



Rapport de veille n° 34

BIM

30/04/2022

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.

Table des matières

1. Références anglophones.....	3
1.1 Articles scientifiques	3

1. Références anglophones

1.1 Articles scientifiques

[Improvement factors of constructability and occupational safety on project life cycle phases](#)

LLF Araújo, MCW Saldanha, CF Gohr... - Automation in Construction, Volume 138, June 2022

DOI : <https://doi.org/10.1016/j.autcon.2022.104227>

This paper aims to a better understanding of constructability and occupational safety issues through a systematic literature review. Therefore, the article provides a general overview of the literature by presenting a network analysis and a descriptive quantitative one. We extract definitions of buildability and constructability, main topics, categories, and factors that improve constructability and occupational safety through an in-depth analysis of the papers. We identified 27 improvement factors of constructability and 72 of occupational safety regarding project life cycle phases. A visual representation was done, including those that improve both constructability and occupational safety (46 factors). These factors represent a standard guideline among safety and constructability categories. The paper also presents research opportunities for future studies regarding project lifecycle phases, research method, constructability, and safety field, and needs for future work situations. We expect to contribute to architectural, engineering, and construction industry development concerning occupational safety and constructability improvements.

[Proposal for the Deployment of an Augmented Reality Tool for Construction Safety Inspection \[PDF\]](#)

J Ramos-Hurtado, ML Rivera, J Mora-Serrano... - Buildings, 2022, 12, 500, 36 p.

DOI : <https://doi.org/10.3390/buildings12040500>

The construction site is a hazardous place. The dynamic, complex interaction between workers, machinery, and the environment leads to dangerous risks. In response to such risks, the goal is to fulfill the zero accidents philosophy, which requires the development of safety skills among workers and the provision of tools for risk prevention. In pursuit of that vision, this work studies collective protective equipment (CPE). Traditional methodologies propose visual inspections using checklists, the effectiveness of which depends on the quality of the inspection by the safety advisor (SA). This paper analyses the traditional process of safety inspections in building projects: the traditional methods, main pain points, and bottlenecks are identified, along with the key performance indicators (KPIs) needed to complete these processes correctly. Because of this, a methodology that digitises the CPE inspection process is proposed. Augmented reality (AR) is used as a 3D viewer with an intuitive interface for the SA, and, accordingly, functional requirements are detailed and different information layers and user interfaces for AR applications are proposed. In addition, the workflow and KPIs are shown. To demonstrate the feasibility of the proposal, a proof of concept is developed and evaluated. The relevance of this work lies in providing background for the use of AR in safety inspection processes on construction sites and in offering methodological recommendations for the development and evaluation of these applications.

[Reducing Construction Dust Pollution by Planning Construction Site Layout \[PDF\]](#)

G Tao, J Feng, H Feng, H Feng, K Zhang - Buildings, 2022, 12, 531, 17 p.

DOI : <https://doi.org/10.3390/buildings12050531>

Many construction activities generate fine particles and severely threaten the physical health of construction workers. Although many dust control measures are implemented in the industry, the occupational health risks still exist. In order to improve the occupational health level, this study proposes a new method of reducing the construction dust pollution through a reasonable site layout plan. This method is based on the field measurement and dust diffusion law. The dust diffusion law can be fitted based on the field monitoring data. With diffusion law, the average dust concentration exposed to workers of different site layouts can be simulated. In addition, the cost of the dust control method is a concern for site managers. Therefore, the total

transportation cost reduction is another optimization objective. Finally, the multi-objective particle swarm optimization (MOPSO) algorithm is used to search for an optimized site layout that can reduce dust pollution and transportation cost simultaneously. The result shows that average dust concentration exposed to workers and total transportation cost are significantly reduced by 60.62% and 44.3%, respectively. This paper quantifies the construction dust pollution and provides site managers with a practical solution to reduce the construction dust pollution at low cost.

[Awareness of the prevention through design \(PtD\) concept among design engineers in the Philippines \[PDF\]](#)

RLK Panuwatwanich, S Takahashi - Engineering Management in Production and Services, Volume 14, Issue 1, 2022, 15 p.

DOI : 10.2478/emj-2022-0007

The “Prevention through Design” (PtD) concept considers construction safety during the design process. Several countries are currently practising PtD, including the UK, Singapore, Malaysia, Australia, and the USA, which is still not the case in the Philippines. The study presented in this paper aimed to indicate the current level of awareness of the PtD concept among the structural engineers and purposed to generate a basis of initiatives to introduce or improve the understanding and adoption of PtD in the Philippines. A knowledge, attitude, and practice (KAP) questionnaire was distributed to survey respondents selected through a snowball sampling method, consisting of structural engineers currently working in the Philippines. Sixty-one (61) structural engineers responded and were analysed in this study. Results indicated that PtD was relatively a new concept for most structural engineers in the Philippines. Similarly, the designers’ knowledge of the concept was still low. However, structural engineers viewed PtD as necessary and its implementation as essential in the construction industry. Despite the known concerns in the PtD implementation, structural engineers favoured the adoption of the concept. The paper also discussed challenges and key drivers for implementing PtD in the Philippines based on the questionnaire results and supporting literature reviews. The findings and methodology presented in this paper could serve as a baseline for a larger sample size covering other design trades, such as architectural, electrical, and mechanical design services leading to the broader adoption of PtD in the Philippines. Furthermore, the framework of this study could also apply to other countries with similar contexts.

[The Application of BIM-Based OHSMS Information Systems to Improve Safety Performance](#)

A Herzanita, Y Latief, F Lestari - International Journal of Safety and Security Engineering, 2022, volume 12, issue 1, 8 p.

The accidents recorded during university construction projects usually affect the safety performance of the institution. This indicates it is important to recognize the hazards and construction risks at the design stage in order to have an optimal safety plan. Moreover, the university area has several organizations involved in the implementation of Occupational Health and Safety Management Systems (OHSMS). Therefore, there is a need to develop the OHSMS information system to accommodate the role of the parties involved and to disseminate information and communication more effectively. This study was conducted to develop a WBS and BIM-based safety plan for the OHSMS information systems to improve the safety performance using the case study method. The result showed that the WBS is the basic constituent of the safety plan integrated with the BIM to visualize the project in real terms in order to ensure easier identification of hazards and risks. The process involved building data security information in BIM to develop webbased information systems and the BIM-based OHSMS information system developed is expected to improve safety performance in the university area.