SAFETY, HEALTH & ENVIRONMENTAL HAZARD IDENTIFICATION AND RISK ASSESSMENT ON WAREHOUSE RACKING INSTALLATION SITE

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ABSTRACT

Safety is an important aspect in all business industry. Thus, the employers and employees have equal responsibility towards ensuring a safe workplace. As most people spend at least eight hours of each day at work, working conditions play a major and direct impact on the health and wellbeing of the workers. Occupational accidents will result in economic loss not only to the company but also to the workers as it may lead to permanent disabilities or deaths. Occupational accidents are preventable through implementing effective measures at the workplace. In this study, hazard identification, risk assessment and risk control (HIRARC) were used to evaluate the hazard associated with warehouse racking installation activities following the guideline by Department of Occupational Safety & Health, Malaysia. Hazard at workplace were assessed through site observation, survey questionnaire and interview with key personnel at site. All hazards identified were then quantify with risk rating. Risk matrix is useful for risk analysis that adopt likelihood and severity. The outcome of analysis is good on decision risk control. The results were presented in a HIRARC form and perception of workers were analysis through awareness questionnaire. There was no accident reported only some injuries were experienced by the workers which typical exist include bruises, minor cut and back pain.

Keywords: HIRARC, Risk Matrix, Warehouse Racking Installation,

[PENGENALPASTIAN BAHAYA DAN PENIALAIAN RISIKO KESELAMATAN, KESIHATAN & ALAM SEKITAR SEMASA PEMASANGAN RAK PENYIMPANAN DI GUDANG]

ABSTRAK

Keselamatan adalah aspek penting dalam semua industri perniagaan. Oleh itu, majikan dan pekerja mempunyai tanggungjawab yang sama untuk memastikan tempat kerja yang selamat. Oleh kerana kebanyakan orang menghabiskan sekurang-kurangnya lapan jam setiap hari di tempat kerja, keadaan kerja memainkan kesan utama dan langsung terhadap kesihatan dan kesejahteraan pekerja. Kemalangan pekerjaan akan mengakibatkan kerugian ekonomi bukan sahaja kepada syarikat tetapi juga kepada pekerja kerana ia mungkin menyebabkan kecacatan atau kematian kekal. Kemalangan pekerjaan boleh dicegah dengan melaksanakan langkah-langkah berkesan di tempat kerja. Dalam kajian ini, pengenalpastian bahaya, penilaian risiko dan kawalan risiko (HIRARC) digunakan untuk menilai bahaya yang berkaitan dengan aktiviti pemasangan gudang berikutan garis panduan oleh Jabatan Keselamatan dan Kesihatan Pekerjaan Malaysia. Bahaya di tempat kerja dinilai melalui pemerhatian tapak, soal selidik tinjauan dan wawancara dengan kakitangan utama di tapak. Semua bahaya yang dikenal pasti kemudiannya akan dinilai dengan penilaian risiko. Matriks risiko berguna untuk analisis risiko yang mengamalkan kemungkinan dan keterukan. Hasil analisis adalah baik terhadap kawalan risiko keputusan. Hasilnya dibentangkan dalam bentuk HIRARC dan persepsi pekerja adalah analisis melalui soal selidik kesedaran. Tidak ada kemalangan yang dilaporkan hanya beberapa kecederaan yang dialami oleh pekerja yang biasa ada termasuk lebam, pemotongan kecil dan sakit belakang.

Kata kunci – HIRARC, risiko matrik, pemasangan rak penyimpanan Gudang

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Last but not least, I would like to thank my beloved parents, for all the moral support the have given throughout my mater journey and not forgetting anyone who are involved in the completion of this project who I have not mentioned in this report directly or indirectly.

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LIST OF SYMBOLS AND ABBREVIATIONS

DOSH	Department of Occupational Safety and Health
PPE	Personal Protective Equipment
HIRARC	Hazard Identification, Risk Assessment and Risk Control
OSH	Occupational Safety & Health

:

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CHAPTER 1

CHAPTER 1: INTRODUCTION

1.1 Background of Study

Warehouse has many complex activities that may possess high risk and hazard which can affect the workers. Among the safety concern are related to racking system which is the main component in a common warehouse, thus most hazards associated in the warehouse are related to the racking system. This is because racking system require workers to handle heavy and huge objects, thus safety of the worker is at high risk. However, more studies were related during the operation of the warehouse, but less attention was given on the installation of the racking system of the warehouse. Without proper installation of the racking system, the chances of future problems, malfunctions or repairs are greatly increased.

Accidents and injuries can simply happen if there is no safety and health precautions taken to avoid it from happening. To implement safety measures, hazards and the severity of the risk must first be determined. Nevertheless, most employers tend to underestimate hazard at workplace as they perceive them as an inherent part of the job therefore they do not believe that their employees are in danger. In some cases, employers do not focus much on safety at workplace as there is not many problems occurred or reported by employees. On the other hand, some companies only act when there is any major occurrence of accidents or bad experience as an example being fined or license being

suspended by the authority. In most cases, this is because they do not have systematic approach on occupational safety and health implemented in the company.

Occupational accidents are preventable through implementing effective measures at the workplace. Safety is an important aspect in all business industry. Thus, the employers and employees have equal responsibility towards ensuring a safe workplace. Example of by conducting hazard assessment, good housekeeping, training, and better personal protective equipment. Around the world, approximately 5330 people die and 960,000 workers injured daily at related to occupational safety and health. (Hamalainen et al., 2009).

Hazard identification is a process to identify failure conditions or undesirable condition which possess threat and may result in potential safety outcomes. By conducting hazard identification, it become the basic foundation for safety program of a successful Occupational Health and Safety Management System (OHSMS) (Makin & Winder, 2008).

1.2 Problem Statement

Warehouse industry is commonly associated with storing good which usually placed on racks. The racking system in warehouse play an important role to ensure the goods are properly organized and in good condition. Accidents and injuries in warehouses are preventable and come with many serious consequences. An event a rack collapse for example would lead to many losses to the employer as well as the employees such as loss of life, fines and safety violations, legal expenses, loss of customers or business, higher insurance and replacing storage and damaged material.

Improper installation would compromise the structural integrity of the racking system. Issues such as improper beam connections, incorrect aisle width measurement, unbalanced or even installing damaged parts of the rack would affect the stability and operational safety of the racking system therefore putting the products and workers at the risk. To avoid the pitfalls and detrimental effects of an accident, addressing the risks and effects associated with specific process in this study specifically focuses on installation will help employees avoid common mistakes and improve the rates working practice and make the workplace better environment, safe and healthy for all employees.

Thus, the need for safety study and risk assessment is essential and it is a systematic process for assessing the impact, occurrence and the consequences towards human activities. Ganesh & Krishnan, (2016) mentioned that research on occupational injury in Malaysia in general is still at low level and need to be strengthened especially on warehouse industry on the installation of the racking system. Therefore, with this study it will help to support the grow of Malaysian industry awareness on safety at workplace especially on warehouse industry apart from it could help to minimize or mitigate the hazard at workplace besides it might be future reference for the warehouse industry in Malaysia.

1.3 Aim & Objectives

The research aim is to investigate the occupational safety, health and environmental hazard on installation of warehouse racking and carry out risk assessment on the processes involved. The objectives are:

1. To identify the hazard associated with the processes involved during installing the racks in the warehouse

2. To evaluate level of risk for each identified hazard during installation warehouse racking processes.
3. To propose reliable control measures by minimizing or eliminate the identified hazards during installation warehouse racking processes.

1.4 Significance of Study

One of the top priorities of a business is to get the highest possible profit. One disastrous accident can lead to damage of property and equipment and resulting in injury or illness or even fatality and loss of business opportunity (Hale et al, 2012). The significance of conducting research in this area of interest is due to possible contributions identified and explained in the following:

a. Identifying the safety, health and environmental hazards throughout the warehouse industrial racking installation process.
b. Help the organization understands the safety and health problem around the workplace.
c. Determining the effectiveness of implemented safety and health management in place.
d. Offering addition information to the site coordinator to improve safety, health and environment quality around workplace.

1.5 Limitation of Study

Some of the limitation of study includes time constraint, the study was specifically on single company job procedure where the potential hazards and risk associated with installation process were being identified and evaluated, and also the worker from whom perception of safety, health and environmental awareness was determined. For this reason, the findings of this study cannot be generalized to the broader community of other industrial racking system company based on this study. Therefore, to generalize the results for the larger group, the study should have included other industrial racking installation system company and their workers and expanded to whole Malaysia.

CHAPTER 2

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter will review and discuss several previous researches done by other researchers in the relevant educational field related to the studies. All of the information is obtained from journal, articles, books and guidelines and will be used as reference in the study. Several key words related to the topic are selected and these words are considered as the inclusion criteria in considering the selection of related articles, journals and previous review papers.

2.2 Causes of Accidents in Industries

In general, accident does not occur out of sudden, but it is the result of 99% either from unsafe acts or unsafe conditions but it may be in the presence of both reasoning too (Ridley, 1986). Not only that, it is normally observed that injury or accident at workplace was usually happen in combination of several factors. **Figure 2.1** shows the main causes of industrial accidents.

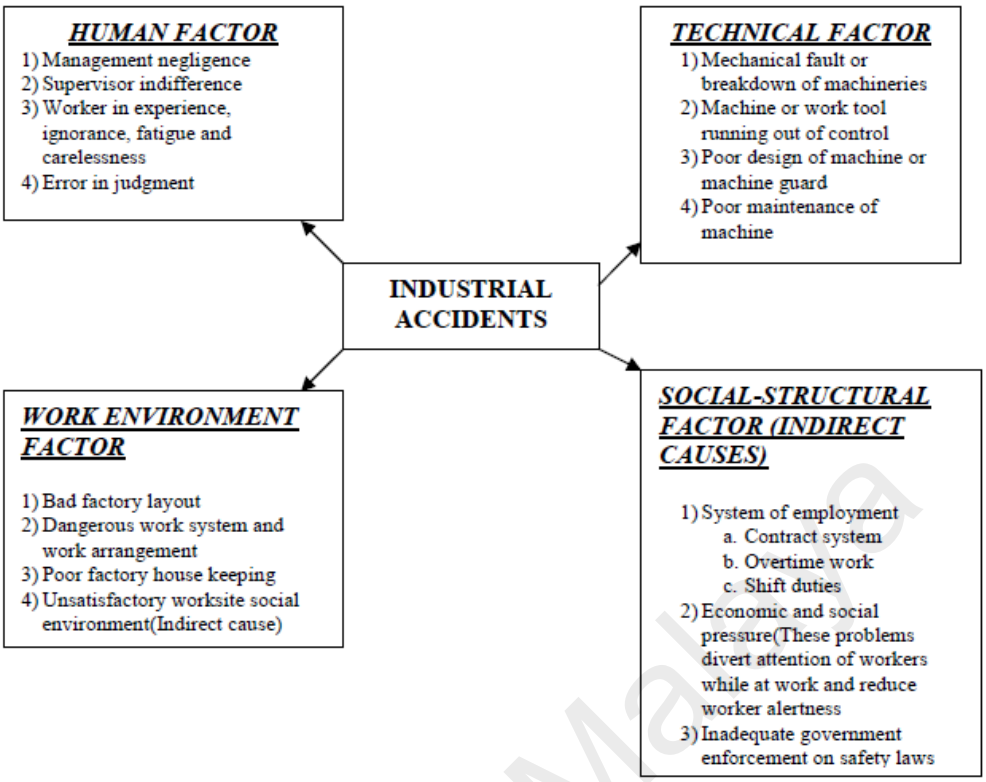

Figure 2-1: Common causes of industrial accidents (Ridley, 1986)

Moreover, accidents at workplace would occur if the hazard was not detected during task or process safety analysis. This is because some hazards were less obvious than others or maybe it was slightly difficult to see the unforeseen circumstances it may occur. Improper induction for new workers on safety and health would also to cause them in danger at work (Hinze, 1997). Apart from that, attitude among the workers on their perception on risk and safety where more positive attitude is less prone to get injury at work. Based on Snook (1978) explained that more experience workers have less unsafe behavior at work as they tend to work in safer condition with better safety attitudes at workplace.

2.3 Potential Hazards Associated with Warehouse Racking System

Workers involve in installation work pose the same hazard during operation. Among the most common hazards associated with warehouse are physical hazards. Warehouse racking installation workers involved with assembling bulky and heavy steel material which this can cause a hazard to employees during handling. This objects not only resulted the workers to many awkward posture of bending, twisting and turning and also can cause slashing or cutting hazard as there are sharp edges involved.

Most of the time improper loads which either too big or too heavy may cause injuries to the workers. Other hazard the workers are exposed to were sharp edges, manually move the materials, dust is the present hazard to many workers is it may be generated from the drilling the cement. Hazard related to lifting vehicles which used for loading and transportation of materials and manual handling are among common hazards towards workers as there a many repetitive task, uncomfortable working position and exerting too much force.

2.4 Risk Management

Risk management has been practiced in most industries nowadays and this shows the importance on managing it correctly. By this it could minimize their treat and maximize their potential. As risk is inherent in everything that we do, risk management aim is to identify evaluating and controlling the potential risks as particularly which associated on safety and health of workers at workplace. Hayes et al., (1997) formulated a risk management approach consisting of risk identification, risk analysis and risk response.

Risk management play in important aspect in reducing losses and increase the profitability. Risk analysis and management in industry depends on the ability to evaluate the situation and based on experience. Therefore, many industries have recognized how highly importance to have risk management and established a department to control the risk they have, or might be expose to (Akintoye et al., 1997). The application of risk management has a positive effect in finding and taking actions to avoid events that could cause negative consequence for the project or organization (Olsson, 2007).

2.5 Risk and Hazards

Hazard refers to a cause or condition which has potential of harm and result in illness, injury, damage to property or the environment or combination. Hazards fall into three major scope of health, environment and safety hazards (DOSH Malaysia, 2008). Commonly hazards are catergorized into groups namely safety, health and environmental hazards.

The Oxford Dictionary of Current English defines risk as a change or possibility of loss or adverse consequence. Kliem and Ludin (1997) define risk as the occurrence of an event that has consequences for, or impacts on projects. Not only that, risk can be defined as a combination of the likelihood of an incident of a hazardous act or exposure with specified duration or in specified circumstances and the severity of injury or damage to the health of people, property, environment or any combination of these caused by the act or exposure (DOSH Malaysia, 2011). The following formula is used for risk calculation:

Risk = Likelihood x Severity

Likelihood means an event prone to occur within particular time or in particular circumstances while severity is the result from an act such as severity of an injury or health of people, or destruction to property, or insult to environment, or any combination of those caused by the act. (DOSH Malaysia, 2008).

2.6 Hazard Identification, Risk Assessment and Risk Control (HIRARC)

In the year of 2008, DOSH has published a guideline for HIRARC in Malaysia. Since then, it has become one of the fundamental system used to plan, manage and operate the business entity as a basic of risk management especially in construction industry. The main aim of HIRARC guidelines is to implement an approach which is very systematic to assess both existing and potential hazards and their related risks to provide specific control measures of the recognized hazards as well as to find ways to contain the risk. As mentioned by Saedi et al., 2014, HIRARC model consists of a comprehensive series of phases for the hazards identification, risk assessment and risk control determination for the implementation of safety and health.

HIRARC is necessary as it is the basis of occupational safety and health in Malaysia. Under the law of Occupational Safety and Health Act 1994, Act 514 Section 15 (2)(a) which reads “the provision and maintenance of plants and systems of work that are, so far as is practicable, safe and without risk to health”. The employer has the requirement under the law to secure the safety, health and welfare of their employees and other related person as prescribed under OSHA 1994. Organization that have carried out HIRARC at workplace notice a tremendous change of working practices as they understand better of their working condition and take the right corrective measures (Asmalia et al., 2016)

HIRARC model was a popular tool to identify hazards and assessing the risk for workplace (Hadi et al., 2014 and Saedi et al., 2014). According to Lee et al., (2010) HIRARC is an effective and highly used tool in managing safety to reduce accidents at workplace. Implementing HIRARC is more commonly used and effective in minimizing the ccurrence accidents on (Ahmadon et. Al, 2008). For example, Asmalia et al. (2016) uses HIRARC to assess accidents at power plant. Meanwhile, two studies from Indonesia researches Bakti Viyata Sundawa et al. (2017) uses HIRARC to assess safety and health laboratories at Politeknik Negeri Medan and R. M Sari et al (2017) uses HIRARC on paper production's company. Based on that, it is known that implementation of HIRARC is a powerful tool to achieve zero accident at workplace in various industry (Lee et al., 2010).

The flowchart of HIRARC process involves 4 basic steps as shown in **Figure 2.2**. It starts with categorizing the work activities in accordance with their similarity. Then identify associated hazard to task with higher risks to safety and health of workers. Next, conduct the risk assessment to analyse and estimate risk from each identified hazard earlier by calculating or estimating the likelihood of occurrence and severity of hazard. Lastly, decided whether the risk is tolerable and apply control measures to eliminate or to reduce the hazard in such the hazard is less risky to employees.

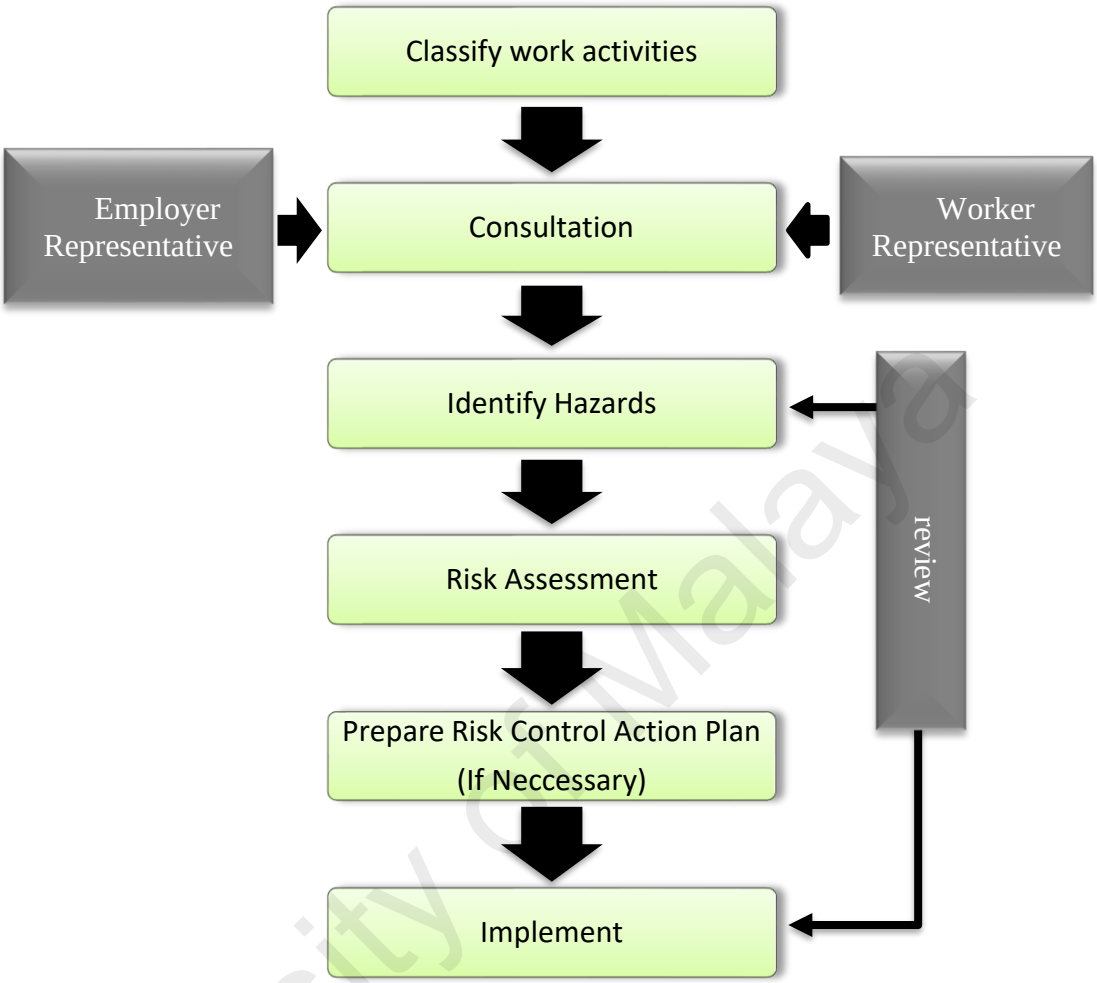

Figure 2-2: HIRARC flow process

2.7 Hazard Identification

Hazard identification is the process of identify the source, situations or acts from the activities at the workplace which can pose significant risks to employees' safety and health as well as prevent the loss of equipment and properties. Hazard identification will assist to find the possible harms which will lead to accidents at the workplace. Ahmadon et al. (2008) suggest the hazard to be identified at construction site are those associated with machineries, equipment, tools and others which are categorized under health hazards and physical hazards. Based on HIRARC guidelines, hazards can be divided into three

main groups namely health hazards, safety hazards and environmental hazards (DOSH, 2008).

As some hazards which might not be readily identified can be conducted by using several available techniques. Ahmadon et al. (2008) mentioned hazard identification can be recorded by reviewing the overall work activities and verify- onsite and using hazard evaluation models. The identification process of hazards can also be based on direct observation of the site and through comprehensive information of material and equipment collected during the walk about process.

There are four (4) common techniques used in hazard identification at construction sites which are checklist, interviews, examining historic data, and brainstorming (Tadayon et al., 2012). While Mahendra et al. (2013) suggested that hazard identification can be done by brainstorming, Delphi technique, interview or expert opinion, experience, and checklist. However, there are some other techniques suggested by DOSH (2008) for hazard identification are workplace inspections, task safety analysis or job hazard analysis, preliminary investigations, potential accident factors, failure analysis, accident and incident investigation depending on the size of the workplace and the management procedure.

2.8 Risk Assessment

Risk assessment is a step in a risk management procedure. Risk assessment is the determination of qualitative or quantitative value of risk related to a concrete situation and a recognized threat (also called hazard). Risk assessment is the process where hazards are identified, risk is analyzed or evaluated associated with that hazard and determine appropriate ways to eliminate or control the hazard. In practical term, a risk assessment is a thorough look at the workplace to identify those things, situations, processes, etc that

may cause harm, particularly to people. After identification is made, evaluation of how likely and severe the risk is done, and then decide what measures should be in place to effectively prevent or control the harm from happening.

Risk assessment is an important step in protecting your workers and your business, as well as complying with the law. It helps to focus on the risks that really matter specifically the one that has potential to cause harm to the workers. By having to assess the risk at the workplace a control measures will list out to ensure enough precautions have been taken to prevent the harm to take place. The workers safety is the responsibility of the employers thus it is vital to take reasonable control measures. The law does not expect to eliminate all the risks, however it is required to protect people 'so far as is reasonably practicable'.

The aim of the risk assessment is to remove a hazard or reduce the level of its risk by adding precautions or control measures, as necessary. By doing so, a safer and healthier workplace will be created. Risk assessment is a process of determining the probability level of the identified hazardous event, severity of the consequences of the hazard event, and finally to determine the risk level of an event determining the significance or value of the identified hazards and risks to the workers. Risk can be analysing by qualitative, quantitative or semi quantitative.

Qualitative analysis required expert knowledge and experience to decide likelihood and severity category. This analysis uses statements to report the magnitude of potential severity and the likelihood that those affected by the severity will occur. These scales can be adapted or adjusted to suit the issue being analyse as it may be different depending on the risk. (DOSH, 2008).

A key early step in the execution of a risk analysis is to determine the appropriate risk assessment tool or methodology. There is generally no single best choice for any given assessment process, and the selection of the appropriate risk methodology should be based on the depth of analysis required, complexity of the subject risk of concern, and the familiarity with the assessment tool. Based on the industry example reviewed, risk matrix and flowcharting were the most popular tools used for basic risk assessment activities (Frank et al., 2008).

2.8.1 Likelihood of An Occurrence

An easy and direct method of risk assessment can be explained by using likelihood of occurrence. Likelihood assessments are based on experience, analysis or measurement (Department of Occupational Safety and Health Malaysia, 2011). **Table 2.1** shows the likelihood using value for rating

Table 2-1: Likelihood of An Occurrence (DOSH, 2011)

Likelihood (L)	Example	Rating
Most likely	The most likely result of hazard/ event being realized	5
Possible	Has good chance of occurring and it is not unusual	4
Conceivable	Might be occur at sometimes in future	3
Remote	Has not been known to occur after many after	2
Inconceivable	Is practically impossible and has never occured	1

2.8.2 Severity of Hazards

Severity can be divided into five (5) catergories in which it is based on increasing level of severity to an individual's health, environment, property and etc. (DOSH, 2011). **Table 2.2** indicates the severity of hazard.

Table 2-2: Severity of Hazard (DOSH, 2011)

Severity (S)	Example	Rating
Catastrophic	Numerous fatalities, irrecoverable property damage and productivity	5
Fatal	Approximately one single fatality major property damage if hazard is realized	4
Serious	Non- fatal injury, permanent disability	3
Minor	Disabling but not permanent disability	2
Negligible	Minor abrasions, bruises, cuts, first aid type injury	1

2.8.3 Risk Matrix

Risk matrix is useful for risk analysis that adopt likelihood and severity. The outcome of analysis is good on decision risk control (DOSH, 2008). **Table 2.3** showed a typical example of risk matrix table. Risk can be determined by using the following formula:

$$\text{Relative Risk} = L \times S$$

Where,

L= Likelihood

S= Severity

Table 2-3: Risk Matrix Table (DOSH, 2011)

	Severity (S)				
Likelihood (L)	1	2	3	4	5
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5

Note:

High	
Medium	
Low	

2.8.4 Classification of Risk Level

The classification of the risk into three different levels of low, medium and high enables management to give priority on the highest-ranking hazards. The ranking standards are defined in **Table 2.4** below. For example, hazards that has been assessed with risk between 15-25 or in "high risk" must be given immediate actions, to resolve the risk either for life safety and or the environment.

Table 2-4: Priority of Risk Based on Risk Value (DOSH, 2011)

Risk	Description	Action
15-25	HIGH	A high risk requires immediate action to control the hazard as detailed in the hierarchy of control. Action taken must be documented on the risk assessment form including date of completion.
5- 12	MEDIUM	A medium risk requires a planned approach to controlling the hazard and applies temporary measure if required. Action taken must be documented on the risk assessment form including date of completion.
1- 4	LOW	A risk identified is low may be considered as acceptable and further reduction may not be necessary. However, if the risk can be resolved quickly and efficiently, control measures should be implemented and recorded.

2.9 Risk Control

Risk control is the process of putting corrective measures to reduce the risk which associated with the hazard it possesses.

Risk hierarchy ranks the measure in a way where the effectiveness is in decreasing order. By this means that, the first level of hierarchy control gives the most effective measures as it may eliminate the hazard completely. Thus removing the risk associated to the hazard can be achieved. Hierarchy of OSH controls should be adopted according to its sequence and priority of controls recommended (DOSH, 2008). **Figure 2.3** shows the hierarchy of control recommended.

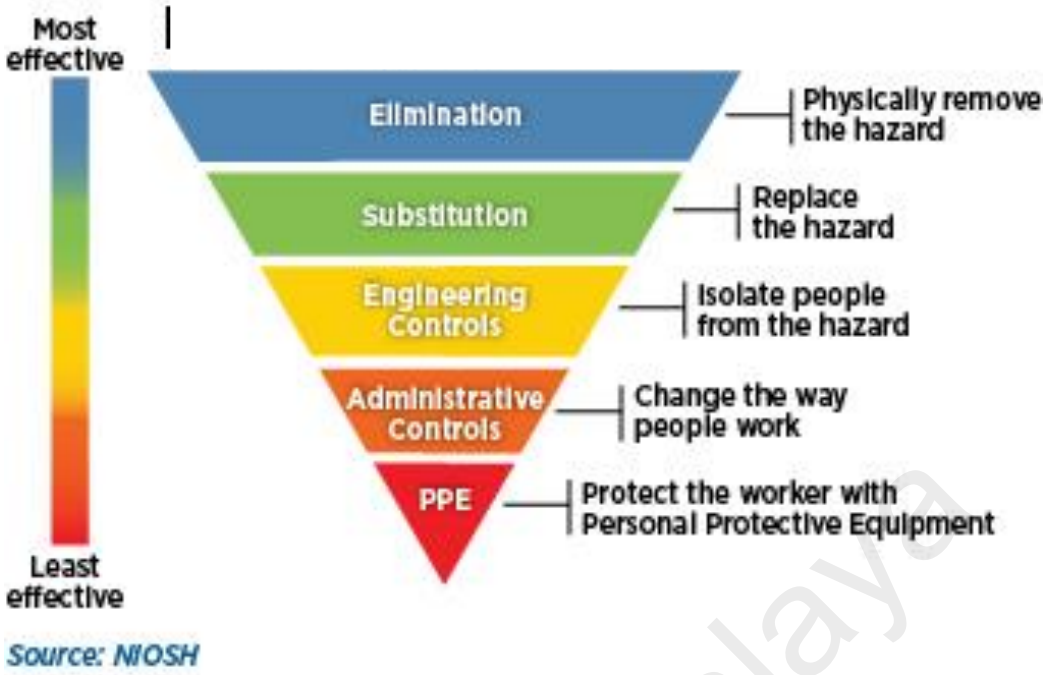

Table 2-5: Hierarchy of Controls

CHAPTER 3

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter will discuss about the methodology used in this research to identify the hazards and collect other relevant data for evaluating the safety, health and environment on warehouse racking installation process and how the risk was quantified and categorized into level as high, medium or low of the installation process through risk assessment. Among the methods used was to go for site visit which allow us to have a clear and real understanding of the working environment, procedure, behaviour of the workers, accident records other than to assess the effectiveness of existing protection or prevention control measures from associated risk.

All this information was recorded using the Hazard Identification, Risk Assessment and Risk Control (HIRARC) table (APPENDIX 1) which follow the guideline given by Department of Occupational Safety and Health (DOSH) Malaysia. By using this table, it enables us to justify and quantify the likelihood and severity of an activity carry out by the workers, with or without existing control. This is one of the major factor for us to decide the risk rating of the given activities.

Questionnaire survey was also conducted with the workers to assess their awareness on safety, health and environment at workplace. Finally, risk control measures were discussed as to deliver recommendation of solution in which to eliminate or at least minimize the risk to an acceptable level as far as practicable. The framework of the whole process is as **Figure 3.1.**

There are many formal techniques to analyse safety and health and environment in general and risk analysis. From the literature review, the most common methodology used to assess risk was HIRARC. The HIRARC model was used to identify the primary and secondary hazards which may be inherent in the system which were determined as serious threat for the worker and people surrounding.

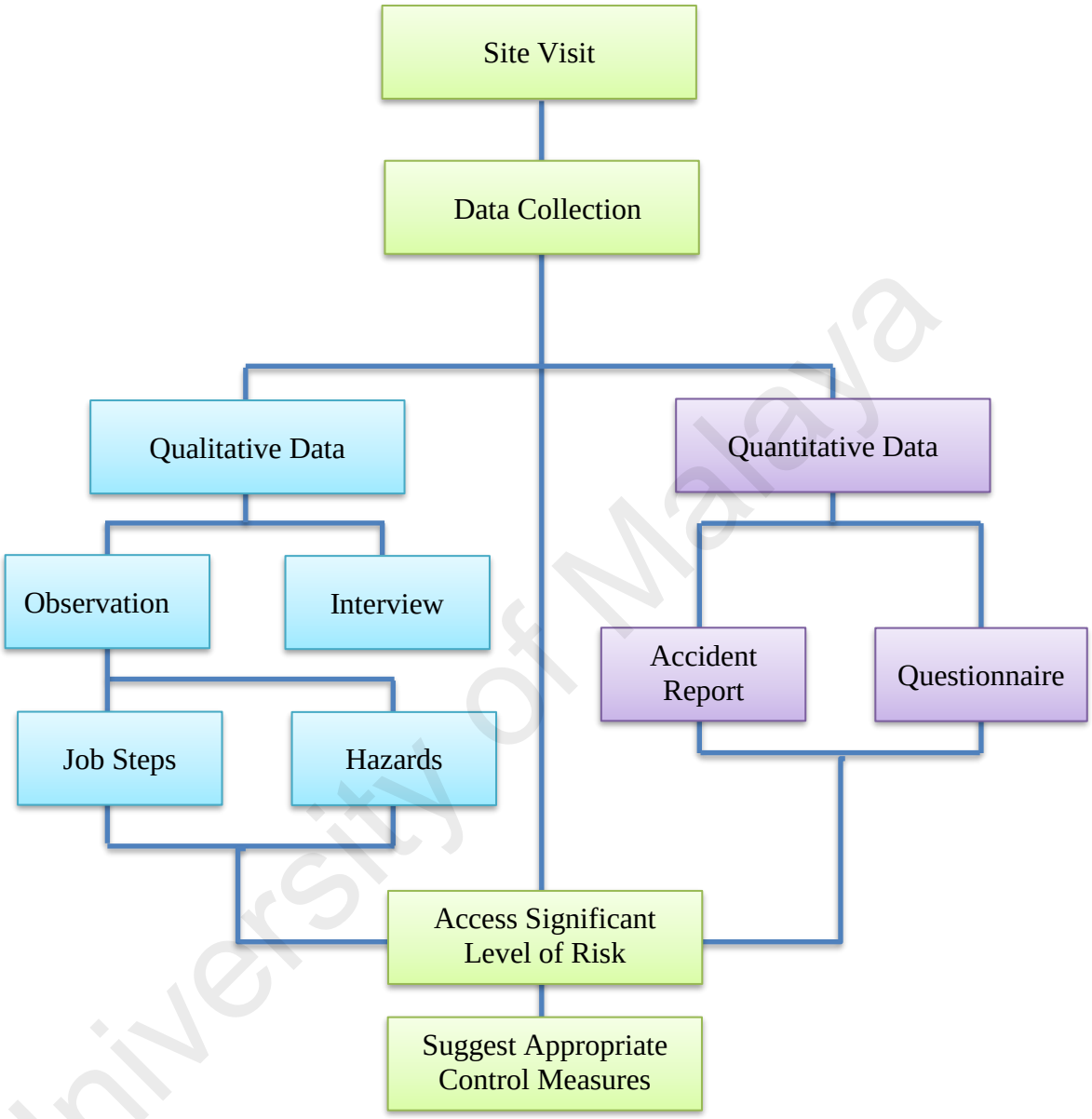

Figure 3-1: Process Flow of study

3.2 Risk Assessment Flow Chart

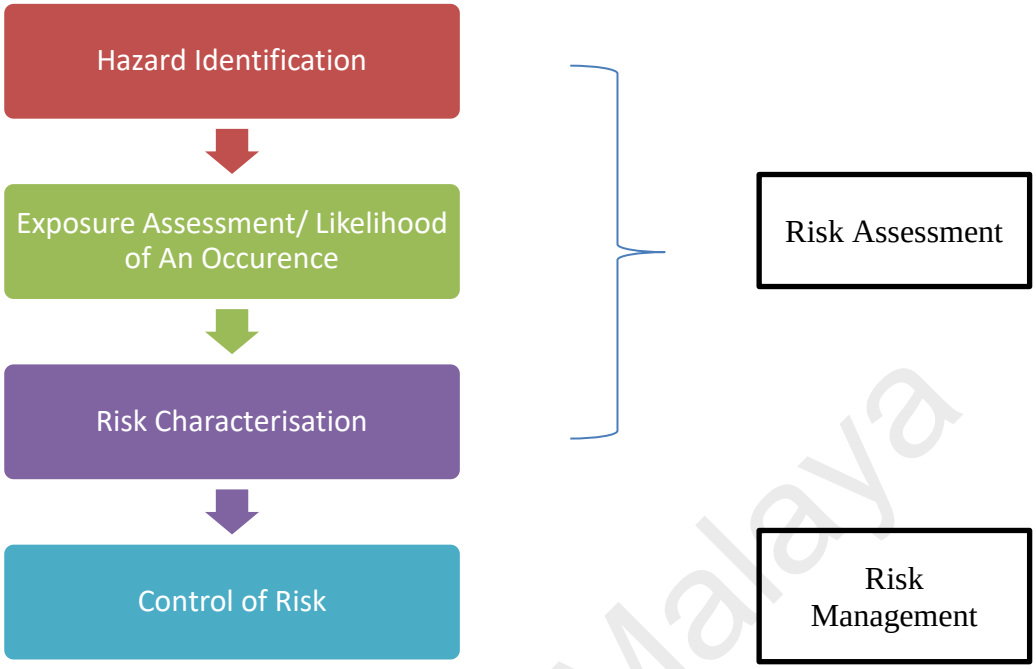

Figure 3-2: Risk Assessment flowchart

3.3 Hazard Identification, Risk Assessment & Risk Control (HIRARC)

Hazard identification is a process to make known of the potential source of hazard and it is used as one of the tool for risk assessment. Hazard identification is referred to the identifying of undesired events leading to hazard materialization and the mechanism of their occurrence. Several techniques were used to conduct hazard identification in the study area.

The following methods were used to ascertain the hazards in the in this study:

a. Hazard identification checklist
b. Workplace inspection (observation and interview)
c. Task safety analysis or job hazard analysis
d. Accident and incident investigations.
e. Questionnaire Distribution

3.3.1 Site Observation

According to Boyle (2012), site observation is the simplest approach to identify hazards and look for unsafe behaviours and conditions. Site observation allows a better understanding of the whole operation of the workplace which includes work procedure and workers' interactions.

I was given the opportunity to visits the site area several times throughout the research period and observe the process of racking installation under the supervision of the safety coordinator at site. With the guide of the safety coordinator, I had obtained better understanding of the whole steps performed and equipment used throughout the installation process. The real practices of daily work can be clearly observed through site observation.

All the job steps, equipment and machinery used were noted down during the observation. Moreover, during the observation I also able to identify risks and hazards associated with the work, equipment and machinery used at the construction site for the racking installation process.

3.3.2 Questionnaire Survey

The questionnaire was developed from a few articles with similar research objectives that involve assessing safety, health and environmental awareness. The questionnaires were designed to review the perception of the workers towards the study issue which include safety awareness, safety at workplace, health at workplace and environmental issues. The sample of questionnaire is as **APPENDIX 2**

3.3.3 Interviews

Apart from response from survey questions, conducting interview is a good methodology to get opinion from the key person. Interviewing the person in charge of the project who is very well verse on the job at site does give additional input to obtain on the risk management adhered by the organization. Indirectly, through the conversation it helps to determine the HIRARC provision on the activities. Mainly the interview to get clearly view on the accident statistic, complaint from workers if any and the problems that occur among the workers.

CHAPTER 4

CHAPTER 4: RESULT & DISCUSSION

4.1 Introduction

This chapter presents the result and discussion for the whole study. For the start, this chapter presents the results from site observations, documents reviewed and interview with HSE coordinator on hazard identification and risk assessment on warehouse industrial racking activities. The second part of this chapter presents the HIRARC table that have been conducted at site and last part of this chapter will discuss on the result of questionnaires survey with workers on their perception towards safety awareness, health and environmental condition.

4.2 Description of study

The selected study area is situated in Banting, Selangor. The site was to build a five zones area of multi- purpose warehouse building. The scope of work for the contract was to install industrial racking system throughout the five zones of the warehouse. The duration of the contract given was six (6) months which started in July 2017 and expected to finish by January 2018. The other construction activities were concurrently being conducted at site as the project timeline is quite stringent. However, the study was conducted during the second months of the project which was in August 2017 until early December 2017. Throughout the duration, we were guided by the safety coordinator from the racking company, Mr. Khairul Safwan.

Before we could enter the site, we we set to attend safety induction training together with other new construction workers conducted by the main contractor at their office near the construction area. It is a necessary regulation set by the main contractor to ensure the safety awareness and communicate that safety is their utmost concern for everyone involved in this project. The induction course was explaining the hazard general safety measures related to work task, identify and understand the hazard signs available on site and briefing on using proper PPE during work.

Figure 4-1: Site Location

Figure 4-2: Study Team Members

4.3 Site Observation and Reviewing Documents

As mentioned in previous chapter of research methodology, two ways of determining the nature of the industrial racking installation were through site observation and documents reviewing. From the observation, the types of safety hazards and potential hazards sources were determined. There were several possible safety hazards exist at the workplace. Since the objective of study is to determine hazard that is associated with warehouse racking installation activities, thus the researcher focused only on the risk throughout the installing activities only.

Once we were permitted to enter the site, Mr Khairul assist us for a walk about at the work station which location inside the warehouse as their job is to install the racking system for the warehouse. The warehouse was divided into 5 zones which the type of racking system was determined earlier based on the type and load of the products. There were three type of racking system installed for the warehouse namely Adjustable Pallet Racking (APR), SOS racking and free-standing mezzanine platform.

The workers were divided into several groups where each zone has around 10-12 person. As we observed most of them were doing multi- tasking job based on objective of the day. Tool box meeting was conducted every Tuesday at 8.30am in front of the main office and safety audit was conducted once a week by the safety officer when they do walk about of the whole construction site.

Based on observation surrounding of the work area is quite dark as the main source of light is from natural light from outside of the warehouse. The ventilation inside the warehouse is only limited especially for those who need to work between the racks. Nevertheless, their break time is quite sufficient as at 12.30pm and 4pm they were given half and hour break to have some drink or rest. Based on Mr. Khairul information, they are not restricted to have some rest in between whenever they feel tired.

4.3.1 Racking Installation Procedure

Storage racking installation requires an experienced crew with proper tools and equipment together with a proper installation procedure. This result in job that is safely and efficiently executed by the workers. **Figure 4.3** below shows the step of racking installation as observed during the site visit. From the observation, the steps seem simple but each steps possess various hazards towards the workers if less attention was given it may lead to accident and injuries to the workers. The hazard identification was done throughout the installation process to determine the known hazards and potential hazards and risk towards the workers while doing their job. **Figure 4.4** and **Figure 4.5** shows some of the steps of racking installation. All aspect of their working processes was inspected and assessed to determined what are the factors that may harm and injured the worker and other people at site. The tool used to record the assessment were using HIRARC table

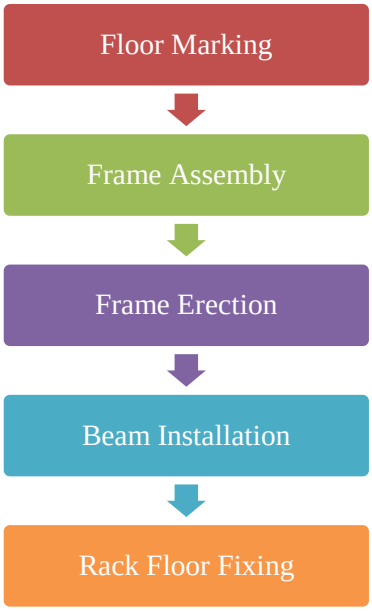

Figure 4-3: Warehouse Racking Installation Process

Figure 4-4 Frame Assembly Process

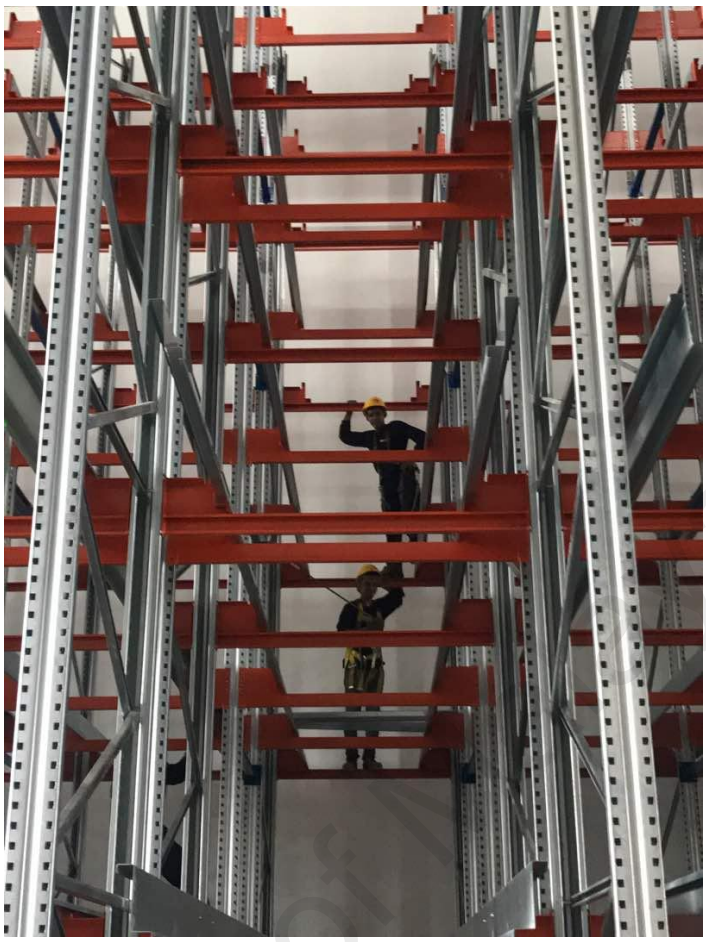

Figure 4-5 Beam Installation Process

4.3.2 Waste Management

The wastes generated on site were basically come from the packaging materials such as wooden pallet, plastic wrapping, boxes, small nuts and screws. **Figure 4.6** and **Figure 4.7** shows the example of wastes found at the work area. The wastes were gathered together depending on the materials, so it is easier for them to manage later. **Figure 4.8** shows the temporary bin that they make themselves to allocated small waste such as plastic wrapping.

Figure 4-6 Leftover Wooden Pallet

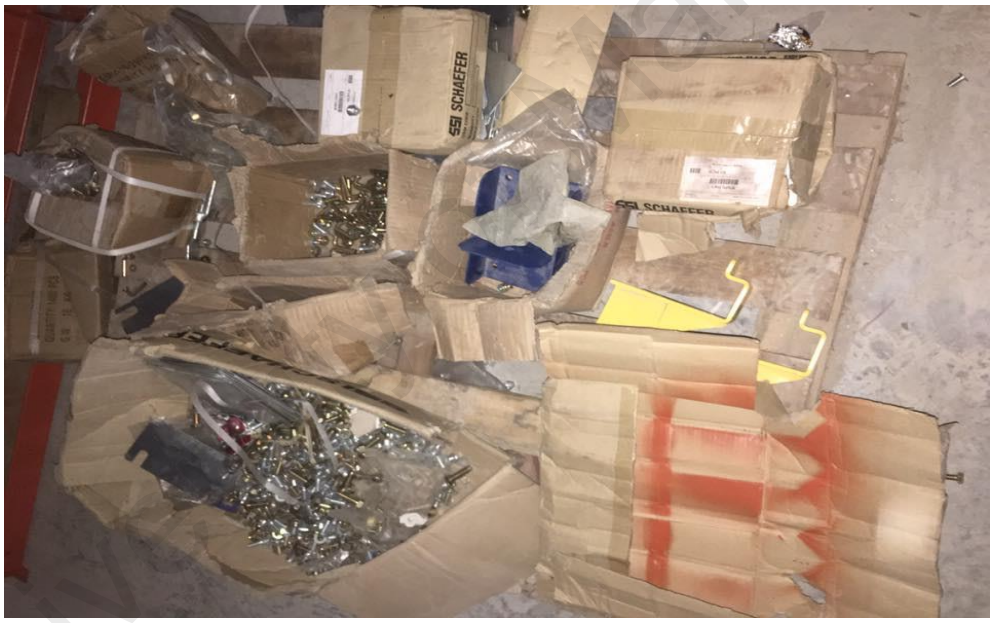

Figure 4-7 Screws and Nuts

Figure 4-8 Temporary bin

4.4 HIRARC Form

HIRARC is used for the qualitative assessment by zooming down to the installation processes in the racking system. **Table 4.1** shows the result of HIRARC for the racking installation.

The HIRARC was carried out to review the current process steps in the racking installation based on work through survey, interview and observation of works. The qualitative result has shown that the risk level by type of racking system installed at the warehouse where the risk rating was classified as low risk (L), medium risk (M) and high risk (H). Recommended control measures were proposed as necessary to minimize or eliminate the hazard.

HAZARD IDENTIFICATION, RISK ASSESSMENT & RISK CONTROL (HIRARC) FORM			
Task/ Job Description	To Install Warehouse Racking System Type APR (Selective Rack)	**Date**	20/11/2017

1. Hazard Identification					**2. Risk Assessment**			**3. Risk Control**
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
1	Untrained workers	a. Wearing improper attire at site b. Lack of safety awareness c. Commit unsafe act while working	a. harm to any parts of body b. accident may happen	a. Workers should attend Safety Induction course before starting any work b. Wearing appropriate PPE c. Before start work, toolbox talk must be given by supervisor to explain the safety method of work.	3	5	15 (High)	a. Make sure the workers have a valid CIDB Green Card b. Brief HIRARC to all workers before start work. c. Provide proper PPE to workers d. Assure that supervisor accompany the workers

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
2	Electrical equipment handling Eg: a. Drilling machine b. Impact tool c. Grinder	a. Exposure to electrical shock b. Exposure to excessive vibration c. Slip and trip d. Improper handling e. Equipment faulty	a. Electric shock b. Cut and Abrasion c. MSDs d.	a. Equipment must be inspected by Safety Personnel/supervisor before start work. b. Worker must be trained to handle the equipment. c. Take a break after long exposure	2	3	6 (Medium)	a. Put up hazard sign around working area . b. Place caution tape around working area c. Place equipment at designated area before leaving
	Machinery handling Eg: a. lift truck b. Forklift c. Scissor lift	a. Material on truck not properly secured b. Untrained & imcompetent operator c. Improper PPE during work	a. Collapse of machinery b. Traffic accident	a. Must have Valid PMA before start work (Scissor lift) b. Equipment must be park at suitable ground before leaving site of project. c.	3	4	12 (medium)	a. Assigned only competent person to handle machinery. b. Assist buddy system while working c. Inform colleague to aware them of the task conducting

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
3	Unloading materials from truck by using forklift	a. Struck by forklift	a. Damage of materials b. c. Serious injuries/ Fatality (Workers)	a. Install alarm and warning light b. Always look out for blind sport and sound the horn necessary c. Operate need to attend MHE training before allowing to operate MHE. d. Always alert workers to keep away during forking and shifting of loads.	2	4	8 (Medium)	a. Regular maintenance of forklift trucks. b. Reduce speed when load with materials c. Introduce buddy system to assist the operation d. Turn on the forklift lights when operating indoors
		b. Toppling of forklift	a. Serious injuries/ Fatality b. (Driver & workers) c. Damage the machinery d. Damage the material handling	a. Only well-trained operator can operate forklift.	2	4	8 (Medium)	a. Regular maintenance of forklift trucks. b. Assign only specific person of each truck c. Operate machine with optimum speed to reduce loss of control

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		c. Hit by Load	Death or serious injuries (Driver & workers)	a. Well trained forklift operator. b. Do not walking below the lifted fork. c. Ensure load firmly secured before forking. d. Always sound the horn necessary e. Wear appropriate PPE	2	4	8 (Medium)	a. Lifting materials within the forklift lifting capacity. b. Introduce buddy system to assist the operation
4	Handling material inside warehouse	a. Trip and fall on work floor	Leg sprain, bruise or fracture	a. Proper housekeeping b. Wear appropriate PPE	2	3	6 (Medium)	a. Use proper equipment or machinery to assist the job. b. Use proper technique for lifting to less the burden

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		b. Hit by falling object	Head and body injuries (Workers)	a. Wear safety vest	2	3	6 (Medium)	a. Barricade the area b. Put up safety signage
		c. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE	2	3	6 (Medium	a. Use proper handling technique b. Use machinery to assist the job
5	Floor Marking	a. Trip and fall on work floor	Leg sprain, bruise or fracture (Workers)	a. Familiarise with the work surrounding before carrying out the work. b. Wear safety shoes	2	3	6 (Medium	a. Provide adequate lighting b. Proper housekeeping before carrying out the work
		b. Health Hazards	Inhalation of dusts (Workers)	a. Wear dust mask.	2	3	6 (Medium)	a. Ensure adequate ventilation less the exposure.

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
6	Frame Assembly	a. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE	2	3	6 (Medium)	a. Be more careful and focus during work b. Policy to wear arm guide for protection
		b. Caught in between during assemble frame	Hand or finger injury (Workers)	a. Practice proper coordination and communication during handling and lifting b. Reach truck operate by well-trained operator. c.	3	3	9 (Medium	a. Provide adequate lighting around the work area. b. Ensure load firmly secured before forking.
		d. Exposure to electrical shock	Electrocuted or property damaged (Workers & Occupants)	a. Daily check of hand tools before use. b. Monthly inspection of hand tools by Safety Officer	3	2	6 (Medium	a. Use gloves while handling equipment.

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		c. Ergonomically Hazard	Backache or back injury (Workers)	a. Practice proper coordination and communication during handling and lifting. b. Have adequate work rest regime	3	3	9 (Medium)	a. Practice proper manual lifting posture
7	Frame Erection	a. Trip and fall on work floor	Bodily injury (Workers)	a. Familiarise with the work surrounding before carrying out the work. b. Wear safety shoes	2	3	6 (Medium)	
		c. Contact with sharp edges	Bodily injury (Workers)	a. Wear safety gloves & long sleeves	2	3	6 (Medium)	a.

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		b. Ergonomically Issue	a. Backache or back injury (Workers) b.	a. Practice proper coordination and communication during handling and lifting. b. Have adequate work rest regime	3	3	9 (Medium)	a. Practice proper manual lifting posture.
		c. Exposure to noisy sound	Hearing loss	a. Use appropriate PPE (ear plug) b. Have adequate work rest regime	3	3	9 (medium)	b. Reduce the duration of exposure
8	Beam Installation	a. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE b. Wear Full Safety Harness	2	3	6 (Medium	

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		b. Hit by falling object	Head and body injuries (Workers)	a. Familiarise with the work surrounding before carrying out the work. b. Make sure no works being carried out above the work area. c. Barricade work area to prevent other trades from accessing and working in the area. d. Wear Appropriate PPE	4	3	12 (Medium)	a. Introduce buddy system to assist on work done.

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		b. Fall from height	Death or serious injury (Workers)	a. Access to height from end of frame. b. Worker to wear full safety harness with double lanyard. c. Hook safety harness to bracing when accessing to height. d. Hook safety harness to bracing or beam during installation	4	4	16 (High)	a. Use scissor lift to the designated height b. Provide adequate lighting c. Provide adequate ventilation d. Have shift regime
		c. Low illumination	Suffer eye strain	-	4	2	8 (medium)	a. Provide sport light at designated area to increase illumination at work place

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
9	Rack Floor Fixing	a. Exposure to electrical shook b. Exposure to vibration	a. Electrocuted or property damaged (Workers & Occupants) b. MSDs	a. Daily check of hand tools before use. b. Monthly inspection of hand tools by Safety Officer	3	2	6 (Medium)	
		c. Noise	Irritation or noise induce deafness (Worker & Occupants)	a. Wear safety ear plug b. Have adequate work rest regime	3	2	6 (Medium)	NR
		c. Health Hazards	Inhalation of dusts (Workers)	a. Practice proper handling of the power drill b. Stop the power drill c. Inform supervisor -in-charge	2	3	6 (Medium)	NR

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		d. Contact with rebar during drilling	Sprain on wrist or arm (Workers)	a. Practice proper handling of the power drill b. Stop the power drill c. Inform supervisor -in-charge	2	3	6 (Medium	NR
		e. Dust exposure	Difficulties in breathing or more severe health problem	Wear appropriate PPE	4	3	12 (Medium)	Establish monitoring program Health surveillance check up
10	Housekeeping	a. Trip and fall on work floor	Leg sprain, bruise or fracture (Workers)	a. Familiarise with the work surrounding before carrying out the work. b. Wear safety shoes	2	3	6 (Medium)	Do proper housekeeping to reduce obstacle

1. Hazard Identification					2. Risk Assessment			3. Risk Control
No	**Work Activities**	**Hazard**	**Which can cause / effect**	**Existing Risk Control (if any)**	**Likelihood**	**Severity**	**Risk Rating**	**Recommend Control Measures**
		b. Health Hazards	Inhalation of dusts (Workers)	a. Wear dust mask.	2	3	6 (Medium)	Do proper housekeeping whenever necessary to remove the dust
		c. Ergonomically Issue	Backache or back injury (Workers)	a. Practice proper coordination and communication during handling and lifting. b. Have adequate work rest regime	3	3	9 (Medium)	Provide proper equipment

Table 4-1 HIRARC for warehouse racking installation

Based from the HIRARC table above there were 30 hazards associated with racking installation were identified and it is regarding safety and health hazards. The safety hazards involve are falling from height, electric shock, hit by object and in contact with sharp edges. The health hazard was associated with dust that cause respiratory disease, noise exposure and ergonomic hazards such as manual handling. Environmental hazards involve with discomfort of lighting, infection and others. The risk associated with racking installation were classified between medium and high risk ranging from 6 - 16 rating. There were 28 and 2 hazards were classified as medium and high risk respectively.

4.5 Interview

A face to face interview was conducted with Mr. Khairul Safwan which is the Health, Safety and Environmental coordinator at site. The interview was exploratory and unstructured as the purpose was to obtain the opinion of the interviewees regarding the nature of work at site on racking installation process and to gain some information on incidents, near- misses and injuries that had occurred at workplace or heard of in the same industry. The duration of the interview conducted was at least 30 minutes long and it was held at the meeting room at the construction site. Based on the interview, there was no accident reported at the workplace so far and the documentation of incident report was not updated and not available for review. Moreover, he mentioned that this is because the company safety department was lacking implementation and they are still working on it soon.

From the interview, we were informed that the construction workers are sub contracted to them not hired directly by the company. However, most of them experienced workers and are regularly hired by the company for other projects. When asked on implementation of PPE among workers he highlighted that the workers are too persistent to follow rules but if he saw any unsafe act by the workers definitely he will issue warning letter to their superior for further action.

4.6 Questionnaire Analysis

A total number of 30 workers out of 45 workers successfully answered the survey questions. The remaining workers were not available during the time we conducted the survey. The method used were face to face verbal interview as most of the worker are illiterate. Questions were read out to the respondents one by one to obtain the information. The duration of each interview was around 5- 10 minutes. The results of the survey were discussed below.

4.6.1 Section A: Demographic Information

Table 4.2 shows the demographic information of the respondents for this survey. It is clearly seen that all the respondents (100%) were from the male group. However, majority of the workers (86.67%) are foreign workers from Acheh, Indonesia and only a small number are Malaysian refer to **Table 4.3** below. It is noted also most workers involved are young men aged below 40 years old this may due to the job scope which uses a lot of strength everyday as shown in **Figure 4.9**.

Table 4-2: Gender of Workers

Gender	No of Respondent
Male	30
Female	0

Table 4-3: Nationality of Workers

Nationality	No of Respondent
Malaysia	4
Others	26

Figure 4-9: Age of Workers

4.6.2 Section B: General Information

All the workers work between the duration of 8 to 12 hours per day doing various kind of task with one hour of break. There is no shift practice by the company as their working hours start at 9 am until late evening for 6-7 days per week. The reason was because they are in a rushing to complete the project to meet the deadline of the project proponent. Result of is shown on **Table 4.4** and **Table 4.5** respectively. From the **Figure 4.10** which shows the years of involvement in the racking installation sector. From 30 respondents, 12 of them were working as racking installer for more than 4 years only, 4 person have work for around 3-4 years and 5 and 9 person have between 1- 2 years and less than a year respectively.

Table 4-4: Working hours per day

Duration of working per day	No of Respondent
Less than 8 hours	-
Between 8 to 12 hours	30
More than 16 hours	-

Table 4-5: No of work days per week

Working days per week	No of Respondent
Less than 3 days	-
Between 4 to 5 days	-
Between 6 to 7 days	30

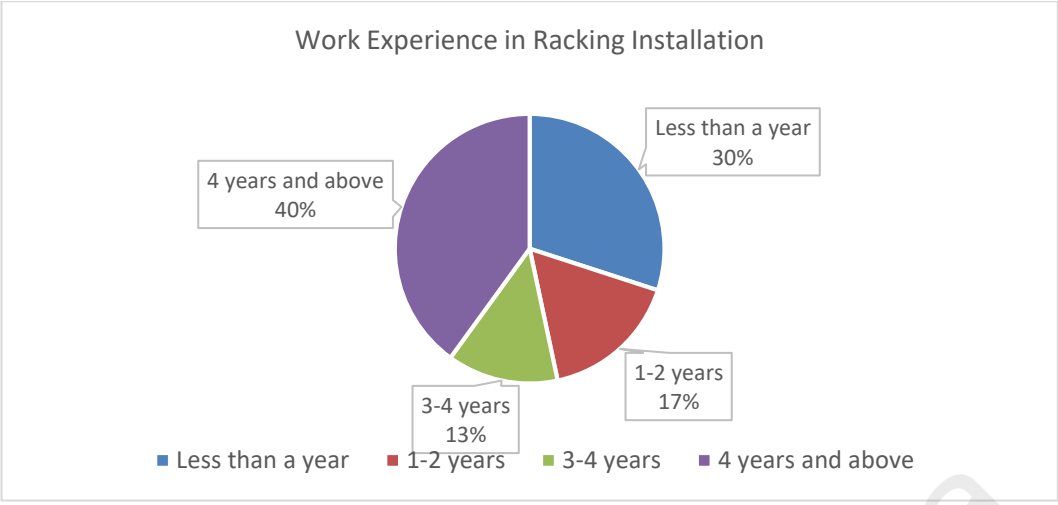

Figure 4-10: Years of involvement in racking installation

4.6.3 Section C: Work Environment

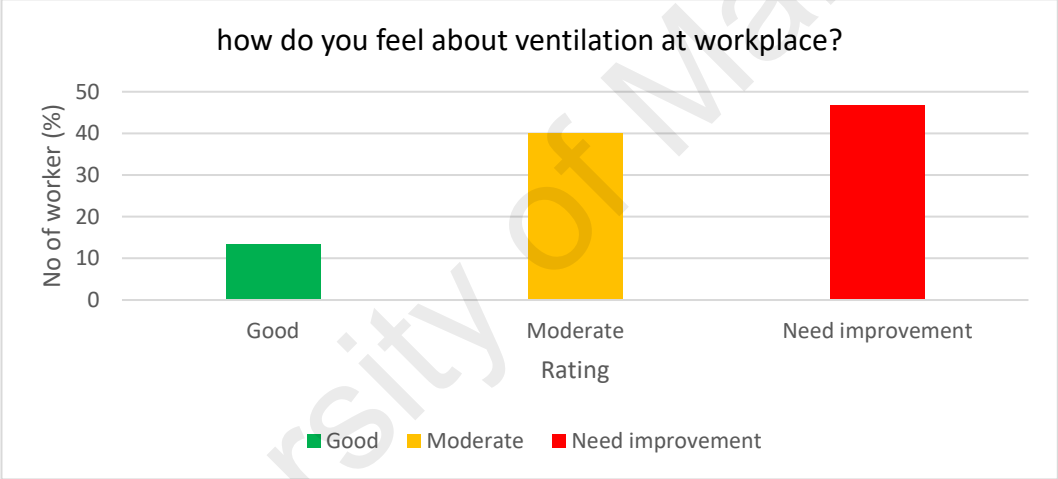

Figure 4-11: Ventilation at Workplace

Almost half of the respondents think that the ventilation at their workplace need to be improved. As their task involved a lot of moving, adequate supply of fresh air is necessary so that the worker would not feel suffocated and easily feel fatigue. Ventilation may come from various openings so fresh air can be drawn from outside the workplace.

More than 50% of the respondents interviewed said the lighting at their workplace is not sufficient for them which working in an indoor area. To ensure a safe work operation, lighting level should be well recognized and to give priority. It is aware with poor lighting system it can possess as safety and health hazard and jeopardize their work quality.

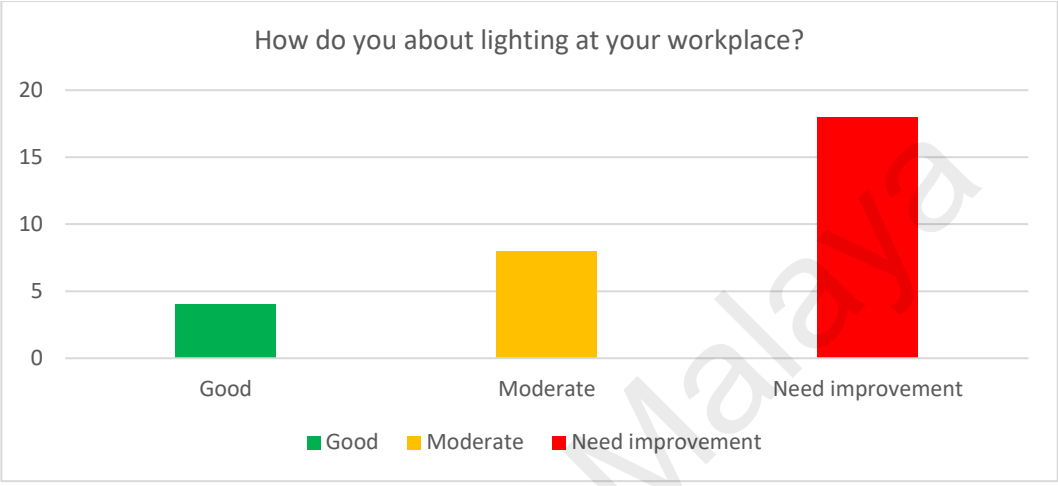

Figure 4-12: Lighting at Workplace

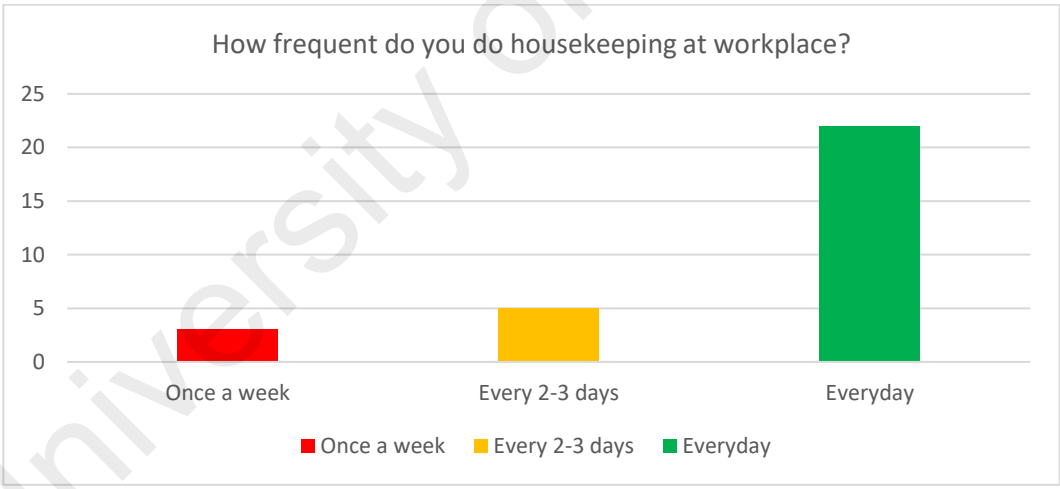

Figure 4-13: Frequency of Housekeeping in A Week

Housekeeping should be practice everyday before and after work. With proper housekeeping many hazards at workplace can be eliminated. Hazard like slip and trip is easily avoided at workplace and make the workplace a better environment for all. However, from the survey conducted majority do practice a good housekeeping at workplace only 3 persons mentioned they only do housekeeping once week the remaining 5 respondents said they only do housekeeping 2-3 days per week.

4.6.4 Section D: Safety Awareness

One of the effort in reducing accident and incident at workplace is through awareness. A slight unsafe act may lead to accident in workplace. Therefore, if awareness on safety is understand at all level and action was taken accordingly then accident is simply avoidable. Almost all the respondents are aware of all the safety effort provided by the company. Thus, the workers are indirectly being exposed with work hazard and ways to avoid them.

However, implementation is another thing to be concern about as most problem is not because the system is not there, but lack of implementation is what cause accidents in most cases. An based on information gathered, there was no accident happene before so that makes people tend to neglect safety at workplace. This was justified as only a person thinks that his workplace is not safe & clean as compared to 29 other respondents consider their workplace is safe and clean environment for them to work.

From observation the toolbox meeting was conducted every where all the workers involved in the project were gathered and briefing was conducted by the main contractor of the site. All sort of reminder was given by the safety officer as to remind them that safety comes first and briefing on the progress of the project and what have achieved and the target for the week. It is noticed also most workers were given full attention and serious throughout the meeting conducted. Results regarding awareness among worker are shown in **Figure 4-14** until **Figure 4-18**.

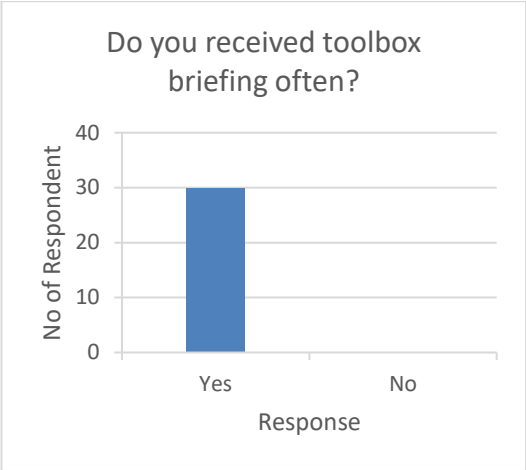

Figure 4-14: Toolbox Briefing Awareness

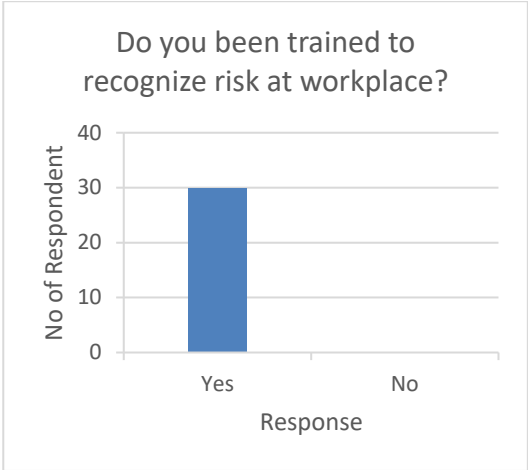

Figure 4-17: Risk Recognizing Training Awareness

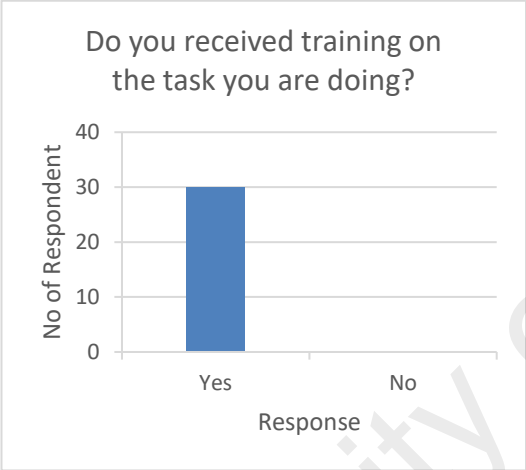

Figure 4-15: Work Procedure Training

Figure 4-18: Workplace Safe & Clean Awareness

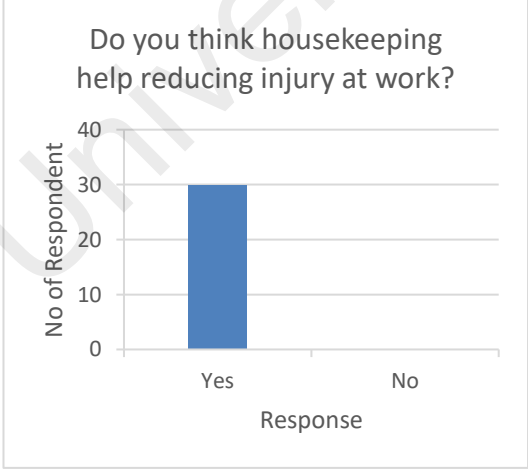

Figure 4-16: Housekeeping Effectiveness

4.6.5 Section E: Safety at Workplace

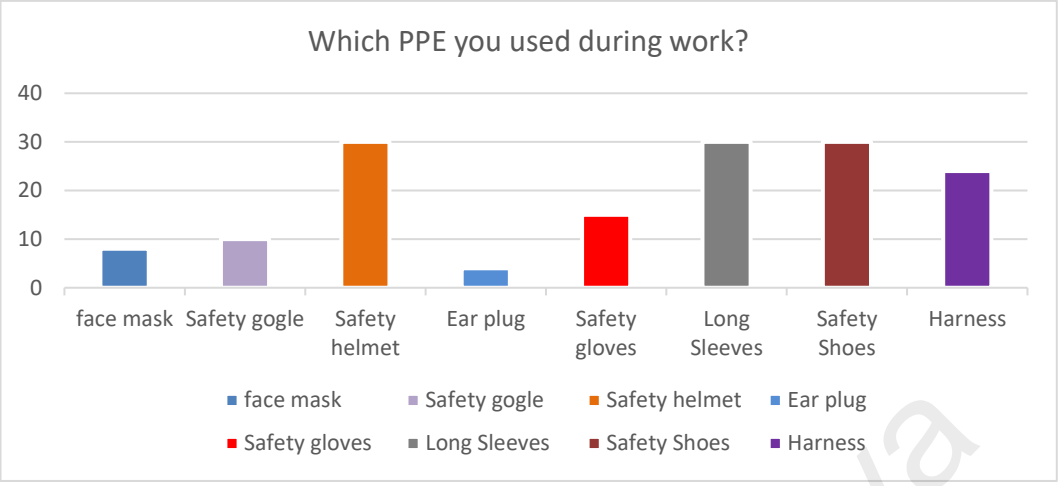

Figure 4-19: PPE Usage Among Workers

Figure 4-20: No of Accident Occurrence at Workplace

From the **figure 4-19** is can be said that most workers do wear the basic PPE at work such as safety shoes, safety helmet, long sleeves and harness. However, based on their job scope of handling heavy and sharp materials awareness on wearing safety gloves could be improved more. The other types of PPE are not synonym among workers it may be due to their job scope. For example, ear plug is only wear by the worker who involved in noise exposure work such as drilling or using impact tool. Thus, the no of workers involved may be less. Based on **figure 4-20** shows that none claimed that they have not experience accident at workplace before such as slip/ trip, fall from height, hit by moving or hit by stationery object.

4.6.6 Section F: Health at Workplace

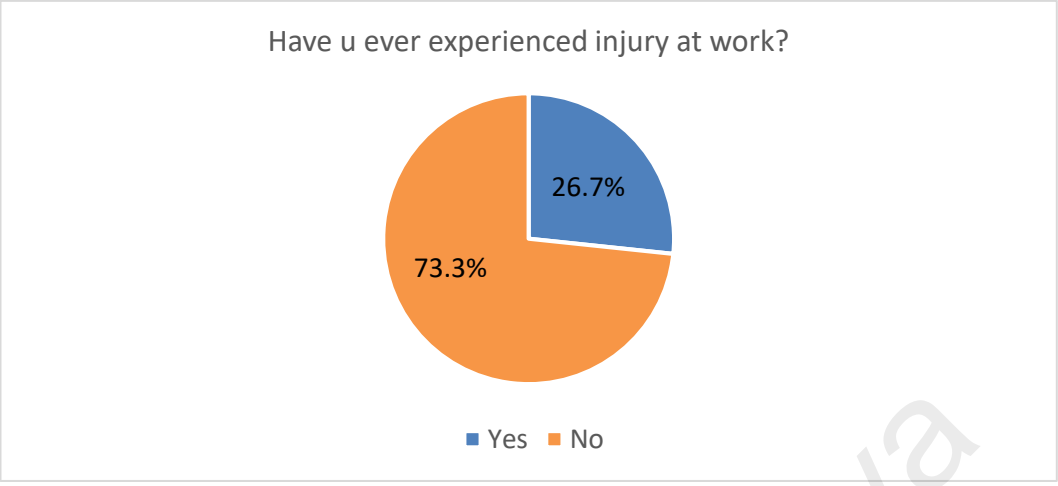

Figure 4-21: No of Workers Experienced Injury at Work

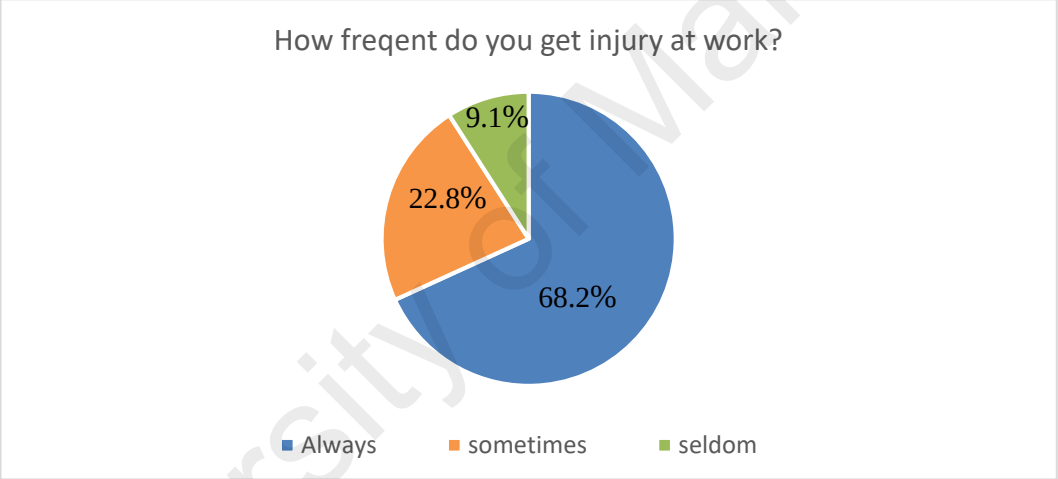

Figure 4-22: Frequency of Injury Occurrence Among Workers

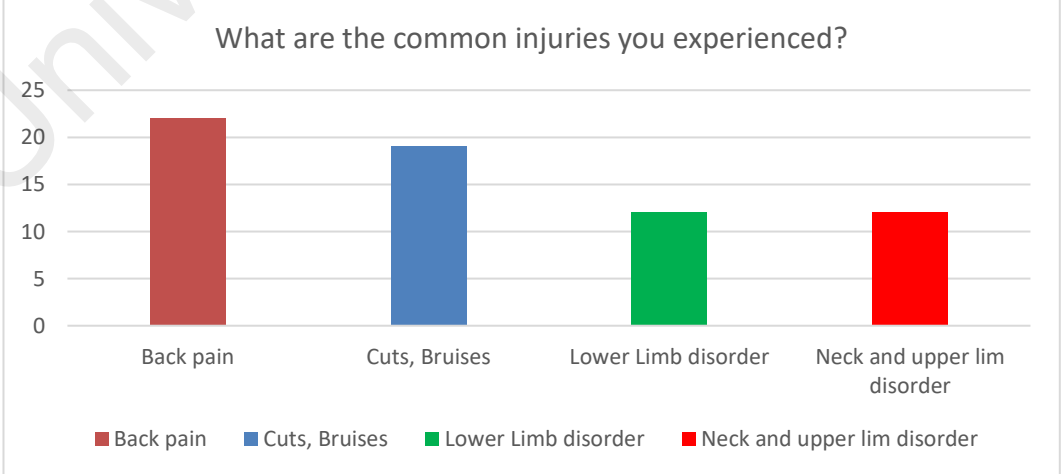

Figure 4-23: Common Injuries Experienced by Workers

From the **Figure 4-21**, a total of 22 respondents claimed they have experience injury from their work activities and 8 said they never experience injury at work. Among the respondents who had injury before, 68.2% always experience but other only feel it some of the times and seldom accounting 22.8% and 9.1% respectively as shown in **Figure 4-22**. Nevertheless, when probe have they report the issues to employer majority is it common pain that any construction work would experience it and it is part and parcel of working as construction worker. From my observation, this is due lack of exposure toward occupational health among workers by the employee. From the employer point of view, they are sub- contractor hire by them not their employee thus it is indirectly not their responsibility as they are paid for project basis.

From the questionnaire, the common injuries experienced by them are back pain followed by cut and bruises, neck and upper limb disorder and lastly lower limb disorder as in **Figure 4-23**. The manual handling and awkward posture might lead to the cause of these injuries. As a lot of lifting, bending and fixing involve in their job activities. From observation, these activities were during assembling the frame. The workers need to assemble the frame from scratch. Not only that, during some who involve in tighten the screw and nuts are constantly in awkward posture of lifting their head up. Some engineering control should be implemented to overcome this issue.

4.6.7 Section G: Environment

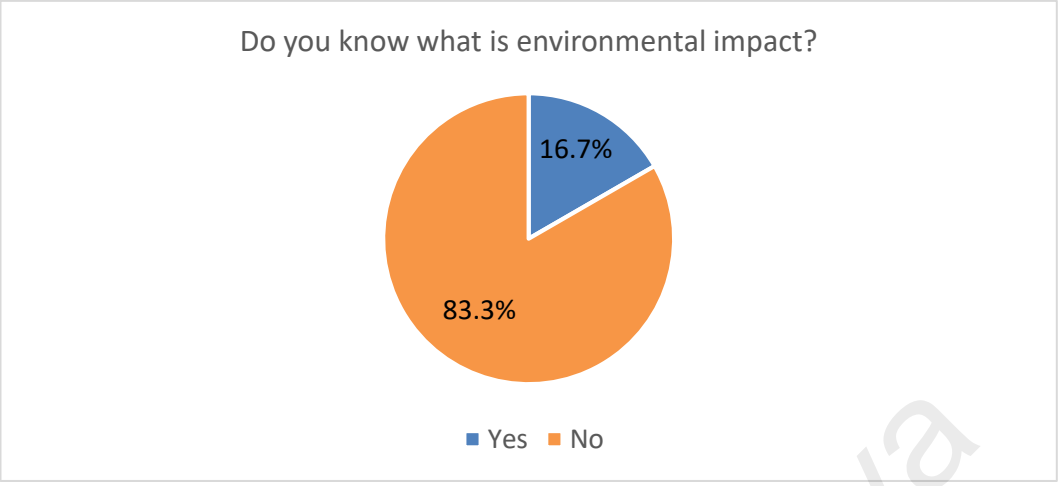

Figure 4-24: Environmental Awareness Among Workers

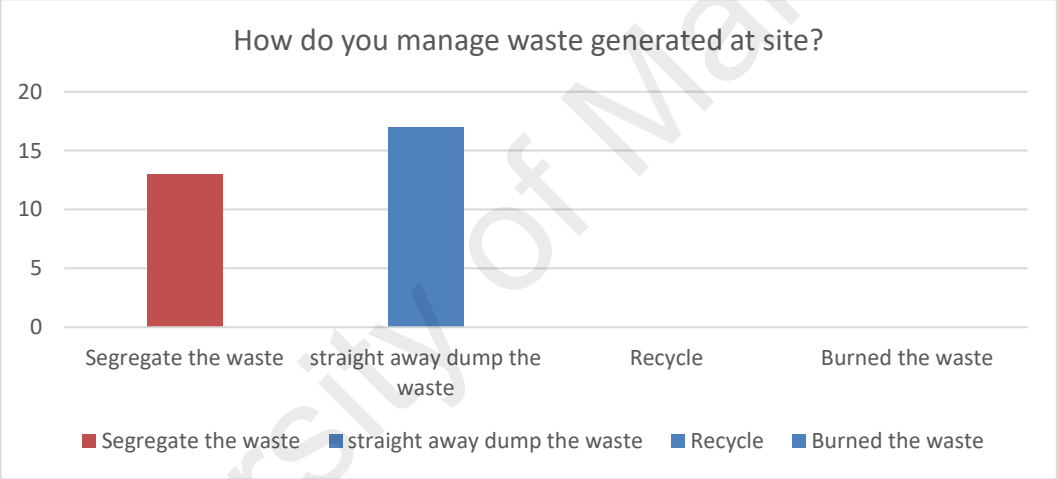

Figure 4-25: Effort to Manage Waste Generated at Site

In general, it is clearly seen that majority of them was not aware of environmental impact. One of the major environmental impact was the generation of waste. A few type of waste generated daily at site was mostly on packaging from the material used such as empty pallet, plastic wrapping, small screw and nuts. When asked on how they managed the waste as shown in **figure 4.22** the number of respondents segregating the waste and straight away dump the waste were 13 and 17 respondents respectively. There was no hazardous waste generated at site observed.

4.7 Control Measures

In this study control measures were determined with respect to the source of the hazard and the application of engineering controls, administrative controls, and personal protective equipment. The controls which were used to verify and regulate hazards by comparing with standards in order to reduce or prevent hazards. Based on the degree of risk identified, suitable risk control should be implemented by determining whether these risks are tolerable. The safety measure which includes good work practices is aimed at providing assurance that all hazards associated with the warehouse racking installation are understood and the adequate measures will be implementing to manage these hazards.

4.7.1 Elimination & Substitution

The best way to control a hazard is by elimination where hazard is removed from the work process. Thus, it is considered as the first principle in the hierarchy of control as it can abate the hazard straight away from workplace. For example, illumination problem faced by some workers who need to do work between the rack. If providing a spotlight is too much to ask for, I suggest providing a head lamp for each person could solve the problem. Other than that, workers are required by the company to wear the company's black t-shirt which promotes more heat absorption towards the workers. Instead should the company provide a brighter or cooler colour so it could reduce heat absorption to the body. Furthermore, for safety purposes it increases the visibility of others towards the workers.

4.7.2 Engineering Controls

If the hazard cannot be eliminated or a safer substitute cannot be found, the next best approach is to use engineering controls to keep hazard from reaching the workers. This method of control involves designing or adding physical safety features to the process so it would become the barrier between the workers and the hazard. To barricade the area where work at height activity is being held could reduce the consequences of workers being hit by falling object. Moreover, using scissor lift instead of climbing the rack from the side could prevent from workers trip and fall from height. Well- designed engineering controls can be highly effective in protecting the workers and they typically do not interfere with workers productivity or personal comfort and ease the workers to perform their job.

4.7.3 Administrative Controls

If the engineering controls cannot be implemented as it may be costly or cannot be implemented right away, administrative controls should be considered. Administrative controls involve changes in workplace policies and procedures. They can include such changing policies, reducing the time workers are exposed to a hazard, training, standard operating procedure, and implementing warning signs and labels. This type of controls has the purpose to minimize the exposure of hazard without removing it.

Implementing job rotation could be the best solution as most workers need to work almost 7 days a week 10 to 12 hour per day. This could reduce stress level and gives more rest to the workers. Other than that, back- up alarm for moving machinery is an example of effective warning systems to aware of others working nearby. Providing training and information to the workers on safe work practices and other workplace health issues so that they can work safely.

4.7.4 Personal Protective Equipment (PPE)

PPE is not a particularly effective control measures and should only be used when all other control measures are impractical or in conjunction with other more effective control measures are being developed or installed. To ensure that the PPE can control the risk to a reasonably practicable level, it is important to select the correct PPE and fitted for the hazard identified if not it will not only harm the workers but creating another hazard to them. PPE and safety equipment should be use throughout the day such as safety boots, safety helmet, safety gloves and safety harness as it is essential to prevent any incident while they are doing their job.

For example, where you cannot eliminate the risk of a fall, the usage of harness could minimize the distance and consequences of a fall. However, as observed and information received by the safety coordinator, wearing harness is most common unsafe act commit by the worker while installing the racking system.

CHAPTER 5

CHAPTER 5: CONCLUSION & RECOMMENDATION

The hazard identification and risk assessment of the racking installation process at the warehouse was done using HIRARC to assist the whole process of warehouse racking installation of hazard identification and risk assessment. All the information was obtained through observation hazard associated with the racking installation have been identified with regards of the job step observed and from interview with the key personnel. Not only that risk rating associated for each hazard is assessed and risk control relevant to reduce the occurrence have been suggested for the use of the employer and employees. From the HIRARC, there are 30 job hazards were identified which 28 of them are in the medium risk while only 2 is considered as high risk. Immediate action should be taken to minimize the risk for the 2 hazard which is regarding untrained workers and fall from height.

Based on the questionnaire distribution analysis, the workers are considered as well trained on safety measures on dealing with possible hazard and risk at workplace. From the result, they have a proper training, and were educated on hazard and risk associated with racking installation procedure and conduct housekeeping regularly to ensure safety at workplace. Furthermore, majority agrees that their workplace is safe place and clean. The issue is on the health aspect, where more workers are experiencing frequent back pain, this may due to most of the job procedure required manual handling and awkward posture. Thus, further check up by the occupational health doctor should be carried out to determine the issue. Meanwhile, the company could give some training or information on

occupational health to highlight the issue and give awareness to the workers on how to reduce the injuries they experienced.

Some recommendation for improvement is on the ventilation and illumination at the workplace. The working condition is important for the comfort of the workers as they need to work more than 8 hours per day thus sufficient ventilation and illumination for the workers are essential, so they can perform their work better. Apart from that, the usage of safety harness and safety gloves while performing their task should be emphasize by the company to minimize the impact to the workers. From observation, less workers uses safety gloves while using hand- held tool such as drilling and impact tool. Direct exposure of vibration from the tool both short and long term exposure may cause a loss of sensitivity in the fingers and hand.

CHAPTER 6

CHAPTER 6: REFERENCES

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