SAFETY AND HEALTH PRACTICE BY CONSTRUCTION WORKERS

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ABSTRAK

Industri pembinaan telah dikenali sebagai salah satu industri yang berbahaya dan berisiko bukan sahaja di Malaysia tetapi juga di seluruh dunia. Pekerja-pekerja binaan terdedah kepada pelbagai bahaya dan ancaman di tempat kerja. Oleh itu, adalah penting untuk mempunyai amalan keselamatan dan kesihatan yang baik di tapak pembinaan untuk mengurangkan kemungkinan berlakunya kemalangan. Kajian ini bertujuan untuk menilai faktor yang menjejaskan prestasi keselamatan dan kesihatan di tapak pembinaan, untuk mengenal pasti tahap kesedaran pekerja pembinaan pada keselamatan dan kesihatan di tapak pembinaan dan untuk mengenal pasti tahap pekerja kepuasan terhadap keselamatan dan aspek kesihatan di tapak pembinaan . Kajian di atas telah dijalankan di tapak pembinaan Gred 7 kontraktor di Pahang. Seramai 40 orang pekerja binaan telah disoal selidik untuk mendapatkan data dengan menggunakan soal selidik berstruktur. Dapatan kajian menunjukkan bahawa kontraktor mempunyai amalan keselamatan dan kesihatan yang baik. Tahap kesedaran pekerja terhadap keselamatan dan kesihatan adalah sangat tinggi. Selain itu, pekerja-pekerja berpuas hati dengan aspek keselamatan dan kesihatan di tapak pembinaan.

ABSTRACT

Construction industry has been recognized as one of the dangerous and risky industries not only in Malaysia but also around the world. Construction workers are exposed to various hazard and threat at the workplace. Hence, it is important to have a good safety and health practice at the construction site to reduce the possibility of accidents from happening. This paper aims to evaluate the factor affecting on safety and health performance at construction site, to identify the level of awareness of construction worker on safety and health at construction site and to identify the workers' level of satisfaction towards safety and health aspect at construction site. The above study was carried out at construction site of Grade 7 contractor in Pahang. A total of 40 construction workers were used as sample. Data is obtained by using structured questionnaire. The finding reveals that the contractors have good safety and health practice. The level of awareness of workers towards safety and health are very high. Besides that, the workers are satisfied with the safety and health aspect at construction site.

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LIST OF ABBREVIATIONS

OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Act 1994
NIOSH	National Institute of Safety and Health
ILO	International Labour Organization
PPE	Personal Protective Equipment
UAE	United Arab Emirates
WHO	World Health Organization's

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Engineering in construction has a multiple sector such as civil engineering, mechanical engineering, architecture, electrical engineering and others. It is an important role for this sector in the growth of economies in the countries throughout the world. The construction industry is one of the important sectors in Malaysia and contributes to the Gross Domestic product (GDP).The construction industry is a major employer of labour. In Malaysia, the construction industry is recognized as important sector in providing job opportunities to approximately 600,000 people.

In the positive effect there is a negative consequence arise from the growing of activities. The usage of various types of equipment and machinery could lead to the arising risk of accident and occupational safety and health if there are no prevention policies done by all the parties involved in order to control the risk. (Fong, 2000). Kines, Spangenberg, and Dyreborg (2007) stated that construction industry is considered to be the most hazardous industries because of its unique nature all around the world.

There are 25–40 percent of fatalities has been acknowledge in the world's occupational settings are contributed by construction (ILO 2005). Besides, construction is generally one of the industries which fatal injuries happened most frequently and many researches and studies has shown that high percentage of fatal occupational injuries come from construction industry (Im et. al, 2009).

Safety and health at the construction site must be taken seriously because it involves the life of human. Hinze advocated the idea that safety is no luxury but a

necessity (Hinze, 2007). Every individual in life whether one is employed or not, both at the workplace and outside the workplace has the intrinsic need to be safe. (Kwayiba, 2009)

1.2 Background of the Study

Construction industry has been recognized as one of the dangerous and risky industries not only in Malaysia but also around the world. Construction workers are exposed to various hazard and threat at the workplace. Their health are at risk if many thing worse. Construction workers are exposed too many dangerous such as unpleasant dusts, fumes from burning processes, gases from combustion processes and geological formations, and large numbers of toxic chemicals. (Snashall, 1990)

Due to globalized economic trends, the subject of safety in the workplace has taken on such importance that international conventions instituted the international organization for standardization to help regulate and bring about improved workplace conditions and services (Zwetsloot, 2003). Safety and health in the workplace have become an integral component to the viability of business for employers, labour unions, governments, and environmentalists in general (Macintosh and Gough, 1998; Anderson and Gough 2004).

Until 1994, Malaysia still did not have adequate provisions to sure safety and health of employees at the workplace. On 25th February 1994, Occupational Safety and Health Act 1994 (OSHA) came in force providing protection on safety and health for work activities in all economic sectors including public services and statutory authorities, except those subjected to Merchant Shipping Ordinance and the armed forces. It is an Act to make further provisions for securing the safety, health and welfare of person at work. Act 514 is an enabling Act which is superimposed over existing safety and health legislation such as the Factories and Machinery Act 1967 (Act 139).

Act 514 provides the promotion, co-ordination, administration and enforcement for occupational safety and health. The Act places certain duties on employers, employees, self-employed persons, manufacturers, designers and suppliers. It also places emphasis on the prevention of accidents, ill health and injury. The long term goal

of the Act is to create a healthy and safe working culture among all Malaysian employees and employers. (Bakri, Mohd Zin, Misnan, & Mohammed, 2006).

Under Section 15 (1) and (2) Occupational Safety and Health Act 1994, employers have a duty to ensure, as far as practicable, that employees are not exposed to any hazard at the workplace. According to industry experts many of these injuries and fatalities would be completely avoidable if only good safety practice were to be observed.

1.3 Problem Statement

In 20 years ago, the perspective of worker safety climate and how workers perceive the safety climate of their workplace was raised as an issue. All the workers must have a responsibility for every decision they make with regard to securing their own health and safety in every social setting. For example in Malaysia, incident of Penang second bridge collapse cause the instability of scaffolding.

To avoid any of an accident at the workplace, safety and health could be one of the crucial concerns of workers and employers. The responsibility to provide safety in an undertaking for the prevention of accidents lies in the hands of the employer. OSHA94 clearly define that “the management of safety and health at work place is the responsibility of those who create the risks and those who work with the risks”. Hence, the contractors practice on safety and health at construction is needed nowadays to avoid any injuries.

Workers must ensure that the working environment at workplace is safe and follow all regulation that has been set up by the government. Furthermore, workers must have awareness in their life about the important of safety and health at works. The knowledge in safety awareness among the workers at construction site is very important. The knowledge can be gain through training. According to Hinze, (1997) training should be at the core of every safety program.

Construction Industry Development Board (CIDB) is one of the agencies that giving us realizing in important of safety and health in the construction industry, construction industry in Malaysia has team up with National Institute of Occupational

Safety and Health (NIOSH) to conduct Safety and Health Induction for Construction Workers (SICW) or better known as Green Card Program. It is an integrated safety and health training program for all construction workers and personnel, which involves the registration and accreditation of Construction Personnel to enhance safety levels at construction sites.

The awareness and perception of the workers toward safety, health and their working environment are important aspects to enhance the building construction to the better condition to the workers themselves. (Che Hassan, Basha & Wan Hanafi, 2007). Worker's perception and safety relate to each other. The worker's perception will influence their action in the workplace. Workers' perspectives need to be considered in devising and carrying out health and safety measures at the workplace (Bennet, 2002).

Ensuring safety on a construction site is a difficult challenge. The contractor must ensure all the safety and health of the construction site conforms to legislation requirement, approved standards, code of practice, guidelines, specifications and contractual requirements. Hence, it is important to evaluate the performance of contractors on the safety and health practices at site. The findings can be used to benchmark the level of safety and health performance of construction industry in Malaysia;

1.4 Aims and Objectives

The aim of this study is to investigate level of awareness and perception of workers on safety and health practices by contractors. The objectives of this research are:

1. To determine the factors affecting on safety and health performance at construction site
2. To identify the worker's level of satisfaction towards safety and health aspect at construction site.
3. To analyse the level of awareness of construction worker on safety and health at construction site

1.5 Scope of the Study

This study focused on identifying worker's perception on safety and health practice by contractor. This research will be carried out with a careful study based on the structured interview method.

Due to time constraint, the study is limited to these boundaries:

1. The location of this study focuses on Kuantan, Pahang only.
2. The respondents are construction workers from construction site Grade 7 of Construction Industry Development Board (CIDB).
3. A total of 40 respondents from the site are analysed to get the data.

1.6 Significance of the Study

The important of this study is to evaluate the perception of workers on safety and health practices by contractors. The outcome can be used to assess safety and health performance of contractor as well as improving worker's attitude towards safety and health in construction site. Furthermore, this research can be used for training information and knowledge on safety and health at the site to the construction workers. The contractors also can improve their practices on health and safety at the construction site. Lastly, the result and findings of this study would be beneficial to the researchers in the future who wish to explore more in this area of study.

1.7 Method of the Study

The important stage of method and step of the process carried out in order to achieve the objective in this study is important in methodology of research. It is because, the research methodology described what method to be used to collect data and to analyse data. The first stage involved further understanding of research topic; consist of problem statement, aim and objectives, as well as scope and limitations of study. Literature reviews are done on previous studies, journals, statistics, books, Malaysian enacted acts, safety manuals, and newspaper as a primary data to get information related on safety and health. Objective in this study used both primary data and secondary data to achieve it.

Next, the second part is data collection where data is collected through using structured questionnaire. In this part, the respondent was chosen in order to collect information and data based on questionnaire designed. After the data had been collected, the analysis of the data will be done using frequency analysis and average index analysis. It is important to record the present data for future reference. Lastly, the conclusions and recommendations will be made based on the results obtained from the interview.

1.8 The Organization of the Study

This study was divided into five chapter, reference and appendices. It is summarized of the entire chapter in this project report. It includes as the following below:

- **Chapter 1**

  This chapter presented an introduction to the study which includes: the back ground, the statement of the problem, aim and objective, scope of the study, significance of the study and research methodology.

- **Chapter 2**

  It presented the literature review which includes history of safety and health, role of construction personnel. Further, it includes the studies and research which had been made to identify the factor affecting on safety and health performance, causes of accident, Personnel Protective Equipment, act, rules and law on safety and health.

- **Chapter 3**

  Discusses the study of methodology which includes: information of the study design, respondent, questionnaire design, statistical technique, data analysis and research methodology

- **Chapter 4**

  This chapter presented and discussed about result and discussion. The statistical analysis of the result obtained from the questionnaire surveys, and the table and graphics deduced from statistical analysis and statistical result.

- **Chapter 5**

  It summarized the result and objective of the study, to present the conclusions, recommendations of this study and proposal for future work.

CHAPTER 2

LITERATURE RIVIEW

2.1 Introduction

In this chapter it is mostly discussed about literature review in safety and health in construction field. Construction industry has been recognized as one of the dangerous and risky industries not only in Malaysia but also around the world. Construction workers are exposed to various hazard and threat at the workplace. Today, working conditions for workers, including construction employees, have improved significantly. The chance of a worker being killed on the job is less than half of what it was 50 years ago. 'The levels of death, serious injury and ill health are still too high' (HSE, 1997). Hence, it is important to have a good safety and health practice at the construction site to reduce the possibility of accidents from happening.

2.2 History of Safety and Health

The earliest documented safety statement which announced by E. I. du Pont that is "we must seek to understand the hazard we live with it" during establishing gunpowder factory in U.S.A 1892. Based on, Klein had found the first safety precaution which were taken into consideration during design and construct the building. Apparently, it was individual act by employer and was not by the law or regulation.

From the beginning until 1916, all works under common laws which made by employer were responsible about the risk of their work. After 1916, the worker's compensation law were deemed by the government which enforce the workers to be responsible to their workplace's safety and health. However, the employers was enforces by the law and must paid for injuries occurring on the work place, it will be better financially to stop the injuries from happening at first place. Eliminating the

hazardous that exist in the work places was the first step to make an organized industrial safety movement. On April 1971, Occupational Safety and Health Act (OSHAct) became effective and applied to more than five (5) million businesses including sixty (60) million workers in U.S.A, (Hammer & Price, 2000).

Occupational safety and Health (OSH) management protects the safety, health, and welfare of people at the workplace. The International Labour Organization (ILO) 7 and the World Health Organization (WHO) have shared a common definition of occupational health which is "occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job", (Guidotti, 2011).

Several organizations were setting guides, standards, regulations, and training for safety and health at the construction site which can be implemented internationally or nationally according to the publishing organization and the local authority in construction industry. Alleyne was found that the variance in occupational health and safety standards between different countries has been cited as a major route of the international transfer or acquisition of health risks.

2.3 Construction Work on Safety and Health Definition

Safety in term of civil engineering means the discipline of preserving the health of those who build, operate, maintain and demolish engineering works and of others affected by those work. Safety is defined as one of the freedom from any danger or risks in construction works. It can apply the same to the danger of physical injury and to the risk of damage to health over a period of time. Safety and health is the concept that is worried with protecting the safety, health and welfare of people involved in work or employment (Lingard and Rowlinson, 2005).

Accidents are commonly occurring during construction and demolition activities result in injury, mostly, but not invariably, to worker on the site. It can also occur even before works begin, during survey and investigatory phases of a project, and also after works such as, faulty design or construction, causing death or injury to those involved on maintenance work and to members of the public too. In this era about 1500 people are killed on construction sites and 25000-30000 more are seriously injured. Moreover, 300000-400000 suffers injuries sufficient to keep them off their normal work for at least three days.

Construction workers are mostly exposed to the harsh working and hazardous substance in the construction industry that will brought to the various illness and suffer disease health. Safety and health is the purpose of being protected from or unlikely to cause danger, risk, or injury. While safety and health of workers defined as a protection of workers from any injuries, accidents and treat from unsafe environment by Occupational Safety and Health Administration (OSHA). In term of civil engineering, safety means the discipline of preserving the health of those who build, operate, maintain, and demolish engineering works and of others affected by those works, as well as freedom from danger of risks (Davies and Tomasin, 1996).

2.4 Roles of Construction Personnel in Safety and Health

One or more people can be given the responsibility for coordinating, facilitating, and directing a company's safety and health activities, and then all construction personnel share the responsibility for safety. Safety on the job is a 'team support' at construction site. Members of the safety and health team consist of professional personnel, supervisors, employees and subcontractors and safety and health professionals. Contractors, as the owner in the company has a big responsible for safety and health on their job sites. The responsibility of the contractor are setting a pro-safety tone for the company, complete a commitment to safety and health from the top down and ensuring that sufficient resources are provided to support a comprehensive, company-wide safety effort.

2.4.1 Managers and Other Professionals and Safety

Contractors have a staff of management personnel and other professional personnel in the company. Management personnel may have the position including project managers, financial managers and accountants, marketing representatives, office managers. While, other professional personnel may include positions like an engineer, designer, estimators, expeditors and architects. All of them are responsible for setting a positive example relating to safety and health. The following types of action were accomplished:

I. Developing performance appraisal forms that contain safety and health criteria
II. Developing work procedures that emphasize safety and health
III. Developing job descriptions that make safety and health part of every worker's job
IV. Keeping up to date with the latest OSHA regulations relating to construction
V. Safe work behaviour as a part of a company incentive programs were recognized
VI. The company must has a comprehensive and effective safety and health program

2.4.2 Supervisor and Safety

In the construction industry, supervisors played an important role in maintaining and establish safe and healthy job site. Supervisors are the first level of management; they interacted with employees on job sites more frequently than do higher level managers. Supervisors are hands-on responsibility in everyday to keep safety and health for all workers. Supervisors fall into the following categories of activity such as training, accident prevention, accident investigation and reporting. It is important to all company to have supervisor on safety and health in construction industry for makes sure all the workers follow the rule of safety and health at construction site.

2.4.3 Employees and Safety

Accident did not happen unless have an employees. Safety and healthy work practices not prevent accidents unless they are put to use on the job given. To make a safety environment at the site, all members of team must concerted efforts and employees are the crucial team. It is not enough just to know the rule of safety but the rules must be followed by employees. Employees should play an important role in preventing any accident that might be caused by careless of them.

2.4.4 Safety and Health Professionals

Safety and health professional (safety manager or safety engineer) is an important member of the safety and health team. A biggest company have a large enough employees sometimes employ a safety and health manager at an appropriate level in the corporate hierarchy. Construction companies with a highly placed safety and health manager were rare. Passage of the OSHA Act in 1970 began to change this. The OSHA Act, any other single factor more than must put in the job description of safety and health professionals. On-site inspection and penalties have encouraged a greater commitment to safety and health by OSHA standard. The responsibility of the safety and health manager is complex and diverse. The description of the job included hazard analysis, accident reporting, standard compliance, record keeping, training and emergency planning.

2.5 Accidents Happen in Construction

There are some contributing factors that lead to the accident happen such as, physical hazard, environmental hazard, human factors, no safety regulation, and poor communication within employees and other than that. The accidents happen may cause of the physical injuries or health disease in long term (Hinze, 1997). Accident can occur only the result of an unsafe act by a person or physical or mechanical hazard, or both. Moreover, the reason why people commit unsafe acts can serve as helpful guides in selecting corrective actions. Human factors that include overload, inappropriate response and inappropriate activities leading to the accident happen such as environmental factors (noise, distraction), detecting hazard but not correcting it and performing tasks without the requisite training.

2.6 Factor Affecting on Safety and Health Performance

Safety and health performance are big dictated by designer's decision. The designer should take consideration on how the project component will be assembled and how construction task are handled. Therefore, safety and health performance improved when the designer aware to the safety consequences and of their design project. This led to the reduction in injuries and decrease in design cost and in operating cost for special equipment and procedure (Hinze & Gambatese, 2003).

There are many factors affecting on safety and health performance in construction industry such as project cost, project duration, weather condition, safety and health policy, safety and health training, personal protection equipment (PPE), emergency planning and procedure, work environment and welfare facilities and many others. These factors will bring the effect on the construction company for making a decision on how to handle it.

2.6.1 Project Cost

In other hand, construction industry tends to have a low awareness of the long term advantages of safety practices. So it will consider on safety, resulting in cost and corner cutting and lead to the competitive tendering. It is actually deciding on the contractors where they are ready to take major risk or made major mistake in this field. These costs and disputes arise from interruptions in construction progress, penalties for these interruptions, economic losses, personal injuries and fatalities. Research has shown that safe workplaces and workers increase productivity accompanied by reduced costs and increased profitability, (Levitt & Samelson, 1993).

2.6.2 Project Duration

In China, significance in relation to the project objective was conducted regarding the risk of the project (Zou, et al., 2007). They found that tight schedule is one of the most factors affecting on safety and health performance at construction site. When the accident or conflictions happen between construction progresses, the project construction will be more delayed. In addition, the deadline for the completion specified job will creates more injuries (Hinze & Raboud, 1998). So the progress of the project is important to all the workers for preventing any accident happen.

2.6.3 Safety and Health Policy

Research found that the reduction of accident would be accomplished when management takes attention and dedicate to the safety and health improvement like a maintaining good safety and health policy. Research shows that 69% of the construction company in UAE have a lacking on understanding safety and health policy (Shibaini, 2012). Safety and health training also can effect on safety and health performance in construction industry where is there are many workers have the injuries. Training usually make a workers become more educated about the work there are performing. For example, workers are given a task to handle the equipment before they work on the real site. It is because to make a workers know how to handle the work and can prevent any injuries happen at site. (Teo, et al., 2005) found that the workers in Australia in training have prevention effect to avoid injury. These are one the most factors can effects on safety and health performance at construction site.

2.6.4 Weather conditions

Weather conditions have direct effect on safety and health performance in construction industry. An extreme hot weather in the summer time as temperature 13 reaches to 50 degree at some times. Also humidity has proportional relation with heat, as it increases the feel of heat when humidity increases. Heat stress is a serious issue on workers' health. Heat stress can lead to heat cramps, heat exhaustion, or heatstroke, which if untreated or sufficiently severe, may lead to death, (Brake & Bates, 2002). So it is important to check the weather conditions in the working area several times a day to work.

2.6.5 Safety and Health Training

In the construction industry, training shows a significant role for enhancing the workers' safety and health performance. Education and training sessions help workers to perform various activities efficiently. It also helps to establish a positive attitude towards safety and incorporates safety into production and quality goals, (Kartam, et al., 2000). For example, the training which is provided to certify the persons who are responsible for erecting or supervising the scaffolding, as it considers being the most risky job in the construction sites. So the training was important to avoid any accident happen.

2.6.6 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) can be divided into two categories. The first must be used safety helmet; safety shoes; and appropriate clothing. The second category depending kind of work, like eye protection, protective gloves, ear protectors, and the safety harness, (Jannadi & Bu-Khamsin, 2002). Construction companies were provide PPE to their workers because it usually increse the worker's productivity. In the construction industry, it is common that PPE means safety of workers. However, safety is all about how to create the appropriate environment in the workplace that PPE only to be considered as extra protections for the worst scenario might occur.

2.6.7 Emergency Planning and Procedures

Duties of contractor were to ensure that all workers are aware about the proper response to fire and other serious emergencies. One of the most factors affecting safety performance is emergency planning and preparation, (Jannadi & Bu-Khamsin, 2002). Effective emergency planning needs the workers to be aware about the emergency procedures before a crisis occurs.

2.6.8 Welfare Facilities

Welfare facilities such as the provision of drinking-water, washing, sanitary and changing place, restrooms, smoking areas, first-aid arrangements and assistance in transport from place of residence to the work site and back, all support to reduce exhaustion and improve workers' health. Therefore, decent work-related welfare facilities improve workers' health and morale and their efficiency, resulting in enhanced productivity and better work relations, (ILO, 1995).

2.6.9 Work environment

(Mattila, et al., 1994) found that there were direct relation between the quality of the work environment and the level of safety in construction sites. Further, the high quality work environment will improve the housekeeping and reduce the accident frequency rates. The work environment and procedures to ensure a better level of protection.

2.7 Ethic and Safety

The ethical behaviour in organization is influenced by both individual and social factors. Ethical can identify three personality measures that can influence an employee's ethical behaviour which is ego strength, Machiavellianism and locus of control (Trevino, 1996). Ego strength is one of the employee's ability to undertake self-directed task and to cope with any condition and situation. A measure of employee's Machiavellianism is the extent to which workers will attempt to deceive and confuse others. Meanwhile, locus of control is the perspective of workers concerning of what controls their behaviour.

One of the influence ethical behaviours in organization is social factor. These factors include religion, role differences, gender, age, work experience, nationality and influence by people surrounding. People needs to learn appropriate behaviour by observing the behaviour of important role models like a parents, teachers, public official and supervisor because construction professionals as a significant role model for their employees. It is crucial that the ethical behaviour is beyond reproach in all situations to make all the employers have their own responsible.

As a construction professional, they should be able to make responsible in decision concerning ethical choice. But, deciding is much easier than actually doing what is ethical. The facts in construction are responsible for setting an example of ethical behaviour. Then, they are responsible for helping fellow employees make a right decision. Lastly, construction professionals are responsible for helping fellow employees to undertake the ethical option once been identified. Ethic and safety not for construction professional but it is including company's role in ethic.

Like all businesses, construction companies have a crucial role to play in promoting ethical behaviour among the employees. They actually can creating an internal environment that promotes, expects and reward ethical behaviour. Besides, setting an example of ethical behaviour in all external dealing is one of role of construction companies. A company that created an ethical environment with establishing policies and practices that ensure all employees are treated ethically. One of the effective ways to build an ethical environment is with developing an ethic policy.

2.8 Causes That Can Occur To Accident Happen At Construction Site

Accident happen at construction site is due to attitude of employees that lack of everything in training, lack of personal protective equipment (PPE), handling equipment, lack of knowledge in construction, a lack of supervision that not monitored workers rightly, careless of workers in carry out the task and downright reckless. The main cause of construction accidents found are failure of workers to obey work procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment and poor workers attitude about safety (Abdul Rahim Abdul Hamid, 2008). These workers are reflected very high risk work environment surrounded by building material, tools, machinery and dusting. They can find themselves facing hazard at every moment at the site construction and then causing the injury or death.

Based on, Pipitsupaphol and Watanabe had found that the three most frequently occurring type of accidents in Thailand were workers being struck by falling objects, stepping on or striking against objects and person falling (Pipitsupaphol and Watanabe, 2000). Falls and struck by falling objects also have been the cause of the highest number of injuries and fatalities in the U.S. construction industry as reported by OSHA and Huang et al (2003). It also follows Schriver (1997) findings which indicate fall from roof is the most common cause of fatality in construction sites. This is happen because the lack of edge protection, inadequate scaffolding, dangerous demolition work and inappropriate use of ladders. Another factor that caused the accident at the site is being struck by falling objects, materials or tools. To prevent any fall accident, scaffolding must be put properly; workers must wear personal protective equipment (PPE), and removed hazardous material to reduce fall accidents.

Study by Toole (2002) in the USA and suggested that the causes of accidents were due to lack of proper training; deficient enforcement of safety; safety equipment not provided; unsafe methods or sequencing; unsafe site conditions; not using provided safety equipment; poor attitude toward safety; and isolated and sudden deviation from prescribed behaviour. According to Ridley 99 per cent of the accident are caused by either unsafe acts or unsafe conditions or both (Ridley, 1986). The unsafe act is an

infringement of an acknowledged safe system which could allow any accident. Most accident results from a combination of contributing causes and one or more unsafe acts and unsafe condition. Abdelhamid and Everett (2000) conducted a more comprehensive study in the USA and classified the causes into human and physical factors. This is due failed to secure or warn, fail to wear personal protective equipment (PPE) and used defective tool or equipment; and other unsafe action.

2.8.1 Direct Causes of Accident

Examples of direct causes in forms of energy and hazardous material can be found in table 2.1

Table 2-1 Sources of direct causal agents

Energy sources	Hazardous material
Mechanical: Machinery, Tools, Noise Explosive	Corrosive Material
Electrical: High Voltage Source, Short Circuit	Flammable Material: Solid, Liquid, Gas
Thermal: Molten Metal, Flame, Hot surface	Poison
Chemical: Acid, Fuel, Explosive	Dust
	Liquefied Gas: Flammable, Non-Flammable
	Oxidizing Material

(Source: Handbook of OSHA Construction Safety and Health, 2006)

2.8.2 Indirect causes of Accident

Indirect causes of accidents are unsafe acts and/or unsafe condition. It will cause any injuries to the workers cause of their own default and mistake. Table 2.2 show example of the unsafe acts and unsafe conditions:

Table 2-2 Unsafe acts and conditions

Unsafe Act	Unsafe Condition
Failure to wear Personal Protective Equipment(PPE)	Defective Tool/Machine
Failure to warn workers or co-workers to secure equipment	Congested Work Area
Ignoring equipment/ tool defect	Poor Illumination
Improper Lifting	Poor Ventilation
Improper working Condition	Inadequate support or Guard
Operating Equipment without Authority	Radiation Exposure
Horseplay	Poor Housekeeping

(Source: Handbook of OSHA Construction Safety and Health,2006)

2.9 Personal Protective Equipment (PPE) and Lifesaving Equipment

Personal Protective Equipment (PPE) must be worn at all time during construction works. It is to prevent any injuries happen or death. Before selecting the types of PPE that needed to prevent from hazards, employees are required to provide the necessary PPE to workers and train them to use properly. Employees who perceive a strong organization-wide commitment to safety have been found to be more than 2.5 times more likely to adhere to safety protocols than those who lack such perceptions (Gershon et al., 1995). So it is important to the workers to wear PPE during a work. Personal protective and lifesaving equipment contain the following section:

- Head protection
- Eye and face protection
- Hearing protection
- Respiratory protection
- Foot and Leg Protection
- Fall Protection

2.9.1 Head Protection

A tool like hammer is one of the dangerous tool that can be injured a worker from the drop and falling over the 20-foot drop and strikes a worker below. Had the worker not been wearing a hard hat, he would have sustained serious injuries from the impact. Any object that fall, are slung from a machine, and might become projectiles pose a serious hazard to the heads of workers. All worker requires to use appropriate PPE and follow a safety rules to prevent sustain head injuries on the job.

Falling objects are involved many injuries to the workers in spite of the fact that many of the victims were wearing hard hats. Hard hats are designed to provide a protection from the impact to the top of head and transmitted to the head, neck and spine. Hard hats can help reduce the risk associated with falling or projected objects but it will reduce the impact if they wore hard hat.

2.9.2 Eye and Face Protection

Eye and face protection are consist of safety goggles or face shields. OSHA also makes a non-prescription eye and face protective devices pass two impact test which is a high-mass, low-speed test and low-mass and high-speed test. Statistic shows that about 2000 workers in US have a job related to the eye injury that requires medical attention for each day. Goggles and face shields provide better protection in preventing eyes injury from dust, chemical splashes, welding and blood-borne hazard.

2.9.3 Hearing Protection

Workers should be required to use proper hearing protection devices where noise hazard exist. Earplug also a device that fit in to ear canal that designed and melded for the individual employee. Ear plug that made of a soft rubber or plastic substance can use to prevent any hazard noise. Active noise reduction (ANR) is the technology to reduce noise by manipulating sound and signal waves.it created a mirror image of sound waves that tends to cancel out the unwanted noise in the same way that negative numbers cancel out positive numbers. Nowadays a benefit of ANR technologies is optimization. The amount of noise protection can be adjusted by workers so it means they can prevent from any suffering a hearing loss. Too little noise can mean that they may not hear warning signal.

2.9.4 Respiratory Protection

There is some of respiratory system for protection in construction work such as respirator, gas mask, airline helmet, hoods, hose blower, chemical cartridge and mechanical filter. It is important to consider the respirator's assigned protection factor the ratio of the ambient concentration of a given contaminant to that inside a respirator face piece (Cohen et al. 2001).

2.9.5 Foot and Leg Protection

Almost 20 percent of all disabling workplace injuries in the United States have a foot and toe injuries. The factor kinds of injuries to the foot and toes are from the following:

- Impact from sharp or heavy objects which fall on the feet or legs
- Slips on unstable walking surfaces
- Hot liquid or metal splashed into shoes or boots
- Temperature extremes
- Conductivity of electricity or heat through foot
- Punctures through the sole of the foot

The workers must ensure that each affected worker uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole. Modern safety boots that provide comprehensive foot and toe protection are available. Types of protection for safety boot are steel toe for impact protection and slip-resistant soles for protection against slippery surfaces.

2.9.6 Fall Protection

American National Standards Institute (ANSI) published a Fall Protection Standard (ANSI Z359.1: Safety requirements for Personal Fall Arrest Systems, subsystems and Components). The most comprehensive fall protection standard is OSHA’s fall protection standard for the construction industry. Any construction worker working higher than 6 feet off the ground must use a fall protection device, such as a safety harness and lifeline. Employers are required to provide fall protection for workers erecting or dismantling supported scaffolds where the installation and use of

such protection is feasible and does not create a hazard. On the other hand, if clothes fit properly and do not impede the wearers‟ ability to do their job, they are much less likely to suffer a costly lapse in concentration or make a potentially lethal mistake (Taylor, 2011).

2.10 Emergency Response Plan

Research by (Khalid, 1996; Hanna et al., 1996) who found that for many years construction has consistently been among those industries with the highest injury and fatality rates. So it is crucial to respond in such emergencies in a way that minimize harm to people and damage to property. An emergency is a potentially life threatening situation, usually occurring suddenly and unexpectedly. The emergency responses professionals must do a job in quickly organize, stabilize and administer to respond in a manner as the result of preparation. Preparation involves a combination of planning, practicing, evaluating and adjusting to specific circumstance. Among industries, the construction industry stated the highest accidents rate, including death and disabling injuries (Cheng et. al, 2004). When emergency happens, it is important to act fast in responding which mean it can be differed between life and death or between minimal damage and major damage.

2.10.1 Emergency Planning

Superfund Amendments and Reauthorization Act (SARA) is also known as the Emergency Planning and Community Right-to-Know Act. There are four categories or requirement in the Emergency Planning and Right-to-Know which is emergency planning, emergency notification, and toxic chemical release reporting and information requirement. Among industries, the construction industry stated the highest accidents rate, including death and disabling injuries (Cheng et. al, 2004). So, the safety and health professionals must involve in developing emergency response preparation for their companies. The component of emergency planning is form local emergency planning committees (LEPCs) and state emergency respond commission (SERCs). LEPCs are required to develop emergency response plan for the local communities, host public forums, and select a planning coordinator for the community. While, SERCs are required to oversee LEPCs and review their emergency response plan.

2.10.2 First Aid in Emergencies

Workplace emergencies usually require a medical response. Apparently, first aid is the immediate response to a medical response. First aid consists of life saving measure taken to assist and injured person until medical help arrives. Providing first aid training to employees should be part of preparing for emergencies.

2.10.3 First Aid Training Programs

First aid program are often available in most communities. The community colleges and continuing education department typically offer first aid training. The National Safety Council is also provider of first aid training materials. There is some basic first aid training in course outline for first aid class:

- **Basic First aid**

  Basic first aid training must be educate to all employers because it is important if something serious injured happen, basic first aid can withstand from injured.

- **Cardiopulmonary resuscitation (CPR)**

  Having a dependable CPR team makes sense for any construction company. And to establish an emergency response unit, you'll need the finest CPR training. Construction industries exposed too many hazardous, so it is important to have CPR training among workers.

- **Burns**

  One of the best ways to prevent burns is to make sure all workers are well-versed in Hazard Communication, which covers the symbols and labels that will communicate risk. These labels will also include the important information on the steps workers can take to prevent burns if they come into contact with dangerous.

2.10.4 Training beyond

It is important part of preparing emergencies for training employees. However, there is more to being prepared to administer first aid than just training. In addition, it is important to do the following:

i. Have well-stocked first aid kits available
ii. Have appropriate personal protective devices available
iii. Post emergency telephone numbers
iv. Keep all employees informed

2.11 Act, Rules and Laws on Safety and Health in Malaysia

In Malaysia, there are act, rules and laws on safety and health. For example on safety and health are OSHA and NIOSH.

2.11.1 Occupational Safety and Health Act 1994 (OSHA)

Occupational Safety and Health Act 1994 (OSHA94) is one the main legislation that govern the safety and health for construction industries in Malaysia. It was established on 25 February 1994 by the Malaysian Parliament. The purpose of Occupational Safety and Health Act 1994 is to promote and encourage occupational safety and health awareness among workers and to create organization along with effective safety and health measures.

The Occupational Safety and Health Act 1994 complements any existing legislative provision and if there are any conflicts, the Occupational Safety and Health Act 1994 will overcome it. This Act, which contains 15 sections, is a measure that supersedes any conflict in existing occupational safety and health laws such as the Factory and Machinery Act 1967.

The objectives of OSHA (94) are to secure the safety, health and welfare of persons at work against risks. Besides that, OSHA is established to protect persons at a place of work other than persons at work against risks. It also promote an occupational environment for persons at work this is adapted to their physiological and psychological needs. Furthermore, the objective of OSHA is to provide the means whereby the

associated occupational safety and health legislations may be progressively replaced by a system of regulations and approved industry codes of practice operating in combination with the provisions of this Act designed to maintain or improve the standards of safety and health.

In safety and health organization, OSHA is established the committee at place of work for every employer shall establish a safety and health committee at the place of work in accordance with this section if there are 40 or more persons employed at the place of work or the Director General directs the establishment of such a committee at the place of work. OSHA also organized every employer in consult the safety and health committee to the making and maintenance of arrangements which will enable him and his employees to cooperate in promoting and developing measures to ensure the safety and health at the place of work and in checking the effectiveness of such measures.

2.11.2 National Institute of Safety and Health (NIOSH)

In June 1992, NIOSH Malaysia was established as a limited company under the Ministry of Human Resources in occupational safety and health. NIOSH Malaysia is a company limited by guarantee owned by the Government of Malaysia. “In the words of the Minister of Human Resources, Malaysia, NIOSH would be a "critical catalyst" in the promotion of occupational safety and health that would also serve as the "backbone" to create a "self-regulating occupational safety and health culture" in Malaysia.”

NIOSH Malaysia conducts regular Occupational Safety and Health-related trainings around the country. As the “training arm” of the Department of Occupational Safety and Health (DOSH), IMHO, the courses offered by NIOSH are recognized by that department. The NIOSH Construction Program gives national and world leadership to prevent work-related illness, injury, disability, and death by systematically gathering information, conducting targeted scientific research, and translating the knowledge gained into products, solutions and services tailored to meet construction needs As a team with industry and work accomplices and partners, including OSHA, we are devoted to enhancing wellbeing conditions for all development specialists.

Objectives of NIOSH are as the following:

- To advice the Government in the formulation of a national policy on Occupational safety & health & on the working environment both of employers & employees taking into consideration the nature of the occupation & safety of the employers & Employ.
- To advice the Government on measures required for the prevention of accidents and injuries relating, to Occupation at work places;
- To conduct, undertake and assist in investigations, study programs, surveys and research in the field of Occupational safety and health
- To provide advisory services to any institution or person on the correct use of equipment, hazardous substances, physical, chemical or biological agents or products or any other hazards;
- To educate and provide necessary training to employees, occupiers, workers or any other person required of knowledge and training in occupational safety and health and related subjects either in collaboration with any other institution or university in Sri Lanka or abroad, or by the Institute and award certificates or diplomas on completion of such education or training;

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

They are numerous ways to understand the concept of safety and health practices by construction workers. This chapter explains how to conduct this study using methodology. In order to achieve the objective of this study, primary data and secondary data played an important role in this research. There are three objectives of this study that needed to fulfil in this study.

The first objective is to determine the factors affecting on safety and health performance at construction site. The second objective is to identify the worker's level of satisfaction towards safety and health aspect at construction site and lastly, the third objective is to analyse the level of awareness of construction worker on safety and health at construction site.

This study was carried out by the literature review and questionnaire survey.to achieve of the objective of this study, the information related on safety and health has been collected from journal, internet and published book. There is a needed to understand the actual circumstance which had been practiced in construction industry for the aim to relate the theory and practical in reality. Therefore, a necessary to obtain the feedback from construction industry had been taken which is from the respondent of the construction company Grade 7 with registered CIDB. As a result, both of primary data and secondary data combined in the attainment of this research.

3.2 Respondent

The respondent had been chosen for the conduct of questionnaire survey**.** in this study, total of the 40 respondent is selected to be the respondent of this study. The respondent can be originated from contractor organization (G7 registered with CIDB) which located in Kuantan, Pahang.

3.3 Questionnaire

The question is designed based on information gathered from literature review. Questionnaire survey was conducted to carry out the data gathered from the respondents. This question consists of 4 elements, where the elements were as below:

a) Background of the respondents
b) The factors affecting on safety and health performance
c) The worker's level of satisfaction towards safety and health aspect
d) The level of awareness of construction worker on safety and health

3.4 Questionnaire Structured

The questionnaire was divided into 4 parts and hand out was shown in Appendix. The first part consists of the demographic information of the respondent, such as age and nationality. The second, third and fourth part consists of rating-based question. The questionnaire was designed to have the level of agreement from the respondents as its measurement was in ordinal scale numbering from 1 to 5. The respondents may choose one of the ordinal scales according to their level of agreement for each question.

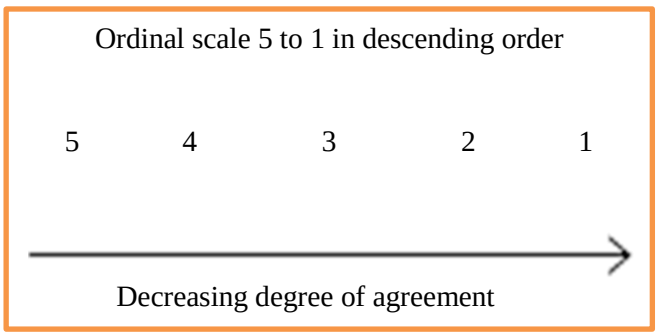

Figure 3-1 Likert Scale

Each scale represents the following rating

Ordinal Scale	Level of Agreement
1	Very low degree of agreement
2	Low degree of agreement
3	Neutral degree of agreement
4	High degree of agreement
5	Very high degree of agreement

3.5 Statistical Technique

This study will choose to use Statistical Package for social Sciences (SPSS) as a method for statistical analysis. It is a tool for a software package used for logical batched and non-batched statistical analysis. The process started with primary process that is SPSS. The types used in this study as independent variable and dependent variable are based on questionnaire question.

SPSS provides a range of techniques, including ad-hoc analysis, hypothesis testing and reporting. It is to make it easier to access and manage data, select and perform analyses and share your results. The solution offers a base edition with optional add-ons that can be activated to expand your predictive analytics capabilities as you need them. SPSS Statistics is available as a flexible subscription option or a perpetual license. Other than average index method, SPSS is software to calculate frequency and average index with just kept in the data on the independent variable and dependent variable.

When opening data, SPSS displays them in a spread sheet-like fashion. This sheet-called as a data view and it will always displays our data values. Next, SPSS data file has a second sheet called variable view. It shows the metadata associated with the data. Metadata is information about the meaning of variables and data values. After kept in the data, SPSS will show output items, typically tables and charts, are easily copy-pasted into other programs. Tables are usually copied in rich text format, which means they'll retain their styling such as fonts and borders.

3.6 Data Analysis

In general, the data collected from questionnaire survey was analysed using the average index method. The equation used for the average index analysis is as follow (Al-Hammad, A.Mohsen, & Assaf, 1996). AI method was calculated using the following formula:

$$Average\ Index = \frac{\sum (ai\ .Xi\ )}{\sum (Xi)}$$

Where,
ai is a constant expressing weight given to i
Xi is the variable that expressing the frequency of degree

To identify the level of each objective, the rating of five levels is important in order to achieve the objective of this study. It was classified into five levels which were very low, low, moderately, high and very high. For level very low, an average index was in between 1.0 to 1.5. For the low level, average index was within 1.50 to 2.5, for moderately, 2.5 to 3.5 and high level shows on 3.5 to 4.5 of average index. And for the very high level, the average index is classified in the range within 4.5 to 5.0.

Determining the describing and analyse the data is a first step in planning educational or research projects. Then should discuss, in the Methods section if the explanation is too lengthy, why they have chosen to portray and analyse their data in a particular way. So, the classification of average index makes it easier to summarize the data. The classification of the average index will be rated into five levels of achievement which were:

"Very Low" $1.00 \leq$ Average Index < 1.50
"Low" $1.50 \leq$ Average Index < 2.50
"Moderately" $2.50 \leq$ Average Index < 3.50
"High" $3.50 \leq$ Average Index < 4.50
"Very High" $4.50 \leq$ Average Index ≤ 5.00

3.7 Research Methodology Flow Chart

This chapter discussed about data collection and data analysis of the study. The steps taken in order to conduct this study are presented in a flow chart. The methodology of this study was the following below:

i) Study of literature related on safety and health
ii) Preparation of questionnaire
iii) Questionnaire survey
iv) Analysing the questionnaire
v) Qualitative analysing data obtained from respondent
vi) Present data to be recorded for future reference
vii) Conclusion and recommendation

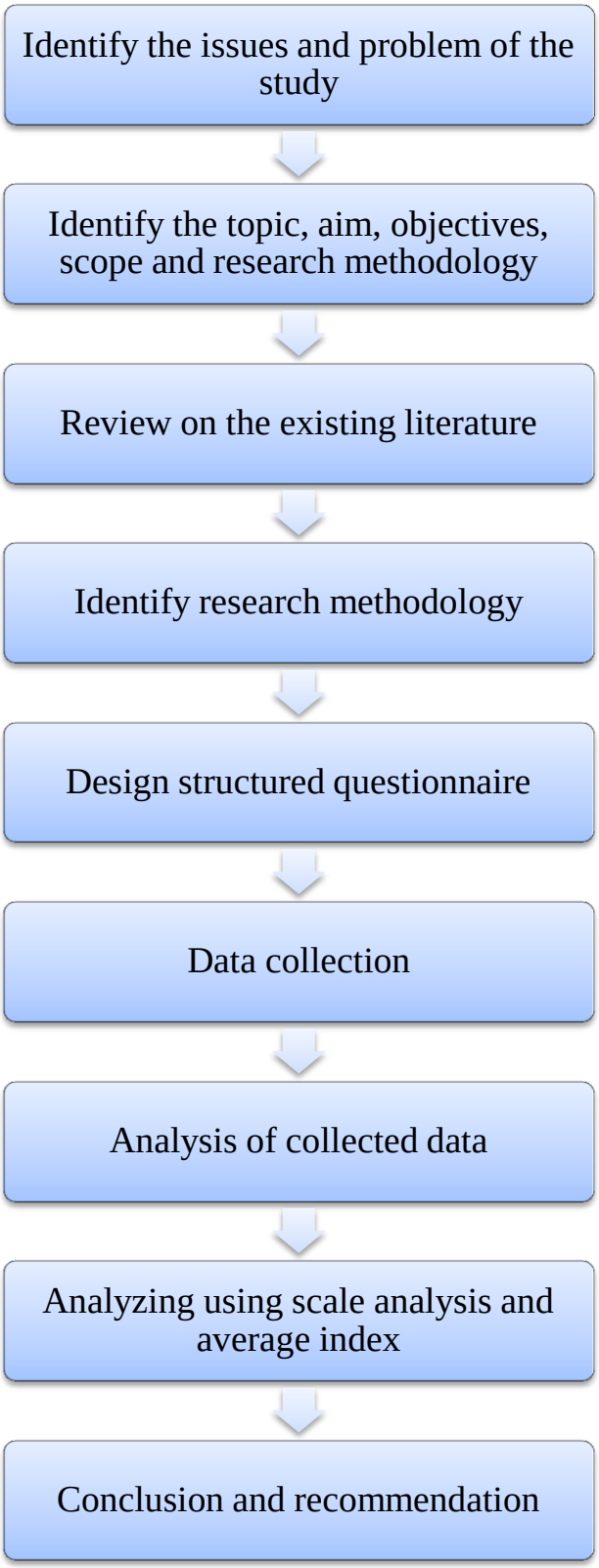

Figure 3-2 Methodology Flowchart

3.8 Conclusion

Overall this chapter discussed about the method used to carry out the data collection and data analysis. Method helps to learn how to use the information source to enable literature critical evaluation in creating special observation and skill. Literature review was used in this study as the basis to provide more understanding about this research. In addition, the literature review leads to the suitable data collection and data analysis in order to carry out this study.

The research instrument used is structured questionnaire. A structured questionnaire is a quantitative research method commonly used in survey research. It is a data methodology that involves a standard set of questions asked in the same manner and order. The descriptive study involves data collection in order to answer the question arose from the issues by examining the current status of an item under study. Once the data had been collected, the data will be analyzed and reported in a written form. As a conclusion, method used in this study can help to achieve the objectives of this study.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter will analyse and discuss the data had been collected from the respondents. In order to achieve the objective of this study, the data had been collected thought structured questionnaire. Each of the section in structured questionnaire will be discussed and analysed respectively.

4.2 Data Collection

The structured questionnaire was designed based on previous chapter. There are 50 sets of survey questionnaire have been distributed to the workers level to get the data information. But, only 40 questionnaires were returned completely. That was indicates a response rate of 80 percent.

Table 4-1 Questionnaire distribution and responses

Categories	Number of Distributed	Number of respondents	Percentage (%)
Workers	50	40	80

4.3 Data Analysis and Findings

The question is divided into 4 sections which are section 1, section 2, section 3 and section 4. The section was arranged according to the chronology in the structured questionnaire. The sections were as below:

Section 1: Demographic Information

Section 2: Factors affecting on safety and health performance at construction site

Section 3: Worker's level of satisfaction towards safety and health aspect at construction site

Section 4: Level of awareness of construction worker on safety and health at construction site

4.4 Demographic Information

From the figure 4.1 and 4.2, the percentage age of the workers is (40%) were age is between 31-40 years old and all the construction workers is male.

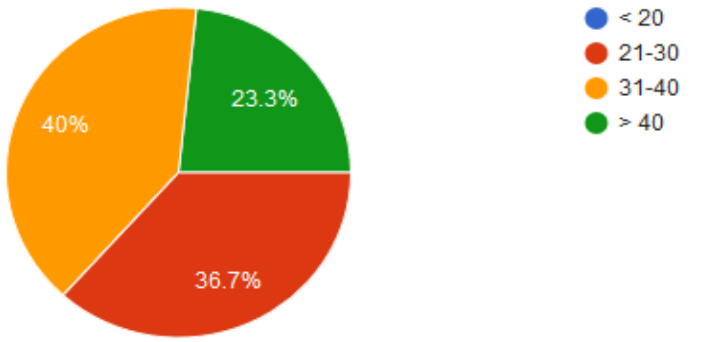

Figure 4-1 Age of respondents

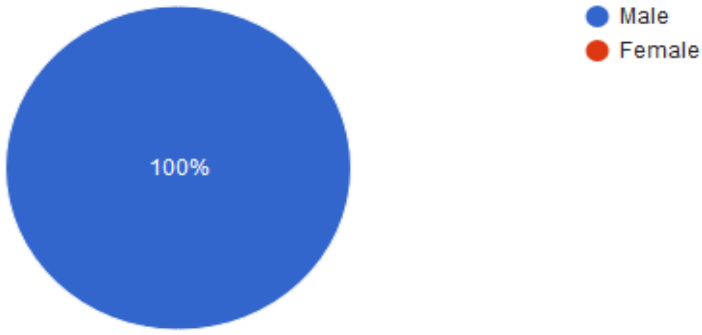

Figure 4-2 Gender

The percentage of local and foreign workers at construction site was shown in the figure 4.3 below. It shows that the majority of the construction workers at the construction site are foreign workers.

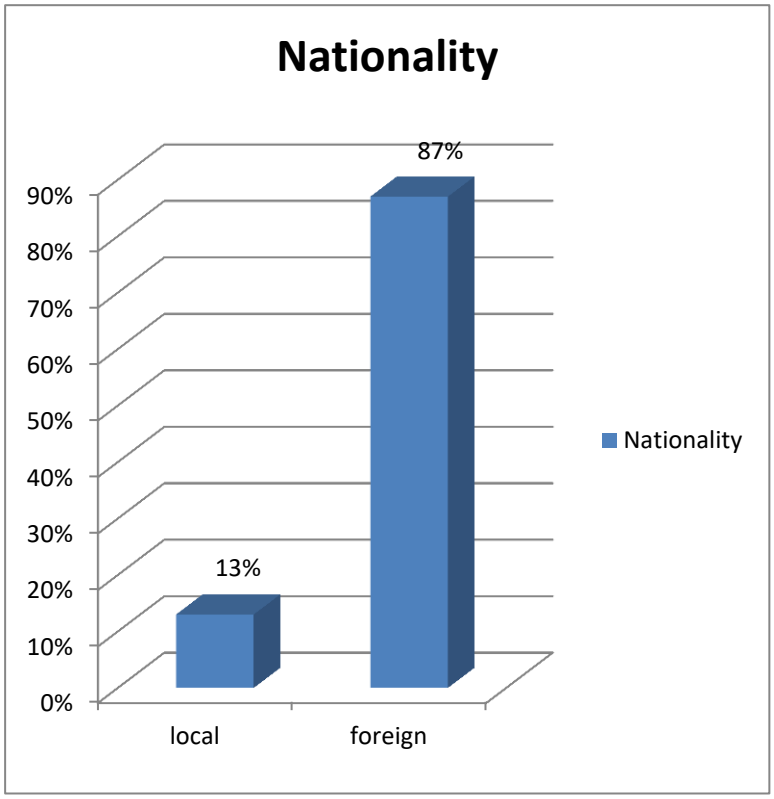

Figure 4-3 Nationality

From the figure 4.4 below, it shows the percentage of years in service for construction workers. It was divided into 4 categories which is less than 1 year, 5 to 10 years, 11 to 20 years and 21 years and above. The result shows that the percentage of the majority respondent for years in service is 11 to 20 years.

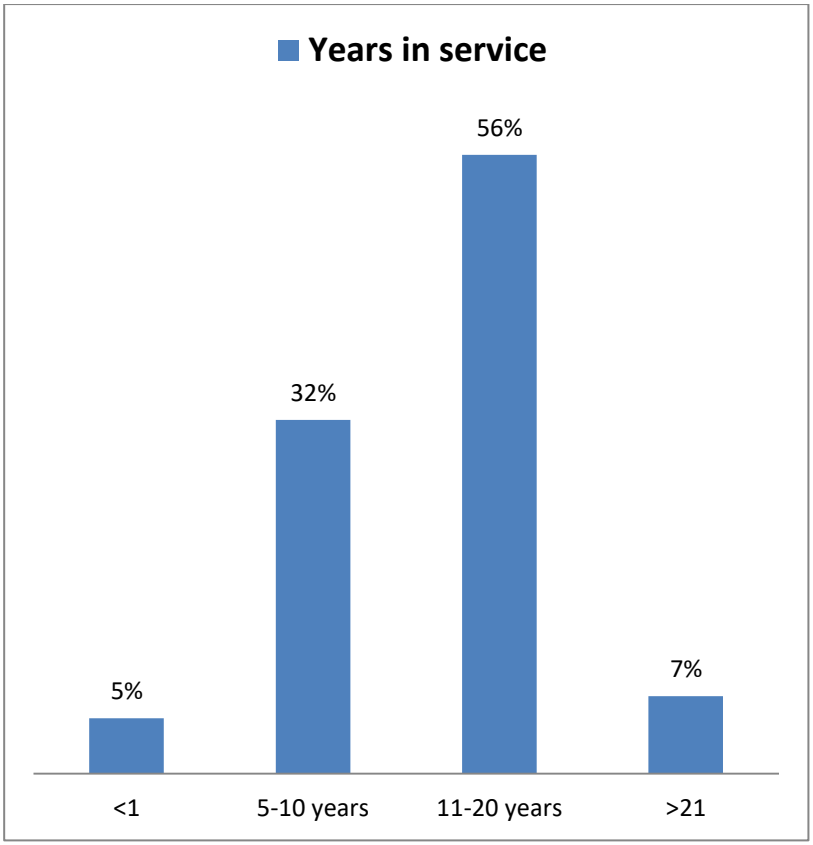

Figure 4-4 Years in service

4.5 Factor Affecting on Safety and Health Performance at Construction Site

This part was discussed on factor affecting on safety and health performance at construction site. It was measured using 8 elements which are project cost, project duration, weather condition, safety and health policy, safety and health training, personal protection equipment (PPE), work environment and welfare facilities.

Table 4.2 and 4.3 will illustrate the factor affecting on safety and health performance at construction site. As shown in table 4.2 and 4.3, the contractor considered many factors that effect on safety and health performance at construction site. Mostly, the respondent chooses project cost is the higher factor affecting on safety and health performance at construction site. It is very high the average index as much as 4.60 for degree of impact. It is because, if the project cost is higher, the project site is bigger and leads to more dangerous on safety and health, then, followed by project duration with second highest average index with 4.55 degree of impact.

Most of the respondents totally agree that the project cost and project duration is the factor affecting on safety and health performance at construction site. Based on the primary data which is journal, internet and book, it stated that safety and health policy is the most main group of factor affecting on safety and health performance at construction site. The research shows that 69% of Construction Company in UAE has a serious lack of understanding on safety and health policy. And all small construction companies together with 80% of medium construction companies do not have written safety and health policy.

Table 4-2 Factor affecting on safety and health performance

Factor affecting on safety and health performance	**Rating of frequency**									
	VL (1)		**L (2)**		**A (3)**		**H (4)**		**VH (5)**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
a) Project cost	0	0.0	0	0.0	0	0.0	16	40	24	60
b) Project duration	0	0.0	0	0.0	2	5.0	15	37.5	23	57.5
c) Work environment	0	0.0	0	0.0	4	10.0	17	42.5	19	47.5
d) Personal protection equipment	0	0.0	0	0.0	5	12.5	18	45	17	42.5
e) Safety and health policy	0	0.0	0	0.0	10	25	18	45	12	30
f) Weather condition	0	0.0	0	0.0	13	32.5	17	42.5	10	25.0
g) Safety and health training	0	0.0	0	0.0	15	37.5	18	45	7	17.5
i) Welfare facilities	0	0.0	2	5.0	20	50	13	32.5	5	12.5

Note: VL=Very Low, L=Low, A=Average, H=High, VH=Very High

Table 4-3 Degree impact of factor affecting on safety and health performance

No.	Factor affecting on safety and health performance	Total respondent	Average index	Rank
1.	Project cost	40	4.60	1
2	Project duration	40	4.55	2
3	Work environment	40	4.38	3
4	Personal protection equipment	40	4.30	4
5	Safety and health policy	40	4.10	5
6	Weather condition	40	3.95	6
7	Safety and health training	40	3.80	7
8	Welfare facilities	40	3.53	8

4.6 Level of Satisfaction toward Safety and Health Aspect at Construction Site

From the analysis, it can be said that the workers are satisfied towards safety and health at the construction site. There were eight item used in this section. They were in table 4.4 below. The analysis showed that the respondent are satisfied with the personal protection equipment (PPE) which is has a higher average index, 4.48. In addition they are also satisfied with management health and safety practice. The average index for that item is 4.25 which mean categorized under satisfied level. Then, followed by emergencies planning and procedure provided which score on average index 3.95. The other items also have a high score in rating level of achievement where score on average index < 3.50 is. It showed that the workers at the construction site were satisfied towards safety and health aspect respectively.

Table 4-4 Satisfaction towards safety and health aspect

Level of satisfaction towards safety and health	Rating of frequency									
	VD (1)		D (2)		MS (3)		S (4)		VS (5)	
	N	%	N	%	N	%	N	%	N	%
1) Personal protection equipment (PPE) provided	0	0.0	0	0.0	1	2.5	18	45	21	52.5
2) Management health and safety practice	0	0.0	0	0.0	5	12.5	17	42.5	18	45
3) Emergencies planning and procedure provided	0	0.0	0	0.0	8	20	22	55	10	25
4) Safety signals, signs and barricades	0	0.0	0	0.0	10	25	20	50	10	25
5) Workplace environment	0	0.0	0	0.0	12	30	19	47.5	9	22.5
6) First-aid facilities provided	0	0.0	0	0.0	15	37.5	23	57.5	2	5
7) Health and safety conditions at workplace	0	0.0	0	0.0	16	40	21	52.5	3	7.5
8) Supervision by immediate supervisor	0	0.0	1	2.5	18	45	20	50	1	2.5

Note: VD=Very Dissatisfied, D=Dissatisfied, MS=moderately satisfied, S=Satisfied, VS=Very satisfied

Table 4-5 Level of satisfaction towards safety and health aspect

No.	Level of satisfaction towards safety and health	Total respondent	Average index	Rank
1.	Personal protection equipment (PPE) provided	40	4.48	1
2	Management health and safety practice	40	4.25	2
3	Emergencies planning and procedure provided	40	3.95	3
4	Safety signals, signs and barricades	40	3.83	4
5	Workplace environment	40	3.63	5
6	First-aid facilities provided	40	3.50	6
7	Health and safety conditions at workplace	40	3.48	7
8	Supervision by immediate supervisor	40	3.33	8

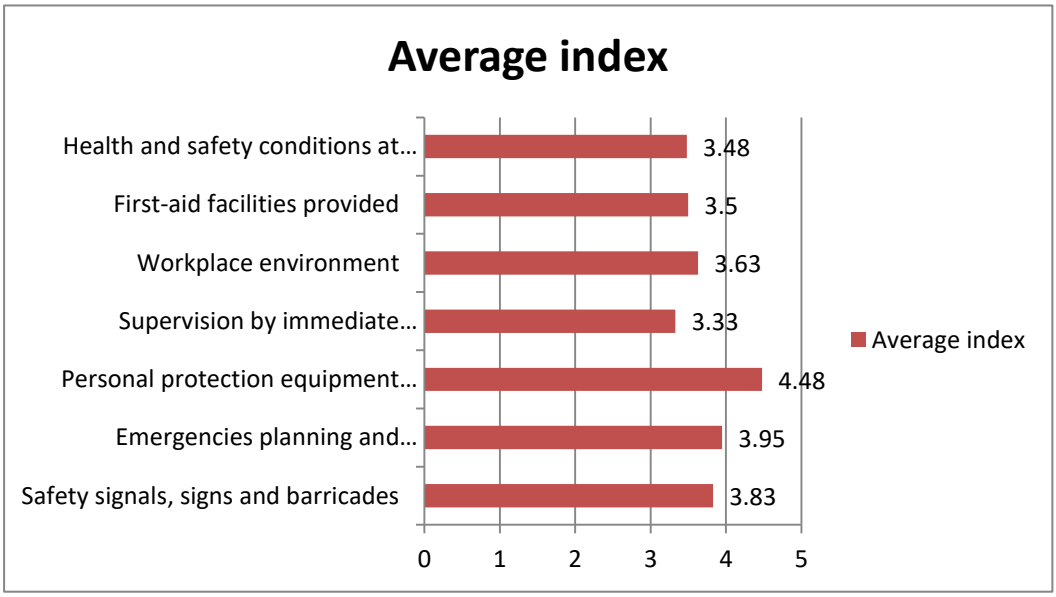

Figure 4-5 Average index for level of satisfaction towards safety and health aspect

4.7 Level of awareness of Construction Worker on Safety and Health

Table 4-6 Awareness of construction worker on safety and

Awareness towards safety and health	Rating of frequency									
	SD (1)		D (2)		MA (3)		A (4)		SA (5)	
	N	%	N	%	N	%	N	%	N	%
a) Safety and health is important at construction site	0	0.0	0	0.0	0	0.0	13	32.5	27	67.5
b) Safety training is important	0	0.0	0	0.0	1	2.5	15	37.5	24	60
c) Failure to adhere to safety procedure can cause injury to me and my co-worker	0	0.0	0	0.0	5	12.5	24	60	11	8.3
d) There is safety procedure at construction site.	0	0.0	0	0.0	8	20	24	60	8	20
e) Using personal protection equipment while working	0	0.0	0	0.0	15	37.5	23	57.5	2	5
f) Have First Aiders and First Aid facility on your premises	0	0.0	0	0.0	16	40	23	57.5	1	2.5
g) Have a system in place to report and record incidents and near misses	0	0.0	0	0.0	17	42.5	23	57.5	0	0.0
h) Have a system for keeping up-to-date with the OSHA	0	0.0	1	2.5	20	50	16	40	3	7.5

i) Have a tasks that may include any hazardous Manual Handling activity	0	0.0	1	2.5	32	80	7	17.5	0	0.0
j) Workplace is suitable for disabled workers and visitors	3	7.5	31	77.5	6	15	0	0.0	0	0.0

Note: SD=Strongly Agree, D=Disagree, MA=moderately agree, A=agree, SA=Strongly Agree

Table 4-7 Level of awareness of construction worker on safety and health

No.	Awareness towards safety and health	Total respondent	Average index	Rank
1.	Safety and health is important at construction site	40	4.68	1.
2	Safety training is important	40	4.58	2
3	Failure to adhere to safety procedure can cause injury to me and my co-worker	40	4.13	3
4	There is safety procedure at construction site.	40	4.00	4
5	Using personal protection equipment while working	40	3.68	5
6	Have First Aiders and First Aid facility on your premises	40	3.62	6
7	Have a system in place to report and record incidents and near misses	40	3.58	7
8	Have a tasks that may include any hazardous Manual Handling activity	40	3.18	8
9	Workplace is suitable for disabled workers and visitors	40	2.05	9

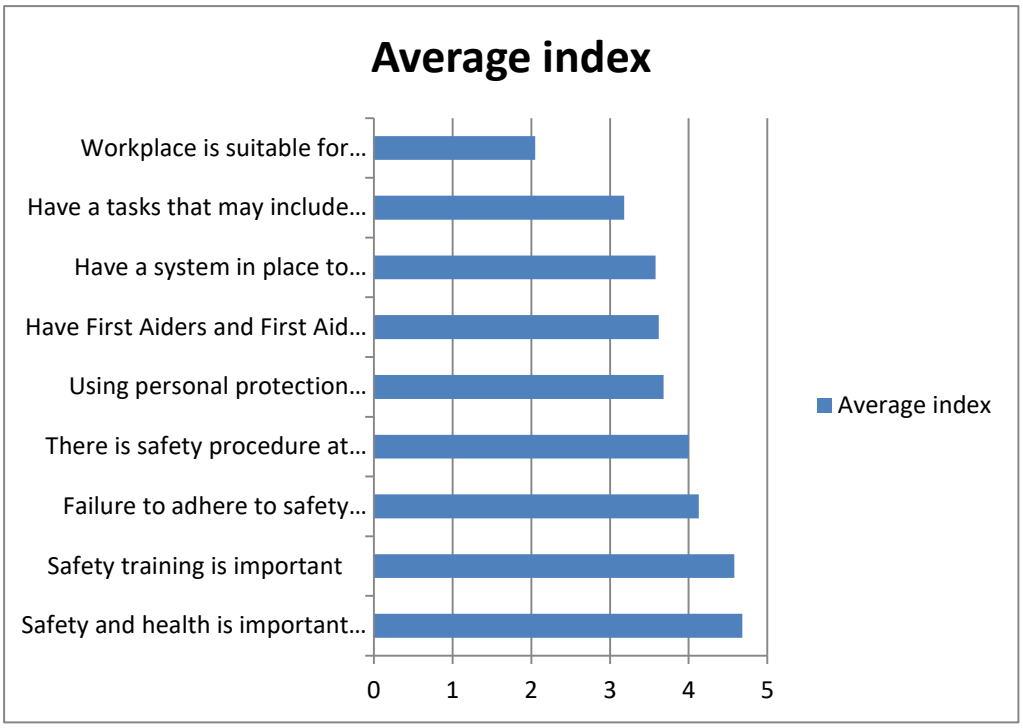

Figure 4-6 Average index for level of awareness of construction workers on safety and health

This part discussed on the level of awareness of construction workers on safety and health at construction site. There were 9 questions being asked in this part. Table 3 illustrated that the awareness of construction workers toward safety and health. The result from analysis indicates that mostly all the workers have very high level of awareness toward safety and health. This is possible because all the workers have more experience working at the site and hold CIDB Green Card. Almost all the respondents strongly agree with the importance of safety and health at construction site.

This analysis shown that the average index is 4.68 which score is very high. In addition they were also having a safety training program to make sure all the workers prevented from injuries. The average index for safety training is 4.58 and followed by failure to adhere to safety procedure can cause injury to me and my co-worker as much as 4.13 of average index. However, the respondent is disagree on workplace is suitable for disabled workers and visitors because the site construction is the dangerous site.

4.8 Summary

The structured questionnaire was used in this research to obtain the data from the respondent. A total of 40 respondents were chosen at the construction site in order to get the data. The respondent was originated from contractor organization (G7 registered with CIDB) which located in Kuantan, Pahang.

All of the part in questionnaire structured consist 4 parts which is demographic information of the respondent. Meanwhile, the second, third and fourth part consists of rating-based question. The second part was compared with primary data which is literature review to make an analysis if the answer related in questionnaire structured. And for rating-based question, it was regarding the respondent's opinion for a specific fact by making 5-point scale ranging.

The method used in this research was frequency analysis and average index in order to obtain the result and data analysis. For part one, it represented the demographic section which the main concerned are to identify the respondent's background such as age, gender, nationality and years in service. The study was found that majority of the respondents were foreign worker.

Based on the data analysis and results obtained, all the objectives of the study have been achieved. The factor affecting on safety and health performance at construction site has been identified. As well as worker's level of satisfaction towards safety and health aspect at construction site and the level of awareness towards safety and health at construction site are also identified. As a conclusion, the entire objective had been achieved with successful in this study.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter concludes all the findings that lead to the achievement of the objective of the study. The result is based on the analysis and result obtained from the data frequency. In this chapter, each of the objectives will be discussed in order to indicate a clear insight for the achievement of each objective. There are some recommendations for those who are desire to do further studies on safety and health practices.

5.2 Valuation of Objective

In this study, the questionnaire structured was divided into 4 parts to achieve the objectives of this study. All of the part in questionnaire each of objectives will be discussed more comprehensively as below:

5.2.1 Demographic Information

All the respondents involved in this study both local and foreign workers. The entire of the respondent were male and majority of the respondents at sites are foreign workers. This is common situation in Malaysia construction industry. According to Department of Statistic as of June 2011, Malaysian construction industry employs 1,214,000 or about 10% of our country total employment 12,116,600. However, around 70% - 80% of construction labours are occupied by foreigners. The respondent has the working experience for years in service are 11 to 20 years. And the percentage of the years in service is 56%.

5.2.2 Objective (i): To determine the factors affecting on safety and health performance at construction site

The first objective of this study was to determine the factors affecting on safety and health performance at construction site. There are 9 elements to measure for the factors affecting on safety and health performance which is project cost, project duration, weather condition, safety and health policy, safety and health training, personal protection equipment (PPE), emergency planning and procedure, work environment and welfare facilities. From the analysis and result in previous chapter, the contractor considered many factors that effect on safety and health performance at construction site. Mostly, the contractor chooses project cost is the very high level on factor affecting on safety and health performance at construction site. It is because, if the project cost is higher, the project site is bigger and leads to more dangerous on safety and health.

Table 5-1 Level of factor affecting on safety and health performance at construction site

Factor affecting on safety and health performance at construction site	Average index	Level
Project cost	4.60	Very high
Project duration	4.55	Very high
Work environment	4.38	High
Personal protection equipment	4.30	High
Safety and health policy	4.10	High
Weather condition	3.95	High
Safety and health training	3.80	High
Welfare facilities	3.53	High

5.2.3 Objective (ii): To identify the worker's level of satisfaction towards safety and health aspect at construction site.

The second objective of this study was to identify the worker's level of satisfaction towards safety and health aspect at construction site. The rating-based question was used to achieve this objective. From the analysis, it can be concluded that most of the workers are satisfied towards safety and health at the construction site. The analysis showed that the respondent are satisfied with the personal protection equipment (PPE) which is has a higher average index. In addition they are also satisfied with management health and safety practice. The level on personal protection equipment provided has the highest level among others.

Table 5-2 Level of satisfaction towards safety and health

Level of satisfaction towards safety and health	Average index	Level
Personal protection equipment (PPE) provided	4.48	High
Management health and safety practice	4.25	High
Emergencies planning and procedure provided	3.95	High
Safety signals, signs and barricades	3.83	High
Workplace environment	3.63	High
First-aid facilities provided	3.50	High
Health and safety conditions at workplace	3.48	Moderate
Supervision by immediate supervisor	3.33	Moderate

5.2.4 Objective (iii): To analyse the level of awareness of construction worker on safety and health at construction site.

The last objective of this study was to analyse the level of awareness of construction worker on safety and health at construction site. It is similar method used in objective 2 which is rating-based question. This part discussed on the level of awareness of construction workers on safety and health at construction site. There were 10 questions being asked in this part. The result from analysis indicates that mostly all the workers have very high level of awareness toward safety and health. This is possible because all the workers have more experience working at the site and hold CIDB Green Card. Almost all the respondents strongly agree with the importance of safety and health at construction site and the level is very high. In addition they were also having a safety training program to make sure all the workers prevented from injuries. However, the respondent is disagree on workplace is suitable for disabled workers and visitors because the site construction is the dangerous site and it stated the low level

Table 5-3 Level of awareness towards safety and health

Awareness towards safety and health	Average index	Level
Safety and health is important at construction site	4.68	Very high.
Safety training is important	4.58	Very high
Failure to adhere to safety procedure can cause injury to me and my co-worker	4.13	High
There is safety procedure at construction site.	4.00	High
Using personal protection equipment while working	3.68	High
Have First Aiders and First Aid facility on your premises	3.62	High
Have a system in place to report and record incidents and near misses	3.58	High
Have a tasks that may include any hazardous Manual Handling activity	3.18	Moderate
Workplace is suitable for disabled workers and visitors	2.05	Low

5.3 Recommendation for Future Research

There are some recommendations for those who are desire to do further studies on safety and health practices in future:

i. The number of construction site must be increased in order to compare which site has better in safety and health practices
ii. The result obtained must be validated by the safety expert like a safety officer to reconfirm the findings.

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APPENDIX A

QUESTIONNAIRE

FACULTY OF CIVIL ENGINEERING

SAFETY AND HEALTH PRACTICE BY CONSTRUCTION WORKERS

MOHAMAD HARIS BIN ABDULLAH

UNIVERSITI MALAYSIA PAHANG

SECTION 1: BACKGROUND OF RESPONDENTS (Please tick the appropriate box)

1. Age (Years):

[ ] < 20

[ ] 21-30

[ ] 31-40

[ ] > 40

2. Gender:

[ ] Male

[ ] Female

3. Nationality:

[ ] Local

[ ] Foreign

4. Years in Service:

[ ] < 1

[ ] 5-10

[ ] 11-20

[ ] 21 and above

SECTION 2: FACTOR AFFECTING ON SAFETY AND HEALTH PERFORMANCE AT CONSTRUCTION SITE *(Please tick the appropriate box)*

No.	Factor Affecting on Safety and Health Performance at Construction Site	Degree of impact				
		Very Low (1)	**Low (2)**	**Average (3)**	**High (4)**	**Very High (5)**
1	Safety and Health Policy					
2	Project Duration					
3	Safety and Health Training					
4	Project Cost					
5	Weather Condition					
6	Personal protection equipment (PPE)					
7	Work Environment					
8	Welfare Facilities					

SECTION 3: LEVEL OF SATISFACTION TOWARDS SAFETY AND HEALTH ASPECT AT CONSTRUCTION SITE

Please tick your assessment on the given answer:

Very Dissatisfied	Dissatisfied	Moderately Satisfied	Satisfied	Very Satisfied
1	2	3	4	5

No.	Statement	Scale				
1	Management health and safety practice	1	2	3	4	5
2	Emergencies planning and procedure provided	1	2	3	4	5
3	Supervision by immediate supervisor	1	2	3	4	5
4	Personal protection equipment (PPE) provided	1	2	3	4	5
5	Health and safety conditions at workplace	1	2	3	4	5
6	First-aid facilities provided	1	2	3	4	5
7	Workplace environment	1	2	3	4	5
8	Safety signals, signs and barricades	1	2	3	4	5

SECTION 4: AWARENESS TOWARDS SAFETY AND HEALTH AT CONSTRUCTION SITE

Please give your appropriate rating of agreement for the following statement.

Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly agreed
1	2	3	4	5

No.	Statement	Scale				
1	Have a system for keeping up-to-date with the OSHA	1	2	3	4	5
2	Have a tasks that may include any hazardous Manual Handling activity	1	2	3	4	5
3	Failure to adhere to safety procedure can cause injury to me and my co-worker	1	2	3	4	5
4	Safety and health is important at construction site	1	2	3	4	5
5	Using personal protection equipment while working	1	2	3	4	5
6	There is safety procedure at construction site	1	2	3	4	5
7	Have a system in place to report and record incidents and near misses	1	2	3	4	5
8	Workplace is suitable for disabled workers and visitors	1	2	3	4	5
9	Safety training is important	1	2	3	4	5