

Safety Management in Construction Projects: Malaysia Context

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Abstract: The complex and uncertain nature of mega construction projects needs an effective safety and risk management system. This study aimed to uncover existing safety issues as well proposes improvement strategies method to reduce safety issues and enhance safety risk management in a mega project in Malaysia. Quantitative case study was conducted, and questioners were distributed among construction experts of the project. From the result, the most top ranked safety issues have identified. Furthermore, the authors have recommended strategies to reduce safety risks of the construction site.

Keywords: Construction industry; Health and Safety, Risk Management, Project

Introduction

Globally, construction industries have vast contribution in the economic, business (Abd-Hamid et al., 2015) and physical structural developments. The implementation and materialization of construction projects inevitably can bring benefits to the people, thus satisfying the aspiration of national progress and growth and in uplifting the status of the nation economically. Until now some studies have been done to enhance performance of construction projects (i.e. Sorooshian (2015a) and Ansah et al (2016a; 2016b; 2016c; 2016d)). Project risks is also been studies (i.e. Sorooshian (2015b), Ansah & Sorooshian (2017)). However, construction risk management

toward human resource safety needs more studies. Management of risk is an important role a project manager (Adeleke et al., 2018, Ansah et al, 2017). At the implementation stages of developing a project human resource safety and risk management is an essential (Edwards & Bowen, 1998). Since the scope of risk identification has grown in many fields so it is crucial to eradicate risk factors in health and safety especially in mega construction projects in Malaysia. Survey studies explored that globally to provide safety and reduce risk in all large industries spends huge money in their projects. Health and safety related risks in any construction project cannot be eluded. Identification of health and safety related risk and management has been introduced decades ago (Edwards et al., 1998). Since advancement of new technology and volume of the construction size increased, serious threats to the human life and health long term issues were found more comparison to the past. Although, all employees are bound to follow safety rules in construction sites but most recently fatalities of workers in the project expose the safety gap in the construction projects. For example, an incident happened due to collapse of 300 tons of concrete slab and in the result three workers found dead in Selangor (The Star online, 2014). Today, in many construction projects, heavy machineries and advance technology use which increase more risk to the human life and health. Regardless of construction industry importance, in many countries it is consider the most hazardous and unsafe industry due to higher casualty's rates compared to other industries (Aksorn & Hadikusumo, 2008; Lingard & Rowlinson, 2005). According to Berg (2010) worldwide safety gap has been found in the construction industry and not dealing with adequately to reduce the impact of risk in construction management. The purpose of risk and safety management tools implementation in construction industry is reduce the risk by identifications using scientific techniques, the major risks can be predicted and reduce their pressure before it occurs.

Safety management term is the mix of exercises such as arranging, association, supervision of personals and work exercises to finish given undertaking venture with high level of security execution. It is important to finish every undertaking with high wellbeing estimation taken and recognize danger present in the venture. Risk management is not just important in development field in all sort of tasks need exceptional risk management and safety management assumes their part to adapt to all risks (Berg, 2010). Loosemore & Raftery, (2006) characterized risk management as powerful choices made based on the available information of hazard appraisal. Berg (2010) described risk management as choice making whatsoever level of the undertaking

will avoid hazard and more effectively finish those undertaking. Some studies believe and define risk as decision making process while others define as the systematic approach to the unidentified risks in the projects and process of identifying, assessing and best action against to evade before occurrence. The planning for unknown and uncertain amount of risks to reduce the losses in term of cost, time and fatalities are difficult. Project management Institute (2004) defined risk management as the process which enables the analysis and assessment for risks. It is exceptionally troublesome will arrangement something for obscure risk. The risk management plays very important role in the control of all parameters or accidental safety management issues in construction project.

In the construction field smaller to larger possibility of happening any type of risk cannot be avoided. The concept of risk is multi-dimensional. In the light of past studies founding lack of risk identifications planning and management process in the construction direct the risk of occurrence to the next level. Therefore, the understanding of risks is essential.

Murie (2007) divided the risk management occurrence into technical risk and human errors risk. Zeng et al. (2008) found that lack of safety awareness in project management and training of manager caused construction accidents in China in 2004. Study conducted by Dejus (2007) in the Lithuanian Republic reported that lack of knowledge and training are the top reason of accidents in construction in country. Hamid et al. (2008) identified main causes of construction accidents in Malaysia are unprotected method of construction, lack of knowledge and poor understanding of project lead the construction project to complex stage of highly risky and unplanned risk management. Additionally, causes of construction accidents is grouped into five main factors such as site conditions, equipment's and materials, human error, management and job factors. The aim of this study is to investigate the major safety and risk management in construction projects in Malaysia and to propose strategies for reducing the safety risks.

Research Methodology

One of the mega construction projects is Malaysia have been selected for this study. Questionnaire survey based primary data collection approach has adopted in this study to gather information from the experts of the project. The purpose of the using questionnaire survey because in the past several researchers used this techniques by conducting survey among experts and closed ended questions were asked to answer. The questionnaire of this study consists

several parts including demographic information, questions related to major causes of accidents, and a part for suggestions for improvement. The questionnaire asked the participants to present their opinion with Likert scale 5 where 1, strongly disagree, and 5, strongly agree, have used. The data was collected from the construction project experts. The questionnaire was distributed to 120 experts / staff member of the mega construction project. Descriptive analysis used to elaborate the findings.

Results

The data collections record shows total 120 questionnaires were distributed among experts, total 112 were collected while 8 participants did not respond. The percentage of returned data is shown 93.3% which indicate highly interested and related respond from the participants.

Table 1: Demographic Analysis

Description	Variables	Frequency	Percentage (%)
Gender	Male	86	76.8
	Female	26	26.2
Age (Years)	20-25 years	10	8.9
	25-30	28	25
	30-35	56	50
	40 and above	18	16.1
Respondents highest qualification	SPM	3	2.7
	Diploma	32	28.6
	Bachelor degree	55	49.6
	Master degree	22	19.1
Discipline of Expertise	Engineer	53	47.3
	Architecture	12	10.2
	Quantity survey	23	20.1
	Contractor	10	8.9
	Developer	14	12.5
Years of experience in construction	1-5	19	17.5
	5-10	48	42.9
	10-15	41	36.6
	More than 15	4	3.6

The demographic analysis of the study as shown in the Table 1 indicated that male participants are larger than female, where minimum respondent age is 20 years old. The study respondent's educational qualification has significant impact on the findings where findings show that most of the respondents have diploma and bachelor degree and most of them are from engineering background also experience of the respondent's shows between 5-10 years. Most of the construction experts claimed that they have permanent safety supervisor and regularly inspection done by the safety supervisor. The two most frequently occurred accidents on construction site are falls from the height and electrical shocks also partial disability and small injury are the degree of injuries most often happened in the construction sites in Malaysia.

Safety Issues: The understanding of first objective of the study is to uncover the issues of safety and risk related factors are significantly important. Top five most influencing factors are extracted from the study results and analysis. According to the descriptive analysis it is found that unsustainable construction and planning is the most rated factor mean value 4.25 and std. deviation 0.84. Most of the participants highly ranked this factor and shows unsustainable construction and planning is the fundamental factor in the result safety and risk management. Unavailability of professionals and project managers was ranked second mean 4.17, sufficient skilled labor on construction site is ranked third mean 4.0. Absences of health and safety committees on construction sites may cause the one reason of safety risk and accidents on construction site this factor has mean 3.85 and ranked fourth. The fifth ranked factor causing safety and risk related problem on construction site is excessive use of heavy machinery and unskilled labor 3.81 might cause accident on construction site. The exposure to the height or subway construction and unavailability of proper safety procurement mean value 3.75 indicate neutral cause of construction accidents. Lack of safety awareness program also coordination among project manager and other stakeholders of the project are the neutral factors of mean value 3.667. Based on the study finding top five influencing factors in safety risk are drawn on Table 2.

Table 2. Top five safety risk issues on construction sites

Safety Risk Issues	Mean	Rank
Unsuitable construction program planning	4.2589	1
Unavailability of sufficient professionals and managers	4.1786	2

Unavailability of enough skilled labor	4.0001	3
Absence of safety and health committees	3.8929	4
Excessive use of heavy machines, equipment's and metals	3.8125	5

The factors less likely influence or not strongly affect the safety risk on construction site are lack of protection equipment's but respondents argued that due to stricken law of not allowing anyone to enter to the construction site avoid this statement and ranked in lower level because every worker before entering to the construction site has properly equipped with safety protection. Moreover, study revealed that small construction projects can be execute without proper management but in mega construction projects each and every activity is planned and well managed. That is the reason, poor maintenance and planning is ranked in lower level and respondents not agree with the statement. The participants of the study are the staff member of the mega construction project and recently fatal accident taken plane ranked low the statement of lack of worker training. Regarding this statement respondent claimed that it is highly and importantly necessary training to the worker including engineers given before initiate project.

Safety Enhancement Strategies: The most frequent construction accidents is objects fall from the height, slipped and electric shocks and these accidents can be fatal if not properly manage or resist. Some construction experts with positive attitude stressed health and safety is one the core issue in Malaysian construction and main reason unskilled foreigner labors likewise all accidents happened mostly foreigner suffered because of less awareness and knowledge of safety on construction site. The individual contribution to reduce construction accidents is to strictly follow the health and safety manual and daily based safety practice should be revising for the staff also all workers. The construction industry is one of the complicated industries where each activity is different than other and most of the activities not repeat before new activity safety training should be given to all staff. Permanent based safety engineers and supervisor should be monitor construction site daily and identify the weak point. The construction experts in the questionnaire describe the weak point of the accident happened in the project was poor planning and management among stake holder especially site engineers and safety responsible. Moreover, untrained staff was involved in the technical construction activity and negligence of the safety supervisor can be risky for the construction project. Table 3 shows the top-ranking recommended strategies proposed by the respondents to reduce the safety risk in construction.

Table 3. Top five recommended strategies to reduce safety risk

Safety Enhancement Strategies	Mean	Rank
Proper training and supervision under safety experts team	4.8121	1
Regular maintenance of hand and power tools	4.3536	2
First aid equipment's on the site	4.3304	3
Safety Training	4.6893	4
Safety nets and Hearing Protections	4.2883	5

Conclusion

The construction industry is one of the complicated industries where each activity is different than other and most of the activities not repeat before new activity is happened. Absences of health and safety committees on construction sites and excessive use of heavy machinery where operators are unskilled are concluded parameter might cause high risk and accidents on construction sites. From observations of the construction site, the study concluded that due to stricken law implemented on all construction sites none of employees can enter on the site without proper protection such as gloves, shoes, helmet also necessary to wear sun shade glass if working with welding job on site or steel cutting. This stricken law encouraged the above-mentioned safety practicing on mega construction site which lead the project to high level of safety. Importantly, poor maintenance or unplanned activates carried out in small construction projects but respondents shows disagreement because in a mega project or any complex project each and every single activity is planned and well manage, thus this is not the reason accident or safety risk happen in mega construction project. Based on the study findings it is recommended that the safety training should conduct for all employees; must hire full time safety engineers and supervisors should monitor the site on daily based and identify the weak point. Based on the past literature and construction experts' opinions this study also recommends for the construction agencies to carry regular based medical checkup of employees, for drugs addicted or mentally issues.

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