



THE ROLE OF DIGITAL SOLUTIONS IN IMPROVING THE EFFICIENCY OF URBAN MANAGEMENT: EXPERIENCE, RISKS, AND PROSPECTS FOR UZBEKISTAN

Shatokhina Svetlana Yuryevna,

Senior Lecturer, Department of

"Macroeconomic Policy and Forecasting"

Tashkent State University of Economics

sshatokhina165@gmail.com

ORCID iD: 0009-0004-7388-4684

Аннотация: в статье рассматривается влияние цифровых решений на повышение эффективности управления городским хозяйством в Узбекистане. Проведен анализ текущего состояния цифровизации, выявлены институциональные и инфраструктурные барьеры, а также региональные различия в доступе к цифровым услугам. На основе статистических данных определены ключевые тренды, возможности и риски внедрения цифровых технологий в городское управление. В работе предложены практические рекомендации по формированию устойчивой цифровой экосистемы на уровне муниципалитетов.

Ключевые слова: городское управление, цифровизация, цифровые технологии, Узбекистан, смарт-город, цифровая инфраструктура, региональная политика, устойчивое развитие.

Abstract: The article examines the impact of digital solutions on improving the efficiency of urban management in Uzbekistan. It analyzes the current state of digitalization, identifies institutional and infrastructure barriers, and highlights regional disparities in access to digital services. Based on statistical data, the study outlines key trends, opportunities, and risks related to the implementation of digital technologies in municipal governance. The paper proposes practical recommendations for building a resilient digital ecosystem at the local government level.

Key words: urban management, digitalization, digital technologies, Uzbekistan, smart city, digital infrastructure, regional policy, sustainable development.

INTRODUCTION

In the context of rapid digital technology development, the issue of effective urban management has become increasingly important. The growth of urban populations, the complexity of city infrastructure, and limited resources demand the adoption of innovative management approaches—among which digital solutions play a key role. Digitalization enables not only the automation of routine processes but also the creation of a fundamentally new model of interaction between government authorities, residents, and businesses based on principles of transparency, responsiveness, and sustainability [1, 2].

For the Republic of Uzbekistan, the transition to digital urban management is both a strategic priority and a potential risk. In recent years, the country has actively implemented initiatives aimed at the digital transformation of the economy and social sectors, including the development of e-government, the introduction of “smart” urban solutions, and the creation of digital platforms and services [3, 4]. However, the level of digitalization across urban management systems remains uneven, and the effectiveness of implemented measures is constrained by various factors—ranging from legal and infrastructural to human resource and organizational challenges [5, 6].

The aim of this study is to analyze the role of digital solutions in improving the efficiency of urban management in Uzbekistan, with a focus on current experience, identification of key risks, and the development of practical recommendations and promising directions for further development. The research is based on a comparative analysis of international best practices, an assessment of the current state of digitalization in Uzbek cities, and the author’s proposals for

institutional and organizational rethinking of urban governance approaches in the digital age.

LITERATURE REVIEW

A review of theoretical and applied studies in this area shows that digital technologies are becoming an integral element of modern urbanism and strategic planning. In the works of S. M. Markova [1] and S. Yu. Glazyev [2], the importance of digital transformation is emphasized as a foundation for building “smart” cities, where governance is based on data analysis and algorithmic modeling. These ideas are further developed in international Smart City concepts, aimed at optimizing processes in housing and utilities, transportation, environmental management, and social infrastructure.

Domestic scholars are also increasingly addressing issues related to the digitalization of urban management. For instance, I. A. Nazarov [5] identifies organizational challenges that hinder the effective implementation of digital solutions in the management of urban environments in Uzbekistan. Meanwhile, F. T. Bekmurodov [6] highlights the shortage of qualified personnel as one of the key threats. Furthermore, the *Digital Uzbekistan – 2030 Strategy* [3] and publications from the Ministry of Digital Technologies [4] set out strategic goals for implementing digital solutions across the country’s regions, providing an institutional foundation for the digital modernization of cities.

METHODS AND METHODOLOGY

Based on the above, this study adopts an interdisciplinary approach that integrates principles from management theory, urban studies, digital economy, and regional development. The methodological foundation of the research includes comparative analysis, systems and factor-based approaches, as well as expert assessments and content analysis of Uzbekistan’s regulatory and strategic documents.

The research relies on both primary data (official statistics) and secondary sources such as academic publications, analytical reviews, and international reports.

ANALYSIS AND RESULTS

Based on the chosen methodology, a comprehensive assessment was carried out to evaluate the current state of urban digitalization in Uzbekistan. The analysis covers key areas of digital solution implementation—transport, utilities (housing and communal services), environment, urban infrastructure—as well as the degree of involvement of local authorities and the public in digital governance processes.

Drawing on the data from [7, 8], the following key indicators of digitalization and the adoption of digital solutions in urban management were identified:

1. Open Data Index – Uzbekistan rose to 12th place out of 198 countries in the Open Data Inventory (ODIN) with a score of 83 points, maintaining its leadership among Central Asian nations.
2. Internet Penetration and E-Government Development – Over 64% of the population (from a total of 35 million) actively uses the internet. Approximately 82% of government services are delivered through the e-government portal, which currently offers over 729 digital services.
3. Investment in Geospatial Data – In May 2025, the World Bank approved a concessional loan of \$35 million, and the government allocated an additional \$5.7 million for a project to enhance access to geospatial data, support 3D modeling of Samarkand, and digitalize land cadaster records.
4. Digitalization of Utilities and Construction Sectors – The Digital Uzbekistan – 2030 state program includes measures for digitalizing various sectors, including housing and communal services (HCS). Under presidential orders from 2020 to 2022, more than 400 information systems and digital services were developed.

5. Growth of the ICT Sector – From 2018 to 2023, the number of ICT companies increased 1.8 times, reaching 12,000. The industry employs over 100,000 specialists, and IT parks hosted 846 resident companies in 2023. The average salary in Tashkent's tech sector reached 16.2 million UZS (approx. \$1,267).

These findings indicate that digitalization of urban governance in Uzbekistan is progressing under strong governmental policy, institutional support, and substantial technological investments. However, to obtain a complete picture, it is essential to analyze core digital indicators that reflect the current level of implementation of information systems, accessibility of digital services, and the development of the ICT sector.

A summary of these indicators is presented in Table 1.

Table 1.

Key Digital Indicators of Uzbekistan

№	Indicator	Value
1	ODIN Ranking Position	12 / 198
2	ODIN Score	83
3	Internet Coverage	> Over 64% of the population
4	E-Government Services Available via Portal	82 % (~729 services)
5	Geospatial Credit (World Bank + State Budget)	\$40,7 million
6	IT Companies	≈ 12 000
7	Employment in the ICT Sector	> 100 000 people.
8	Average Salary in IT (Tashkent)	16.2 million UZS (~\$1,267)

The data presented in Table 1 illustrate the general direction of digital transformation in Uzbekistan, encompassing infrastructure, access to technology, and institutional changes. At the same time, a comparative analysis is necessary for

a deeper understanding of ongoing processes, allowing the identification of key differences between the current state of digitalization and its future prospects. Such a comparative overview is provided in Table 2.

Table 2

Comparative Analysis of the Current State and Prospects of Digitalization in Urban Governance in Uzbekistan

№	Direction	Uzbekistan (2025)	Development Prospects
1	Open Data	Regional Leader in Central Asia (12th place in ODIN ranking)	<i>Expansion of open platforms and APIs for information systems</i>
2	Online Public Services	82% of services are available	Complete digital transition of the remaining government services
3	Geospatial Data	loans for 3D models and cadastral systems	Implementation in cities
4	Digitalization of Public Utilities	Start of digitalization programs	Expansion of public utilities coverage and digital infrastructure
5	Digitalization of Public Utilities	Rapid growth, over 100,000 employed	Human capital development and IT services export

Thus, the comparative analysis shows that despite the progress achieved in several areas — particularly in open data and online services — there remains significant potential to enhance the effectiveness of digital governance at the urban management level. The most pressing challenges include expanding the coverage of

digital services in regional and smaller cities, strengthening human resource capacity, and developing infrastructure.

Over the past five years, Uzbekistan has demonstrated steady growth in key digital indicators related to urban environment management. National and regional programs have supported the development of essential areas — from the implementation of electronic public services to digital mapping and telecommunications coverage.

Therefore, the development of digital technologies in the management of the urban environment in Uzbekistan is characterized by consistently positive trends. The most dynamic progress is observed in areas related to e-government services, internet infrastructure, and activities in the ICT sector.

To visually illustrate the dynamics of key digitalization indicators over recent years, **Table 3** presents aggregated data for the period from **2019 to 2024**.

Table 3.

Dynamics of Key Digitalization Indicators in Urban Management of Uzbekistan (2019–2024.)*

№	Indicator	Period (year)			Growth over 5 years
		2019	2021	2024	
1	Share of Population Using the Internet	49%	57%	64%	+15 p.p.
2	<i>Number of Electronic Government Services</i>	250	460	>700	+180 %
3	<i>Number of ICT Companies (ICT – Information and Communication Technology)</i>	6800	9000	12000	+76 %
4	Number of IT Park Residents	243	510	846	+248 %

5	<i>Share of Cities Connected to GIS Services</i> <i>(GIS – Geospatial Information Systems)</i>	<10 %	≈20 %	~40 %	+30 p.p
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* Source: Compiled by the author based on data from the Ministry of Digital Technologies of the Republic of Uzbekistan, IT-Park.uz, and data.egov.uz

Thus, the pace of digital transformation in Uzbekistan remains high, particularly in the areas of IT entrepreneurship, internet access, and electronic interaction between citizens and the government. However, this rapid growth is accompanied by disparities in coverage across regions and sectors of governance.

It should be noted that the intensity of digital transformation in urban management is directly linked to the level of digital accessibility among the population — especially with regard to mobile connectivity, which serves as the primary channel for accessing most electronic services.

To illustrate this, let us examine the statistics on the number of mobile subscribers by region of the Republic of Uzbekistan as of April 1 of each year during the period 2020–2024 (Table 4).

Table 4.

Number of Mobile Subscribers in Uzbekistan by Region (thousands of subscribers, as of April 1) [7]

Regions	2020	2021	2022	2023	2024
Republic of Uzbekistan	24 316,7	26 953,5	29 912,8	32 245,2	33 909,0
Republic of Karakalpakstan	1 347,4	1 374,1	1 442,0	1 507,2	1 572,8
regions:					
Andijan	2 025,2	2 035,5	2 531,4	2 691,3	2 816,4

Bukhara	1 366,8	1 379,2	1 505,0	1 557,6	1 624,0
Jizzakh	861,7	887,7	985,2	1 045,9	1 126,8
Kashkadarya	1 889,6	1 981,9	2 150,7	2 229,8	2 405,8
Navoi	876,1	893,7	990,6	1 042,9	1 080,9
Namangan	1 854,7	1 844,4	2 267,0	2 391,3	2 483,5
Samarkand	2 330,3	2 381,4	2 843,8	2 995,2	3 185,0
Surkhandarya	1 472,6	1 480,6	1 669,4	1 806,7	1 871,4
Syrdarya	596,4	639,5	710,3	736,2	812,1
Region					
Tashkent	1 243,6	1 461,3	1 708,6	1 807,7	2 226,2
Region					
Fergana	2 590,5	2 754,5	3 088,5	3 223,5	3 310,3
Khorezm	1 246,7	1 266,1	1 352,6	1 427,7	1 561,5
Tashkent city**	4 615,1	6 573,6	6 667,8	7 782,1	7 832,3

** Including the volumes of "UNITEL" and "RUBICON WIRELESS COMMUNICATION" in Tashkent Region

As shown in the table, during the period from 2020 to 2024, all regions of Uzbekistan experienced growth in the number of mobile subscribers, indicating an expansion of the population's digital engagement. However, the pace of this growth varies: while Tashkent, Fergana, and Samarkand regions show particularly high increases, regions such as Syrdarya, Jizzakh, and Navoi demonstrate more moderate changes.

To better illustrate the territorial structure and dynamics of subscriber activity, the data are presented in graphical form (Figure 1).

Despite the overall increase in the number of mobile subscribers, a noticeable territorial disparity in digital engagement persists. In regions such as Jizzakh, Syrdarya, and Navoi, the growth rates remain below the national average, highlighting the need for more targeted digital policy measures.

CONCLUSIONS AND RECOMMENDATIONS

The analysis conducted allows us to draw the following conclusions:

First, Uzbekistan demonstrates a steady positive trend in the digitalization of urban management, as evidenced by the increasing number of e-services, ICT companies, and expanded internet access.

Second, the main drivers of digital transformation are state programs, the activities of IT parks, the development of online services, and the implementation of GIS technologies.

Third, despite the progress, structural and organizational risks remain relevant. These include infrastructure disparities, a shortage of skilled personnel, fragmented systems, and limited citizen engagement.

Fourth, the absence of a unified digital governance architecture and insufficient integration of information systems among city services reduce the effectiveness of decision-making.

Fifth, small towns and remote areas require more targeted digital support and prioritized development of ICT infrastructure.

Based on the above conclusions, the following recommendations are proposed:

1. Develop and implement a unified digital platform "Smart City Uzbekistan" to ensure the integration of all information systems at the level of urban management;
2. Strengthen digital infrastructure development in small and medium-sized cities using public-private partnerships and grant programs;
3. Establish regional IT competence centers to train personnel in digital governance, GIS, and urban planning;
4. Introduce digital maturity indicators for local self-government bodies into the system for evaluating local administrations;

5. Expand citizen participation through interactive digital platforms, mobile applications, and e-surveys to increase transparency and accountability of authorities;

6. Develop legal and regulatory frameworks that define standards for digital systems in urban management and protect personal data.

Digital transformation in the management of urban services in Uzbekistan is becoming a key factor in enhancing the resilience, transparency, and quality of municipal services. Over the past five years, there has been significant growth in internet users, an expansion in the range of electronic public services, increased activity among IT companies, and the development of digital infrastructure in cities.

The analysis has shown that, although digitalization is progressing overall, regional disparities persist — particularly in the coverage of GIS services, mobile connectivity, and human resources. The identified risks — infrastructural, organizational, and institutional — require a systematic response aimed at leveling the digital potential of cities.

Uzbekistan needs a strategic shift from fragmented digital solutions to the comprehensive implementation of a unified digital urban governance architecture. It is also crucial to ensure personnel training, active public participation, legal protection of digital information, and sustainable financing for digital initiatives.

Thus, digital technologies can become not only a tool for optimizing urban services but also a foundation for creating a comfortable, safe, and sustainable urban environment. Their effective implementation will determine the pace and quality of future urban development in Uzbekistan.

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