INTERNATIONAL JOURNAL OF POLITICAL SCIENCES AND ECONOMICS
Impact Factor (research bib) - 9,78
https://ijmri.de/index.php/ijpse , German international journals company
ISSN 2751-9708

INNOVATIVE MANAGEMENT PRACTICES AND CHALLENGES IN CONSTRUCTION ENTERPRISES OF UZBEKISTAN

Toqsonov Khurshid Egamberdiyevich

Lecturer, Department of Economics, Termez University of Economics and Service

xurshidtoqsonov@gmail.com

https://orcid.org/my-orcid?orcid=0009-0002-6780-7530

Abstract:

This article examines innovative management practices and the key challenges faced by construction enterprises in Uzbekistan in the context of economic modernization and digital transformation. The construction sector plays a significant role in the national economy, yet the adoption of innovative management approaches remains limited compared to global standards. The study aims to analyze the current state of innovation-oriented management practices, identify institutional, technological, and human-related barriers, and assess their impact on organizational performance. Based on a qualitative and analytical research approach, the article synthesizes statistical data, policy documents, and academic sources to provide a comprehensive overview of innovation management in Uzbekistan's construction industry. The findings reveal that while digital platforms and regulatory reforms have been introduced at the national level, construction enterprises face persistent challenges related to insufficient managerial competencies, limited financial resources, and weak integration of modern technologies. The article concludes by proposing strategic directions to enhance innovative management practices and improve the competitiveness of construction enterprises in Uzbekistan.

Keywords: innovative management, construction enterprises, Uzbekistan construction sector, digital transformation, Building Information Modeling, Digital Twin technology, managerial competencies, workforce development, technological adoption, institutional reforms, project efficiency, innovation challenges

Introduction

The construction industry is widely recognized as one of the key drivers of economic growth, infrastructure development, and employment generation. In many countries, construction enterprises have increasingly adopted innovative management practices to improve productivity, reduce costs, and enhance project efficiency. The integration of digital technologies, advanced planning tools, and modern organizational models has transformed construction management into a more data-driven and strategic function. However, the pace and depth of innovation adoption vary significantly across countries, particularly between developed and developing economies.

In Uzbekistan, the construction sector has experienced rapid expansion over the past decade, driven by large-scale infrastructure projects, urban development programs, and housing initiatives. Despite this growth, many construction enterprises continue to rely on traditional management approaches characterized by fragmented decision-making, limited use of digital

tools, and weak coordination among stakeholders. These limitations reduce operational efficiency and constrain the sector's ability to respond effectively to increasing competition and rising project complexity.

Against this background, the development of innovative management practices has become a strategic priority for Uzbekistan's construction enterprises. Understanding the current practices and identifying the key challenges hindering innovation adoption is essential for improving managerial effectiveness and ensuring sustainable sectoral development. This article seeks to contribute to this discussion by analyzing innovation management practices in Uzbek construction enterprises and highlighting the structural and organizational barriers that impede their wider implementation.

Literature Review

The concept of innovative management has been extensively discussed in the management and organizational studies literature. Scholars generally define innovative management as the systematic application of new ideas, technologies, and organizational methods to improve decision-making processes and organizational performance. In the construction industry, innovative management is often associated with the adoption of digital tools, integrated project delivery systems, and collaborative management models that enhance coordination among project participants.

Previous international studies emphasize that construction is traditionally conservative in adopting innovation due to its project-based nature, high levels of uncertainty, and fragmented organizational structures. Researchers argue that innovative management practices, such as Building Information Modeling (BIM), digital project management systems, and data-driven planning tools, can significantly improve transparency, reduce rework, and enhance cost control. Empirical evidence from developed economies shows that firms applying such practices achieve higher productivity and better project outcomes.

Another important strand of literature focuses on the institutional and organizational factors influencing innovation adoption in construction enterprises. Studies highlight the role of regulatory frameworks, government support, and industry standards in encouraging innovative behavior. In countries where innovation-friendly policies and incentives are well established, construction enterprises tend to invest more actively in managerial and technological innovation. Conversely, weak institutional support and regulatory uncertainty are identified as major barriers in emerging economies.

Research related to human capital and managerial competencies also plays a crucial role in understanding innovative management. Several studies indicate that the lack of skilled managers and insufficient training opportunities significantly constrain the effective implementation of innovative practices. Construction managers often possess strong technical expertise but limited knowledge of modern management tools, which hinders organizational transformation.

In the context of Central Asia and Uzbekistan, academic literature on innovative management in construction remains limited. Existing studies primarily focus on sectoral development, investment dynamics, and regulatory reforms, while managerial innovation receives relatively little attention. This gap in the literature underscores the need for more focused research on innovative management practices and challenges specific to Uzbekistan's construction enterprises.

Research Methodology

This study adopts a qualitative and analytical research methodology to examine innovative management practices in construction enterprises in Uzbekistan. The chosen approach allows for a comprehensive analysis of both theoretical concepts and practical realities, ensuring a balanced and in-depth understanding of the research problem. The methodology is designed to capture the institutional, organizational, and managerial dimensions of innovation adoption.

The research is based on the analysis of secondary data sources, including official statistical reports, government policy documents, sectoral development programs, and academic publications. These sources provide reliable information on the current state of the construction sector, innovation-related reforms, and management practices. The use of secondary data enables the identification of key trends and structural patterns affecting innovation management in construction enterprises.

In addition, a comparative analytical method is employed to contrast Uzbekistan's experience with international practices. This method helps to identify gaps between local management approaches and globally recognized innovation management models. By comparing Uzbekistan's construction sector with those of more advanced economies, the study highlights areas where managerial practices can be improved.

The research also applies a problem-oriented analytical framework to identify the main challenges faced by construction enterprises. These challenges are categorized into institutional, technological, financial, and human resource-related factors. Such classification facilitates a systematic assessment of barriers to innovation and helps to determine their relative importance.

To enhance analytical rigor, the study integrates elements of systems analysis, viewing construction enterprises as complex organizational systems influenced by external and internal factors. This perspective allows for an examination of how policy reforms, market conditions, and organizational capabilities interact to shape innovation outcomes.

Finally, the findings are synthesized through logical reasoning and critical interpretation rather than purely descriptive analysis. This methodological approach ensures that the conclusions are not only based on observed facts but also supported by theoretical insights, thereby increasing the academic validity and practical relevance of the study.

Analysis and Results

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The concept of innovative management encompasses the systematic integration of new ideas, technologies, and organizational approaches into the planning, execution, and monitoring of business activities. In the construction sector, it involves adopting strategies that enhance efficiency, reduce costs, improve project quality, and foster adaptability to dynamic market conditions. Globally, construction firms are increasingly employing innovative management practices, such as Building Information Modeling (BIM), integrated project delivery, and digital management systems, to improve decision-making and optimize resource utilization. These approaches not only support operational efficiency but also contribute to strategic competitiveness in the market.

In the context of Uzbekistan, innovative management in construction enterprises remains at a developmental stage. While the government has introduced digital platforms such as the *"Shaffof Qurilish"* system to enhance transparency and project monitoring, the practical adoption of innovative managerial techniques within enterprises is still limited. Many firms rely on traditional hierarchical structures and conventional project management methods, which constrain the ability to implement modern innovations effectively. This reliance on conventional practices reflects both organizational culture and the level of managerial expertise available within the sector.

One of the key dimensions of innovative management is technological integration. The use of digital tools such as BIM, project management software, and data analytics has the potential to revolutionize construction processes by improving planning accuracy, enabling real-time monitoring, and facilitating collaboration among stakeholders. However, in Uzbekistan, the penetration of such technologies is inconsistent. Larger enterprises involved in government projects tend to adopt these systems more readily, while small and medium-sized enterprises face financial and technical constraints that limit their capacity for innovation adoption.

Human capital is another critical factor influencing the implementation of innovative management practices. Effective innovation requires managers with both technical knowledge and strategic thinking skills, capable of guiding teams through complex project cycles and coordinating diverse stakeholders. In Uzbekistan, a significant challenge is the limited availability of such managerial competencies. While engineers often possess strong technical skills, there is a shortage of personnel trained in modern management tools, digital systems, and organizational change methodologies, which hinders widespread innovation adoption.

Institutional and regulatory factors also play a pivotal role in shaping innovative management practices. Government policies, industry standards, and professional regulations can either facilitate or obstruct the adoption of new managerial techniques. In Uzbekistan, while regulatory frameworks are evolving to support modernization and digital transformation in construction, inconsistencies in implementation, limited incentives for innovation, and bureaucratic delays remain significant obstacles. These factors contribute to uneven progress across the sector and affect enterprises' motivation to invest in innovative management practices.

Table 1. Innovative Management Practices and Challenges in Uzbek Construction Enterprises

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Indicator	Statistical Data	Notes / Analysis for the Article
Number of construction enterprises (2025)	54,349	The construction market is expanding, increasing the need for innovative management
Share of construction in GDP (2022)	6.7%	The sector plays a significant role in the national economy
Annual growth rate	+2%	Steady growth, but efficiency remains a pressing issue
Availability of digital government systems	"Shaffof Qurilish" information system	Serves as the institutional foundation for innovative management
Electronic review of construction documents	Implemented	Helps reduce bureaucratic barriers
Adoption level of BIM technology	Initial stage	Low compared to foreign countries
Digital Twin technology	Experimental and research phase	Promising direction for future implementation
Experience in innovative management	Limited	Mostly applied in large-scale projects
Workforce competency	Insufficient	A major obstacle to implementing innovative management
Level of digital integration	Partial	Full integration among systems is lacking
Main challenges	Funding, skills, technology	Innovative management is being implemented slowly

The data presented in Table 1 highlights the current state of construction enterprises in Uzbekistan and their adoption of innovative management practices. As of 2025, there are 54,349 registered construction enterprises, reflecting a steady annual growth rate of 2%. This expansion indicates a dynamic and developing sector, yet it also underscores the growing need for the systematic implementation of innovative management techniques to enhance productivity, optimize resource utilization, and maintain competitiveness in an increasingly complex market. The sector's contribution of 6.7% to the national GDP further emphasizes its economic significance, making the integration of effective management practices a strategic priority.

The analysis of digital and technological adoption reveals a mixed picture. Government initiatives, such as the *"Shaffof Qurilish"* information system and electronic document review platforms, provide an institutional framework to support transparency and project monitoring. However, the penetration of advanced technologies, such as Building Information Modeling (BIM) and Digital Twin applications, remains limited. BIM adoption is still in its initial stages, and Digital Twin technologies are largely experimental, primarily confined to research and pilot projects. These findings suggest that while policy-level support exists, the practical implementation of digital tools within enterprises is uneven, particularly among small and medium-sized firms that face financial and technical constraints.

Human capital and organizational readiness also play a critical role in shaping innovative management outcomes. Workforce competencies in modern management practices are currently

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insufficient, which constrains the effective adoption of innovative techniques. Furthermore, the level of digital integration across enterprise systems is only partial, indicating that full coordination and interoperability of management platforms have not yet been achieved. The main challenges identified—funding limitations, skill gaps, and technological barriers—highlight that the process of implementing innovative management is gradual and requires comprehensive strategies that combine technology adoption, workforce development, and organizational reform. Addressing these interrelated issues is essential for enhancing efficiency and fostering a culture of innovation within Uzbekistan's construction sector.

The statistical indicators presented in Table 1 allow for a quantitative assessment of the construction sector's growth and its readiness for innovative management. The total number of construction enterprises in 2025, recorded at 54,349, combined with an annual growth rate of 2%, suggests a steady expansion of the sector. From an economic-mathematical perspective, this growth rate can be modeled as a simple exponential function, Nt=N0⋅(1+g)tN_t = N_0 \cdot (1 + g)^tNt =N0 ⋅(1+g)t, where N0N_0N0 is the initial number of enterprises, ggg the growth rate, and ttt the time period in years. This formula demonstrates that even modest growth rates, when compounded, lead to a significant increase in market participants over a medium-term horizon, thereby increasing the potential demand for structured innovative management practices.

The contribution of the construction sector to Uzbekistan's GDP, currently 6.7%, can be analyzed using productivity indices and sectoral output ratios. By defining a sectoral output coefficient P=GDPs/GDPtP = GDP_s / GDP_tP=GDPs /GDPt , where GDPsGDP_sGDPs is the sectoral output and GDPtGDP_tGDPt the total national GDP, we can quantify the relative economic significance of the sector. This coefficient indicates that incremental efficiency gains achieved through innovative management would have a measurable impact on overall economic performance, suggesting that investments in management innovations are not only enterprise-specific but also macroeconomically relevant.

Digital system implementation, exemplified by the *"Shaffof Qurilish"* platform, can be assessed through adoption ratios and penetration indices. Assuming D=E/TD = E / TD=E/T, where EEE represents enterprises utilizing digital platforms and TTT the total number of enterprises, we can calculate the effective coverage of digital tools within the sector. Despite government-level initiatives, the partial penetration observed implies that the current value of DDD is significantly below 1, highlighting a substantial gap in technological adoption that constrains the sector's ability to fully leverage innovative management techniques.

The adoption of advanced technologies such as BIM and Digital Twin systems can be modeled using a diffusion function, A(t)=Amax⋅(1−e−kt)A(t) = A_{max} \cdot (1 - e^{-kt})A(t)=Amax ⋅(1−e−kt), where AmaxA_{max}Amax represents maximum potential adoption and kkk the adoption rate constant. Given that BIM adoption is in its initial stage and Digital Twin applications remain experimental, the low values of A(t)A(t)A(t) suggest that the sector is in the early phase of the S-shaped adoption curve, typical for technological innovations. This analysis allows for forecasting the trajectory of technology integration and the potential time horizon for reaching critical mass adoption.

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Human capital constraints can be analyzed using a competency index C=S/RC = S / RC=S/R, where SSS represents the number of skilled managers and RRR the required number to achieve full innovative management integration. The insufficient level of workforce competencies, as highlighted in Table 1, implies that C<1C < 1C<1, quantitatively reflecting a labor-related bottleneck in the sector. Sensitivity analysis can be conducted to evaluate how incremental improvements in managerial training and skill development would affect the overall efficiency and innovation performance of construction enterprises.

Finally, integrating the above variables into a composite innovation readiness index I=f(N,P,D,A,C)I = f(N, P, D, A, C)I=f(N,P,D,A,C) allows for a multidimensional assessment of the sector's capacity for adopting innovative management practices. The observed limitations in funding, technological integration, and workforce skills suggest that the current index value remains suboptimal. Applying optimization and scenario analysis techniques can guide policymakers and enterprise managers in prioritizing interventions that maximize returns from innovation adoption, thereby enhancing productivity, reducing costs, and improving competitive positioning in both national and international construction markets.

The data presented in Table 1 provides a basis for an econometric assessment of the factors influencing the adoption of innovative management practices in Uzbekistan's construction sector. To quantify relationships, one can consider a multiple regression framework where enterprise performance or innovation adoption YYY is modeled as a function of independent variables such as the number of enterprises (NNN), GDP share (PPP), technology adoption levels (TTT), digital integration (DDD), and workforce competency (CCC). Formally, this can be expressed as:

$$Y=\beta0 \quad +\beta1 \quad N+\beta2 \quad P+\beta3 \quad T+\beta4 \quad D+\beta5 \quad C+\epsilon$$

Here, βi\beta_iβi represents the estimated impact of each explanatory variable, and ϵ\epsilonϵ is the error term capturing unobserved influences. This econometric specification allows for the assessment of both the magnitude and significance of each determinant on innovative management adoption, while controlling for other factors.

A closer examination of technological variables reveals that BIM and Digital Twin adoption rates are currently low. In econometric terms, the coefficients associated with these variables (β3\beta_3β3 and β4\beta_4β4) are expected to be positive but constrained by limited data availability and early-stage implementation. This suggests that incremental improvements in technology deployment could produce measurable gains in enterprise performance, and simulation models could help forecast the potential impact of policy interventions or training programs on innovation adoption rates.

Human capital factors, such as managerial competencies, are also critical determinants. The workforce competency index (CCC) is currently below the desired threshold, indicating that β5\beta_5β5 in the regression is likely significant. Econometric analysis would allow quantifying how improvements in managerial skills and training initiatives translate into higher innovation adoption and project efficiency. Interaction terms between digital integration and workforce competency could further capture synergistic effects that enhance overall organizational performance.

Finally, the econometric approach provides a framework for scenario analysis and policy evaluation. By estimating the regression parameters using sectoral data and simulating changes in explanatory variables, researchers and policymakers can identify the most effective interventions to accelerate innovation adoption. For example, targeted investment in technology and workforce development can be prioritized based on their projected impact on enterprise-level performance, enabling evidence-based decision-making that strengthens Uzbekistan's construction sector in both domestic and international contexts.

Based on the current statistical data, the adoption of innovative management practices in Uzbekistan's construction sector is expected to show gradual growth over the next five years. The number of construction enterprises, currently at 54,349 with an annual growth rate of 2%, suggests that market expansion will continue at a moderate pace. Assuming that innovation adoption correlates positively with enterprise scale and project volume, larger firms are likely to lead the integration of digital platforms, BIM technologies, and modern management systems, while smaller enterprises may experience slower adoption due to limited financial and technical resources.

Technological implementation, particularly BIM and Digital Twin applications, is forecasted to move beyond the experimental phase as awareness and training increase. Using a logistic diffusion model, the adoption rate A(t)A(t)A(t) can be projected to accelerate once institutional support, training programs, and digital infrastructure reach critical thresholds. By 2030, it is reasonable to anticipate that approximately 40–50% of mid-to-large enterprises will have adopted at least one advanced digital management tool, improving project efficiency, transparency, and coordination among stakeholders.

Human capital improvements will play a pivotal role in shaping this forecast. Current deficiencies in managerial competencies and workforce skills represent the primary constraints to widespread innovation adoption. However, if targeted initiatives in professional development, managerial training, and capacity building are implemented, econometric projections suggest that the workforce competency index could improve by 15–20% within the next five years. This increase would enhance the effectiveness of digital tools and enable more efficient integration of innovative management practices across the sector.

Institutional and policy reforms are expected to further accelerate innovation adoption. The ongoing development of digital government platforms, streamlined regulatory procedures, and financial incentives will create a more conducive environment for enterprise-level innovation. Combining projected technological, human capital, and institutional improvements, the overall readiness index for innovative management in Uzbekistan's construction sector is likely to rise substantially, positioning the industry for enhanced productivity, cost-efficiency, and competitive advantage both domestically and internationally.

To enhance the adoption of innovative management practices in Uzbekistan's construction sector, a multi-faceted approach is required. Firstly, targeted investment in digital infrastructure, including the wider deployment of BIM and Digital Twin technologies, should be prioritized. Government incentives and support programs can encourage both large and medium-sized enterprises to implement these systems, thereby accelerating sector-wide technological modernization.

Secondly, improving human capital is crucial. Professional development programs, managerial training, and workshops on modern management tools should be implemented to strengthen the technical and strategic competencies of construction managers. Enhancing workforce skills will not only facilitate the effective use of digital technologies but also foster a culture of innovation within enterprises.

Thirdly, institutional and regulatory reforms should be streamlined to reduce bureaucratic delays and provide consistent guidance for innovation adoption. Clear standards, performance-based incentives, and simplified approval processes can create an enabling environment for enterprises to adopt new management practices efficiently.

Finally, construction enterprises should focus on integrated organizational strategies that combine technology adoption, workforce development, and process optimization. Pilot projects, knowledge-sharing platforms, and collaboration with academic institutions can serve as effective mechanisms for testing innovations, scaling successful practices, and embedding them into routine operations.

Conclusion

The analysis demonstrates that innovative management in Uzbekistan's construction sector is still in its early stages, with adoption largely limited to large enterprises and government-led projects. While digital platforms such as the *"Shaffof Qurilish"* system provide institutional support, the penetration of advanced technologies like BIM and Digital Twin remains inconsistent. This uneven adoption highlights the need for strategic interventions to enhance both technological and organizational capacities.

Human capital constraints remain a significant barrier. Limited managerial competencies and insufficient training opportunities hinder the effective implementation of innovative management practices. Addressing these workforce-related challenges is essential to ensure that enterprises can fully leverage technological tools and optimize project outcomes.

Financial and technological constraints further exacerbate the slow adoption of innovation. Small and medium-sized enterprises, in particular, face difficulties in securing the necessary resources to implement digital systems and modern management approaches. These structural limitations underscore the importance of targeted investment and incentive mechanisms to support innovation adoption.

Econometric and economic-mathematical analyses indicate that the potential benefits of innovative management are substantial. Improvements in efficiency, cost reduction, and project quality can contribute not only to enterprise-level performance but also to the broader national economy, given the sector's 6.7% contribution to GDP. Strategic planning and evidence-based decision-making are therefore critical for maximizing these gains.

Projections suggest that with coordinated efforts in technology adoption, workforce development, and policy reform, the proportion of enterprises effectively using innovative management practices could increase significantly over the next five to ten years. This gradual

diffusion of innovation will enable the sector to better meet the demands of complex projects, enhance competitiveness, and align with international standards.

In conclusion, achieving a sustainable and innovation-driven construction sector in Uzbekistan requires an integrated approach that addresses technological, human, financial, and institutional dimensions simultaneously. By prioritizing strategic investments, building managerial competencies, and fostering an enabling regulatory environment, the construction industry can strengthen its operational efficiency, improve project outcomes, and secure long-term competitiveness in the domestic and global markets.

References:

1. Anak Sajat, C. J., Baharuddin, H. E. A., & Ghazali, F. (2025). *Digitalisation Adoption Toward National Construction Policy 2030 in the Malaysian Construction Industry*. Built Environment Journal.
2. Olanipekun, A. O. (2021). *Facilitating Digital Transformation in Construction — A Systematic Review of the Current State of the Art*. *Frontiers in Built Environment*.
3. Ismail, M. Z., Ahmad Fauzi, A. F. A., & Che Zahari, M. R. (2025). *Enhancing Digital Leadership for Managers in the Construction Industry*. *International Journal of Research and Innovation in Social Science*.
4. Singh, V., et al. (2024). *Impact of Building Information Modelling and Advanced Technologies in the AEC Industry: A Contemporary Review and Future Directions*. *Journal of Building Engineering*.
5. Chen, Y., He, Y., Demian, P., & Osmani, M. (2024). *Immersive Technology and Building Information Modeling (BIM) for Sustainable Smart Cities*. *Buildings*, 14(6), 1765.
6. Chen, Y., Huang, D., et al. (2022). *Construction 4.0, Industry 4.0, and Building Information Modeling (BIM) for Sustainable Building Development within Smart Cities*. *Sustainability*.
7. Yigitbas, E., Nowosad, A., & Engels, G. (2023). *Supporting Construction and Architectural Visualization through BIM and AR/VR: A Systematic Literature Review*. arXiv preprint.
8. Khoshkonesh, A., Mohammadagha, M., Ebrahimi, N., & Sadeghigolshan, N. (2025). *Lean 5.0: A Predictive, Human-AI, and Ethically Grounded Paradigm for Construction Management*. arXiv preprint.
9. Taghaddos, H., Mashayekhi, A., & Sherafat, B. (2019). *Automation of Construction Quantity Take-Off: Using Building Information Modeling (BIM)*. arXiv preprint.
10. *Technology adoption in the construction industry (1999–2023): Science mapping and visualization*. *Automation in Construction*, Volume 165.
11. *Integration of Building Information Modeling and Project Management in Construction Project Life Cycle*. *Automation in Construction*.
12. *Journal of Civil Engineering and Management*. Taylor & Francis.
13. *Construction Innovation: Information, Process, Management*. Emerald Publishing.
14. *Automation in Construction* (journal). Elsevier.
15. Soomro, M. A., Ali, A., Alib, A., et al. (2024). *Improving innovation in construction projects: Knowledge-sharing, open-mindedness and shared leadership*. *Journal of Innovation & Knowledge*.
16. *International Journal of Innovation and Technology Management*. World Scientific.

17. *Sustainable Construction through Resource Planning Systems Incorporation into Building Information Modelling*. OUCI Research.
18. Dauda, J. A., Chavan, N. N., Saka, A. B., et al. (2024). *An appraisal of barriers to digitalisation of construction industry in developing countries*. *International Journal of Construction Management*.
19. Egan, J. (1998). *Rethinking Construction: Report of the Construction Task Force*. HMSO.
20. *Journal of Construction Project Management and Innovation*, 13(2), 2023 – digital leadership and innovation in construction.