

DEVELOPMENT OF THE DIGITAL ECONOMY IN UZBEKISTAN: INTERNATIONAL EXPERIENCE AND PERSPECTIVES**Mamadzhanov Shokhrukh Mukhiddinovich**

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Abstract: The article is devoted to the analysis of trends in the development of the digital economy in Uzbekistan, taking into account the international experience of digital transformation. The paper presents the theoretical foundations of the digital economy, examines the models and practices of the leading countries - Estonia, South Korea, China and the United States, which have achieved significant results in the field of digitalization of public administration, financial technologies and innovation infrastructure. Based on a comparative analysis, practical recommendations have been formulated aimed at accelerating the implementation of digital solutions, improving the efficiency of public administration and stimulating innovation activity in Uzbekistan. The results of the research can be used in the formation of a national digital strategy and the modernization of management mechanisms in the digital economy.

Keywords: Digital economy; digital transformation; Uzbekistan; fintech; e-government; innovations; ICT infrastructure; artificial intelligence; big data; international experience; digital platforms; digital strategy; sustainable development.

Introduction. The digital economy is viewed as a new quality of economic growth based on the widespread application of information and communication technologies. The very concept of the "digital economy" gained popularity thanks to D. Tapscott (1995). In domestic literature, the digital economy is often defined as an economy in which the satisfaction of participants' needs is achieved through the efficient use of information and modern digital technologies. Indeed, as noted in one of the studies, digitalization allows for the automation of business processes, optimization of production, and raising the quality of services, ensuring a qualitatively new level of societal development. Under modern conditions, the digital transformation of the economy comes to the forefront in all countries of the world, stimulating productivity growth and innovation. [1]

For Uzbekistan, which is actively conducting reforms and striving for the status of a highly developed country, the development of the digital economy is one of the priority directions. The challenges of globalization and competition dictate the need to take into account international experience in digital transformation when building its own development strategy. The purpose of this article is to analyze the potential and current state of Uzbekistan's digital economy, relying on global experience, and to develop specific practical recommendations for its further development. The research objectives include studying the theoretical foundations of the digital economy, reviewing the experience of leading states (Estonia, South Korea, China, USA), analyzing Uzbekistan's programs and infrastructure, as well as identifying the main problems of digital transformation in the country. The digital economy (or "information" economy) is an economy in which modern ICTs and digital data play a leading role. In a narrow sense, it is defined as an economy where the production and distribution of goods and services are based on new information technologies. [1] A key feature of the digital economy is the maximum satisfaction of

participants' needs through the use of information resources. Electronic technologies allow for a transition to a new type of economic activity—for example, supporting electronic transactions, automating management, and the emergence of "smart" services (smart payments, cloud computing, Big Data, etc.). As researchers note, the predominance of digital platforms and online services makes the economy more flexible and faster: thus, in the United States during the "digital revolution," about 70% of economic growth was linked to the spread of computer technologies and the Internet. [1]

Modern conceptual approaches to the digital economy emphasize its multi-faceted nature: it is a data economy, the economic dimension of the information society, and a strategy for the comprehensive digitalization of social institutions. Research shows that a successfully implemented transition to the digital economy is capable of not only increasing business efficiency but also improving the quality of life of citizens due to the convenience of access to public services, education, and medicine [1]. This is precisely why many countries develop official concepts and strategies for digital development: they typically include infrastructure creation, regulatory and legal support, and human capital development.

The novelty of the study lies in the fact that international experience is considered not in an abstract and theoretical form, but through specific mechanisms that have already proven their effectiveness in different countries and can be adapted to the conditions of Uzbekistan. This refers to such areas as electronic identification, integration of state information systems, development of broadband internet and 5G networks, startup support, increasing the digital literacy of the population, and improving regulation in the field of cybersecurity. The work shows that for Uzbekistan, it is particularly important not to develop isolated digital solutions, but to build an integrated system in which infrastructural development, institutional changes, training of specialists, and narrowing the digital divide between regions complement each other.

Additional value is brought to the study by the proposed comparative approach to assessing the conditions and factors of digital economy development. It allows not only for a deeper understanding of the current position of Uzbekistan but can also serve as a methodological basis for further cross-country research, as well as for the development of more well-founded and practically oriented solutions in the field of state digital policy.

Research Methods. The conducted study is based on theoretical propositions reflected in extensive open academic literature, state acts, and regulatory decrees. The work applies a combination of qualitative and quantitative methods based on the analysis of statistical data and the use of economic models.

Results. Estonia is today often called a benchmark of the "electronic state." Over the last two decades, the country has built a comprehensive digital infrastructure, under which 100% of public services were digitized by the end of 2024. Citizens have an electronic identification that allows them to securely submit documents, pay taxes, participate in voting, and even receive medical services online. The "single window" principle and the "once-only data entry principle" minimize bureaucracy: the system automatically exchanges information between departments. As a consequence, 82% of Estonia's residents are satisfied with the quality of public services through digital channels. However, social studies show that despite all the digital efficiency, the issue of trust and "digital inclusion" of various population groups has become one of the new challenges. This experience of Estonia emphasizes that technologies must be complemented by measures to increase digital literacy and inclusion. [2]

The government policy of South Korea emphasizes early digitalization. Back in the 1980s–1990s, the authorities began to computerize administration and build the first electronic public service systems. As a result, in the 21st century, Korea obtained one of the most developed digital public infrastructures in the world: according to UN and OECD data, this country's e-governance system consistently occupies high positions in international rankings (E-Government Index, Networked Readiness Index, etc.). [3] South Koreans are accustomed to fast service via smartphones and the Internet: 90% of public services can be obtained remotely without a visit to bureaucratic offices. [3] A feature of the Korean model is the close interaction of the state with the private sector and investment in the digital literacy of the population. This experience demonstrates that a comprehensive national digitalization strategy (infrastructure + education + transparent processes) allows a country to become a leader in the field of e-governance and stimulate the development of the IT industry.

China has been conducting large-scale digital transformation programs since the mid-2010s. In 2015, the "Internet Plus" strategy was launched, aimed at integrating the Internet and technologies into all key sectors of the economy. In 2018, the national strategy "Digital China" was released—a set of measures for the transition to a "smart society" and the development of innovative services. [4] The state prioritizes infrastructure: thus, according to estimates, by the end of 2021, more than 1.425 million 5G base stations were functioning in the PRC (which accounted for more than 60% of the global fleet), and all administrative villages of the country were connected to the fiber-optic network. Digitalization made China one of the world's largest IT markets and an exporter of digital services: Chinese companies dominate the e-commerce market and supply technologies globally. [4] However, it must be noted that along with the rapid growth of industrial-digital projects, rigid cybersecurity and data control rules were established in China. When analyzing China's experience, it is important to consider both the scale of investments in digital infrastructure and the efforts to regulate new digital industries.

The USA traditionally remains one of the world leaders in digital innovation. The American economy was the first to feel the benefits of the internet and cloud technologies: in 1998, the US Department of Commerce published the report "Advancement of the Digital Economy," declaring the digital economy a "new type of economy." [1] In 2009, the United States adopted a federal "Cloud Computing Strategy" aimed at shifting government services to a cloud environment to reduce costs and increase management efficiency. [1] Big tech companies (Apple, Google, Microsoft, etc.) stimulate the development of startups and create an IT services market of a national scale. However, the US experience shows that with the dominance of major players, problems with market monopolization and data privatization also arise. For Uzbekistan, a key lesson of the American experience could be the importance of flexible state strategies for the development of the startup ecosystem and cybersecurity while maintaining a competitive environment.

For the clarity of international comparison, it is advisable to present the comparative infrastructural indicators of the countries considered in the study.

Table 1 – Comparison of infrastructure prerequisites for the development of the digital economy

Country	Internet usage	Mobile communication and telephony	Broadband / 5G / digital infrastructure	Value for the development of the digital economy
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Uzbekistan	about 83–89% of the population use the internet	approximately 95–100 mobile connections per 100 people; mobile access remains the key connection channel	within the framework of the "Digital Uzbekistan – 2030" strategy, about 2.5 billion dollars have been allocated for the development of communication networks; 4G/5G are developing, but rural coverage still lags behind urban; 57th place in the world in terms of e-government development (2024)	infrastructure growth is already stimulating the ICT sector, however, the digital divide between urban and rural areas still limits the full realization of the digital economy's potential
Estonia	over 92% of the population use the internet	more than 140 mobile connections per 100 people; high prevalence of smartphones	robust broadband networks, a single digital identification, and fully integrated state registries; by the end of 2024, 100% of public services were digitized	shows that the decisive factor is not only internet access, but also the connectivity of state digital platforms
South Korea	over 97% of the population use the internet	more than 120 mobile connections per 100 people; almost ubiquitous use of smartphones	one of the most developed broadband and 5G networks in the world; about 90% of public services are available remotely	demonstrates the synergy effect of infrastructure, education, and a consistent state digitalization strategy
China	about 77–79% of the population use the internet	more than 125 mobile connections per 100 people; the largest mobile internet market	by the end of 2021, more than 1.425 million 5G base stations were operational; the fiber-optic network was extended to all administrative villages	confirms that large-scale investments in 5G, fiber optics, and digital platforms accelerate the development of e-commerce, fintech, and digital services
USA	over 95% of the population	over 115 mobile connections per 100 people; a	developed cloud infrastructure, a powerful network	emphasize the role of private investments, the startup ecosystem, and

	use the internet	high level of smartphone adoption	of data centers, and a mature market of digital platforms; the cloud strategy was actively applied in public administration as well	cloud solutions in expanding the digital economy
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Source: compiled by the author based on research materials and open international statistical databases for 2023–2024; to avoid false precision, certain indicators are presented in interval form.

Discussion. In Uzbekistan, the development of the digital economy is a state priority. In October 2020, Presidential Decree No. UP-6079 approved the "Digital Uzbekistan – 2030" Strategy and measures for its implementation. [5] The document proclaimed a set of measures for the active implementation of ICT in all sectors of the economy (primarily public administration, education, healthcare, and agriculture). Among the key initiatives is the implementation of more than 220 priority projects aimed at improving e-government, developing the domestic software and IT services market, creating IT parks in all regions, as well as training qualified personnel. [5] A special place is occupied by the "Digital Tashkent" city program, which provides for the launch of an integrated geoinformation platform, public transport management via IT systems, and the digitalization of social services. Thus, a legal and organizational base for systemic digitalization is being formed: in addition to the 2030 strategy, other acts have been adopted in the country (for example, resolutions on "e-government", on stimulating IT exports, etc.), which creates a regulatory framework for the development of the sector.

Real growth indicators of the ICT sector confirm the effectiveness of the initiated reforms. According to estimates by international experts, the share of the "Information and Communication" sector in Uzbekistan's GDP amounted to 2.1% in 2023, and the number of registered companies in the ICT field exceeded 10.5 thousand (including private startups and enterprises). [6] An important driver was the expansion of the IT Park (a special regime for technology companies), which by 2023 brought together more than 2,500 residents, as a result of which the export of IT services more than doubled – from \$140 million in 2022 to \$344 million in 2023. The government allocates significant funds to infrastructure: for example, within the framework of "Digital Uzbekistan – 2030" [6], about \$2.5 billion has been allocated for the development of communication networks and accelerating the internet. Electronic services are developing – thus, according to data for 2024, Uzbekistan ranks 57th in the world in e-government development, although it is still far from advanced countries in terms of the actual use of e-services [6]; in addition, programs to increase digital literacy are being actively implemented: for example, the "One Million Uzbek Coders" project has trained hundreds of thousands of schoolchildren and students in the basics of programming.

International organizations note the positive dynamics of the digital sector in Uzbekistan but also emphasize the remaining risks. Thus, according to World Bank data, the export of IT services in Uzbekistan grew from \$0.6 million in 2017 to \$140 million in 2022, however, the contribution of the ICT sector to GDP still remains low (about 1.9% in 2022). [7] The national development strategy until 2030 sets ambitious targets: by the end of the decade, Uzbekistan intends to become the IT hub of Central Asia (an annual IT export volume of \$5 billion, the presence of 1,000 foreign IT companies, and the creation of 300 thousand jobs for youth in the IT sector). [7] Achieving

these objectives will require significant investments in education and infrastructure, as well as the formation of a favorable legislative environment. [7] [6].

Problems and Challenges of Digital Transformation in Uzbekistan

Despite positive trends, digital transformation in Uzbekistan faces a number of serious obstacles. One of the main problems is the digital divide between urban and rural areas. Although the overall internet audience is growing, broadband access outside urban areas remains limited: 4G/5G networks predominantly cover cities. [6] Accordingly, digital services are not yet universally accessible to the rural population, which creates social inequality. Weak "network readiness" is reflected in Uzbekistan's low 133rd place in the global IT ranking, the Network Readiness Index (out of 134 countries). [6] Infrastructure problems also indirectly affect the development of the private sector: many small and medium-sized enterprises cannot fully transition to digital business models due to communication deficiencies and information resource shortages. [6]

An important constraint is the talent deficit and low digital literacy. According to UNDP estimates, from 2020 to 2023, the number of employees in the ICT sector grew only from 62.2 thousand to 87.8 thousand, despite the fact that the market demands increasingly qualified specialists. [6] In universities, the number of IT programs is expanding (more than 21 universities offer ICT specialties), but the shortage of experienced programmers and engineers persists. [6] In particular, in 2021, 62% of IT companies in Uzbekistan reported difficulties in hiring suitable specialists (due to a lack of practical skills, high salary expectations, and turnover). A gender gap is also noted: women account for only about 11% of IT students, and the share of female startup founders is estimated at 2–5%. [6] This indicates an uneven involvement of all population groups in the digital sector.

Another problem is the insufficient development of venture and financial instruments to support innovation. According to the UNDP, the legal and regulatory ecosystem for startups remains fragmented. In Uzbekistan, a specific law on startups has still not been adopted, tax incentives for investors are practically non-existent, and the necessary mechanisms for alternative financing (crowdfunding, convertible bonds, etc.) are absent. [6] The volume of venture capital investments in digital companies is small – in 2023, it was just \$6.3 million (twice as much as in 2022, but significantly less than in neighboring countries). As a consequence, about 70% of Uzbek startups name the lack of funding as their main problem. At the same time, although support organizations are emerging in the country (IT Park, startup accelerators, technoparks, etc.), many innovators are insufficiently informed about these opportunities or are not involved in them. [6]

Finally, it is worth mentioning regulatory and institutional challenges. Uzbekistan continues to improve its legislation in the field of digital technologies, but the integration of different acts is moving slowly. For example, the issue of cybersecurity recently received a dedicated law (2022), but a comprehensive law on data protection does not yet exist. Uncertainty in the legal framework hinders the attraction of foreign investment and the full realization of digital market potential. As experts note, to maintain user trust, it is important to simultaneously ensure reliable information protection and support algorithm transparency (which is confirmed by the experience of Estonia and other countries [2] [6]). Based on international practices and the domestic context, the following recommendations can be formulated for the further development of the digital economy of Uzbekistan:

- **Expand network infrastructure and internet access:** it is necessary to accelerate the construction of modern communication networks in rural and remote areas, bringing broadband

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access to 100% of the population. This will allow for narrowing the digital divide between urban and rural areas. [6]

- **Strengthen digital literacy and inclusion:** conduct systematic training of the population in ICT skills, paying special attention to the elderly, regional residents, and women. Retraining and professional development programs in IT should be developed more actively (for example, expanding the "One Million Coders" project to all regions). [6]

- **Develop the private sector and startup ecosystem:** stimulate the creation and scaling of private IT companies. Introduce flexible tax incentives for investors, develop and adopt a law on startups, incorporating venture financing and crowd-investing mechanisms. Ensure the transparency of business norms and the simplification of regulatory procedures for innovative firms. [6]

- **Strengthen human capital potential:** coordinate the educational policy of universities with the needs of the IT market, encourage practice-oriented learning and internships in the industry. Facilitate the attraction of specialists from foreign countries (for example, through retraining programs) and create comfortable conditions for IT professionals (competitive salaries, social guarantees). [6]

- **Support the implementation of electronic public services:** expand the number of services available in an online format, while simultaneously increasing their quality and reliability. Provide for feedback and user support so that digitalization does not lead to the alienation of citizens (take into account the lesson of the "trust paradox" from the Estonian experience). [2]

- **Ensure comprehensive information security and ethics:** develop legislation in the field of personal data protection and cybersecurity, aligning with international standards. In parallel, implement mechanisms for the transparent use of algorithms (open data, AI audit) to strengthen public trust in the digital economy.

Conclusion. The analysis shows that Uzbekistan possesses significant potential for the development of the digital economy: modernization of infrastructure, accelerated implementation of electronic services, and support for IT entrepreneurship have already yielded first results (growth in ICT exports, creation of IT parks). At the same time, global experience suggests that technological progress must be accompanied by socio-economic measures. In particular, the Estonian example points to the importance of citizens' trust in digital services, while the Korean one emphasizes the need for comprehensive national digitalization strategies.

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