www.ricuc.cl
LinkedIn Revista Ingeniería de Construcción

Vol. 39
Nº3 2024
DOI: 10.7764/RIC.00124.21

Special Issue - IX Congreso Iberoamericano de Gestión y Tecnología de la Construcción (ELAGEC)

Edición Especial IX ELAGEC

Alarcón, Luis F.[*,**]; Zegarra, Omar[**,****]; Herrera, Rodrigo[***,*****]; Salazar, Luis[***,******]**

* Editor in Chief Revista Ingeniería de Construcción
** Assistant Editor Revista Ingenieria de Construcción
*** Invited Editor Revista Ingeniería de Construcción; Comité Científico IX ELAGEC
**** Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile
***** Escuela de Ingeniería Civil, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile
****** Departamento de Obras Civiles, Universidad Técnica Federico Santa María, Valparaíso, Chile.

Fecha de Recepción: 29/11/2024
Fecha de Aceptación: 06/12/2024
Fecha de Publicación: 09/12/2024
PAG:i-iii

Globally, the construction industry is projected to experience significant growth over the next two decades, posing an unresolved challenge. The industry is expected to grow from 13 trillion USD (2023) to 22 trillion USD (2040), driven by the demand for infrastructure, housing, and buildings, as well as the need to meet sustainability and net-zero emission standards by 2050 (Deloitte, 2024; Mischke et al., 2024). However, the industry's capacity to meet this demand is under question (Mischke et al., 2024). This is due to inherent structural issues of the industry such as high economic risk, fragmented supply chains, poor project performance in terms of cost, time, and productivity, zero-sum contractual relationships, low technological development, and a shortage of human resources, among others (e.g., Mischke et al., 2024; National Research Council, 2009). In addition, the potential response is influenced by the presence of multiple trends that must be capitalized on, such as the urgency to address the sustainability needs, the digitalization and generative AI revolution, and the development of strategies to face issues such as market uncertainty, price volatility, and talent attraction (Deloitte, 2024). The industry faces a complex problem, and a successful response - i.e., generating value and reducing losses- will require changes and effective adaptation to the challenging conditions of an evolving industry.

In this context, the **Revista Ingeniería de Construcción** is pleased to publish its **Volume 39(3), 2024 Special Edition - IX Congreso Iberoamericano de Gestión y Tecnología de la Construcción (ELAGEC)**. This volume includes articles addressing various aspects related to the major global trends impacting the construction industry in Ibero-America. The volume presents a selection of articles, that are based on the best papers presented at the conference but, which have been **significantly expanded and peer-reviewed** to incorporate new analyses and perspectives, thereby generating a new contribution.

This special edition covers topics related to **Construction 4.0**, **Lean Construction**, **Sustainability**, and **Social Aspects**. The first three articles present studies on emerging topics such as the use of AI, 3D concrete printing, and the combined use of BIM and drones. A second set of articles uses a lean perspective to address critical topics such as safety, contracts, and collaborative design. The next three papers focus on sustainability in the context of public housing, the workforce, and public works. Finally, the volume concludes with two studies related to the participation of women in the industry and gender gaps. In this regard, the content of the articles is as follows:

- Pino, Barkokebas, Prieto and Bastos in "***BIM and procurement data integration in industrialized construction using artificial intelligence***", based on the use of artificial intelligence, propose a novel method to integrate BIM and ERP data in industrialized construction firms. Their findings, provide evidence of successful materials identification and time savings, as well as various implications for future studies.

Corresponding author: lalarcon@uc.cl,
Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

ISSN: 0718-5073

Vol. 39
Nº3 2024
DOI: 10.7764/RIC.00124.21

- In "***Comparative study of visual programming procedures for 3d concrete printing of different geometric shapes***", Forcael, Alucema, Burkart, García-Alvarado, Sepúlveda-Morales, and Martínez study visual programming routines used in 3D concrete printing, providing a comparative analysis between sixteen different geometries that emphasize the robotic arm printing time. They found that differences between printing times are not significant. This result empowers researchers and professionals to explore the boundaries of what is possible regarding the printing of more complex shapes.
- Oliveira, Souza, Sampaio de Melo y Bastos in "***Proposal for integrating drone images and BIM in educational public buildings to support maintenance management***" integrate drone images and BIM, in a method proposed for the maintenance management of educational public buildings. Their findings highlight the need for studies in low-digital-maturity contexts, clear guidelines, skilled labor, and stronger preventive maintenance culture.
- In turn, "***Optimizing security in architecture by design. Risk prevention in construction with a lean perspective"*** by Flores and Martínez, studies the integration of safety and architectural design by evaluating the safety improvement levels driven by the use of Lean Construction and Prevention through Design (PtD). Their findings demonstrate that the use of this approach can reduce the level of accidents by up to 20%.
- Araya, Pérez, Salazar, and Olivari in *"**Qualitative analysis of the subcontract bidding process in mining projects"*** study the bidding and awarding process of subcontracts within a contractor firm, they analyzed 13 projects with an average of 33 subcontractors each. Inefficiencies related to approval and supplier management were found. This work suggests positive implications for efficiency and quality caused by optimized outsourcing.
- In "**Development of a collaborative design management system for enhancing building project efficiency"** Herrera and Castañeda, developed a methodology that integrates Lean, Agile, and BIM methodologies into a system for improving communication, coordination, and performance in multidisciplinary design teams. Their findings reveal a practical framework useful for future research aimed at optimizing collaboration in design.
- Sierra-Varela and Rivas-Ríos in"***Assessment of the social sustainability of public housing projects in Chile"*** study and explain the interdependence between social criteria that govern the socially sustainable housing projects for vulnerable populations in Chile. They discuss and validate a structural equation model -using a survey of 188 professionals and five housing public projects- to address this highly relevant issue.
- "***Workforce sustainability in U.S. construction: Impact of health and wellbeing, diversity, equity, community, and connectivity on job satisfaction and retention"*** by Bonilla, Gbiengu Prospe and Nnaji Chukwuma, investigates the relationship between key attributes for workforce sustainability -such as diversity, health and wellbeing, equity, community, and connectivity- and the effect they exert on job satisfaction and attrition intentions on diverse communities in the U.S. construction sector. They found that some of these attributes play a central role in job satisfaction and retention.
- Valdivieso-Ramírez, Montalbán-Domingo, García-Segura, Sanz-Benlloch, and Pellicer, in "***Analysis of sustainability in the procurement of public works: the influence of the Covenant of Mayors"*** Identify the main commitments of town councils, associated with this initiative, and analyze the influence of public work procurement on environmental sustainability. Their findings reveal the focus of the work of Municipalities affiliated with the Covenant of Mayors initiative, which is on the efficiency of energy use.
- In "***Challenges for the retention of women in the Chilean construction industry: A quantitative analysis"*** Bahamondes, Araya, Olivari, and Salazar, study the obstacles that women encounter to participate in the Chilean construction industry. A survey of 111 individuals revealed the prominence of gender over other factors as the most influential aspect in this regard.
- Finally, Salazar, Olivari, Olivari, and Araya in '***Diagnosis of gender gaps in higher education: a case study in the civil construction program at Federico Santa María Technical University'*** addresses the gaps and challenges faced by female students of civil construction. Based on a systematic literature review, a survey of 47 female students and ten semi-structured interviews, they found negative - i.e., stigma, peer evaluation, and harassment- and positive -i.e., interest in enrolling, and support received- aspects related to this issue.

We hope that the articles presented as part of this special issue will stimulate further research and collaboration using the topics addressed in this volume as a starting point. Construction 4.0, lean construction, sustainability, and the human factor are topics highly relevant to the

Corresponding author: lalarcon@uc.cl,
Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

ISSN: 0718-5073

Vol. 39
Nº3 2024
DOI: 10.7764/RIC.00124.21

industry (e.g., Oesterreich & Teuteberg, 2016; Choi et al., 2022; Lima et al., 2021). Their potential to contribute to the industry's future is vast and must be harnessed to achieve meaningful progress.

At this point, we also want to express our gratitude and sincere congratulations to the authors, reviewers, the IX ELAGEC scientific committee, and the Editorial Team of the Revista Ingeniería de Construcción. Their commitment, effort, and great work have made this special issue possible.

Finally, it is worth remembering that the construction industry in Iberoamerica must be ready to adapt and co-evolve with the trends currently shaping the global industry. In the current, complex global context, marked by uncertainty, volatility, and ambiguity, the construction industry is exposed to evolutionary pressures driven by political, social, economic, and technological factors, where change is inevitable(Balland et al., 2022). It will depend on the actors involved to influence the response of the construction industry. We invite professionals and researchers in our sector to immerse themselves in the articles of this special edition, hoping they will find a source of inspiration for the task ahead.

Luis F. Alarcón, Editor in Chief Revista Ingeniería de Construcción; Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile. **ORCID** https://orcid.org/0000-0002-9277-2272	**Omar Zegarra,** Assistant Editor Revista Ingenieria de Construcción; Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile **ORCID** https://orcid.org/0000-0001-7811-7637
Rodrigo Herrera, Invited Editor Revista Ingeniería de Construcción; Comité Científico IX ELAGEC; Escuela de Ingeniería Civil, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile **ORCID** https://orcid.org/0000-0001-5186-3154	**Luis Salazar,** Invited Editor Revista Ingeniería de Construcción; Comité Científico IX ELAGEC; Departamento de Obras Civiles, Universidad Técnica Federico Santa María, Valparaíso, Chile. **ORCID** http://orcid.org/0000-0001-7339-8935

References

Balland, P.-A.; Broekel, T.; Diodato, D.; Giuliani, E.; Hausmann, R.; O'Clery, N.; Rigby, D. (2022). The new paradigm of economic complexity. Research Policy, 51(3), 104450. https://doi.org/10.1016/j.respol.2021.104450

Choi, J. O.; Shane, J. S.; Chih, Y.-Y. (2022). Diversity and Inclusion in the Engineering-Construction Industry. Journal of Management in Engineering, 38(2), 02021002. https://doi.org/10.1061/(ASCE)ME.1943-5479.0001005

Deloitte. (2024). 2024 engineering and construction industry outlook. Deloitte Insights. https://www2.deloitte.com/us/en/insights/industry/engineering-and-construction/engineering-and-construction-industry-outlook-2024.html

Lima, L.; Trindade, E.; Alencar, L.; Alencar, M.; Silva, L. (2021). Sustainability in the construction industry: A systematic review of the literature. Journal of Cleaner Production, 289, 125730. https://doi.org/10.1016/j.jclepro.2020.125730

Mischke, J.; Stokvis, K.; Vermeltfoort, K. (2024). Improving construction productivity is the new imperative | McKinsey. https://www.mckinsey.com/capabilities/operations/our-insights/delivering-on-construction-productivity-is-no-longer-optional

National Research Council. (2009). Advancing the Competitiveness and Efficiency of the U.S. Construction Industry. National Academies Press. https://doi.org/10.17226/12717

Corresponding author: lalarcon@uc.cl,
Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

ISSN: 0718-5073

Vol. 39
Nº3 2024
DOI: 10.7764/RIC.00124.21

Oesterreich, T. D.; Teuteberg, F. (2016). Understanding the implications of digitisation and automation in the context of Industry 4.0: A triangulation approach and elements of a research agenda for the construction industry. Computers in Industry, 83, 121-139. https://doi.org/10.1016/j.compind.2016.09.006

Corresponding author: lalarcon@uc.cl,
Departamento de Ingeniería y Gestión de la Construcción, Escuela de Ingeniería, Pontificia Universidad Católica de Chile

ISSN: 0718-5073