

RISK ASSESSMENT ON SAFETY IN CONSTRUCTION SITE

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DEDICATION

*Special thanks to my parents, my brothers, and to all my friends for their support, help
and understanding*

Thanks for Everything....

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ABSTRACT

Problems on occupational safety and health are commonly occurred in the construction industry, including falling from height and falling of materials. The key of dealing with project safety and risk assessment in construction industry is important. This study is carried out to determine the safety risk factor occurred on site and after the risk factor have been identify, risk assessment is conducted. The objective of this study is to determine and analyze the safety risk factor in construction site. Failure Modes and Effects Analysis (FMEA) method is used to assess the risk factor in the construction site by taking consideration of occurrence, severity and detection. In this study, a total of 22 safety risk factor was determined. Questionnaire had been distributed to the project team members in construction site around Kuching and Johor Bahru. The completed set of questionnaires was received from 8 out of 10 different construction sites. The project team members of each site consist of client representative, project manager, engineer, architect, safety officer and site supervisors. The collected data was analyzed through frequency analysis, average index analysis and FMEA. The risk factor that has the most occurrences is 'scaffolding falls'. The risk factor that has the most impact is 'building collapse' while the 'crane falls on construction site' has low chance to be detected. After that, the safety risk factor is rank based on Risk Priority Number (RPN) and the level of acceptability and the consequences is graded. The findings indicated that 'roof related falls', 'crane falls on construction site', 'scaffolding falls', 'hit by falling objects', 'scaffolding accidents', and 'fatal electric shock' are graded as unacceptable.

ABSTRAK

Masalah keselamatan dan kesihatan pekerjaan lazimnya berlaku dalam industri pembinaan diantaranya ialah kejadian ‘jatuh dari kawasan tinggi’ dan ‘objek terjatuh’. Kajian ini dijalankan untuk menentukan faktor risiko keselamatan yang berlaku di tapak bina diikuti dengan proses penilaian risiko. Objektif kajian ini adalah untuk menentukan dan menganalisis faktor risiko keselamatan di tapak bina. Kaedah Failure Modes and Effects Analysis (FMEA) digunakan untuk menilai faktor risiko di tapak bina. Keadaan ini mengambil kira kebarangkalian berlakunya faktor risiko, impak dan pengesanannya. Dalam kajian ini, sebanyak 22 faktor risiko keselamatan telah ditentukan. Soal selidik diedarkan kepada staf projek di tapak bina yang dikenalpasti di sekitar Kuching dan Johor Bahru. Sebanyak 8 dari 10 set soal selidik telah dikembalikan. Setiap set soal selidik dari setiap tapak bina diterima daripada wakil pelanggan, pengurus projek, jurutera, arkitek, pegawai keselamatan dan penyelia tapak bina. Data yang dikumpul dianalisis melalui analisis kekerapan, analisis indeks purata dan kaedah FMEA. Didapati bahawa faktor risiko yang kerap berlaku ialah ‘jatuh dari perancah’. Faktor risiko yang mempunyai impak yang serius pula ialah ‘bangunan runtuh’ manakala faktor risiko ‘kren jatuh’ didapati mempunyai peluang yang rendah untuk dikesan. Faktor risiko kemudiannya disusun berdasarkan Nombor Keutamaan Risiko (RPN) dan tahap gred kebolehterimaan dan akibatnya. Hasil kajian menunjukkan bahawa ‘jatuh berkaitan dari bumbung’, ‘kren jatuh di tapak bina’, ‘jatuh dari perancah’, ‘dihentak oleh bahan terjatuh’, ‘kemalangan perancah’, dan ‘kejutan elektrik maut’ dikategorikan sebagai tidak boleh diterima.

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FORM OF QUESTIONNAIRE

CHAPTER 1

INTRODUCTION

1.1 Introduction

Construction industry is considered as one of the economic sectors which are important in the economic development of a country. In the development of a country, construction sector should not be determined by the size of the industries but by its role to construct the facilities that are needed by the manufacturer and the consumers (Abu Bakar, 1985). The coverage of construction industry is very wide; it includes heavy engineering construction, residential construction and commercial building construction, infrastructure, civil engineering, industrial construction and etc. All this generate to the economic growth in the country (Tatiana Rina, 2005).

Kines, Spangenberg & Dyreborg (2007) stated that construction industry is considered to be the most hazardous industries because of its unique nature all around the world. In the construction industries, safety and quality are always concerns by the people. (Wyk, Bowan & Akintoye, 2008). But in recent years, the construction industry

also faced environmental problem due to the pollution and hazards that is created by the construction activities (Chen, Li & Jong, 2004).

In Malaysia, the construction industry is recognize to generate the country development and is a major economic force. (Bakri, Mohd Zin, Misnan, & Mohammed, 2006).The frequencies of accidents and properties losses create a great impact to the construction organization. Anon (2011) stated that high rates of incidents of accidents and casualties can cause delays to the construction project. The delay of the project directly and indirectly will incur the cost. As a result, all the construction organization must provide a safe working environment for the workers

1.2 Background of the Study

Zeng, Tam & Tam (2010) acknowledge that various management system have been implemented including Occupational Safety and Health Act 1994 (OSHA) for the safety and health of the workers, ISO 14001 for environmental management and ISO 9001 for quality management but it is difficult to deal with these management system and support them with organizational strategies.

Similar to other industries, risks exist in the construction industries too. The meaning of risk is the likelihood of harm will occur according to the Health and Safety Commission (Sarpin, 2006). Thereby, risk management is carried out to avoid or minimizing the risk that might happen in the construction site. A good risk management is essential in order to ensure the success of the project (Rashid & Adnan, 2008).

Risk management is important in the construction organization and it is a central part of the construction organization's strategic management (Anon, 2002). Kypriadis, Hidek, (2007) stated that risk management is a process where the organization carefully deals with the risks which attach to the activity with a goal of achieving a sustained benefit. The purpose of risk management is to add maximum sustainable value to all the activities that is carried out (Anon, 2002). Besides that, a good risk management is to identify the risk and to treat the risk.

According to 'A Risk Management Standard' (2002), risk management can increase the probability of success, and reduces the probability of failure and the ambiguity of achieving the construction organization's objectives. Risk management is supposed to be a continuous and developing process which runs throughout the organization plan.

1.3 Problem Statement

Risk assessment is one of the steps in the risk management process. According to European Agency for Safety and Health at Work (2008) risk assessment is a process to evaluate the risk of workers' safety and health from the workplace hazard. It is a careful assessment that considers what would cause harm or injury to the workers at work. Besides that, risk assessment also considers whether the hazard can be eliminated or not and if the hazard cannot be eliminated, there are protective measures that can control the risk.

Based on Health and Safety Executive (1998) risk assessment is an important step in protecting the workers and business in an organization and act in accordance with the law. Risk assessment help to focus on the risks that might be potential to cause harm to the workers in the workplace. Ahmed and Ahmed (1999) stated that risk in the construction project exists because of the complication of the project, type of contract, location, knowledge and experience related with the work and etc.

Based on the statistics report by DOSH (2010), accidents in construction sector on category of death is reported to have a highest number of death case (66 people) if being compared to other sectors. Table 1.1 shows the statistic of the workers accident according to sector for the category of death in year 2010. From the statistics, it can be seen clearly that accident in construction site are more serious compared to other sectors.

Besides that, table 1.2 illustrates the statistic of the workers accident according to sector for the category of death until May 2011. Even though it is the second highest, but the death case in construction industries is still high.

The construction industries record the highest accident rates and risks if compare to the others industries according to the new straits times' newspaper. The director-general Datuk Dr Johari Basri of Department of Occupational Safety and Health (DOSH) said that 10 per cent of the 1,231 deaths in the workplace reported to the Social Security Organization (SOCSO) last year were happen at the construction sites. (New Straits Times, 2010) Furthermore, 41 percent of 34 accidental deaths were reported in Johor in the year of 2009 and most of the victims were falling from tall buildings. The DOSH has inspected that 1,309 construction site in Malaysia and only a total of 969 construction site complied with safety guidelines.

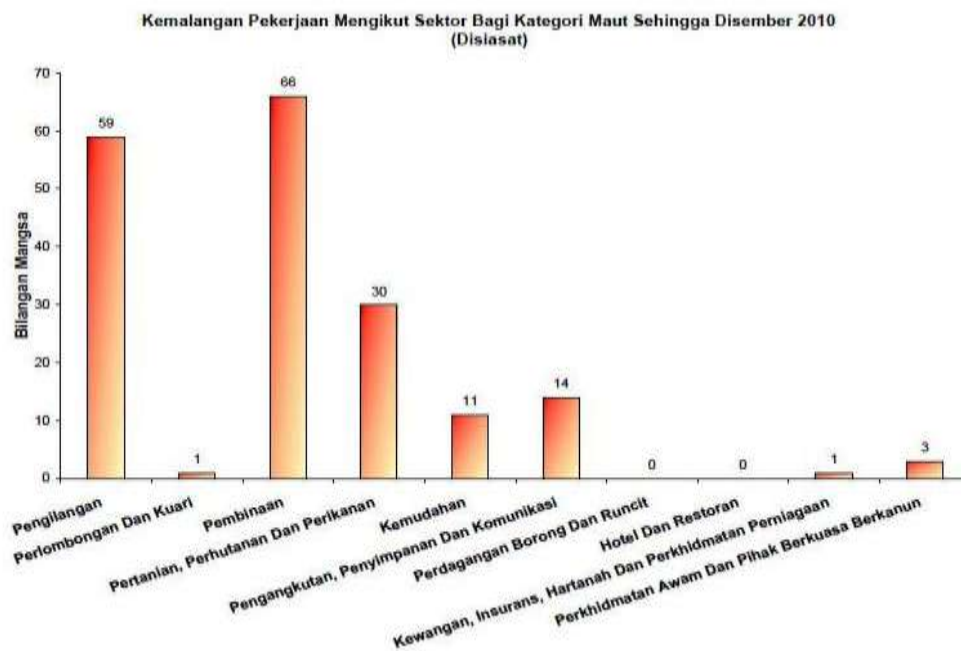


Figure 1.1: Statistic of the workers accident according to sector for the category of death in year 2010

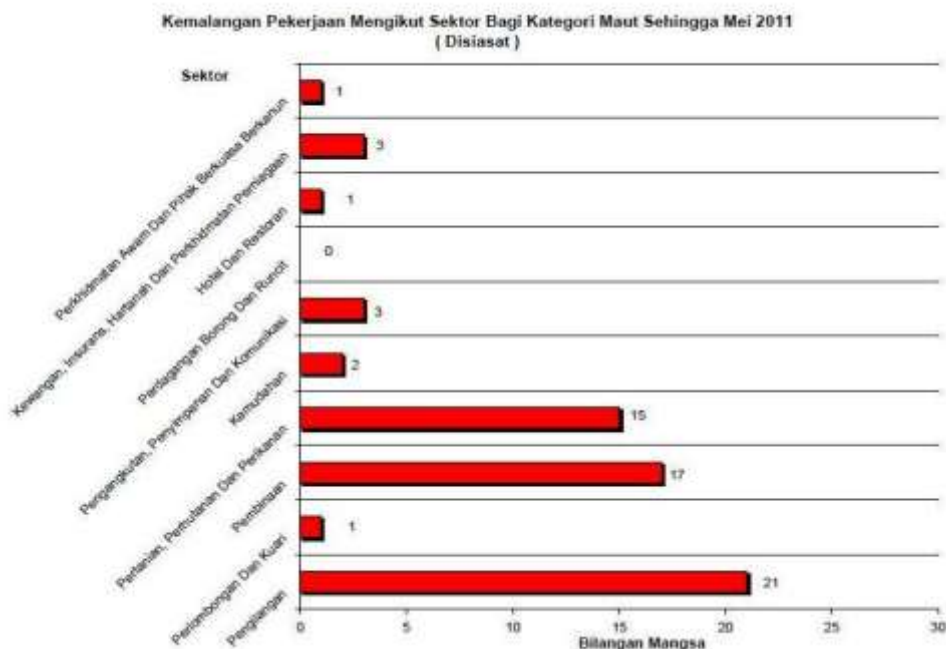


Figure 1.2: Statistic of the workers accident according to sector for the category of death until May 2011

According to Mehr and Hedges (1989), if the risk is not properly managed, it may cause significant losses to the parties. For that reason, Rashid and Adnan (2008) added that risk management is used to deal with the risk that might occur and it is important to manage the risk properly to avoid interference to the construction project.

Occupational safety and health risk is commonly occurred. Saari (1995) stated that the occupational safety and health professionals should have projected the risk that might happen and they have the tools and the right methods for identifying the possibility of hazard or the possibility of the harm to human. Fung, Tam, Lo & Lu (2009) added that it is difficult to conduct risk assessment on construction site because of the work nature of the construction industry is highly hazardous and changing the workforce is highly dynamic.

1.4 Aims and Objectives

The aim of this study is to evaluate the level of risks on safety in the construction site.

The objectives of this research are:

1. To determine safety risk factors in construction site
2. To analyze the occurrence, severity and detection of the risk factor
3. To evaluate the level of risk in construction site

1.5 Scope of Study

The scope of this study was focused to construction site in Kuching and Johor Bahru. This study will be carried out based on questionnaire. The questionnaire will be distributed to the respondent. The target respondent for this study is the project team members (client representative, architect, engineer, safety officer, project manager, and site supervisors) on construction site. The analysis of the risk factor was conducted by using FMEA.

1.6 Significance of this study

The significance of this study is to evaluate the level of risk factor according to the occurrence, severity and detection of the risk in construction site. FMEA method is used to analyze the risk factor in construction site. The use of FMEA is to identify the potential risk factor, the impact and to determine their effect and finally to determine the potential risk factor that might happen on site.

The outcomes of this study can be used to help and guide the parties in construction site to resolve or minimize the potential risk factor on site. These will indirectly make the construction industries as a safe industry in contributing toward the economic development.

1.7 Research methodology

Research methodology is an important step in the research because it will describe what method to be used to collect the data and how the data is being analyze. In order to achieve the results of this study, questionnaire is being used as a research instrument to collect data. After the data has been collected, the next step in this study is to analyze the data. Data analysis is carried out to achieve the objective of this study. Data analysis means to transform a raw data into useful information that can be used or to illustrate something that can help to achieve research objectives. Figure 1.3 shows the methodology used of the study. The research methodology will be discussed in details in chapter 3.

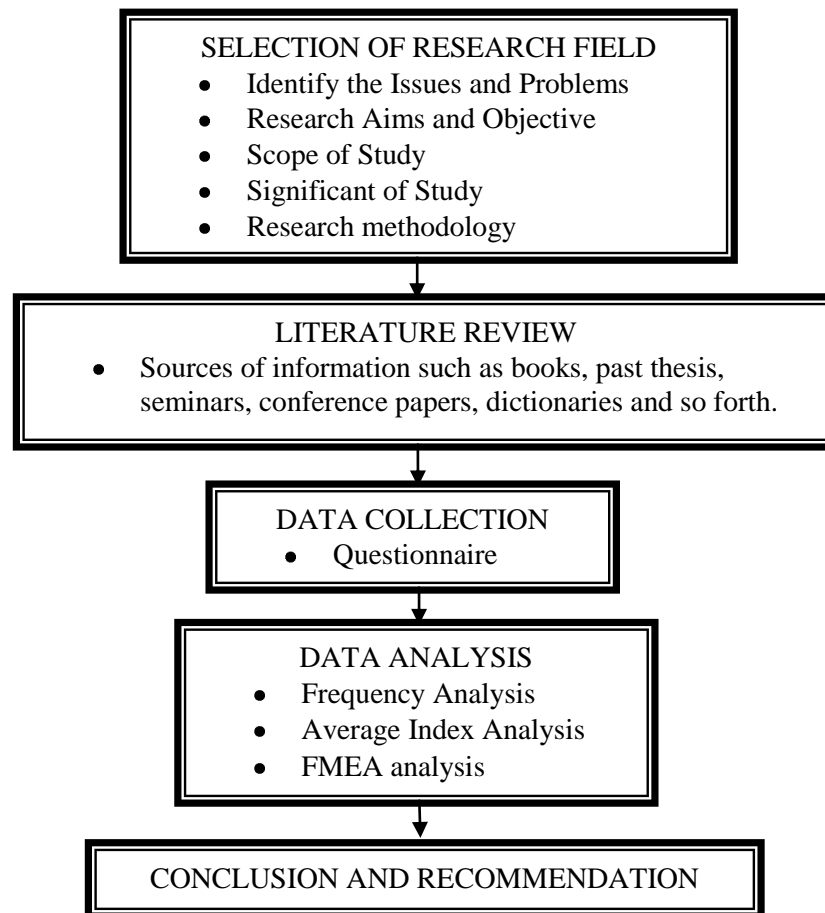


Figure 1.3: Flow Chart of Research Methodology

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