Effective Safety Management in Construction Project

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Abstract. Effective safety management is one of the serious problems in the construction industry worldwide, especially in large-scale construction projects. There have been significant reductions in the number and the rate of injury over the last 20 years. Nevertheless, construction remains as one of the high risk industry. The purpose of this study is to examine safety management in the Malaysian construction industry, as well as to highlight the importance of construction safety management. The industry has contributed significantly to the economic growth of the country. However, when construction safety management is not implemented systematically, accidents will happen and this can affect the economic growth of the country. This study put the safety management in construction project as one of the important elements to project performance and success. The study emphasize on awareness and the factors that lead to the safety cases in construction project.

Keywords: construction, safety, injury, awareness, management

1. Introduction

According to Ahmadon [1] construction sites are generally complex and sometimes unsafe to the workers and environment. It is one of the most dangerous workplaces because of high number and frequency of accidents. Therefore, construction safety is one of the serious problems in the construction industry worldwide, especially in mega construction projects. This is because of the involvement of many workers, modern methods of construction, many large and heavy plants, a great amount of materials and equipment used, complex construction operation, multi-interface, and various disciplinary aspects of its project workforce. All of this criteria that lead to the higher accident rate at the construction projects. The accidents include those that result from falling from height, collision, collapse and electric shock, amongst which falling from height and collisions are the most prevalent [2].

1.1. Background of Study

Construction safety as a result continues to represent a serious problem and pose a challenge for researchers and practitioners [3]. In Malaysia, both the society and economy have suffered human and financial losses as a result of the poor safety performance in the construction industry. Department of Occupational Safety and Health (DOSH) in Malaysia reports that occupational accidents by sector shows that the highest number of death was in the construction industry as of for the 2015 incidents [3].
1.2 Problem Statement
Effective safety management on project sites is of utmost importance due to the nature of the construction industry. However, it is usually not as top priority in a market-driven society where the main focus is completing projects at the specific quality with minimum time and cost. Thus, safety issues are considered only after an accident occurs at a construction site. Therefore, proper effective safety management in construction is of utmost importance. Various factors that affecting construction safety performance were explored through a questionnaire survey responded by people that involve in construction projects.

1.3 Objectives
This project focuses on few objectives, which are:
   i. To study the safety issues that happen in construction projects
   ii. To identify variables that significantly affects construction safety

1.4 Scope of Study
The scopes of study in this project as below:
   i. Safety policy at construction projects
   ii. Factors that lead to safety cases
   iii. Method that applied to reduce the frequency of accidents at construction sites

2. Literature Review
Effective safety management in construction projects is a core consideration for all types of organizations that are accountable for protecting and optimizing the efficiency of human resources. In regard to construction, ensuring workplace safety is not an easy task. Occupational accidents in the construction industry will give impact to economic and social issues in organizations, as well as countries. Abdul Rahim [4] stated that the development of construction industry has been plagued by the accidents or injuries that are frequently occurred. It is estimated that there are around 60,000 construction fatalities occurred worldwide each year, which equates to one accident happens every nine minutes. Among all industries in the world, construction has the highest rate of accidents, including deaths and disabling injuries [5].

Many ways have been made to minimize this problem, but the outputs are far from satisfactory as construction accidents continue to dominate. Despite various programs implemented by government authorities at a national level and the initiatives of private companies, the number of construction accidents remains alarmingly high. It is evident that these efforts are not sufficient to minimize the occurrence of unsafe acts and unsafe conditions at construction sites. According to Chang [6], accidents at work occur either due to lack of knowledge, supervision, lack of means to carry out a work safely, errors in judgment, carelessness in making decision, or total irresponsibility. In addition, the lack of a controlled working environment and the complexity and diversity of the sizes of organizations have given impacts on safety performance in the industry. Inadequate safety precautions, non-implementation of rules, deficient knowledge and unqualified officers cause unexpected accidents in the construction project. Furthermore, the safety practices adopted at construction sites are far below acceptable standards.

According to Edward [7], the safety legislation and policies have a great impact upon the safety level of a construction worksite. Legislation forms a framework in which health and safety is regulated and controlled. In this case, management have to follow the rules and regulations duly and punishments to be meted out to those who flout them. The identification of unsafe factors in the construction field mainly highlighted on the site layout, multi-interface, safety screen and scaffolding, plant operation, and construction operation [8]. The identification processes are based on type of work conducted at the sites, which integrates the safety risks. By walking through the site and inspecting all the workers work, the managers can identify the potential hazard factors by themselves.
3. Methodology
This research was conducted to establish effective safety management in construction project. It also will act as a benchmark to analyze the safety policy and the factors that lead to the safety accidents at construction sites. The research can be divided into phases as shown in Figure 1 which are from preliminary study phase, data collection phase based on the questionnaire, data analysis phase and conclusion. A questionnaire was designed with the objective of determining the variables that affect safety management in construction.

![Project Activities Flow Diagram](image)

4. Result and Discussion
The pilot survey had been done throughout all of the professional engineers either in the academic, construction or consultancy industry. After obtaining and analysing the results of the pilot survey, logistical, technical and other issues or problems have been addressed. The questionnaire format was revised and the type of survey had been altered into a more suitable one. After the revision of the survey being made, the large-scale of the survey was executed.

The questionnaires had been distributed to the project teams which base at Bangi area. It consists of the client, consultant, contractor and companies. Since this study is a qualitative study, 30 feedbacks are sufficient enough. The questionnaire consists of two sections, General Information and Factors Affecting Effective Safety Management in Construction Project. Based on the Average Index and Relative Importance Index (RII) as shown in Table 1, Figure 2 and 3, the respondents rank the first factor affecting effective/improper safety management in construction is “Safety training and awareness”, with a relative importance index of 0.91 and average index of 4.57. It indicates that safety training and awareness play a very important role in safety management in construction projects. “Worker’s attitude towards safety” is graded the second with a relative importance index of 0.89 and average index of 4.43. The results are a clear indication of poor worker’s attitude towards safety. The
respondent grade availability of safety equipment, safety inspections and organization safety policy are ranked the third, fourth and fifth respectively, with a relative importance index of 0.85, 0.84 and 0.82. As for the rest of the factors it is ranked the sixth, seventh, eighth, ninth and labour turnover rates are graded as least factor which affecting effective/improper safety management in construction projects with a relative importance index of 0.59 and average index of 2.87.

**Table 1.** Factors Affecting Effective / Improper Safety Management using Statistical Package Social Science (SPSS) Software

| Factors Affecting Effective Safety Management in Construction Projects | Statistics |
|-------------------------------------------------------------|------------|
|                                                             | N  | Mean | Std. Error | Std. Dev. |
| Organization safety policy                                  | 30 | 4.03 | 0.176      | 0.964     |
| Safety meeting                                              | 30 | 3.57 | 0.157      | 0.858     |
| Safety training and awareness                               | 30 | 4.57 | 0.124      | 0.679     |
| Availability of safety equipment                            | 30 | 4.27 | 0.135      | 0.740     |
| Safety inspections                                          | 30 | 4.23 | 0.164      | 0.898     |
| Safety incentives and penalties                             | 30 | 2.77 | 0.124      | 0.679     |
| Worker's attitude towards safety                            | 30 | 4.43 | 0.124      | 0.679     |
| Labour turnover rates                                       | 30 | 2.97 | 0.155      | 0.850     |
| Compliances with safety legislation                         | 30 | 3.77 | 0.190      | 1.040     |
| Safety measuring devices                                    | 30 | 3.10 | 0.211      | 1.155     |

**Figure 2.** Factors Affecting Effective / Improper Safety Management Using Average Index
Figure 3. Factors Affecting Effective / Improper Safety Management Using RII

5. Conclusion
Construction worksites are one of the most high risk places because of the high safety cases reported at construction sites. This study investigates various ways that management may take in line to make their sites safer. This study analyzed all the variables that significantly will give effect to site safety. The results of this study are very important because the factors that affecting safety have been identified. Safety training and awareness, worker’s attitude towards safety, availability of safety equipment, safety inspections and organization safety policy are the top five most important factors affecting safety at construction sites. If these factors are addressed and monitored closely, safety cases at construction sites can be minimized. In conclusion, safety affects all levels of the construction organization from government, company management, supervisor, and worker.

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