

# Special Issue – Digital Construction Management

## Editorial note

Edición Especial - Gestión digital de la construcción | Nota Editorial

Prieto, Andrés J.<sup>\*,\*\*,\*1</sup>; Zegarra, Omar<sup>\*\*,\*\*\*</sup>

\* Guest Editor Revista Ingeniería de Construcción

\*\* Assistant Editor Revista Ingeniería de Construcción

\*\*\* Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

Fecha de Recepción: 15/12/2025

Fecha de Aceptación: 20/12/2025

Fecha de Publicación: 22/12/2025

PAG:i-iii

The construction industry continues to face persistent challenges related to productivity, cost overruns, safety, environmental performance, and fragmented project delivery. In this context, digital construction management has emerged as a critical enabler for addressing these systemic issues by enhancing transparency, coordination, and decision-making across the project lifecycle (Whyte & Hartmann, 2017). Despite the increasing availability of digital technologies, their effective integration into management practices remains uneven, particularly in complex and dynamic project environments (e.g., Su et al., 2023; Wang et al., 2022). Recent studies highlight that the value of digitalization in construction lies not only in technology adoption but in its capacity to transform how information is generated, shared, and used to reduce uncertainty and improve project outcomes (e.g., Pan & Zhang, 2021). Consequently, advancing digital construction management is essential for enabling a more resilient, efficient, and data-driven construction sector.

The advancement of digital construction management requires sustained research efforts that bridge technological innovation with organizational, human, and process-oriented perspectives. The construction sector's inherent fragmentation and multidisciplinary nature require integrated approaches that combine digital tools (and their associated challenges, such as data integration) with lean principles, collaborative practices, and adaptive management frameworks (e.g., Whyte & Davies, 2023). Research plays a pivotal role in demonstrating how emerging solutions—such as digital twins, artificial intelligence, UAVs, and advanced BIM methodologies—can be operationalized to support real-world decision-making. Moreover, strengthening collaboration between academia, industry, and public institutions is crucial to accelerate knowledge transfer, validate solutions in practice, and foster scalable digital transformation across projects of varying size and complexity.

Looking ahead, the continued development of digital construction management represents a strategic opportunity to reshape the construction industry in line with the demands of the 21<sup>st</sup> century. Beyond efficiency gains, digital management approaches have the potential to enhance safety, sustainability, and workforce engagement while supporting more proactive and predictive project delivery models. This Special Issue underscores the need to move from isolated digital applications toward coherent, management-oriented digital ecosystems. We encourage researchers, practitioners, and policymakers to build upon these contributions, promoting long-term investment in digital capabilities and fostering a culture of innovation that positions digital construction management as a cornerstone of future construction practice.

<sup>1</sup> Corresponding author: [andres.prieto@uc.cl](mailto:andres.prieto@uc.cl),

Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

The articles in this special issue address the following topics:

- **UAVs in Digital Construction Management**  
In “Advancing digital construction management in Latin America through drones (UAVs): Benefits, challenges, and future directions”, Concha et al. (2025) present a systematic literature review on the use of UAVs in the region, highlighting benefits, barriers, and opportunities for integration with other digital technologies. The study positions drones as key enablers for monitoring, data capture, and decision-making in Latin American construction projects.
- **Artificial Intelligence (AI) in Operational Management**  
Cisterna, Weinmann, and Cruz (2025) in “Chat as front end, structured data as output: A WhatsApp-native AI agent for the AEC Industry”, present an AI-based solution embedded in messaging platforms to transform unstructured information into structured operational data. The article presents the deployment of an AI in a large construction-mining project (i.e., ~2000 persons and 400 units of equipment). It shows substantial gains in efficiency, technology adoption, and reduced administrative effort, highlighting a low-friction approach to digitalization.
- **Digital Twins and Lean Applied to Cranes**  
In turn, Loyola and Martínez (2025) in “Real-time energy and CO<sub>2</sub> optimization in construction cranes through digital twins and lean construction” report an empirical study in Denmark which uses IoT sensors, digital twins, and Lean principles to assess the energy and environmental performance of construction cranes. The work demonstrates the potential of digital twins to optimize operations in real time.
- **Digital Twins – Conceptual Model for Construction Sites**  
Next, in “Proposal of a conceptual model of digital twins for construction sites”, Silva Araújo et al. (2025) propose a conceptual framework for implementing digital twins on construction sites, focused on the management of physical resources. The study contributes to clarifying definitions and structures, supporting improved decision-making, production monitoring, and coordination.
- **Lean, Agile, and BIM in High-Rise Building Design**  
In “Lean, Agile, and BIM relationships in the design of high-rise building projects”, Jerez Lazcano et al. analyze how the integration of these approaches addresses key challenges in the design phase of high-rise buildings. The results show that BIM structures design management, while Lean and Agile enhance planning, collaboration, and adaptability.
- **Digital Collaboration: ICE and CDE**  
Zanabria et al. (2025) in “Collaboration in Digital Construction: Integrating synchronous and asynchronous practices”, examine the interaction between synchronous collaborative practices (i.e., Integrated Concurrent Engineering -ICE- in the Virtual Design and Construction -VDC- methodology) and asynchronous ones (i.e., Common Data Environments -CDE- under ISO 19650). The study highlights their complementarity and emphasizes the need for integrated management frameworks that balance rapid decision-making with information control.
- **BIM 4D and Construction Safety**  
Finally, in “Integration of 4D BIM methodology into proactive risk management for falls from heights: Planning Collective protection measures in the structural phase”, Martínez Aires et al. (2005) analyze, based on a literature review, the use of 4D BIM to anticipate and manage fall risks. The work uses digital planning to improve coordination and strengthen preventive safety measures on-site.

We hope that the articles presented in this special issue will contribute to stimulating further research, collaboration, and implementation. The topics addressed directly respond to the industry’s critical needs in advancing digital transformation.

This Special Issue demonstrates that digital construction management is no longer an emerging trend but a necessary paradigm shift for improving productivity, safety, sustainability, and collaboration across the construction sector. The contributions presented highlight how technologies such as UAVs, BIM-based methodologies, digital twins, AI-driven interfaces, and digitally enabled collaborative practices are reshaping managerial decision-making throughout the project lifecycle. Beyond technological adoption, these studies emphasize the importance of integrating digital tools with lean principles, organizational processes, and human-centered approaches. Together, they provide valuable insights into how digital

construction management can be effectively implemented in diverse and dynamic contexts, particularly in Latin America. We invite researchers, practitioners, and policymakers to build upon these contributions to advance a more data-driven, collaborative, and resilient construction industry capable of addressing the complex challenges of the 21st century.

## Acknowledgments

Revista Ingeniería de Construcción wants to thank the authors, reviewers, and our editorial staff for their diligent work and effort in supporting and making possible the publication of this special issue.

## Declaration of generative AI and AI-assisted technologies

While preparing this work, the authors used ChatGPT to improve the draft's style. After using this tool/service, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

## Notes on Contributors

**Andrés J. Prieto (PhD)**, Assistant Professor of the Department of Engineering and Construction Management, School of Engineering, Pontificia Universidad Católica de Chile  
**ORCID:** <https://orcid.org/0000-0003-0604-0364>

**Omar Zegarra Marmanillo (PhD)**, Assistant Editor, Revista Ingeniería de Construcción, Department of Engineering and Construction Management, School of Engineering, Pontificia Universidad Católica de Chile  
**ORCID:** <https://orcid.org/0000-0001-7811-7637>

## References

- Pan, Y., & Zhang, L. (2021).** Roles of artificial intelligence in construction engineering and management: A critical review and future trends. *Automation in Construction*, 122, 103517. <https://doi.org/10.1016/j.autcon.2020.103517>
- Su, S., Zhong, R. Y., Jiang, Y., Song, J., Fu, Y., & Cao, H. (2023).** Digital twin and its potential applications in construction industry: State-of-art review and a conceptual framework. *Advanced Engineering Informatics*, 57, 102030. <https://doi.org/10.1016/j.aei.2023.102030>
- Wang, K., Guo, F., Zhang, C., Hao, J., & Schaefer, D. (2022).** *Digital Technology in Architecture, Engineering, and Construction (AEC) Industry: Research Trends and Practical Status toward Construction 4.0*. 983-992. <https://doi.org/10.1061/9780784483978.100>
- Whyte, J., & Davies, A. (2023).** Systems Integration in Construction: An Open-Ended Challenge for Project Organising. En S. Addyman & H. Smyth (Eds.), *Construction Project Organising* (1.ª ed., pp. 33-49). Wiley. <https://doi.org/10.1002/9781119813798.ch3>
- Whyte, J. K., & Hartmann, T. (2017).** How digitizing building information transforms the built environment. *Building Research & Information*, 45(6), 591-595. <https://doi.org/10.1080/09613218.2017.1324726>