



Rapport de veille n° 82

BIM

30/04/2026

Objectif : *L'utilisation du BIM en phase de conception et de ses potentiels applications pour la prévention des risques*

La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS.

Les liens mentionnés dans le bulletin donnent accès aux documents sous réserve d'un abonnement à la ressource.

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1. Articles scientifiques

[Challenges and potential benefits for the implementation of robots in building projects: The case of Perú](#)

A Erazo-Rondinel, G Angela, J Romani, I Ccoyllar - Revista Ingeniería de Construcción, 41(1), 2026, pp. 1–16

DOI : <https://doi.org/10.7764/RIC.00170.21>

Robotics is a key component of Construction 4.0 and has gained increasing attention in construction projects. However, previous studies have mainly focused on technological development, with limited analysis of the perceived challenges and benefits among industry stakeholders. This study examines these aspects in the Peruvian construction sector. A literature review was conducted to identify potential challenges and benefits, which were validated by six experts, resulting in 11 benefits and 13 challenges. A survey was then administered to construction professionals, and the data were analyzed using Cronbach's coefficient, Relative Importance Index (RII), and Exploratory Factor Analysis (EFA). The results show that the main challenges include weak innovation culture, limited investment capacity, and complex technological requirements. The most significant benefits are improved efficiency through automation and digital interoperability, continuous improvement through industrialized production, and enhanced organizational competitiveness. These findings highlight the importance of strengthening innovative culture, developing regulatory frameworks, and adapting implementation strategies to promote robotics adoption in the construction industry.

[Key Performance Indicators in Building Renovation: A Detailed Systematic Literature Review](#)

A Hrubovcakova, P Mesaros, M Spisakova - Buildings, 2026, 16(8), 1467

DOI : <https://doi.org/10.3390/buildings16081467>

The main objective of this study is to produce a systematic literature review that analyses key performance indicators (KPI) in the context of efficient and sustainable building renovation. Efficiency and sustainability, in combination with building renovation, are important themes due to the increasing need for creating sustainable renovations worldwide. The identification and monitoring of KPIs is fundamental in decision-making processes, but also in the monitoring of short-term and long-term project goals. In the current academic literature, existing research gaps, especially in the social aspects of sustainability and research, have also been analyzed in terms of regional differences in the approach to each KPI. The systematic literature review examined 29 studies published between 2014 and 2024, based on a literature search conducted in 2024, using databases such as Scopus and Web of Science, with the final search performed in June 2024. The inclusion criteria focused on peer-reviewed studies addressing KPIs in sustainable building renovation, while studies not directly related to renovation processes or lacking KPI analysis were excluded. The research results show that the majority of studies focus on economic and environmental factors, which are the most commonly addressed, while research on other KPIs is significantly behind. The results were synthesized using a qualitative comparative analysis of identified KPI categories. This study also highlights the importance of addressing effective and sustainable renovation for historic buildings with a focus on heritage preservation and the need to further analyze the use of KPIs with a focus on historic buildings. The limitations include the limited number of studies and the underrepresentation of social sustainability aspects.

Smart PPE and wearable technology for construction safety management: A scientometric analysis and state-of-the-art review

OJ Adebawale, JN Agumba - Archives of Environmental & Occupational Health, 2026

DOI : <https://doi.org/10.1080/19338244.2026.2655851>

This study presents a scientometric and state-of-the-art review of smart personal protective equipment (PPE) and wearable safety technologies (WSTs) in construction safety management for the period 2015–2024. Framed within SDG Target 8.8, the research utilizes data from Scopus and Google Scholar to map research trends, technological trajectories, and adoption dynamics. The findings demonstrate a transition from conventional PPE to intelligent, sensor-enabled systems integrated with artificial intelligence and real-time monitoring, thereby enhancing hazard detection and worker health surveillance. Despite increasing technical maturity, adoption is hindered by privacy concerns, cost-prohibitive procurement, and digital infrastructure deficits, particularly in the Global South. The study underscores the necessity of robust data governance and user-centered design to mitigate these barriers. It contributes a scientometric roadmap that bridges technological innovation with human-centric adoption, offering strategic insights for aligning construction safety practices with global sustainability mandates.

2. Conférence / ouvrage / thèse

Building Construction Safety Monitoring

H Li, R Guo, L Bai, B Yang - In book: Computer Vision and AI for Indoor/Outdoor Thermal Environment and HVAC Equipment Monitoring Edition: 1 Publisher: CRC Press, Boca Raton, 2026, pp.155-179

DOI : 10.1201/9781003611455-6

This chapter explores advanced technologies revolutionizing safety monitoring in construction. It details six key methodologies: unmanned aerial vehicle-based aerial surveying for efficient site inspection, hazard detection, and site mapping, overcoming limitations of manual checks. Behavior recognition technology utilizes computer vision to analyze worker poses and actions from images/videos, enabling real-time identification of unsafe acts like improper ladder use. Real-time location systems track workers and equipment, preventing collisions by monitoring proximity in complex environments; performance challenges like signal occlusion are addressed. Spatial planning technology leverages building information modeling (BIM) to integrate design models with real-time sensor data for proactive collision risk analysis, automated rule checking, and optimized site layout planning. Wearable devices and electroencephalogram (EEG) technology monitor worker physiological states to prevent accidents caused by diminished alertness or unsafe movements. Eye-tracking and virtual reality/augmented reality (VR/AR) enhance safety training and risk awareness; VR simulations provide immersive hazard experience, while eye-tracking analyzes visual attention patterns to understand risk perception differences between novice and experienced workers. Case studies demonstrate the practical implementation and effectiveness of these technologies in improving proactive safety management, reducing accidents, and enabling data-driven interventions. The chapter concludes by acknowledging limitations and outlining future research directions, like enhanced three-dimensional (3D) proximity modeling and integrated wearable systems.

BIM-Based Safety Management: Enhancing Safety with Digital Technologies in Indian Construction Project

P Tripathi, YK Mittal - In: Kumar Shukla, S., Tripathi, B., Naser, M.Z., Das, S.K. (eds) Artificial Intelligence for Resilient Infrastructure and Sustainable Engineering Materials. AIRISE 2025. Lecture Notes in Civil Engineering, vol 809. Springer, Singapore, pp. 1-16

DOI : https://doi.org/10.1007/978-981-95-6386-9_1

The construction sector is characterized by its complexities and hazardous nature, leading to increased occupational risks and safety challenges. Despite the presence of established safety regulations, violations persist, highlighting the need for innovative approaches to address safety management challenges. Integrating Building Information Modeling (BIM) into construction safety management is recognized for its ability to reduce risks and enhance overall project performance. The study's objective is to examine the perception of BIM professionals regarding the effectiveness of BIM in modeling preventive measures and the abilities of various BIM dimensions in supporting efficient safety management. The study investigates the proactive role of BIM in managing safety hazards throughout the construction lifecycle using content analysis and a structured questionnaire survey. The findings indicate that Indian construction professionals primarily utilize 3D and 4D BIM rather than 5D–7D BIM, and there is no adoption of newer 8D–10D dimensions. While BIM adoption for safety management remains limited, respondents show significant potential for 3D and 4D BIM applications in safety management. Further, the study highlights significant barriers to BIM implementation in India, including a lack of skilled personnel and financial constraints. The study also identifies Virtual Reality (VR), Augmented Reality (AR), and the Internet of Things (IoT) as key digital technologies that can be integrated with BIM to



enhance safety management on construction sites. Finally, the current BIM-implemented real-time projects and government BIM policies in India are examined. This study theoretically contributes to the literature by documenting Indian professionals' perspectives on BIM adoption and identifying preventive safety measures that can be integrated with BIM in the construction industry.