. The proposed formula provides a framework to measure these benefits, helping technoparks assess which areas show the most progress and where there's room for improvement.

Additionally, technoparks equipped with AI are better positioned to connect research with industry. By continuously monitoring key performance indicators, they can track how effectively R&D translates into high-tech production. This creates a dynamic feedback loop where successes can be replicated, and challenges addressed. The ability to assign weights to different metrics ensures flexibility, allowing technopark managers to align operations with their strategic priorities. This adaptability can help foster an environment where innovation flourishes and technological advancements thrive.

Finally, the formula's application goes beyond measurement, it encourages a culture of improvement. Regularly evaluating AI-driven efficiencies can help technoparks set benchmarks, refine processes, and establish targets that align with global standards.

Conclusion and recommendations. Technoparks play a vital role in driving innovation and high-tech manufacturing by bridging the gap between research and industry. In Uzbekistan, the establishment of 55 innovative infrastructures lays a strong foundation for developing a thriving innovation ecosystem. But to truly unlock their potential, these hubs need to adopt smarter management practices. Integrating artificial intelligence (AI) into their operations could be a game-changer. AI not only streamlines processes but also enables technoparks to monitor and enhance performance more effectively. The proposed formula offers a practical way to measure these improvements, ensuring that technoparks can make informed, data-driven decisions to achieve long-term growth.

To fully realize the potential of technoparks, a strategic focus on several key areas is essential. First, embracing AI-driven management systems can significantly enhance operational efficiency. By integrating AI technologies, technoparks can optimize resource allocation, improve tenant management, and monitor project outcomes more effectively. Predictive analytics, for instance, can help forecast resource demands and avoid inefficiencies, ultimately boosting productivity and tenant satisfaction.

Another crucial area is strengthening the connection between research and industry. Bridging this gap requires targeted initiatives such as startup incubators, innovation clusters, and enhanced collaborations with academic institutions. These efforts will ensure that research and development (R&D) outcomes are effectively translated into high-tech production, fostering a dynamic and innovative ecosystem.

Investing in modern infrastructure is equally important. Upgrading technoparks with state-of-the-art facilities and advanced equipment will not only attract high-tech industries but also facilitate global partnerships. Alongside infrastructure, building a skilled workforce is vital for maximizing the benefits of AI and innovation ecosystems. This can be achieved through comprehensive training programs, scholarships, and partnerships with international educational and research institutions.

Finally, fostering international collaboration should be a priority. Establishing partnerships with globally recognized technoparks, such as those in South Korea and the Netherlands, can provide access to advanced technologies, best practices, and valuable insights. These collaborations will enable knowledge transfer and help Uzbekistan's technoparks align with global standards, enhancing their competitiveness and contribution to high-tech manufacturing.

By addressing these areas, Uzbekistan can ensure that its technoparks become powerful drivers of innovation and economic growth, positioning the country as a leader in the global high-tech economy.

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