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DEVELOPMENT OF UZBEKISTAN'S CONSTRUCTION INDUSTRY IN THE CONTEXT OF GLOBAL INNOVATIVE TRENDS

A.N. Djabriev
Prof. DSc, Tashkent University of Architecture and Civil Engineering.
F.A. Tashmuxamedova
Senior Lecturer, Tashkent Institute of Architecture and Civil Engineering.

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Abstract. *The construction industry is one of the key drivers of sustainable economic growth and plays a fundamental role in infrastructure development, urbanization, and technological modernization. This study examines the development trajectory of Uzbekistan's construction sector in comparison with globa innovative trends, including digitalization, automation, energy efficiency, and green construction standards. Using analytical, comparative, and statistical methods, the study evaluates the current state of the industry, identifies the main challenges, and assesses the potential impact of implementing innovative tools such as BIM, COBie, KPI-based monitoring systems, and environmentally sustainable technologies. The results demonstrate that Uzbekistan is gradually integrating digital solutions into project management, strengthening regulatory frameworks, and improving the efficiency of construction processes.*

Nevertheless, the full potential of innovative technologies remains underutilized due to skill gaps, limited digital infrastructure, and insufficient standardization. The study concludes that the implementation of advanced project management methods, expansion of digital modeling, adoption of green standards, and modernization of building materials production are crucial for enhancing competitiveness and ensuring sustainable development of the construction industry.

Keywords: *construction industry, Uzbekistan, BIM, digitalization, innovation, energy efficiency, green building, COBie, KPI, project management.*

INTRODUCTION.

Construction is one of the most strategically important sectors of the global economy, shaping infrastructural development, residential growth, and economic modernization. In recent decades, the global construction market has undergone rapid technological transformation, driven by digitalization, automation, and the adoption of environmentally sustainable standards.

According to international analytical agencies, the global construction market reached USD 13 trillion in 2021 and is projected to grow to USD 15.5 trillion by 2025. This growth is influenced by the integration of advanced technologies such as Building Information Modeling (BIM), artificial intelligence–based planning systems, automated construction machinery, and energy-efficient materials.

For developing economies, the modernization of the construction sector plays a critical role in shaping long-term national development strategies. Uzbekistan is currently implementing broad economic reforms aimed at improving investment attractiveness, expanding infrastructure, modernizing industry, and integrating innovative solutions into construction processes. These reforms are complemented by efforts to strengthen the regulatory environment and enhance the efficiency of project management systems.

Despite considerable progress, challenges remain in technological adaptation, training of qualified personnel, integration of digital models, and widespread adoption of green building principles. Therefore, studying the construction industry of Uzbekistan in the context of global innovative trends is an important scientific and practical task.

METHODS.

This research employs a combination of comparative, analytical, and qualitative methods to comprehensively evaluate the integration of global technological innovations in the construction industry and to assess the development trajectory of the construction sector in Uzbekistan. A comparative analysis was conducted to examine the implementation of advanced construction technologies across leading global markets, including the European Union, the United States, South Korea, and Germany, focusing on the adoption levels of BIM technologies, the application of COBie standards for structured asset information exchange, the integration of KPI-based project management systems, and the implementation of green building frameworks such as LEED and BREEAM. This approach made it possible to identify common trends, best practices, and barriers encountered during digital transformation in various countries.

The study also includes an analytical review of policy documents, legal frameworks, and national development programs of Uzbekistan, such as modernization strategies for the construction sector, regulations related to digitalization of design documentation, energy-efficiency initiatives, and investment policies supporting infrastructure development. This analysis enabled the evaluation of how governmental reforms contribute to improving sector efficiency, transparency, and overall investment attractiveness.

To assess the dynamics of Uzbekistan’s construction industry, the research incorporates official government statistics, annual sector reports, industry surveys, investment indicators, and growth data for the period 2019–2024. The collected material provided a basis for examining long-term trends in construction output, investment flows, and the commissioning of new facilities, allowing for a detailed understanding of the sector’s evolution. Qualitative assessment methods were used to evaluate the impact of technological innovation, digitalization, and modern construction materials on industry performance, with particular attention given to the effectiveness of BIM-based workflows, the benefits of KPI-driven project management platforms, the role of COBie data systems in building lifecycle management, and the improvements associated with sustainable construction materials and energy-efficient technologies.

Expert opinions and international case studies were integrated to deepen the qualitative evaluation and to highlight organizational transformations within construction companies, including process optimization, workforce competence, and the development of modern project management culture. The findings generated through comparative, analytical, and qualitative assessments were then synthesized to determine the current level of technological integration in Uzbekistan’s construction sector, compare it with global benchmarks, identify existing challenges and growth opportunities, and evaluate the impact of ongoing reforms on productivity, cost reduction, project quality, and sectoral competitiveness. This comprehensive methodological framework ensures a scientifically grounded and holistic analysis of the construction industry’s development dynamics in Uzbekistan within the broader context of global innovation trends.

RESULTS.

The global construction industry is currently experiencing significant transformation driven by technological innovations, digitalization, and sustainability initiatives. Modern construction markets worldwide are focusing on several key innovations, including digitalization through Building Information Modeling (BIM), lifecycle data management using COBie, green construction standards, and automation via robotics and advanced construction technologies.

BIM has been widely adopted in leading economies; for example, over 70% of construction companies in Germany utilize BIM at various stages of project design and implementation, and since 2020, BIM has become mandatory for all federal infrastructure projects. The adoption of BIM significantly improves project accuracy, reduces errors, automates documentation processes, and enables cost optimization, establishing it as a central tool for efficient construction management.

In parallel, the use of COBie (Construction to Operations Building Information Exchange) has emerged as a critical instrument for structured asset documentation, efficient facility management, and reduction of operational costs. COBie enables systematic recording of technical specifications, maintenance information, warranties, and spare parts inventories, ensuring smoother handover of projects from construction to operational phases. Moreover, the international market increasingly emphasizes sustainable construction, with widespread adoption of standards such as LEED and BREEAM. Key performance indicators (KPIs) in green construction typically include energy savings, water consumption, CO_2 emissions, and the use of renewable materials, reflecting a global shift toward environmentally responsible building practices. Additionally, automation and robotics are being progressively integrated, including robotic masonry systems, automated concrete pouring, drone-based monitoring, and 3D concrete printing, which enhance construction productivity, accuracy, and safety.

The construction industry in Uzbekistan has demonstrated stable and dynamic growth over the period 2019–2024, reflecting both targeted economic reforms and a proactive approach to infrastructure development. Sector growth has been consistently positive, with annual increases of 8.5% in 2019, 9.2% in 2021, and 10.1% in 2023. This expansion is driven by large-scale projects in residential construction, road and transport infrastructure, industrial modernization, and the development of social facilities. Investment inflows have also increased steadily, rising from USD 6.2 billion in 2019 to USD 8.3 billion in 2023, while the number of newly commissioned facilities grew from approximately 1,200 in 2019 to 2,400 in 2023. These facilities encompass multi-story residential buildings, industrial plants, logistics centers, highways, bridges, and healthcare and educational institutions, reflecting the comprehensive modernization of the country's construction sector. Table 1. Sector Growth, Investments, and New Facilities Commissioned in the Construction Industry of Uzbekistan (2019–2023)

Year	Sector Growth (%)	Investments (billion USD)	New Facilities Commissioned
2019	8.5	6.2	+1,200
2021	9.2	7.4	+1,800
2023	10.1	8.3	+2,400

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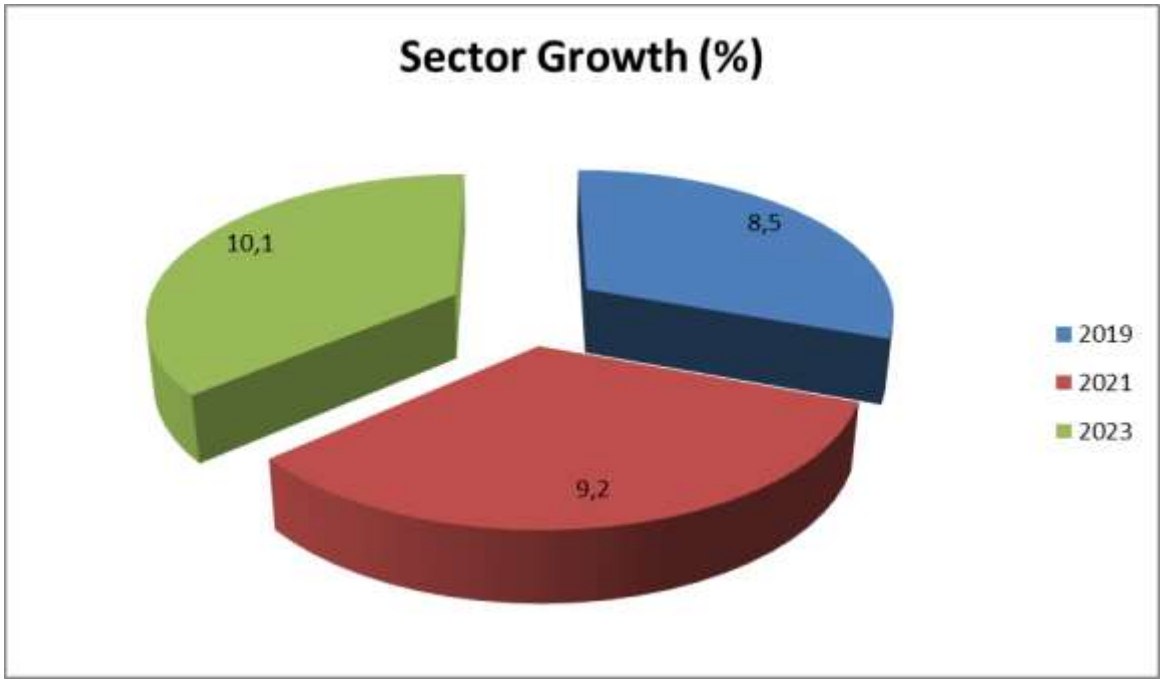

Figure 1. Dynamics of Construction Sector Growth in Uzbekistan (2019–2023)

Uzbekistan is actively implementing digitalization measures in the construction industry, including electronic project documentation, automated modeling, and monitoring systems for project deadlines and resource allocation. However, several challenges remain, such as an insufficient BIM-skilled workforce, lack of standardized digital protocols, and limited IT integration among smaller contractors. BIM adoption is currently limited, with only 15–20% of large construction companies using the technology regularly. Barriers include high software costs, restricted training resources, and resistance to organizational change. COBie implementation is emerging in pilot projects focused on public infrastructure, industrial facilities, and energy sector projects. Meanwhile, green construction is gradually being introduced, with energy-efficient materials, solar energy solutions, and enhanced thermal insulation standards; however, the absence of national green building certification limits large-scale adoption.

Furthermore, KPI-based monitoring systems have been applied to track schedule adherence, budget control, quality inspection, and clash detection. When integrated with BIM platforms, these systems create a unified digital ecosystem that enhances project transparency, improves coordination among stakeholders, and allows for systematic performance evaluation.

Collectively, these innovations indicate Uzbekistan's commitment to aligning its construction sector with global technological and sustainability trends, though the pace of full-scale digital integration remains moderate, and further investments in workforce development, standardization, and regulatory support are required to achieve optimal efficiency and competitiveness.

DISCUSSION.

The analysis demonstrates that Uzbekistan possesses significant potential for innovative development in the construction sector; however, technological integration remains limited, and the country is still at the initial phase of digital transformation compared to advanced economies.

Among the key strengths of the sector are strong and consistent growth, active government reforms, implementation of large-scale infrastructure projects, and an expansion of foreign investments. At the same time, the industry faces several weaknesses, including low digital readiness, a shortage of skilled BIM specialists, limited standardization, and weak integration of green technologies. Despite these challenges, numerous opportunities exist for advancing construction practices, such as the application of 3D printing for rapid housing construction, AI-driven design optimization, expansion of renewable energy solutions, and adoption of green building standards. Nevertheless, potential threats could impede progress, including rising construction material costs, disruptions in global supply chains, and the emergence of alternative, cheaper technologies in competing markets. Overall, while Uzbekistan's construction sector demonstrates strong growth and modernization potential, addressing weaknesses and mitigating threats will be crucial to fully leveraging technological innovations and sustainable practices.

CONCLUSION.

The construction industry of Uzbekistan is undergoing a significant transformation into a technologically advanced and economically important sector. The adoption of innovations such as Building Information Modeling (BIM), COBie, KPI-based management systems, and green construction technologies presents substantial opportunities for enhancing operational efficiency, reducing costs, and improving the quality of construction projects. To accelerate this modernization process, it is recommended to develop a comprehensive national BIM implementation strategy, establish specialized training centers to enhance digital construction skills, introduce national green building standards, expand the use of digital monitoring and automation tools, and increase investment in research on advanced building materials. The long-term sustainable development of the sector will depend on the effective integration of global innovative practices and the strengthening of national regulatory frameworks, ensuring that Uzbekistan's construction industry remains competitive, efficient, and aligned with international standards.

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