



Rapport de veille n° 42

BIM

31/12/2022

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. Références anglophones

1.1 Articles scientifiques

[A BIM-based two-stage fuzzy inference system for safety risk prediction in building construction projects](#)

M Parsamehr, R Ruparathna - Canadian Journal of Civil Engineering, December 2022

DOI : <https://doi.org/10.1139/cjce-2022-0072>

Building information modeling (BIM) can be recognized as the most promising technology that was introduced to the construction sector in the recent past. The current BIM-based safety risk assessment methods ignore data uncertainty. Hence, this study integrates BIM with fuzzy set theory for safety risk prediction. A Fuzzy Inference System (FIS) was developed based on the causality of safety incidents. The FIS extracts construction project data from BIM models while automatically assessing each potential safety hazard and project's total risk. The proposed method was demonstrated by using a building project in which the safety risk was predicted as low. Safety records of the above project revealed that no safety incidents were recorded in this project. The proposed method can indicate the safety risks level at various stages of a construction project and help to enhance the safety of construction workers on a construction site.

[Health and Safety Improvement through Industrial Revolution 4.0: Malaysian Construction Industry Case](#)

MA Musarat, WS Alaloul, M Irfan, P Sreenivasan... - Sustainability, 2023, 15(1), 201

DOI : <https://doi.org/10.3390/su15010201>

Safety on construction sites is now a top priority for the construction industry all around the world. Construction labor is often seen as hazardous, putting employees at risk of serious accidents and diseases. The use of Industrial Revolution (IR) 4.0 advanced technologies such as robotics and automation, building information modelling (BIM), augmented reality and virtualization, and wireless monitoring and sensors are seen to be an effective way to improve the health and safety of construction workers at the job site, as well as to ensure construction safety management in general. The main aim of this research was to analyze the IR-4.0-related technologies for improving the health and safety problems in the construction industry of Malaysia by utilizing the analytical hierarchy process (AHP) technique. IR-4.0-related technologies show great potential in addressing the construction industry's existing health and safety problems from the perspective of civil engineering practitioners and industry experts. This research adopted the analytical hierarchy process (AHP) for quantitative analysis of data collected through the survey questionnaire approach. The findings of the study indicate that from matrix multiplication, the highest importance among the criteria and the alternatives was for BIM with a score of 0.3855, followed by wireless monitoring and sensors (0.3509). This research suggests that building information modelling (BIM) and integrated systems had the greatest potential as advanced technology and should be prioritized when it comes to introducing it to the construction industry to improve the current health and safety performances.

1.2Conférence / ouvrage / thèse

[Rule Based Safety Checking in Scaffolds by Integrating Building Information Modeling \(BIM\) and Safety Management](#)

A Vilventhan, S Mohapatra - In: Li, R.Y.M. (eds) Construction Safety: Economics and Informatics Perspectives. Springer, Singapore, pp. 51-63

DOI : https://doi.org/10.1007/978-981-19-3234-2_3

The construction industry is one of the most accident-prone sectors in the world. The lack of strict adherence to guidelines and safety standards is one of the major contributing factors to safety hazards. Identifying safety risks before the start of construction is very crucial. This requires incorporating safety parameters into the design stages of the project. A rule-based safety checking model by integrating safety management with Building Information Modelling (BIM) will facilitate safety checking in the design stages. This chapter discusses how the safety regulations are converted to rulesets and integrated to BIM to identify safety risks involved in the scaffolding structures during the design stage of the project. The rule-based safety checking approach will evaluate the BIM model if regulations and specifications are followed as mentioned in the safety codes. The integration of safety management with BIM will enable communicating safety issues with the stakeholders and reduce accidents relating to improper scaffoldings.

[Building Information Modeling on Construction Safety: A Literature Review](#)

JMC Ongpeng - In: Advances in Architecture, Engineering and Technology . Advances in Science, Technology & Innovation. Springer, Cham, pp. 89-102

DOI : https://doi.org/10.1007/978-3-031-11232-4_8

Building information modeling (BIM) technology has a significant contribution to construction safety, such as the automated detection of possible safety hazards and the prevention of potential risks likely to occur. The technology has been implemented in the architecture, engineering, and construction (AEC) industry for decades and has recently been introduced in construction safety. The technology can bring significant benefits to safety management in accident prevention and provide valuable reference material for rescue activities. Therefore, construction safety management must understand the technology, application, and challenges for better utilizing BIM as a safety tool. With these BIM safety tools, we should hope to see a shift in how safety is handled. To overcome this gap, concerning the challenges discussed, future research should consider: (1) generalization of the enhancement of BIM's technicality and functionality, (2) the cost–benefit analysis, and (3) construction practitioners' perspective on BIM applications on the results generated from different tools. It also recommends developing a database of all uncertain identified hazards and potential control measures subject to expert validation.

[Mapping of Global Construction Safety Research using Scientometric Approach \[PDF\]](#)

DA Patel, SB Amlani - ASPS Conference Proceedings, 1: 1175-1183 (2022)

DOI : [doi:10.38208/acp.v1.637](https://doi.org/10.38208/acp.v1.637)

The construction sector is one of the hazardous sectors across the world. In the Indian construction sector, on an average 38 fatal accidents happen every day. Research on construction safety and improvement of safety performance has been continuing for a few years. It explores multiple areas such as safety performance measurement, safety program, human factors, safety planning, site monitoring, etc. This study followed a three-stage literature review approach summarizing the research domain of construction safety. The science mapping approach consists of both bibliometric analysis and scientometric analysis which are carried out in this study. For the bibliometric analysis, Web of Science (WoS) database has been used while for the scientometric analysis, the Cite-Space software has been used in this study. This study identifies key areas of construction



safety management by following by a qualitative discussion on research publications across the globe. It includes information and communication technology in safety management, workers' safety perception and behaviour, safety management system, hazard identification, accident causation, and risk management in safety, safety climate and safety culture. This study helped the authors to prepare the outline of construction safety manual. This paper is useful to academic community and industry practitioners to understand the trend of research in the field of construction safety. Also, the proposed directions for future work could benefit to the new researchers and industry practitioners in enhancing safety performance and improving site 'employees' health and wellbeing.