



Rapport de veille n° 46

BIM

30/04/2023

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

[The Influence of Building Information Modelling Adoption in the Viability of Medium, Small and Micro Scale Construction Firms \(MSMSCFs\)](#)

O Oladimeji, MK Najjar, CAP Soares, AN Haddad - Buildings, 2023, 13(4), 1087

DOI : <https://doi.org/10.3390/buildings13041087>

Identifying factors influencing the viability of medium, small, and micro scale construction firms (MSMSCFs) is a crucial precursor in positioning such firms to aid economic and infrastructural development, especially in developing countries. This article assesses viability factors that are influenced by building information modeling (BIM) in MSMSCFs amidst construction firms' viability factors. Out of a total of 177 workers surveyed from 59 MSMSCFs that were awarded construction project contracts in sampled institutions in Nigeria, 65 staff members from 31 MSMSCFs were accessed. The factors were ranked and reduced to significant ones through principal component analysis. Ten significant factors influence the viability of MSMSCFs and six of them are enhanced by BIM implementations. All eight component factors and 18 of the 27 variables with high factor loadings can be influenced by BIM implementation. BIM can potentially curb corruption in construction projects and enhance MSMSCFs' quality of service, clients' satisfaction, construction management and technology, professional performance, procurement practices, and prompt payment of work certificates. All stakeholders need to pay prompt attention to factors that can be influenced by BIM to improve the viability of MSMSCFs, thereby hastening BIM adoption and utilization, especially in developing countries.

[Determining building information modeling effectiveness](#)

S Caglayan, B Ozorhon - Automation in Construction, Volume 151, 2023

DOI : <https://doi.org/10.1016/j.autcon.2023.104861>

Building Information Modeling (BIM) is a promising development that can address the inherited inefficiencies in construction. This research aims to develop a framework for assessing BIM effectiveness. Following an extensive literature review and expert opinions, the proposed framework was generated with a total of seven constructs. Structural Equation Modeling (SEM) was used to validate the proposed framework and test the research hypotheses based on 172 responses collected from 107 construction projects. The results revealed that BIM effectiveness is mainly governed by project- and company-based factors; where industry-based factors have indirect influences. Besides, BIM effectiveness drives higher process effectiveness, which in turn generates project- and company-related benefits. This research has developed an interactive framework that could be used to collect and analyze data from other countries to enable comparison of findings. Construction practitioners and policy-makers can benefit from the recommended strategies to enhance BIM effectiveness at project, company, and industry levels.

[Determining susceptible body parts of construction workers due to occupational injuries using inclusive modelling](#)

K Koc, Ö Ekmekcioğlu, AP Gurgun - Safety Science, Volume 164, 2023

DOI : <https://doi.org/10.1016/j.ssci.2023.106157>

Despite significant progress has been made in safety management practices, construction industry still accounts for a substantial number of occupational accidents leading to injuries in different body parts of construction workers. In this vein, detecting the most susceptible body parts of construction workers by using only pre-accident information is of particular importance by means of performance augmentation using advanced modelling techniques as it helps safety managers orchestrate the most relevant and adequate mitigation measures. The central focus of this study is to identify the susceptible body parts of construction workers proactively and propose measures specific to the corresponding body parts. Hence, this study aims to develop a machine learning (ML)-based novel inclusive multi-stage ensemble model that identifies the most vulnerable body parts of construction workers using a national dataset recorded in Turkey. Findings illustrate that incorporating ensemble modelling approach into predictions enhanced accuracies and the ensemble random forest (RF) model reinforced with principal component analysis (PCA) yielded the best performance. Results further highlight that number of workers in the company, working days of the worker, and age of the worker are the most influential attributes in the susceptibility of body parts. A utilization plan is developed based on the analysis results, which can be run monthly on construction sites to identify the most vulnerable body parts of construction workers. Overall, this study is expected to contribute to the development of more robust safety management applications by allowing safety managers to evaluate susceptible body parts of construction workers prior to accidents.

1.2Conférence / ouvrage / thèse

[Application of BIM and Internet of Things Technology in Engineering Construction Safety Management](#)

H Wang - In: Abawajy, J.H., Xu, Z., Atiquzzaman, M., Zhang, X. (eds) Tenth International Conference on Applications and Techniques in Cyber Intelligence (ICATCI 2022). ICATCI 2022. Lecture Notes on Data Engineering and Communications Technologies, vol 170. Springer, Cham, pp. 181-188

DOI : https://doi.org/10.1007/978-3-031-29097-8_22

At present, the construction industry pursues high quality development, the requirements of construction safety management are also improved. According to the data released by the Ministry of Housing and Urban-Rural Development, under the current construction safety management mode, the growth rate of the number of construction safety accidents and casualties is slowing down, but it still shows an increasing trend year by year. This paper mainly studies the application of BIM and Internet of Things(IoT) technology in engineering construction safety management. In this paper, BIM and IoT technology are firstly introduced, and BIM and IoT technology are deeply combined in engineering construction to realize information interaction. Based on this, the safety management model of engineering construction based on BIM and IoT is proposed. Through the experimental results of this paper, it can be seen that the application of the model has certain positive significance for the development of construction safety management.

[Handbook of Construction Safety, Health and Well-being in the Industry 4.0 Era](#)

P Manu, G Shang, PJ da Silva Bartolo, V Francis... - 2023, 328 p.

ISBN : 9781032079929

This Handbook seeks to examine and advance current understanding of the confluence of construction health, safety and well-being and the broad range of Industry 4.0 technologies in use in the architecture, engineering and construction (AEC) industry. Globally, the construction sector accounts for more than 100,000 occupational fatalities annually. In many countries, reports of work-related accidents, injuries and illnesses are commonplace, and there is an urgent need to improve the occupational safety and health (OSH) outlook of the construction sector. The fourth industrial revolution presents opportunities to leverage modern technologies (e.g., big data, artificial intelligence, automation, sensors, AR, VR and robotics) to improve the poor OSH performance of the construction industry. However, embracing such technologies could also induce unintended adverse consequences for the safety, health and well-being of construction workers. Therefore, the realisation of the opportunities as well as the mitigation of potentially adverse consequences requires research-informed holistic insights around the union of Industry 4.0 and construction occupational safety and health management. This cutting-edge volume addresses a significant gap in literature by bringing together experienced academics and researchers to highlight the drivers, opportunities and drawbacks of the merging of Industry 4.0 with construction health, safety and well-being. After a detailed introductory section which highlights key issues and challenges, section one covers the application of a broad range of digital technologies; then section two discusses the application of industrial production and cyber physical systems in the context of construction safety and health management. Readers from a broad range of AEC backgrounds as well as safety professionals and technologists will come to understand how the technologies are applied and the resulting OSH benefits as well as potential drawbacks.