

MUHANDISLIK

& IQTISODIYOT

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fan va ta'limga oid ilmiy-amaliy jurnal

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ТАШКЕНТСКИЙ ФИЛИАЛ



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05.01.02 – Tizimli tahlil, boshqaruv va axborotni qayta ishlash
05.01.03 – Informatikaning nazariy asoslari
05.01.04 – Hisoblash mashinalari, majmualari va kompyuter tarmoqlarining matematik va dasturiy ta'minoti
05.01.05 – Axborotlarni himoyalash usullari va tizimlari. Axborot xavfsizligi
05.01.06 – Hisoblash texnikasi va boshqaruv tizimlarining elementlari va qurilmalari
05.01.07 – Matematik modellashtirish
05.01.11 – Raqamli texnologiyalar va sun'iy intellekt
05.02.00 – Mashinasozlik va mashinashunoslik
05.02.08 – Yer usti majmualari va uchish apparatlari
05.03.02 – Metrologiya va metrologiya ta'minoti
05.04.01 – Telekommunikatsiya va kompyuter tizimlari, telekommunikatsiya tarmoqlari va qurilmalari. Axborotlarni taqsimlash
05.05.03 – Yorug'lik texnikasi. Maxsus yoritish texnologiyasi
05.05.05 – Issiqlik texnikasining nazariy asoslari
05.05.06 – Qayta tiklanadigan energiya turlari asosidagi energiya qurilmalari
05.06.01 – To'qimachilik va yengil sanoat ishlab chiqarishlari materialshunosligi
05.08.03 – Temir yo'l transportini ishlatish
05.08.06 – "G'ildirakli va gusenisali mashinalar va ularni ishlatish" (texnika fanlari)
05.09.01 – Qurilish konstruksiyalari, bino va inshootlar
05.09.04 – Suv ta'minoti. Kanalizatsiya. Suv havzalarini muhofazalovchi qurilish tizimlari
10.00.06 – Qiyosiy adabiyotshunoslik, chog'ishtirma tilshunoslik va tarjimashunoslik
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08.00.01 – Iqtisodiyot nazariyasi
08.00.02 – Makroiqtisodiyot
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08.00.04 – Qishloq xo'jaligi iqtisodiyoti
08.00.05 – Xizmat ko'rsatish tarmoqlari iqtisodiyoti
08.00.06 – Ekonometrika va statistika
08.00.07 – Moliya, pul muomalasi va kredit
08.00.08 – Buxgalteriya hisobi, iqtisodiy tahlil va audit
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08.00.13 – Menejment
08.00.14 – Iqtisodiyotda axborot tizimlari va texnologiyalari
08.00.15 – Tadbirkorlik va kichik biznes iqtisodiyoti
08.00.16 – Raqamli iqtisodiyot va xalqaro raqamli integratsiya
08.00.17 – Turizm va mehmonxona faoliyati

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DIGITAL TECHNOLOGIES AS A KEY DRIVER OF SOCIO-ECONOMIC PROGRESS: A QUANTITATIVE ANALYSIS OF IMPACT TRANSMISSION MECHANISMS

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Abstract. This study analyzes the impact of digital technologies on the socio-economic development of the Republic of Uzbekistan in 2021–2026. The objective is to assess the effectiveness of state digital transformation policy and identify structural imbalances that hinder the equitable distribution of “digital dividends.” The methodological framework is based on the analysis of regulatory documents, official statistical data, international indices (UN, World Bank), and secondary processing of industry reports. The findings indicate significant progress: the EGDI index reached a “very high” level (63rd place in 2024), the number of public service portal users increased to 12.5 million, and IT service exports reached \$344 million in 2023. However, a persistent digital divide remains between Tashkent and the regions (209 versus less than 70 internet subscribers per 100 people), along with low levels of digital literacy among the rural population (below 30%). The study concludes that Uzbekistan is transitioning from a phase of accelerated reforms to a stage of deep transformation, where overcoming the digital divide becomes the key challenge.

Keywords: digital technologies, socio-economic development, digital transformation, network readiness index, panel data analysis, human development index, digital divide, economic growth, e-governance.

Annotatsiya. Mazkur tadqiqotda 2021–2026-yillarda O‘zbekiston Respublikasida raqamli texnologiyalarning ijtimoiy-iqtisodiy rivojlanishga ta’siri tahlil qilinadi. Tadqiqotning asosiy maqsadi davlatning raqamli transformatsiya siyosati samaradorligini baholash hamda “raqamli dividendlar”ning teng taqsimlanishiga to’sqinlik qiluvchi tarkibiy nomutanosibliklarni aniqlashdan iborat. Metodologik asos sifatida normativ-huquqiy hujjatlar tahlili, davlat organlari statistik ma’lumotlari, xalqaro reytinglar (BMT, Jahon banki) hamda soha hisobotlarining ikkilamchi tahlili qo’llanildi. Tadqiqot natijalari sezilarli ijobiy o‘zgarishlarni ko‘rsatadi: EGDI indeksi “juda yuqori” darajaga yetib, 2024-yilda 63-o‘rinni egalladi, davlat xizmatlari portali foydalanuvchilari soni 12,5 millionga yetdi, IT xizmatlari eksporti esa 2023-yilda 344 mln AQSh dollarini tashkil etdi. Shu bilan birga, Toshkent shahri va hududlar o‘rtasida barqaror “raqamli tafovut” saqlanib qolmoqda (har 100 aholiga 209 ga nisbatan 70 dan kam internet abonent), qishloq aholisi orasida raqamli savodxonlik darajasi past (30 % dan kam). Xulosa qilinishicha, O‘zbekiston tezkor islohotlar bosqichidan chuqur transformatsiya bosqichiga o‘tmoqda, bunda asosiy muammo – raqamli tafovutni bartaraf etishdir.

Kalit so‘zlar: raqamli texnologiyalar, ijtimoiy-iqtisodiy rivojlanish, raqamli transformatsiya, tarmoq tayyorgarligi indeksi, panel ma’lumotlar tahlili, inson taraqqiyoti indeksi, raqamli tafovut, iqtisodiy o‘sish, elektron hukumat.

Аннотация. В данном исследовании анализируется влияние цифровых технологий на социально-экономическое развитие Республики Узбекистан в 2021–2026 гг. Основной целью является оценка эффективности государственной политики цифровой трансформации и выявление структурных дисбалансов, препятствующих равномерному распределению «цифровых дивидендов». Методологическая база включает анализ нормативно-правовых документов, статистических данных государственных органов, международных индексов (ООН, Всемирный банк), а также вторичную обработку отраслевых отчетов. Результаты исследования свидетельствуют о значительном прогрессе: индекс EGDI достиг высокого уровня (63-е место в 2024 г.), число пользователей портала государственных услуг увеличилось до 12,5 млн, а экспорт ИТ-услуг составил 344 млн долл. США в 2023 г. Вместе с тем сохраняется устойчивый «цифровой разрыв» между Ташкентом и регионами (209 против менее 70 интернет-абонентов на 100 человек), а также низкий уровень цифровой грамотности сельского населения (менее 30 %). Сделан вывод о том, что Узбекистан переходит от этапа ускоренных реформ к стадии глубокой трансформации, ключевой задачей которой является преодоление цифрового разрыва.

Ключевые слова: цифровые технологии, социально-экономическое развитие, цифровая трансформация, индекс сетевой готовности, панельный анализ данных, индекс человеческого развития, цифровой разрыв, экономический рост, электронное правительство.



INTRODUCTION

Relevance. Between 2021–2026, Uzbekistan has demonstrated remarkable progress in digitalization, evolving from a country at the early stages of reform implementation into one of the regional leaders in Central Asia in terms of the development pace of the IT ecosystem and e-government. The adoption of the “Digital Uzbekistan – 2030” Strategy, along with its integration into the “Development Strategy of the New Uzbekistan for 2022–2026,” has established a solid institutional foundation for large-scale digital modernization.

Research Problem. Despite significant macroeconomic achievements, including the growth of IT service exports and improved positions in international rankings, the benefits of digitalization are not yet fully and evenly distributed across all segments of the population. The research problem is therefore defined as the imbalance between the rapid pace of institutional digitalization and the continued presence of structural factors (infrastructural, educational, and economic) that influence the accessibility of digital services for different population groups.

Research Hypotheses:

- H1: The development of e-government in Uzbekistan (2021–2026) demonstrates a more rapid growth trajectory compared to the development of human capital and digital infrastructure in the regions.
- H2: The digital divide between the capital and the regions remains significant and is associated with variations in income levels and the quality of educational infrastructure.
- H3: The effectiveness of digital technologies as a driver of socio-economic progress in Uzbekistan is influenced primarily by institutional and human capital factors rather than technological constraints.

LITERATURE REVIEW

Contemporary scientific research demonstrates that digital technologies are increasingly becoming a key driver of socio-economic development, significantly influencing economic growth, labor productivity, innovation, and market transformation. Many scholars consider digitalization to be a fundamental component in the formation of a modern knowledge-based economy and sustainable development.

In particular, studies by Brynjolfsson and McAfee emphasize that the advancement of digital technologies, including big data, cloud computing, and automation, substantially enhances enterprise productivity and facilitates the emergence of new business models [1]. The authors highlight that digital transformation accelerates innovation processes, improves the efficiency of resource management, and expands companies' opportunities in global markets. Furthermore, their research indicates that the adoption of digital technologies contributes to structural changes in the labor market, thereby increasing the demand for advanced digital skills.

Acemoglu and Restrepo analyze the impact of digitalization and automation on economic growth and employment [2]. Their findings suggest that the implementation of digital technologies can simultaneously enhance productivity and generate new forms of economic activity. At the same time, these processes may lead to structural adjustments in the labor market, which require adaptive policy responses. The authors also demonstrate that the overall impact of digitalization depends on the institutional environment, the level of technological development, and the effectiveness of government policies in education and innovation.

A number of studies also highlight the role of digital technologies in strengthening the competitiveness of national economies. For instance, Tapscott argues that the development of the digital economy fosters new forms of interaction among government, business, and society [3]. In this context, digital platforms and information technologies contribute to the creation of new value-generation mechanisms, enhance the transparency of economic processes, and stimulate innovative entrepreneurship.

The analysis of transmission mechanisms through which digital technologies influence economic growth occupies a central place in the academic literature. Many researchers identify total factor productivity as one of the primary channels of this impact. In particular, studies by Bloom, Sadun, and Van Reenen demonstrate that the adoption of digital technologies improves management practices, optimizes production processes, and enhances the effective utilization of human capital [4]. Consequently, digitalization contributes to increased enterprise productivity and supports sustainable macroeconomic growth.

Special attention is given to the role of digital technologies in developing economies. Gulamov and other researchers emphasize that digital transformation represents a strategic priority for the modernization of Uzbekistan's economy [5]. According to their findings, the development of digital infrastructure, the implementation of e-government systems, and the expansion of digital platforms and data analytics contribute to improving public administration efficiency, fostering entrepreneurship, and strengthening the country's integration into the global digital economy.

Overall, the analysis of the scientific literature confirms that digital technologies serve as an important driver of socio-economic progress. At the same time, their impact is shaped by factors such as institutional

development, the quality of human capital, digital infrastructure, and the effectiveness of innovation and digitalization policies. Therefore, further research should focus on a quantitative assessment of the mechanisms through which digital technologies influence economic growth and socio-economic development.

RESEARCH METHODOLOGY

Research Design. The study is based on a case study approach, complemented by elements of trend analysis and comparative interregional analysis. This design enables a comprehensive assessment of the dynamics and spatial distribution of digital transformation processes in Uzbekistan during 2021–2026.

Data Sources:

1. Official documents: the “Digital Uzbekistan – 2030” Strategy, the “New Uzbekistan Development Strategy for 2022–2026,” and the Decree of the President of the Republic of Uzbekistan on the Development of Artificial Intelligence.

2. Departmental statistics: data provided by the Ministry of Digital Technologies of the Republic of Uzbekistan, including information from the My.gov.uz portal and the interdepartmental interaction system [8].

3. International indices: UN E-Government Survey (2022, 2024), GovTech Maturity Index (2022), and Speedtest Global Index (2020–2025).

4. Industry analytics: data from IT Park Uzbekistan, reports on IT service exports, and analyses of the venture capital market.

Research Methods:

1. Document analysis: systematic examination of the regulatory framework and strategic development documents.

2. Statistical analysis: evaluation of the dynamics of key indicators through the calculation of growth rates for the period 2021–2025 yoki 2021–2026.

3. Comparative analysis: comparison of digitalization levels between Tashkent city and regional areas.

4. SWOT analysis: identification of the strengths, opportunities, and development potential of digital transformation, as well as areas for further improvement.

ANALYSIS AND RESULTS

Analysis and Discussion of Results. Institutional Transformation: From “E-Government” to a “Digital State.”

The period 2021–2026 is characterized by a significant qualitative transformation in the development of the digital state in Uzbekistan. During this period, substantial progress has been achieved in the expansion of e-government services, the improvement of digital infrastructure, and the enhancement of public service delivery mechanisms. These developments reflect a systematic transition from traditional e-government models to a more integrated and service-oriented digital state.

The key indicators illustrating this transformation are presented in Table 1.

Table 1. Dynamics of E-Government Development in the Republic of Uzbekistan (2021–2026)

Indicator	2021–2022	2024–2025	Dynamics
Number of services on the My.gov.uz portal	347 (2022)	800 (2025)	+453 units (230%)
Registered users of the portal	over 3 million (2022)	12.5 million (2025)	+9.5 million (416%)
Mobile app users	2.5 million (2024)	7.5 million (2025)	+5 million (300%)
Volume of payments through the Unified Billing System	–	16.6 trillion UZS (2025)	–
Requests to the interdepartmental integration platform	–	5.1 billion (9 months, 2025)	+182%
EGDI Index (UN)	0.7265 (69th place, 2022)	0.7999 (63rd place, 2024)	+0.0734
GovTech Maturity Index (World Bank)	43rd place (2022)	–	+37 positions (since 2020)

Interpretation. The presented data confirm the institutional nature of digital progress in Uzbekistan. The country demonstrates a notable “time-compression effect,” whereby significant progress has been achieved within 3–4 years, comparable to developments that required decades in many advanced economies. The key drivers of this transformation include strong institutional support and a project-based approach, particularly



through the implementation of the “Digital Government” and “Digital Region” programs. The introduction of Mobile-ID (with more than 30,000 users in a short period) and the transition from paper-based civil registration (including QR-code-based systems) indicate a shift toward a modern, service-oriented digital architecture.

Startup Ecosystem and IT Exports: An Emerging Venture Market. Alongside the development of e-government, a dynamic innovation ecosystem is taking shape. As of 2024–2025, the startup ecosystem has reached an estimated value of \$3.9 billion, with more than 750 active startups and 15 venture funds. The volume of attracted venture capital investments exceeds \$180 million, while IT service exports reached \$344 million in 2023. These indicators reflect the rapid development of a technology-driven entrepreneurial environment.

Analysis. Uzbekistan is increasingly positioning itself as one of the most rapidly developing startup ecosystems in Central Asia. Notably, state policy has evolved from supporting an increase in the number of startups toward fostering scalable and high-value ventures. The strategic targets for 2030 include the development of at least 100 startups with a valuation exceeding \$10 million and 25 startups exceeding \$100 million. This shift highlights the formation of a venture-oriented model of digital development, which is becoming a distinctive feature of the national innovation system.

Digital Inclusion Challenges: Bridging the Structural Gap. Alongside these achievements, the analysis identifies areas requiring further development to ensure balanced and inclusive digital growth.

Infrastructure dimension. According to the Center for Development Strategy, internet subscriber density in Tashkent reaches 209 per 100 people, while in most regions it remains below 70. Mobile internet speeds in rural areas generally do not exceed 2 Mbps and may decrease to 10–50 Kbps during travel. Despite improvements in the Speedtest Global Index ranking (71st place in 2025 compared to 133rd in 2020), there remains considerable potential for enhancing service quality and regional coverage.

Skills dimension. Approximately 40% of schoolchildren possess basic computer literacy, while 37% demonstrate digital literacy. In rural areas, this figure remains below 30%. According to ADB estimates, around 15% of the population has basic digital skills, and 7–8% possess intermediate competencies. These indicators highlight the importance of strengthening digital education and skills development to support long-term innovation capacity.

Investment dimension. The share of digital sectors in foreign investment is approximately 5%, which exceeds the level observed in several Central Asian countries but remains below global benchmarks (24% in OECD countries and 14% in non-OECD economies). This creates opportunities for further expansion of investment flows into the digital economy (Figure 1).

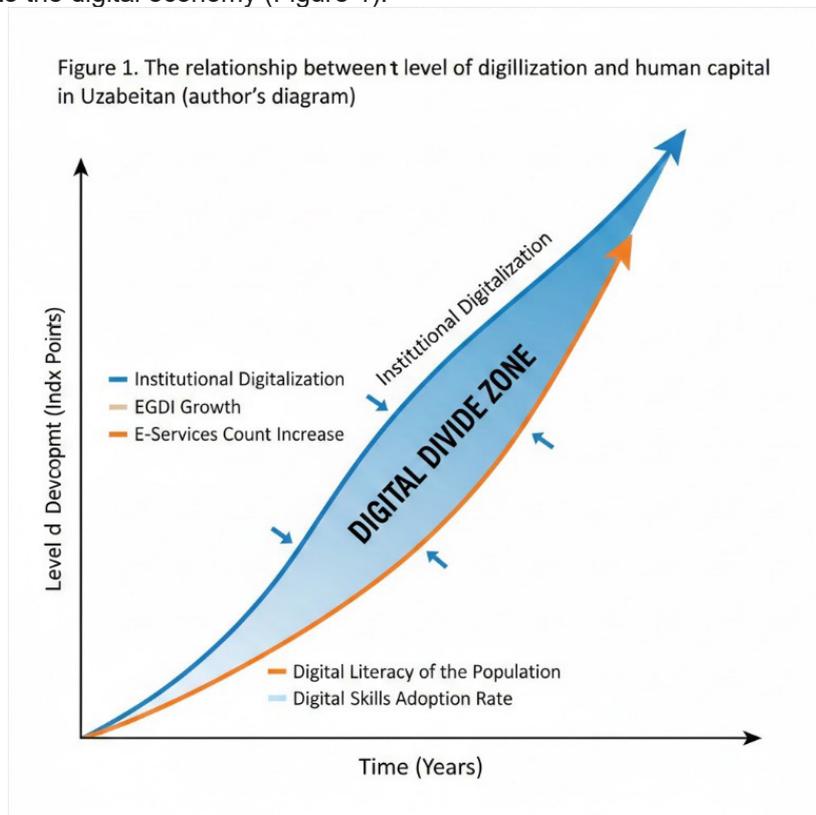


Figure 1. Relationship Between the Level of Digitalization and Human Capital in Uzbekistan

Conclusion on the Hypotheses. The empirical results provide substantial support for the proposed hypotheses. Hypothesis H1 is confirmed, indicating that the pace of institutional digitalization—reflected in the growth of the EGDI index and the expansion of public digital services—has progressed more rapidly than the development of human capital. Hypothesis H2 is also supported, demonstrating that the disparity between Tashkent and the regions remains significant and is closely associated with differences in digital literacy levels. Hypothesis H3 is likewise confirmed, suggesting that the effectiveness of digital technologies as a driver of socio-economic progress is primarily shaped by institutional capacity, educational development, and investment policy, rather than by technological limitations alone.

CONCLUSION AND RECOMMENDATIONS

Conclusions. The period 2021–2026 marked a significant transition for Uzbekistan from a stage of digital catch-up development to a phase of advanced digital transformation in the institutional sphere. The achieved results—reflected in improvements in EGDI, GovTech indicators, and IT service exports—indicate that the initial phase of the “Digital Uzbekistan – 2030” Strategy has been successfully implemented.

Digital technologies have become a key driver of socio-economic progress, although their benefits are distributed unevenly across different population groups. While advanced user segments, such as IT professionals and large businesses, fully utilize digital opportunities, regional populations are in the process of expanding their access and engagement with digital services.

The key priority for 2026–2030 is to transform the digital divide into an opportunity for inclusive growth. With the implementation of targeted and well-designed policies, digitalization can serve as a powerful instrument for reducing inequality and enhancing social cohesion.

Scientific Proposals:

- Development of a composite index “Inclusive Digitalization of Regions” (IDRI). Existing international indices (EGDI, NRI) have limited sensitivity to subnational disparities. The proposed methodology incorporates three sub-indices: infrastructure accessibility (0.4), digital competencies (0.4), and service demand (0.2).
- Introduction of the concept of “institutional–human digitalization lag.” This concept reflects the time gap between the implementation of digital solutions at the state level and the development of population competencies required for their effective use.

Practical Recommendations:

Infrastructure Policy:

- Accelerate the development of Internet Exchange Points (IXPs) with the involvement of global content providers. International experience indicates that the availability of IXPs can significantly reduce the cost of mobile internet traffic.
- Expand subsidized internet access for social facilities (schools, primary healthcare centers, and mahallas) in rural areas, including the use of alternative energy solutions such as solar-powered Wi-Fi hotspots.

Human Capital and Education Policy:

- Modernize school computer science curricula by transitioning to practice-oriented educational standards (drawing on international experience, such as the Malaysian #MyDigitalMaker initiative).
- Support the development of Uzbek-language mobile applications aimed at improving basic digital skills, based on best practices such as Digital India and K-MOOC programs.

Investment Policy:

- Increase the share of digital sectors in foreign investment from the current level of 5% to a target of 15% by 2030.
- Develop specialized financial instruments to attract foreign venture capital, including venture bonds and fund-of-funds mechanisms.

Institutional Measures:

- Establish mandatory requirements for the accessibility of e-government services for users with varying levels of digital literacy (including user-friendly interfaces in the state language, voice-assisted navigation, and video consultation services) within Cabinet of Ministers regulations.
- Introduce a system of regional “regional digital liaison officers,” responsible for monitoring the accessibility of digital public services and supporting citizens in their effective use.

Final Conclusion. Between 2021–2026, Uzbekistan has developed an institutional digitalization model that serves as a strong example within Central Asia. The next stage (2026–2030) should focus on deepening digital inclusion, where quantitative growth in infrastructure and services is complemented by qualitative improvements in digital literacy and equitable access to technology for all citizens, regardless of their place of residence or income level.

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