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ScienceDirect

Procedia Engineering 171 (2017) 396 – 404

Procedia Engineering

www.elsevier.com/locate/procedia

Sustainable Civil Engineering Structures and Construction Materials, SCESCM 2016

A model of integrated multilevel safety intervention practices in Malaysian construction industry

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Abstract

Construction safety management improvement could be aligned with the condition at the workplace. The aim of this research is to identify the most significant safety practices at each intervention levels in improving behavioral safety performance of workers in the construction industry. A literature review was used to identify and determine the relevance of a list of safety intervention practices that take place at various levels; a total of 42 safety practices were identified. Questionnaires were then circulated to measure the level of significant each safety intervention practices towards a positive behavioral safety performance of workers. Targeted respondents are safety personnel and middle level personnel from construction companies that manage differ of construction projects such as oil and gas, infrastructure and building projects. The data will be collected at least from 430 respondents and will be analyzed using structural equation modelling (SEM) to determine the most significant safety practices at each intervention level. From the first result will be references to develop a dynamic model of integrated multilevel safety intervention practices in construction industry. Findings expected to be useful as a guidance in safety construction management in order to improve behavioral safety performance of multinational worker.

Peer-review under responsibility of the organizing committee of SCESCM 2016.

Keywords: Multilevel safety intervention; Malaysian construction industry; safety behaviour; structural equation modelling; system dynamics.

1. Introduction

According to recent Department of Occupational Safety and Health (DOSH), occupational accident statistics by sector in Malaysia in 2014 estimates, there were 184 fatal accidents in total and 70 fatal accidents at workplaces was

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Peer-review under responsibility of the organizing committee of SCESCM 2016.
doi:10.1016/j.proeng.2017.01.349

in construction sector indicates the highest number has been recorded. As noted by Mohamed et al. [1], the importance of hazard identification on site indicated that construction operations are habitually involved hazard. In construction industry where involved dynamic environment with critical and heavy work is complicated to handling hazards that diminish injury rates. Therefore, construction can be considered as an industry that frequently exposure to accidents [2]. Numerous of research studies noticed the construction site is the hazardous place. Construction has known as a vulnerable industry with hazard activities at workplace delineated a comparatively high number of injury and fatal accidents [3−5]. Hence, safety issues have gained vital attention in the construction industry as a whole [6]. Workers are the end person who easily exposed to hazardous on site should be able to prevent the incident and accident [7−10]. However, safety is a responsibility to the whole individual in construction project organization. Hence, an integrated safety practice at each intervention level is necessarily crucial to be identified.

1.1. Problem statement

Recent study by Chi et al. [11] indicated that the results of multiple accident causes been categorized into five main causes with the percentage of frequency which are tabulated (see Table 1). Based on the result research study in Taiwan construction industry, the highest percentage of accident cause indicates 47.9% is unsafe behavior. On top of that, unsafe work behavior found as the most vital factor cause of accidents at construction sites according to some previous studies [4, 12, 13]. Unsafe behavior considers as wrong bodily action while handling the job [11]. There have many examples of unsafe behaviors such as improper use of PPE, poor work practices, overexertion, insufficient capacities, do not use safety harnesses and the like [11, 13]. These unsafe behaviors may due to lack of safety awareness, lack of safety competency, lack of safety understanding, less in safety sharing, not work safely together, less in safety caring among the workers.

Table 1. Frequency of accident causes.

Accident cause	% of frequency
Unsafe behavior	47.9
Unsafe machines & tools	5.5
Unsafe environment	32.7
Harmful environment	14
Unknown	0

Generally, safety management system implementation must be tailored to increase behavioral safety performance especially at the end user, the worker, where most failures tend to occur. As is well known, safety intervention is required in order to change unsafe behavior to safe behavior. Kristensen [14] showed some effectiveness of behavior change from appropriate interventions (see Table 2). Some of these simple examples indicate the impacts of intervention on behavior change. Therefore, the importance of well selection in safety practices at each intervention levels in construction industry is necessary to improve behavioral safety performance.

Table 2. A few examples of behavior change as a result of intervention imposed.

Intervention	Exposure/Behavior
Rules about smoking at the workplace	Reduced passive smoking
Established of self-governing group	Increased decision latitude and social support
Course in lifting techniques	Reduced heavy lifting, adequate lifting behavior
Health promotion program	Reduced smoking, better diet
Establishment of worksite safety committee	Better safety behavior
Leadership training of front-line supervisors	Higher role clarity, less role conflicts, fewer conflicts

Wealth of safety research has been studied [15−19] on the safety program should be implemented by construction industry globally. In addition, huge number of behavioral safety research studies on Behavior Based Safety (BBS) analysis in identifying the effectiveness of the program towards safe worker behavior improvement such as Sulzer-