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Integration of Automated Safety Rule Checking (ASRC) System for Safety Planning BIM-Based Projects in Malaysia

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Abstract

It has been observed that safety and project execution planning has been carried out separately for most Building Information Modelling (BIM)-Based projects. As such, it leads to difficulties for the construction parties to monitor both aspects of planning and safety during project implementation. In this regards, the Automated Safety Rule Checking (ASRC) system is perceived to distinguish the fall hazards by integrating the system in the existing 3D-modeling. This paper pursues to explore the integration of ASRC system within BIM-based projects in Malaysia. A cross-sectional survey was employed to large public and private organisations that involved with BIM. The data were analysed by using content analysis technique and revealed that ASRC system is yet to be incorporated into BIM-based project in Malaysia.

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Keywords: Safety Rule Checking (ASRC); Building Information Modelling (BIM); fall hazard; safety

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1. Introduction

Safety is one of the most decisive aspects in the project development process. It is indeed the construction workers are threatened by various kinds of dangers (especially fall hazard) in their work environment. It has been proven by Bratcher et al. (2010) and U.S Department of Labour (2014), fall hazard in construction is contributing to most of the fatal injuries. For instance, in 2013, almost 36.9% (294 out of 796) of the construction workers died because of falls in United States (US). The probable reason could be due to lack of safety planning and safety protection equipped during the construction phase.

With the technological advancement in the construction industry (i.e., Building Information Modelling), safety hazard shall be diminished as the project progresses. This medium shall integrate both Building Information Modelling (BIM) and safety planning across the project phases. According to Melzner et al. (2012), the integration may detect three (3) important elements, including: (1) what forms of safety protections need to be installed (i.e., cover and guardrail); (2) where to install (i.e., slab edge, slab hole, and wall opening); and (3) when to plan and install the protections (i.e., design development, construction documentation and construction phase).

In relation to the above, much attention in the Architectural, Engineering and Construction (AEC) industry today is focusing on BIM for the fact that it attempts to bring many benefits including safety to the construction projects (Takim et al., 2013). Smith (2007) and Zakaria et al. (2013) states that, BIM is a revolutionary technology that envisages the virtual construction progress in order to mitigate uncertainty, assure the adequate safety, and analyse the potential impacts as the project progresses. Hence, it is an opportunity to make full use of the benefits derived from BIM that potentially integrates both safety and health practices within BIM-based projects in Malaysia. Alternatively, the Automated Safety Rule Checking (ASRC) system shall be used to facilitate the safety planning while the BIM-based projects are in progress.

The paper seeks to explore the integration of the Automated Safety Rule Checking (ASRC) system within BIM-based projects in Malaysia. Correspondingly, it perceive on the understanding of the respondents on the ASRC system.

2. Background

Construction is one of the industries that contribute to major rate of accidents and fatalities. The reason could be due to its nature of environment (i.e., most dangerous and hazardous workplace) which can easily affecting the worker's physical and health condition (Melzner et al., 2012; Mohammed & Ishak, 2013). According to Abdullah & Wern (2011), as recorded by Social Security Organization (SOCISO), the accident and fatality rates in Malaysian construction industry are increasing in a decade. This incident alarms the industry and the government about the critical scenario faced by the construction sector.

Figure 1 shows the accident and fatality rates in Malaysian construction industry reported by the Department of Occupational Safety and Health (DOSH). The statistics for the last five (5) years indicated high number of fatalities and accidents in the construction sector. Based on the research by Mohammed & Ishak, (2013), most of the fatality and accident rates are dominated by falls accident. These indicated that the fall hazard in construction remains as a serious problem faced by the industry and need to be mitigated.

There are two folds of national agendas related to fatalities and accidents in construction including; (1) strategic thrust in Construction Industry Master Plan (CIMP) which is to strive for the highest standard of quality, occupational safety and health environmental practices; and (2) objective in occupational safety and health (OSH) Master Plan 15 which is to reduce the rates of workplace injuries and associated fatalities. For this matter, the accident and fatality rates need to be reduced by all means in order to achieve minimum rates of injuries in the construction project. The growing implementation of BIM in the AEC industry is changing the way of safety in construction across project phases (Zhang et al., 2013). This medium shall be addressed by deploying and integrating the ASRC system in BIM-based project.

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