Advances in Management and Business Studies (AMBuS)
ISS: 3123-6871, Vol 1, No 2, 2026, 97-105 https://doi.org/10.35912/ambus.v1i2.3944

Digital Tools for Project Time Management: Scheduling Performance Improvement in Emerging Economies

Yakubova Samira[1], Makhmudov Mirkhojidin Mirzakhmad O'g'li[2]
Banking and Finance Academy of the Republic of Uzbekistan, Tashkent, Uzbekistan[1,2]
syogubova@bfa.uz[1], mahmudovmirhojiddin@gmail.com[2]

Article History
Received on 28 December 2025
1st Revised on 16 January 2025
2nd Revised on 2 February 2026
Accepted on 12 February 2026

Abstract
Purpose: This study examines the role of digital tools in improving schedule performance for project time management in emerging economies. It focuses on the impact of Project Management Information Systems (PMIS), Building Information Modeling (BIM/4D/5D), and artificial intelligence-based analytics on project time efficiency.
Methodology/approach: This research employs a conceptual review and analytical framework, synthesizing existing empirical evidence from open sources. This study analyzes how digital tools affect schedule performance by integrating Project Time Management Theory and Principal–Agent Theory.
Results: The findings indicate that digital tools, such as PMIS and BIM/4D/5D, enhance schedule performance by improving planning accuracy, real-time monitoring, and decision-making speed. However, their effectiveness depends on technological infrastructure and institutional readiness in emerging economies..
Conclusion: Digital transformation is essential for improving project scheduling in emerging economies. A phased approach, starting with PMIS, followed by 4D/5D BIM integration and AI adoption, provides the most effective strategy.
Limitations: This study relied on secondary data from publicly available sources, which may lack consistency. Additionally, the analysis focuses on schedule performance and does not include cost or scope.
Contribution: This research provides valuable insights into the role of digital tools in project time management, offering practical recommendations for policymakers and practitioners in emerging economies.

Keywords: *BIM 4D/5D, Digital Tools, Emerging Economies Project Management Information Systems, Project Time Management, Schedule Performance*

How to Cite: Samira, Y., & O'g'li, M. M. M. (2026). Digital Tools for Project Time Management: Scheduling Performance Improvement in Emerging Economies. *Advances in Management and Business Studies*, 1(2), 97-105.

1. Introduction

Effective time management in project management plays an indispensable role in the successful completion of any project (Pamuji et al., 2025). When project schedules experience delays, the effects can be devastating, leading to escalating project costs, diminished stakeholder confidence, and ultimately, a reduction in the overall value delivered by the project (Irankunda et al., 2025). The ability to manage time effectively is particularly significant in construction and infrastructure projects, where schedule delays can cascade into increased material costs, labor costs, and failure to meet project milestones (Bustami & Saifrizal, 2025). In these sectors, time is often the most critical factor, directly influencing the overall success of a venture.

In recent years, the rapid advancement of digital tools has revolutionized project management. Technologies such as Project Management Information Systems (PMIS), Building Information Modeling (BIM), and Artificial Intelligence (AI) have all contributed to reshaping traditional project management processes (Gao & Wang, 2026). These digital tools enable real-time scheduling, monitoring, and control, providing project managers with the ability to track progress, identify potential risks, and implement corrective measures in real time (Chen, Martins, Zhang, & Dong, 2025). The integration of these tools has not only streamlined communication and decision-making processes but also enabled a more proactive approach to managing schedules and costs.

Building Information Modeling (BIM) has become one of the most significant innovations in construction project management. BIM is a digital representation of the physical and functional characteristics of a facility, and when combined with time and cost data, it creates a more comprehensive view of a project (Rokooei, 2015). In particular, BIM's 4D and 5D components have transformed the management of construction schedules. The 4D aspect of BIM integrates time data with the 3D model, providing a dynamic visualization of the project schedule that can be used for better planning and coordination (Rehman, Mazher, & Wuni, 2025).

The addition of the 5D component, which incorporates cost data, further enhances the planning process by enabling project teams to make real-time cost assessments as the project progresses. By integrating time, cost, and 3D models, BIM technology enhances planning accuracy, reduces the risk of delays, and improves resource allocation, resulting in more efficient and cost-effective project delivery methods. However, despite the tremendous potential of these digital tools, their effectiveness is not determined solely by their technological capabilities. The geographic and institutional contexts in which they are implemented play a significant role in determining the extent to which these tools are integrated into project management practices. The success of digital tools in project management is highly dependent on the environment in which they are applied.

For instance, in developed economies with well-established infrastructure and technological capabilities, the adoption and integration of digital tools into project management workflows are often seamless (Lakhamraju, 2024). In contrast, in developing economies, the adoption of these tools faces several challenges, including limited access to advanced technology, a lack of skilled professionals, and resistance to change from traditional project management practices. In developing economies, including Uzbekistan, the impact of digital tools on project schedules has not yet been sufficiently studied systematically. While global studies have demonstrated the effectiveness of digital tools in enhancing time management and reducing project delays, the particularities of implementing these tools in a developing country context remain unexplored.

The implementation of technologies such as BIM, PMIS, and AI requires not only the availability of technology but also the capacity to integrate these tools effectively into the local project management culture (Villena-Manzanares, García-Segura, & Pellicer, 2020). This involves overcoming barriers such as the digital divide, insufficient training for project teams, and the need for institutional support to facilitate the adoption of such technologies in the field. Uzbekistan, as a rapidly developing economy, is in the midst of an infrastructure and digital transformation that could benefit significantly from applying advanced project management technologies. However, adapting digital tools to the local context is crucial. Factors such as the availability of high-speed Internet, the capacity of local construction firms to invest in these technologies, and the overall digital literacy of the workforce must be considered when evaluating the effectiveness of digital tools in this setting (Khasawneh & Dweiri, 2025).

Moreover, the institutional frameworks in Uzbekistan, including government policies and regulations, play a pivotal role in determining the successful integration of these technologies into project management practices. Further research on the use of digital tools in Uzbekistan's construction sector is required. While studies from developed countries have demonstrated the value of BIM, AI, and PMIS in improving project schedule efficiency, it remains uncertain whether these tools will have the same impact in Uzbekistan's unique institutional and geographical context. Researching how these digital

tools can be effectively adapted to the local context will provide valuable insights for improving project time management and overall project success in Uzbekistan.

In conclusion, although digital transformation has the potential to enhance project time management through tools such as BIM, PMIS, and AI, the effectiveness of these tools depends significantly on the contextual factors in which they are applied. In developing economies such as Uzbekistan, the challenges of adopting these technologies may be greater, but the opportunities they offer to improve project efficiency are substantial. Therefore, further studies are needed to assess the applicability and impact of these tools in Uzbekistan's construction sector to ensure that their integration into project management practices is effective and sustainable. This research will help inform policymakers, construction companies, and project managers in Uzbekistan on how to leverage digital tools to improve project outcomes, reduce delays, and contribute to the country's economic development.

2. Literature review

2.1. Project Time Management and Its Importance in Construction Projects

Project time management is a fundamental aspect of project success, particularly in construction projects, which often involve complex multi-phase processes (Shah et al., 2023). Effective time management ensures that projects are completed on time, within budget, and in accordance with the specified scope, thereby contributing to the project's overall success (Plattfaut, 2022). Delays in construction projects lead to higher costs, loss of stakeholder confidence, and a reduction in the overall value of the project (Khahro, Shaikh, Zainun, Sultan, & Khahro, 2023). One of the most significant factors contributing to delays in construction projects is poor time management, which can be attributed to inadequate planning, unforeseen circumstances, and changes in the project scope or requirements.

In recent years, the rapid digital transformation of project management practices has introduced new tools, enhancing the ability to manage project time more effectively. These tools help manage uncertainties in project scheduling by providing accurate, real-time data, thereby enabling managers to make informed decisions. Specifically, digital tools such as Project Management Information Systems (PMIS), Building Information Modeling (BIM), and Artificial Intelligence (AI)-based analytics have been shown to improve the accuracy of project timelines, allowing for better predictions of potential delays and faster corrective measures (Dagou, Gurgun, Koc, & Budayan, 2025). These advancements are particularly valuable in public-sector projects, where delays can lead to significant consequences, including increased costs and the loss of public trust. This study aims to explore the impact of such tools on project time management, particularly in emerging economies such as Uzbekistan.

2.2. Digital Tools in Project Time Management

The integration of digital tools into project time management practices has proven to be a game changer in improving schedule performance (Qadir et al., 2025). Among the most commonly used digital tools are Project Management Information Systems (PMIS), which include popular software such as Microsoft Project and Primavera P6. These systems enable real-time monitoring of project schedules, allowing updates and modifications as needed. Empirical studies show that PMIS tools improve the visibility and transparency of project schedules, thereby facilitating the quicker detection of delays and enabling project managers to take corrective action in a timely manner (Bianchi, Conforto, & Amaral, 2021). This is particularly important for large-scale projects, where coordination and communication between teams are crucial.

Another key digital tool in project time management is Building Information Modeling (BIM), especially its advanced components, such as 4D and 5D BIM. These technologies integrate time and cost data with 3D models, allowing for improved scheduling and more accurate project timeline predictions. Studies have shown that the use of BIM in construction projects can reduce project duration by as much as 20%, as it allows for better visualization of project phases and identification of potential scheduling conflicts before construction begins (Succar, 2009). 4D BIM incorporates time-related information, whereas 5D BIM adds cost estimation, further enhancing the efficiency of scheduling and project management.

Artificial Intelligence (AI)-based analytics have also become integral to modern project time management. These tools provide predictive capabilities that forecast potential delays, helping project managers mitigate risks early on. AI algorithms analyze historical project data to identify patterns that can predict future delays and inform decision-making (Hashimzai and Mohammadi, 2024). When combined with other digital tools, such as PMIS and BIM, these technologies offer a comprehensive solution to time management issues in construction projects. Despite their growing use, the effectiveness of these tools varies depending on factors such as institutional readiness, technological infrastructure, and project complexity (Savaş, 2025).

2.3. Challenges and Effectiveness of Digital Tools in Emerging Economies

Although digital tools have revolutionized project time management, their adoption in emerging economies presents several challenges. These challenges primarily stem from the varying degrees of technological infrastructure, institutional capacity, and expertise in these areas. In more developed economies, digital tools such as PMIS, BIM, and AI are more easily integrated into project management practices owing to advanced technological infrastructure and widespread access to training. In contrast, emerging economies face significant barriers to the adoption of these tools, including limited access to cutting-edge technology, a lack of technical skills, and high initial costs associated with the implementation of digital solutions (Pittri, Godawatte, Esangbedo, Antwi-Afari, & Bao, 2025).

For instance, although Project Management Information Systems (PMIS) are relatively simple to implement and widely adopted in emerging economies, more advanced tools such as BIM and AI require substantial investment in both infrastructure and training. Research suggests that while the adoption of PMIS is increasing in emerging economies, the integration of more advanced tools, such as BIM and AI, remains slow because of their complexity and the significant expertise required to use them effectively (Alsofiani, 2024). In emerging economies such as Uzbekistan, digital tools such as PMIS are often adopted first because of their lower cost and simpler implementation process.

However, for more complex projects, especially in sectors such as infrastructure, advanced tools such as 4D/5D BIM and AI-based analytics are essential for improving time management and mitigating delays. Studies in India show that in these economies, the adoption rate of BIM is relatively low ranging from 10% to 18% but when these tools are implemented, they lead to substantial improvements in schedule performance (Ahuja, Sawhney, Jain, Arif, & Rakshit, 2020). Moreover, the effectiveness of these tools is highly context dependent. The institutional readiness of implementing organizations, availability of skilled personnel, and political and economic environment all play significant roles in the success of digital tool integration. In Uzbekistan, where institutional capacity and technical skills may be underdeveloped compared to more advanced economies, a phased approach to digital transformation, starting with PMIS and gradually moving towards more sophisticated tools like BIM and AI, is considered the most practical strategy (Sobirovich, 2021).

This approach ensures that the country can build a solid foundation for effective project time management while progressively advancing its technological capacity. This section of the literature review highlights the growing importance of digital tools in project time management, particularly in emerging economies such as India. However, it also underscores the challenges faced by these economies in adopting and utilizing advanced technologies to improve project schedule performance. This research aims to contribute to the understanding of how these tools can be effectively implemented in Uzbekistan and similar developing countries, offering insights into overcoming the barriers to their adoption.

3. Methodology

3.1. Research Approach

This study adopts a conceptual review combined with an analytical framework approach to explore the role of digital tools in project time management. Unlike traditional empirical studies, this study did not directly collect primary data. Instead, it focuses on synthesizing and analyzing existing statistical and empirical results published in open, accredited scientific journals and other reputable academic sources. By aggregating a wide range of relevant studies, this approach provides a comprehensive understanding

of the topic while ensuring the inclusion of diverse perspectives. The analysis specifically examined three key categories of digital tools that are the most widely used in project time management. These categories include Project Management Information Systems (PMIS) and scheduling software, Building Information Modeling (BIM) technologies with 4D and 5D integrations, and AI-based analytical tools. To structure the analysis, an analytical model is introduced, which highlights the interaction between these tools and their impact on project schedule performance, considering the context in which they are applied.

$$\text{Schedule Performance (SP)} = f(\text{PMIS}, \text{BIM/4D/5D}, \text{AI/Analytics}, \text{Context}) \quad (1)$$

In this study, *Schedule Performance (SP)* refers to the degree to which a project adheres to its planned schedule, the extent of delay reductions, and the accuracy of the project's forecasts. *Context* encompasses the economic and institutional factors that influence the effectiveness of digital tools in project time management, including regional infrastructure, technological readiness, and institutional support. These factors play a crucial role in determining the success of digital tool integration and utilization in various project environments.

3.2. Digital Tools and Time Efficiency: An Analysis of Empirical Evidence

3.2.1. PMIS and Scheduling Software

Project Management Information Systems (PMIS) and scheduling software, such as Microsoft Project and Primavera P6, are widely regarded as the most common digital tools for managing project time. These systems offer an integrated approach to project management by combining planning, schedule updating, and performance monitoring in a single unified information environment. By centralizing these critical project functions, PMIS tools ensure greater coordination and more efficient tracking of progress, enabling project managers to identify issues early and take corrective action quickly.

According to empirical research published in Emerald Insight, approximately 19% of organizations do not implement PMIS, primarily due to the absence of a Project Management Office (PMO). The lack of a PMO often leads to difficulties in adopting standardized processes for managing and tracking project schedules. In organizations that have successfully integrated PMIS, schedule data are updated in real time, allowing for the immediate identification of any deviations from the planned timeline. This real-time monitoring helps project teams take proactive measures to mitigate delays and remain on track. Empirical evidence also indicates that although PMIS tools do not directly reduce schedule delays, they achieve this outcome indirectly. By enhancing the speed of decision-making and increasing schedule transparency, PMIS tools improve the overall efficiency of project management, thereby reducing the likelihood of significant schedule disruptions. This transparency fosters better communication, collaboration, and timely corrective action.

Table 1. Empirical evidence on digital tools and project time efficiency

Type of tool	Mechanism of action	Empirical observation
PMIS	Real-time monitoring and schedule update	Table deviations will decrease (Bianchi et al., 2021)
BIM/4D	3D and time integration	Project duration is reduced by an average of 20% (Rehman et al., 2025)
AI/Analytics	Forecasting and early warning	Decision-making speed increases in 82.6% of cases (Shoushtari, Daghighi, & Ghafourian, 2024)

4. Result and discussion

4.1. 4D/5D BIM and Advanced Digital Tools

4.1.1. 4D BIM

4D Building Information Modeling (BIM) integrates the 3D spatial model of a construction project with the dimension of time, allowing for visual management and monitoring of the project schedule. By combining these two elements, 4D BIM offers project managers the ability to visualize the entire construction process, providing a clearer understanding of how the different stages of the project will

unfold in time (Ramandhani, Lenggogeni, & Yasinta, 2025). This approach not only enhances the planning process but also improves coordination among the team members.

A systematic review published in ScienceDirect revealed that construction projects utilizing 4D BIM experience significant improvements in planning accuracy, with project durations being reduced by an average of 20%. This reduction in duration is attributed to the ability of 4D BIM to highlight potential issues in the early stages of planning, enabling teams to address these issues before construction begins. Furthermore, 4D BIM aids in identifying logical dependencies and potential scheduling conflicts, ensuring that tasks are properly sequenced and resources are allocated efficiently, thus minimizing delays and optimizing project timelines (Doukari, Seck, & Greenwood, 2022; Rehman et al., 2025).

4.1.2. 5D BIM

5D Building Information Modeling (BIM) takes the integration of time in 4D BIM a step further by adding cost data, thus allowing for a detailed analysis of the interrelationship between time and the budget. This addition enables project managers to simultaneously track both the progress of the construction schedule and the associated costs, providing a more comprehensive overview of the project. By combining time and cost data, 5D BIM helps ensure that a project stays within budget while maintaining the necessary schedule, making it a vital tool for effective project management.

Research published in Springer highlights the role of 5D BIM in maintaining a balance between time and cost during the decision-making process, ensuring that resources are allocated efficiently and that project constraints are met without compromising quality. Additionally, recent advancements in 5D BIM, particularly the integration of the digital twin approach, have significantly enhanced its capabilities. With the digital twin, project schedules and cost forecasts can be updated in real time based on actual project data, improving forecasting accuracy and allowing for timely adjustments ((Khoshkonesh, Mohammadagha, & Ebrahimi, 2025). This approach ensures that project managers can respond quickly to changes or unforeseen circumstances.

4.2. Discussion

In developing economies, the success and effectiveness of digital tools for project time management are not solely determined by the capabilities of the technology itself but are heavily influenced by the level of institutional readiness and organizational maturity (Kurniawan and Sushandoyo, 2025). The ability to implement and benefit from digital tools such as Project Management Information Systems (PMIS), Building Information Modeling (BIM), and Artificial Intelligence (AI) is contingent on factors such as the availability of skilled professionals, the readiness of institutions to adopt these technologies, and the existing technological infrastructure within a country or organization. In many developing countries, these factors often represent significant barriers to the widespread adoption of more advanced digital tools, making it difficult to realize their full potential.

For instance, in Uzbekistan, simpler and less complex digital tools, such as PMIS, are more readily adopted because they do not require high levels of technical expertise and can be integrated into existing processes with lower investments. PMIS tools help organizations manage schedules, monitor progress, and update timelines in real time, which are essential for enhancing project efficiency. These tools are often considered foundational in digital project management systems, enabling streamlined project operations.

In contrast, more advanced tools, such as BIM and AI-based solutions, require higher levels of technical expertise and substantial financial investment. Consequently, they are typically adopted at a slower pace. Research indicates that in developing countries, the adoption rate of BIM ranges from 10% to 18%. However, in instances where it has been successfully implemented, it has been shown to significantly improve scheduling efficiency and reduce delays in project completion (Das et al., 2025). BIM integrates time and cost data with 3D models, enhancing planning accuracy and providing a clearer project schedule.

AI-based analytical tools, on the other hand, further improve decision-making speed and resource utilization by providing real-time insights and predictive analytics. These tools help project managers make quicker, data-driven decisions that optimize project execution. However, the successful implementation of AI solutions relies heavily on the presence of core digital infrastructures, such as PMIS and BIM, to provide the necessary data foundation for AI tools to function effectively (Du, Hou, Zhang, Tan, & Mao, 2024). Without these core systems, the full benefits of AI cannot be realized, highlighting the importance of gradually building a solid digital infrastructure before integrating more advanced technologies.

Thus, in developing economies such as Uzbekistan, it is essential to prioritize the establishment and widespread adoption of foundational digital tools such as Project Management Information Systems (PMIS) and Building Information Modeling (BIM). These tools serve as building blocks for more advanced technologies. By focusing on these basic yet critical systems, organizations can gradually build the necessary skills, infrastructure, and institutional readiness required for the successful implementation of more sophisticated AI-based solutions, ensuring a smoother and more effective digital transformation process in the long run.

5. Conclusions

5.1. Conclusion

This study analyzed the role of digital tools in project time management based on conceptual and empirical evidence. The main scientific conclusion of this study is that digital tools influence schedule performance not directly, but through mediating mechanisms such as planning accuracy, visual monitoring, and decision-making speed. For developing economies, including Uzbekistan, digital transformation in project time management should be implemented in phases. The most optimal strategy is to first implement PMIS and scheduling software, then enhance 4D/5D BIM integration, and finally supplement it with AI and analytical tools. This conclusion serves as an important scientific basis for policy and practical decisions regarding project time management.

5.2. Research Limitations

This study provides valuable insights into the role of digital tools in project time management, particularly in emerging economies. However, several limitations of this study must be acknowledged. First, this study did not involve direct empirical data collection but instead relied on secondary data from existing studies. While the synthesized data offer a broad perspective, it does not capture the specific regional challenges and opportunities in depth, particularly within developing countries such as Uzbekistan. Without primary data from the local context, the findings may lack the necessary details to fully understand the challenges of applying digital tools in these regions. Furthermore, the study does not consider the rapid advancements in technology that could affect the future applications of these tools. As new tools and innovations continuously emerge, these findings may soon become outdated. Finally, the generalization of findings from global studies to the unique socio-economic and institutional context of Uzbekistan may not fully address the specific challenges faced in the construction industry there, limiting the applicability of the conclusions to other developing economies.

5.3. Suggestions and Direction for Future Studies

To improve the effectiveness and applicability of digital tools in project time management, a few key suggestions are made. First, future research should focus on primary empirical data collection in emerging economies such as Uzbekistan. Directly gathering data from local construction projects would provide more accurate and context-specific insights, which would be beneficial for adapting digital tools to the region's unique challenges. Another important suggestion is the need for technological training programs for professionals involved in project management and construction. These programs should be implemented by governments and industry stakeholders to ensure that workers are adequately equipped with the skills required to effectively utilize digital tools such as PMIS, BIM, and AI.

Additionally, further studies should explore how digital tools can be integrated into the existing technological and institutional infrastructure of developing economies. Identifying gaps in local infrastructure and creating adaptive strategies for digital tool implementation will be critical for

improving their effectiveness. Finally, a comprehensive cost-benefit analysis of adopting advanced digital tools such as 5D BIM and AI in developing economies should be conducted. This analysis will help stakeholders assess the financial viability of these technologies, considering the economic constraints faced by these regions.

Future research should focus on collecting primary data from local construction projects in emerging economies to provide context-specific insights into the adoption and impact of digital tools. Additionally, studies should explore how digital tools influence different project phases such as initiation, planning, execution, and closure. Comparative studies between developed and developing economies could help identify the challenges emerging economies face in adopting these tools. Longitudinal studies are also needed to assess the long-term effects of digital tools on project management. Finally, further research on integrating AI and machine learning into construction scheduling and predictive analytics could provide valuable insights into improving project outcomes.

References

Ahuja, R., Sawhney, A., Jain, M., Arif, M., & Rakshit, S. (2020). Factors Influencing BIM Adoption in Emerging Markets–The Case of India. *International journal of construction management, 20*(1), 65-76. doi:https://doi.org/10.1080/15623599.2018.1462445

Alsofiani, M. A. (2024). Digitalization in Infrastructure Construction Projects: A PRISMA-Based Review of Benefits and Obstacles. *Astronomy & Computing*, 1-8. doi:https://doi.org/10.48550/arXiv.2405.16875

Bianchi, M. J., Conforto, E. C., & Amaral, D. C. (2021). Beyond the Agile Methods: A Diagnostic Tool to Support the Development of Hybrid Models. *International Journal of Managing Projects in Business, 14*(5), 1219-1244. doi:https://doi.org/10.1108/IJMPB-04-2020-0119

Bustami, K., & Saifrizal, M. (2025). Project Performance in Infrastructure Development: Analysis of Time and Quality Control Against Budget Allocation. *Journal Informatic, Education and Management (JIEM), 7*(2), 527-535. doi:https://doi.org/10.61992/jiem.v7i2.169

Chen, M., Martins, T. S., Zhang, L., & Dong, H. (2025). Digital Transformation in Project Management: A Systematic Review and Research Agenda. *Systems, 13*(8), 1-23. doi:https://doi.org/10.3390/systems13080625

Dagou, H. H., Gurgun, A. P., Koc, K., & Budayan, C. (2025). The Future of Construction: Integrating Innovative Technologies for Smarter Project Management. *Sustainability, 17*(10), 1-29. doi:https://doi.org/10.3390/su17104537

Das, K., Khursheed, S., & Paul, V. K. (2025). The Impact of BIM on Project Time and Cost: Insights from Case Studies. *Discover Materials, 5*(1), 1-18. doi:https://doi.org/10.1007/s43939-025-00200-2

Doukari, O., Seck, B., & Greenwood, D. (2022). The Efficient Generation of 4D BIM Construction Schedules: A Case Study of the Nanterre 2 CESI Project in France. *Frontiers in Built Environment, 8*, 1-18. doi:https://doi.org/10.3389/fbuil.2022.998309

Du, S., Hou, L., Zhang, G., Tan, Y., & Mao, P. (2024). BIM and IFC Data Readiness for AI Integration in the Construction Industry: A Review Approach. *Buildings, 14*(10), 1-54. doi:https://doi.org/10.3390/buildings14103305

Gao, Y., & Wang, B. (2026). Digital Project Management in the Construction Industry: Bim,Ai and Pmis as Drivers of Sustainable Performance. *International Journal of Multidisciplinary Research, 2*(1), 20-24. doi:https://doi.org/10.65231/ijmr.v2i1.67

Hashimzai, I. A., & Mohammadi, M. Q. (2024). The Integration of Artificial Intelligence in Project Management: A Systematic Literature Review of Emerging Trends and Challenges. *TIERS Information Technology Journal, 5*(2), 153-164. doi:https://doi.org/10.38043/tiers.v5i2.5963

Irankunda, G., Zhang, W., Abdullahi, U. I., Fernand, M., David, B., & Jean-Petit, S. (2025). Understanding Critical Delay Causative Factors and Their Mitigation Measures in Burundi Communal Construction Projects: A Factor Analysis and Structural Equation Modeling Approach. *Buildings, 15*(3), 1-29. doi:https://doi.org/10.3390/buildings15030473

Khahro, S. H., Shaikh, H. H., Zainun, N. Y., Sultan, B., & Khahro, Q. H. (2023). Delay in Decision-Making Affecting Construction Projects: A Sustainable Decision-Making Model for Mega Projects. *Sustainability, 15*(7), 1-22. doi:https://doi.org/10.3390/su15075872

Khasawneh, M. A., & Dweiri, F. (2025). Influence of Digital Infrastructure on Project Management Success: Readiness, Fitness, and Tools as Moderators. *Emerging Science Journal, 9*(6), 3319-3348. doi:https://doi.org/10.28991/esj-2025-09-06-024

Khoshkonesh, A., Mohammadagha, M., & Ebrahimi, N. (2025). Integrated 4D/5D Digital-Twin Framework for Cost Estimation and Probabilistic Schedule Control: A Texas Mid-Rise Case Study. *Computational Engineering, Finance, and Science*, 1-22. doi:https://doi.org/10.48550/arXiv.2511.15711

Kurniawan, R., & Sushandoyo, D. (2025). Bridging the BIM Maturity Gap in Developing Country: A Change and Knowledge Management Framework for Enhancing Project Values. *European Journal of Business and Management Research, 10*(4), 198-202. doi:https://doi.org/10.24018/ejbmr.2025.10.4.2736

Lakhamraju, M. V. (2024). Digital Transformation in Project Management: Tools, Challenges, and Best Practices. *Journal of Information Systems Engineering and Management, 10*(52), 927-939. doi:https://doi.org/10.52783/jisem.v10i52s.10885

Pamuji, S., Ni'mah, T., Baharuddin, K., Novianto, A., Wibowo, E., & Kasmin, K. (2025). Time Management: The Key to Success in Managing Complex Projects. *International Journal of Multidisciplinary Approach Research and Science, 3*(1), 124-134. doi:https://doi.org/10.59653/ijmars.v3i01.1234

Pittri, H., Godawatte, G. A. G. R., Esangbedo, O. P., Antwi-Afari, P., & Bao, Z. (2025). Exploring Barriers to the Adoption of Digital Technologies for Circular Economy Practices in the Construction Industry in Developing Countries: A Case of Ghana. *Buildings, 15*(7), 1-31. doi:https://doi.org/10.3390/buildings15071090

Plattfaut, R. (2022). On the Importance of Project Management Capabilities for Sustainable Business Process Management. *Sustainability, 14*(13), 1-12. doi:https://doi.org/10.3390/su14137612

Qadir, S., Alawag, A. M., Baarimah, A. O., Zia, N., Alajmi, M., Almujibah, H. R., & Alyami, H. (2025). The Role of Digital Technologies in Enhancing Construction Project Management. *Scientific Reports, 16*, 1-32. doi:https://doi.org/10.1038/s41598-025-31955-6

Ramandhani, E. A., Lenggogeni, L., & Yasinta, R. B. (2025). Penerapan Teknologi Building Information Modeling (BIM) 4D pada Manajemen Waktu dalam Proyek Konstruksi. *Jurnal Pendidikan Tambusai, 9*(2), 22667-22673. doi:https://doi.org/10.31004/jptam.v9i2.30209

Rehman, I. U., Mazher, K. M., & Wuni, I. Y. (2025). Systematic Review of 4D BIM Benefits in Construction Projects. *Results in Engineering, 28*, 1-17. doi:https://doi.org/10.1016/j.rineng.2025.107091

Rokooei, S. (2015). Building Information Modeling in Project Management: Necessities, Challenges and Outcomes. *Procedia-Social and Behavioral Sciences, 210*, 87-95. doi:https://doi.org/10.1016/j.sbspro.2015.11.332

Savaş, S. (2025). Artificial Intelligence in Construction Project Management: Trends, Challenges and Future Directions. *Journal of Design for Resilience in Architecture and Planning, 6*(2), 221-238. doi:https://doi.org/10.47818/DRArch.2025.v6i2165

Shah, F. H., Bhatti, O. S., & Ahmed, S. (2023). Project Management Practices in Construction Projects and Their Roles in Achieving Sustainability—A Comprehensive Review. *Engineering Proceedings, 44*(1), 1-5. doi:https://doi.org/10.3390/engproc2023044002

Shoushtari, F., Daghighi, A., & Ghafourian, E. (2024). Application of Artificial Intelligence in Project Management. *International journal of industrial engineering and operational research, 6*(2), 49-63. doi:https://doi.org/10.22034/ijieor.v6i2.89

Sobirovich, B. N. (2021). Prospects for Development of BIM Technologies in Uzbekistan. *ACADEMICIA: An International Multidisciplinary Research Journal, 11*(12), 804-808. doi:https://doi.org/10.5958/2249-7137.2021.02743.9

Succar, B. (2009). Building Information Modelling Framework: A Research and Delivery Foundation for Industry Stakeholders. *Automation in construction, 18*(3), 357-375. doi:https://doi.org/10.1016/j.autcon.2008.10.003

Villena-Manzanares, F., García-Segura, T., & Pellicer, E. (2020). Organizational Factors That Drive to BIM Effectiveness: Technological Learning, Collaborative Culture, and Senior Management Support. *Applied Sciences, 11*(1), 1-16. doi:https://doi.org/10.3390/app11010199