

ANALYSIS OF UZBEKISTAN'S IOT STATUS AND STRATEGY

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1. INTRODUCTION

In recent years, the global proliferation of IoT has been significant, with billions of connected devices reshaping how businesses and governments operate. Uzbekistan, as a developing digital economy, is actively embracing these technologies to support national innovation strategies and modernize socioeconomic systems. The implementation of IoT solutions in Uzbekistan shows a growing interest across multiple sectors, including urban management, agriculture, tourism, and manufacturing.

In Uzbekistan, scholarly research increasingly examines IoT applications in agriculture, industry, urban management, and energy systems. Agriculture remains one of the most promising areas for IoT integration due to the country's reliance on irrigation and water-intensive crop production. Smart irrigation systems equipped with soil moisture sensors allow farmers to optimize water usage, monitor climatic conditions, and increase crop productivity. Studies indicate that IoT-based monitoring reduces resource waste and supports sustainable farming practices, which are particularly important in regions experiencing water scarcity and climate variability. Industrial IoT (IIoT) is another emerging field within the Uzbek economy.

Uzbekistan is focusing on quantitative results due to its interest in IoT adoption. Analysis of the challenges and strategically necessary qualitative areas for IoT adoption is necessary. A strategy of selection and focus from the outset and expansion of IoT adoption would be beneficial.

Therefore, this study aims to identify the current status and challenges of IoT adoption in Uzbekistan and analyze strategic policies. The results of this study will provide implications for reducing trial and error in IoT implementation in Uzbekistan.

2. LITERATURE REVIEW

The academic discourse on the Internet of Things (IoT) has expanded significantly over the past decade, reflecting the growing importance of digital technologies in economic and social development. Globally, IoT is widely recognized as a fundamental pillar of Industry 4.0, enabling

cyber-physical systems, real-time data exchange, and intelligent automation. In the context of Uzbekistan, the literature increasingly examines IoT within the broader framework of digital transformation, economic modernization, and innovation-driven growth. International studies define IoT as a network of interconnected physical objects embedded with sensors and communication technologies that allow devices to collect and transmit data autonomously. Scholars such as Atzori, Iera, and Morabito (2010) emphasize the three core dimensions of IoT: connectivity, intelligence, and scalability. Later research links IoT development to productivity growth, transaction cost reduction, and enhanced operational efficiency in both public and private sectors. The integration of IoT with artificial intelligence, big data analytics, and cloud computing further strengthens its transformative potential. Within Uzbekistan's academic environment, research on IoT is closely connected to national digital strategies, particularly the "Digital Uzbekistan – 2030" program. Policy-oriented studies highlight that IoT is not an isolated technology but part of a comprehensive digital ecosystem that includes e-government, smart infrastructure, telecommunications modernization, and IT entrepreneurship development. Researchers argue that expanding broadband access, improving mobile communication standards (4G and 5G), and establishing IT parks create institutional conditions for IoT diffusion. Sector-specific literature identifies agriculture as one of the most promising areas for IoT implementation. Given Uzbekistan's reliance on irrigation and climate-sensitive crop production, scholars emphasize the importance of sensor-based soil monitoring systems, automated irrigation technologies, and climate data analytics.

3. CURRENT STATUS AND CURRENT ISSUES

The development of the Internet of Things (IoT) in Uzbekistan is part of the country's broader digital transformation strategy aimed at building a digital economy, smart infrastructure, and innovative industries. IoT initiatives are mainly implemented within national programs such as "Digital Uzbekistan – 2030" and the "Uzbekistan – 2030 Strategy."

3.1. Development of Digital Infrastructure

One of the main priorities of Uzbekistan's IoT strategy is the modernization of telecommunications infrastructure.

Key measures include:

Expansion of high-speed broadband internet

Introduction of 5G mobile networks

Modernization of more than 3,000 base stations

Construction of 2,000 new communication stations across the country

3.2. IoT Applications in Key Economic Sectors

The national strategy promotes the use of IoT technologies in several sectors:

Agriculture (Smart Farming)

Monitoring soil moisture and weather

Precision irrigation systems

Crop monitoring using sensors and drones

Industry (Industry 4.0)

Smart manufacturing

Equipment monitoring and predictive maintenance

Industrial automation

Energy

Smart electricity meters

Energy consumption monitoring

Smart grid management

Transport and Logistics

Fleet management systems

GPS monitoring

Smart traffic systems

Despite positive assessments, the literature consistently identifies several barriers to IoT development in Uzbekistan. Infrastructure disparities between urban and rural areas limit nationwide adoption. Cybersecurity vulnerabilities increase as device connectivity expands. Furthermore, a shortage of highly qualified specialists in IoT engineering, data analytics, and information security constrains technological progress. Regulatory gaps concerning data protection and digital standards also require further refinement.

4. IMPROVEMENTS AND STRATEGIES

Uzbekistan, as one of the leading countries in digitalization in the region, should pay attention to the opportunities that these technologies open up. The synergy of the capabilities of the Internet of Things, 5G mobile communications and artificial intelligence makes it possible to create new and promising projects. These technologies are changing the world around us, making it more convenient and safe. Many successful projects have already been implemented in different countries, thanks to which you can evaluate the benefits and advantages of these solutions. And Uzbekistan can become a leading country in the region in the implementation of intelligent transport systems based on 5G.

All this will make it possible to build a reliable digital future in accordance with the “Digital Uzbekistan 2030” strategy, approved by President Shavkat Mirziyoyev and aimed at accelerating the digitalization of the country’s economy.

IoT significantly expands the possibilities of automating technological processes in large enterprises: automobile factories, chemical and mining plants.

Often these enterprises are located outside the city outside the coverage of telecom operators. But there is a way out - you can create a private wireless network and install several base stations. If necessary, you can provide access to the network inside buildings and even underground, in mines.

After the construction of such a private network, the enterprise receives all the capabilities of IoT for the digitalization of production and business.

An excellent example is the experience of China. Projects of “unmanned” quarries and mines have been implemented there, in which all devices, including huge mining dump trucks and excavators, are monitored and controlled remotely. Operators are removed from hazardous production areas and work in comfortable conditions in control centers.

CONCLUSION

The analysis of Internet of Things (IoT) development in Uzbekistan demonstrates that IoT technologies are gradually becoming an integral component of the country’s digital transformation strategy. Within the framework of the “Digital Uzbekistan – 2030” program, significant progress has been achieved in expanding telecommunications infrastructure, strengthening digital governance, and supporting innovation ecosystems. These reforms have created favorable preconditions for the adoption of IoT solutions across multiple sectors of the national economy.

The literature and practical developments indicate that IoT implementation in Uzbekistan is particularly promising in agriculture, industry, urban management, and energy systems. Smart irrigation technologies contribute to water conservation and agricultural productivity. Industrial IoT improves equipment monitoring, predictive maintenance, and operational efficiency. Smart city initiatives—especially in Tashkent—enhance public services, optimize traffic systems, and promote transparent utility management. In the energy sector, smart grids and real-time monitoring systems support energy efficiency and the integration of renewable sources.

At the same time, the transition toward large-scale IoT deployment remains at an intermediate stage. Infrastructure disparities between regions, cybersecurity concerns, regulatory gaps, and shortages of highly qualified specialists represent key constraints. Sustainable IoT development requires continued investment in broadband connectivity, digital skills education, cybersecurity frameworks, and research collaboration between universities and industry.

Overall, IoT has the potential to become a powerful driver of economic modernization, productivity growth, and technological competitiveness in Uzbekistan. If supported by coherent policy measures, institutional coordination, and innovation-oriented investment, IoT can significantly

contribute to the country's long-term sustainable development and integration into the global digital economy.

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