MACHINERY RISK ASSESSMENT DURING WAREHOUSE RACKING INSTALLATION

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Abstract

In any work site, hazard and risk are the most common criteria that are needed to be reduce, minimize, or eliminate to assure a safety workplace for employees. Machinery and power tools were commonly used in a racking installation. Forklift, reach truck, and scissor lift contributed in the building of the warehouse racking installation. However, the machinery were also contributed to high risk for the workers. Hazard and risk of machinery needed to be analyze before start of any work. One of the method that was used for hazard identification and risk assessment was Hazard Identification, Risk assessment, and Rick Control (HIRARC) method. This research study analyze the risk developed by machinery during warehouse racking installation located in Telok Panglima Garang site. The identification of hazard was done through inspection and observation on site. Every job task on site were analyzed and evaluated by following the HIRARC method. Questionnaire survey method was done on 30 workers with a purpose in determined the safety awareness during work and handling machinery. By using the HIRARC method, 25 job hazards have been identified as medium level hazard, and 2 job hazard have been identified as high level risk hazard. Physical hazard have been identified as the highest numbered type of hazard on site. Control measures were given based on the result obtained from the survey and the risk rating.

Abstrak

Di semua lokasi tapak pembinaan bahaya dan risiko adalah kriteria yang diperlukan untuk dikurangkan, atau dihapuskan bagi memastikan tempat kerja selamat untuk pekerja. Jentera dan alat kuasa biasanya digunakan dalam pemasangan rak adalah foklif, trak jangkauan, dan lif gunting. Jentera- jentera yang berikut penting dalam pembinaan pemasangan gudang. Walau bagaimanapun, jentera turut memberi risiko yang tinggi untuk keselamatan para pekerja. Bahaya dan risiko oleh jentera perlu dianalisa sebelum memulakan apa-apa pekerjaan. Salah satu kaedah yang boleh digunakan untuk melakukan pengenalpastian bahaya dan penilaian risiko adalah Identifikasi Bahaya, Penilaian Risiko, dan Kawalan Risiko (HIRARC). Kajian penyelidikan ini menganalisa risiko yang dibwujudkan oleh jentera semasa pemasangan gudang di tapak Telok Panglima Garang. Pengenalpastian bahaya dilakukan melalui pemeriksaan dan pemerhatian di tapak pembinaan. Setiap tugas di lokasi kerja dianalisa dan dinilai dengan mengikuti kaedah HIRARC. Kaedah kajian soal selidik telah dilakukan kepada 30 pekerja untuk menentukan kesedaran merreka terhadap keselamatan semasa kerja dan ketika menegndalikan jentera. Dengan menggunakan kaedah HIRARC, 25 jenis kerja yang bahaya telah dikenal pasti sebagai bahaya tahap sederhana, dan 2 jenis kerja bahaya telah dikenalpasti sebagai bahaya risiko tahap tinggi. Bahaya fizikal telah dikenalpasti sebagai jenis bahaya paling tinggi di lokasi pembinaan rak. Langkah-langkah kawalan diberikan berdasarkan hasil yang diperolehi daripada tinjauan dan penarafan risiko.

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Deepest gratitude to my husband and family for all the love and support given to me to assure I could finish my research study. I would never done without all the people that have contribute directly and indirectly towards completing this research report.

Thank you.

Regards,

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List of Symbols and Abbreviations

DOSH : Department of Occupational Safety and Health

HIRARC : Hazard Identification, Risk Assessment, and Risk Control

PPE : Personal Protective Equipment

% : Percentage

SOS : SCHAEFER Orbital System

WAH : Work at height

PTW : Permit To Work

PMA : Permit Machinery Access

MHE : Materials Handling Exercise

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Industry companies in Malaysia must comply with the law created or approved by the Malaysian government to ensure of the safety, health, and welfare of their workers, people living near the working site, and also the environment affected by the activities made by the company. It is necessary for the company to have a safety policy that protects the workers from the possibility of being harmed. The safety policy that created must involve identification and evaluation of the minor and major hazards that may harm their workers during finishing their job or task.

Worker task during warehouse racking installation uses machinery and tools such as forklift, reach truck, power drill, and impact tool. The machineries pose risk to the workers when there is no proper caution on handling them during the racking installation process. For example, a worker may fall and injured himself while working at height while using hand tools to connect the frame due to lack of caution and awareness of the risk and hazard when doing his task. The hazard when using the machineries need to be identify to eliminate or minimize the possible accidents or unwanted incidents during the workers working hours on site. Furthermore, risk assessment on the machineries will help to contain the possible risk that will cause harm to the workers and the people in the surrounding

area. The hazard identification and risk assessment will be done at warehouse racking installation site that is situated in Telok Panglima Garang, Klang. The installation of the warehouse racking was done by SSI SCHAEFER. SSI SCHAEFER was hired by manufacturing company to install several types of warehouse racking such as Selective Pallet system, Orbiter system, and Double Pallet system. SSI SCHAEFER has big concerned over the safety and health of their workers during their task. The risk assessment will be done by the Hazard Identification Risk Assessment and Risk Control (HIRARC) method, identification of hazard and risk by site observation, and studying the safety awareness of the workers by using questionnaire survey method.

1.2 Problem statement

Warehouse industry uses a lot of machineries such as forklift, restruct, hand tools, drill , and impact tool during installing warehouse racking . There are a number of cases involve in accidents when handling machineries in all type of industry in Malaysia. Study or research on possible hazard or risk in machinery during warehouse racking installation is lacking in Malaysia. Hence by applying risk assesment on machinery during the installation process will help to provide more study on the possible risk and hazard for future reference of the warehouse industry.

1.3 Objectives

This research study aims to assess the company on risk assessment on machinery during warehouse racking installation. The objectives of the study are:

1) To identify the potential hazard and the level of risk present during the warehouse racking installation operation when using machinery.
2) To propose mitigation strategies to minimize risk during warehouse racking installation operation.
3) To propose the best solution to minimize or eliminate possible risk during racking installation when using machinery.

1.4 Scope of Study

This study was conducted at a warehouse racking installation site situated in Telok Panglima Garang Klang. There are three types of racking system that were installed by SSI SCHAEFER such as APR Selective, SCHAEFER Orbital System (SOS), and Free Standing Mezzanine Platform. Machineries such as forklift, reach truck, and scissor lift is used during the warehouse working installation. The hazard identification and risk assessment was done on the machineries that were used at warehouse racking installation site. The hazard identification was determine by using the Hazard identification, Risk Assessment, and Risk Control (HIRARC) table. Risk assessment were done by analyzing the machinery and tools by completing the machinery risk assessment survey and by using the risk matrix. The study of safety awareness of the workers will done by

the survey method by giving questionnaire to the workers and by conducting an interview with the safety coordinator of the racking installation site.

1.5 Outline of study

This study will be done by dividing the report in five main chapters. A brief introduction of each main chapter shown as below:

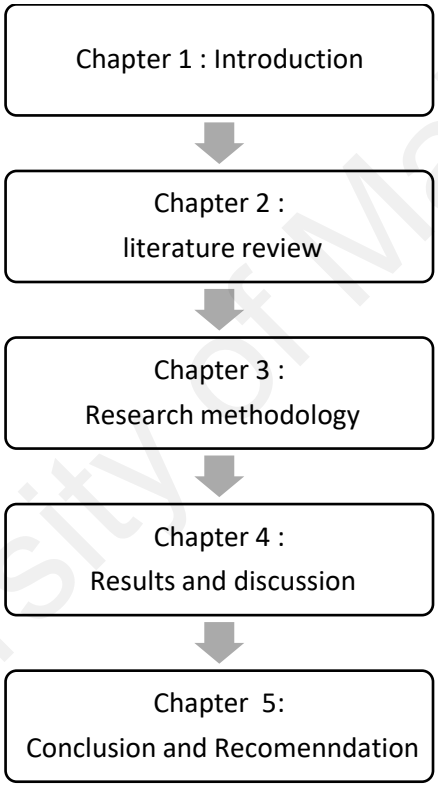

Figure 1.1 : Main chapters flowchart in research study

CHAPTER 2

LITERATURE REVIEW

2.1 Warehouse racking system

Warehouse is a big storage to keep and placed various types of products such as foods, drinks, furniture, and others. The requirement and condition of a warehouse rack must be strong , does not take a lot of space, and could store stacks and stacks of product. One of the most famous type of racks used in the warehouse industry is pallet racking system. Manufacturing pallet racks has long been one of SSI SCHAEFER's key areas of expertise. Pallet racks must fulfill demanding requirements such as the racks have to be sturdy, safe, and expendable. There are ma ny types of racks such as, double deep racking system, mobilet pallet racking system, selective pallet racking system, and Push back racking system.

Machineries such as forklift is the most used machineries in the warehouse area. Forklift functions to help move or pick up products from the pallet racks and transfer to another location either to a loading truck or another room. Warehouse are used by importers, exporters, and wholesalers. A warehouse usually have loading docks and unloading docks to transport the product in and out the building.

There are many types of racking system by SSI SCHAEFER such as Selective pallet racking system, SCHAEFER Orbiter System (SOS), Automated Storage and Retrieval system, and free standing mezzanine platform system. However, There are only three types of racking system used in Telok Panglima

Garang site which are SOS racking system, adjustable pallet racking system (APR), and free standing mezzanine platform.

2.2 Machineries and tools use in racking installation

Warehouse racking installation involves workers using machineries to connect the beams, frames, or pallets due to their heavy weight and size. The racks from SSI SCHAEFER could reach up to a maximum 12 metres high. Hence, the use of machineries such as forklift, reach truck, and scissor lift will help the workers to install the frames easily.

2.2.1 Forklift

Figure 2.2.1 : Forklift with combustible engine

Power truck use to carry materials is called a forklift. Forklifts can be generated by battery or combustible engines.. Forklifts needed for statutory examination by a competent person once every 12 months. This is in in according with the Safety, Health and Welfare at Work (General Application) Regulations 2007. Other than that, forklifts are also being known as a work equipment. All Employers must assure that workers in charge are familiar with the machinery that

they are driving. An appropriate instruction and information need to be known by the workers when handling forklifts. The selected workers will undergo training before being permitted to use forklifts. Pre check up needed to be done frequently to assure that the forklift follows the instruction manual from the manufacturer of the machinery.

2.2.2 Reach truck

Figure 2.2.2 : Reach truck

Reach trucks are designed mainly to be used in warehouse operation. The machinery can perform well for work that requires high level to be reach with excelllent manouveribality. The machinery was called as reach truck because it has the ability to reach out and reach into racking sytem. While operating in a very tight or small area, reach truck is available to lift heavy loads in to the designated level. Reach truck are not preferrable to work on outdoor but suitable well working in indoors. Same as forklift, reach truck is powered by either rechargeable battery or combustible engine.

2.2.3 Scissor lift

Figure 2.2.3 Scissor lift

The scissor lift acts like a scissor which help to letting people moving up the platform to higher elevations. Scissor lift is either powered by battery or gas. Scissor lift can lift big loads to a higher level. Scissor lifts provide a great purpose to be a mobile vehicle that could reach very high areas in the material industry Scissor lift is one of the important machinery used in storage racks such as in warehouse that have multi level of racks to keep products for importers or wholesalers.

2.2.4 Power tools

Power tools are hand tools that have specialforce or strength to be use by mand when they need more exessive force to tighten scews, nuts or bolts. In racking installation, workers need power tools to ease their process in tightening the frames and beams. Example of the power tools that are use during racking installation are power drill and impact tool.

Figure 2.2.4 : Power drill and impact tool

Power drill is a device that help to rotate detacheable drill bit to make hole in either wood, metal or plastic material. Power drills are powered by either battery or 110 volt electrical cord. The cordless drill are the most preferrable device used because it will not tangle when the workers need to repetitively move from one side to the other for tightening screws. While the other tool used is called impact tool. Impact tool is also known as an impact wrench where the purposed of this tool is to aid the tightening and loosening of nuts and bolts . The impact tool help to reduce the manpower of the user by increasing the speed which help with the process of fixing to be tightened or loosened.

2.3 Factories Machinery Act (FMA) 1967

The Factories and Machinery Act (FMA) was enacted in 1967 as Act 64. It was revised on 1st April 1974 and amended to the Laws of Malaysia Act 139. The main objective of this act is to give control on factories to secure safety, health and welfare of people working in the factory. FMA has a purpose of machinery registration and machinery inspection or any matters that connected to machinery. There are 6 parts in the FMA which are divide as first part is preliminary. The second part is the safety, health and welfare of the people in the

factory. The third part is the persons-in-charge andcertificate of competency, The fourth part is the motification of accidents, dangerous occurrence and dangerous diseases. The fifth part is notice of occupation of factory and registration and use of machinery. The last part of the act is general. All companies in malaysia that poses machinery need to follow the act. By not following or disobeying the act, the company will have serious penalty or fine.

2.4 Occupational Safety and Health Act (OSHA) 1994

Occupational Safety and Health Act (OSHA) have objectives and aims to assure the safety, health and welfare of workers at work against risks to safety or health arising out of the activities of persons at work. Other than that, OSHA aims to protect other people that are present in the surrounding of other's working place. OSHA provides with the objectives whereby the associated occupational safety and health legislation may be replace progressively other system of regulations or an approved industry codes of practice operating in combination with the provisions of this Act which was designed to maintain and improve the level of standard of safety and health in Malaysia.

2.5 Machinery risk in workplace

Risk is define as the probability of being harm or injured that may cause a minor or major injury to a person. Risk may be develop through carelessness of a person handling a machinery or in doing his job. Higher risk comes from lack of safety awareness during working in high risk activities. Acknowledging risk at workplace is a necessity for a company to assure that all workers are protected from any harm that might be cause from their work task. In the year 2013, there have been reported by Borneo Post Online that a worker was killed by a forklift

when doing his job in Kota Kinabalu, Sabah. The forklift was reported to have been malfunctioned and unfortunately pinned the worker down. This may be due to no frequent maintainance check on the machinery. Machinery does help to ease the workers on their job. However, when it is not being taken seriously on the safety measures, machinery could harm a person and cause fatality.

2.6 Hazard Identification and Risk Assessment

Hazard identification id the process on determining hazard at workplace. The hazard is determined from the start of each job until the last final stage of the job step. Each work area and work task is examined with all the possible hazard that are possible in the job scope. There are many types of hazard such as ergonomical hazard, physical hazard, biological hazard, and physiological hazard. Each type of hazard may harm the persons at work and may cause fatal injury that prevents them from working efficiently.

While risk assessment is defined as the process of assessing the risk which are associated with the identified hazard. This method makes the risk to become more understandable about is severity to the workers. Risk assessment includes the nature of harm of a task that resulted from the known hazard. The severity of the risk and the likelihood of the risk occuring could be determined.

Another factor that needed to be look upon is the control of risk. Risk control is defined as actions taken to eliminate or reduce the safety and health risk of a task or job. When a certain risk could not be eliminated, the implementation of control measure will help to reduce or minimize the risk. The control measures includes elimination and substitution, engineering controls, administrative controls and personal protective equipment (PPE). PPE have been mistakenly understood as the main control measure to minimize risk . However, PPE is the

last control measure to reduce risk when the risk could not be remove or eliminated. One of the methods that could identified hazard and analyze the risk severity and likelihood is by using HIRARC method.

2.6.1 Hazard Identification, Risk Assessment, and Risk Control (HIRARC) method

Hazard Identification,Risk assessment and Risk Control (HIRARC) method is one of the most effective way in determining hazard identification and risk assessment. The HIRARC represents in a form where job task or type of job done in a process is being thotroughly analyze to evaluate the hazard obtained and the level of risk of each hazard. Table 2.2 shows the types of likelihood and the rating value of each.

Table 2.1 : Risk likelihood descriptors(DOSH, 2008)

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

The severity of the risk was evaluated afterwards. Severity of the consequences assigns a rating based on impact of an identified risk to safety,

resources, work performance, property, or reputation. Table 2.3 shows the indicate level of severity of risk.

Table 2.2 Hazard severity descriptors (DOSH,2008)

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

When the likelihood of risk and the severity of risk have been identified, the risk level will be calculated by using the risk matrix table as shown in table 2.4. The action required on all type of risk is hown in table 2.5.

Table 2.3 : Risk matrix table

	Severity				
Likelihood	1	2	3	4	5
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	8	12	15
2	2	4	6	8	10
1	1	2	3	4	5

Table 2.4 : Risk priority range table (DOSH,2008)

Risk	Risk value	Action required
High	15-25	A high risk requires immediate action and control of the hazard as detailed in the hieraechy control. The actions taken must be documented on the risk assessment from includeing date of completion
Medium	5-12	A medium risk requires aplanned approach to controlling the hazard and appliying the temporary measure when required. Actions taken must be documented on the risk assessment form including the completion date.

Low	1-4	A low identified risk may be considered acceptable and further minimization or reduction may not be necessary. However, if the risk could be resolved quickly and efficiently,control measures should be implemented and recorded.

CHAPTER 3

METHODOLOGY

In this study, the hazard identification was done by using the HIRARC method, and site observation to determine possible hazard the warehouse racking installation site in Telok Panglima Garang , Klang. The risk assessment was done using the risk matrix, and conducting the machinery risk assessment survey. The safety awareness of the workers were studied by conducting individual questionnaire interviews. The flowchart of the reasearch methodology is shown below :

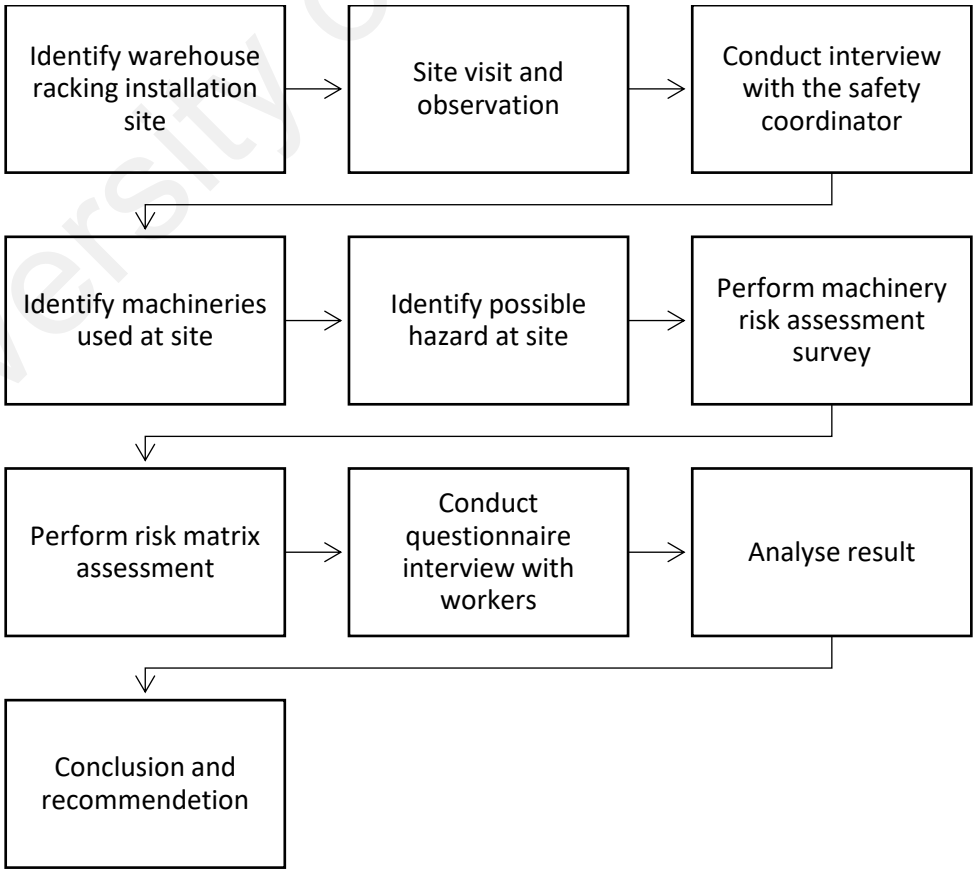

Figure 3.1 : Machinery risk assessment flowchart process

3.1 Site visit location

The warehouse racking installation site id located in Telok Panglima Garang, Klang, Selangor Darul Ehsan, Malaysia. There are 5 warehouse built at the site which consist of 3 types of warehouse racking system provided and build by SSI SCHAEFER .

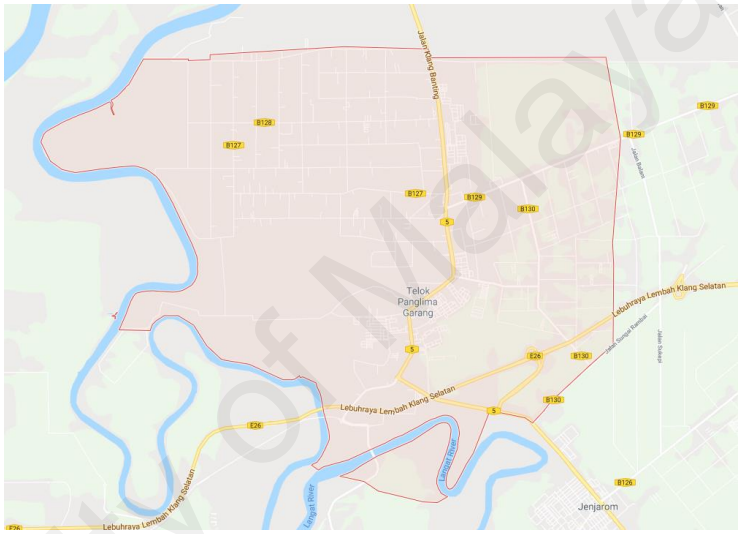

Figure 3.2 : Google map image of Telok Panglima Garang

3.2 Interview with the safety coordinator

An interview with the safety coordinator of SSI SCHAEFER was conducted at Telok Panglima Grang site. The interview was done to determine the safety awareness of the company towards the safety, healt, and welfare of the workers and the safety measures taken by the company to promote a better workplace for the workers and the environment.

3.3 Hazard Identification

Hazard identification determine sthe potential hazards that may occur on site while the installation of the warehouse racking. The methods that are used in this study are :

1. HIRARC method
2. Site Observation

3.4 Risk Assessment

Risk assesment in this study was done to identify and analyse the possible risk pose by the machineries used in the warehouse during the racking installation process. The method use for the risk assesmnet is risk matrix method.

3.5 Questionnaire method

The questionnaire was done to determine the level of awareness of the workers towards rheir safety, health, and welfare during their working hours with the company. The questionnaire was done by asking one to one basis since majority of the workers could not read the questions given. The questionnaire conducted towards 30 workers in the site.

CHAPTER 4

RESULTAND DISCUSSION

4.1 Site Observation

The site of the warehouse racking installation is situated in Telok Panglima Garang , Klang, Selangor. There are 5 sections of warehouses which each has warehouse racking installed by SSI SCHAEFER. SSI SCHAEFER installed three types of racking system which were free standing mezzanine platform, SOS, and adjustable pallet racking system. Before the start of each project of the racking system, each system was being evaluated and analyse about the identification of hazard and risk of the system towards the workers and surrounding of the working site. The safety coordinator, Encik Khairul was in-charge in handling the hazard identification and risk assessment. He used Hazard Identification, Risk assessment, and Risk Control (HIRARC) method to analyse all three type of racking system.

SSI SCHAEFER is one of the sub contractor handling the warehouse racking installation in the warehouse construction site. The main contractor on site is strict on the awareness of safety and health of the workers working in the construction site. All the workers working in the area need to renew all their weekly permit pass before start of their work on site. Encik Khairul will need to do a safety audit with the other safety coordinator from other companies on site to assure the safety of all the workers and the working site. My colleague, Nurul Izzati and I attended an induction course which were held in the main contractor

office on site to obtain our permit pass before being allowed entering the warehouse installation racking site. The induction course explains the hazard on working such as hazard in confined spaces, hazard during working at height (WAH), identification of hazard signs available on site, and briefing on using proper type of PPE during work.

4.2 Hazard Identification and Risk Assessment at warehouse racking installation site

The hazard identification and risk assessment at the warehouse site was done to determine the known hazard or possible hazard and risk of SSI SCHAEFER workers while doing their task or jobs when installing the racks. All aspects of their working operations where inspected and assessed to determined what factors that could cause injury or harm to the workers and other people at site. The methods used were HIRARC method and risk matrix to determine the severity and likelihood of the risk.

4.2.1 Hazard identification and Risk Assessment (HIRARC)

The hazards were being identified from of each job activity or operation through analyzing and evaluating the possible hazard when doing work. Each hazard that have been determined will be evaluate by determine the risk of the likelihood and the severity .The risk rating of each job will determined by the level of risk which were then be classified as low risk (L), medium risk (M), and high risk (H) .After the level of risk have been classified, the recommended controls were proposed to minimize or eliminate the risk. The results of the HIRARC are shown in Table 4.1.

Table 4.1 : HIRARC of three types of racking system at Telok Panglima Garang site.

HAZARD IDENTIFICATION, RISK ASSESSMENT & RISK CONTROL (HIRARC) FORM								
Task/ Job Description	To Install Warehouse Racking System Type Free standing Mezzanine Platform, SOS, and APR Selective Racking				**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	New workers enter construction site.	a. Wearing improper shoes at site. b. New untrained workers lack of safety awareness. c. Wearing wrong type of helmet. d. Workers unaware of moving machineries.	a. Harm to any parts of body of the workers. b. Accident with moving machineries.	a. Workers should attend Safety Induction course before starting any work. b. Wearing appropriate PPE. c. Supervisor give toolbox talk to workers to explain the work safety methods.	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. Assure that the supervisor accompany the workers. d. Make sure all workers wear PPE on site.

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	Mobilization equipment a. Electrical hand tools (drilled machine, impact machine, grinder) b. Scissor lift c. Reach truck d. Forklift	a. Materials loading on machineries are not properly secured and tighten. b. Untrained & incompetent operator operate the machineries. c. Improper use of PPE during work.	a. Collapse of machinery b. Traffic accident c. Electric shock d. Cut and Abrasion e. Fall off or slip from moving trucks.	a. Check machine condition before start work. b. Equipment must be inspected by Safety Personnel/supervisor before start work daily. c. Valid PMA obtained before start work for Scissor lift. d. Equipment must be located or place at a suitable section before leaving site of project. e. Equipment must be handle by certified operator.	2	3	6 (Medium)	a. Put up hazard signage around working area. b. Place caution tape around working area.

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 loading truck using forklift.	a. Struck by forklift	Serious injuries/Fatality (Workers)	a. Install alarm and warning light. b. Always look out for blind sport and push the horn when forklift is moving. c. Operator 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. Turn on the forklift lights when operating Indoors.
		b. Toppling of forklift	Serious injuries/Fatality (Driver & workers)	a. Only well-trained operator can operate forklift.	2	4	8 (Medium)	a. Regular maintenance of forklift.

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**
	(continued..)	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.
4	Transfer material inside warehouse using reach truck	a. Trip and fall on work floor	Leg sprain, bruise or fracture	a. Familiarise with the work surrounding before carrying out the work. b. Wear appropriate PPE (Safety Shoes)	2	3	6 (Medium)	a. Lifting materials within the reach truck lifting capacity b. Wear seat belts during transferring load.

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. Wear safety helmet and safety boots. b. Provide signage.
		c. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE	2	3	6 (Medium)	
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. Put up safety tape around the marking area.
		b. Health Hazards	Inhalation of dusts (Workers)	a. Wear dust mask.	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**
6	Frame Assembly	a. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE.	2	3	6 (Medium)	a. Put on warning labels of sharp edges.
		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 usage to be operated by well-trained operator.	3	3	9 (Medium)	a. Workers are not permitted to work alone during assembly.
		c. Contact with electricity	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. Wear safety gloves to reduce possible electric shock.

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)	a. Wear safety helmet.
		c. Contact with sharp edges	Bodily injury (Workers)	a. Wear safety gloves.	2	3	6 (Medium)	a. Wear safety vest.

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	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.
8	Beam Installation	a. Contact with sharp edges	Bodily injury (Workers)	a. Wear appropriate PPE. b. Wear Full Safety Harness.	2	3	6 (Medium)	a. Put up warning labels and signage during work.

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**
		a. 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. Put up signage or warning labels on working area.

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 when installing frame using machinery. 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. Workers do not work alone. b. Work at height task done by trained workers only. c. Workers need to obtained work at height permit.
9	Rack Floor Fixing	a. Contact with electricity	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. Wear safety gloves to reduce electric shock.

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. Noise	Irritation or noise induce deafness (Worker & Occupants)	a. Wear safety ear plug. b. Have adequate work rest regime.	3	2	6 (Medium)	
		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)	a. Wear dust mask b. Place warning labels of dust hazard in working area.
		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	a. Place safety kit on site. b. Wear hand protector to avoid sprains on wrist.

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**
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)	
		b. Health Hazards	Inhalation of dusts (Workers)	a. Wear dust mask.	2	3	6 (Medium)	
		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)	

The risk assessment on warehouse racking installation shows in range between 2 to 16 which the value 2 shows the lowest risk value and value16 shows the highest risk value in the racking installation process. Based on table 4.1, the calculation of risk matrix have been categorized into each level of risk. The activity or job scope of the workers shows only 2 significance level of risk present on the scoring which were medium and high. There were 25 hazards classified as medium risk level and 2 hazard were classified as high risk level. Table 4.2 shows the summary of the type hazards found in each level.

Table 4.2 : Level risk assessed at racking site

Risk level	Hazards
Medium Risk (5-12)	• Physical hazard from mobilization equipment and electrical hand tools. • Physical hazard when unloading materials from loading truck using forklift. • Physical hazard during transfer material inside warehouse using reach truck. • Ergonomical hazard when doing the floor marking, frame assembly, frame erection, beam installation, and rack floor fixing due to repetitive motion when doing task. • Noise hazard from machinery and tools when fixing rack floors.

	• Physical hazard from working on beam installation. • Biological hazard from inhalation of high amount of dust when doing housekeeping after work. • Ergonomic and physiological hazard due to repetitive motion when connecting the steel to become frames from bending repetitively.
High Risk (15-25)	• Physical hazard from untrained and uneducated workers when first time entering the site. • Physical hazard from fall from height when doing task that involves work at height to tighten the bolt or nut. • Physical hazard from falling when using the scissor lift to transport beams or frames during beam installations.

4.3 Questionnaire analysis

The questionnaire survey was conducted through an informal interview at the site. The workers were personally ask one by one due to lack of reading skills. The question were ask in a more layman terms to make the workers understand the question. There are 30 workers that had been questioned . The purpose of the survey questionnaire was to determine the level of awareness of the workers on safety and health during working hours on working site. The questionnaire was divided into 5 parts. The first part identified the demographic information of the workers. The second part of the questionnaire evaluates the safety awareness and training that was given to the workers. While the third part analyse their awareness on safety at workplace. The fourth and final part of the questionnaire was to determine their health awareness when doing their task and their safety awareness when using machinery and tools.

4.3.1 Section A :Demographic information

The first section in the questionnaire was done to identify the demographic information and their job information. Based on figure 4.1, all respondent were male and 26 people were foreigners while 4 workers were Malaysians. One worker age less than 20 years old, 20 workers age range between 20 to 30 years old, while the other 9 respondent age range between 31 to 40 years old. Based on the survey, all workers have a 7 hour work shift each day. There are also workers who done over time work in the range of 8 to 10 hours per day. Figure 4.2 shows the years of involvement of the workers. Majority of the workers have experience in the racking installation field of more than 4 years, 5 of them have experienced

in between 3 to 4 years, another 5 workers have working experience in between 1-2 years, and 9 respondent have less than 1 year of experience.

Figure 4.1: Age of workers

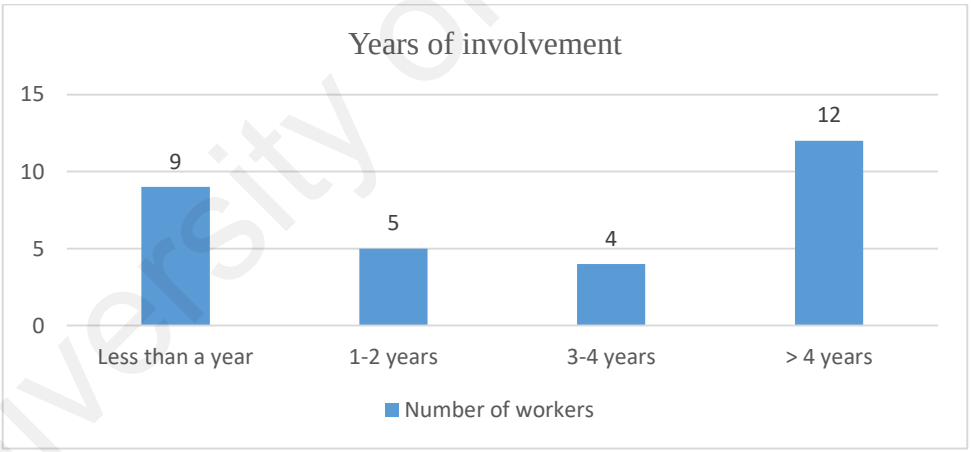

Figure 4.2 : years of involvement in racking installation sector

4.3.2 Section B : Safety and training awareness

Section B in the questionnaire studied the safety awareness of the workers during the racking installation. The first question on this section determine the type of work done by of all workers in the working site. Based on figure 4.3, 22

respondent handle machinery, 25 respondent did work at height, and 28 others manually installed the racks.

Figure 4.3 : Job scope of workers

Figure 4.4 represents the value of which the respondent received related training before doing their task. All male respondent agreed to have received adequate training before being handed their job task. However based on Figure 4.5, 6 % respondent stated that the work task wasnt been given clearly to them. Figure 4.6 shows that 100% of respondent agreed there were proper training given to recognize risk during work.

Figure 4.4 : Knowledge of task

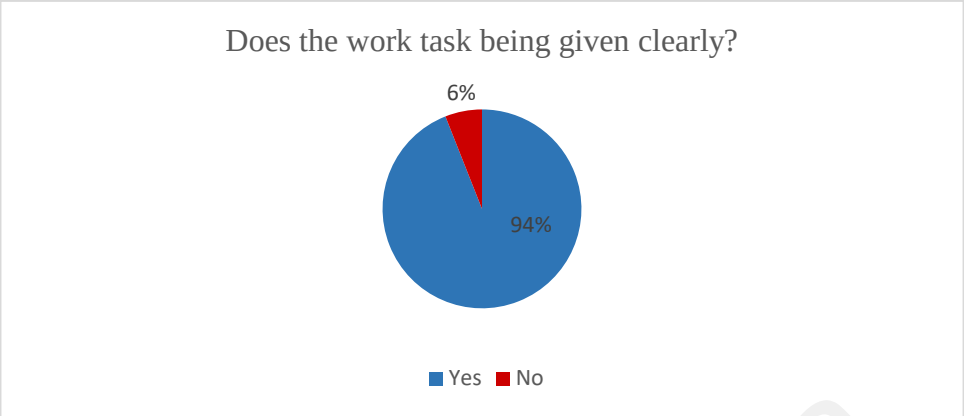

Figure 4.5 : Knowledge on task

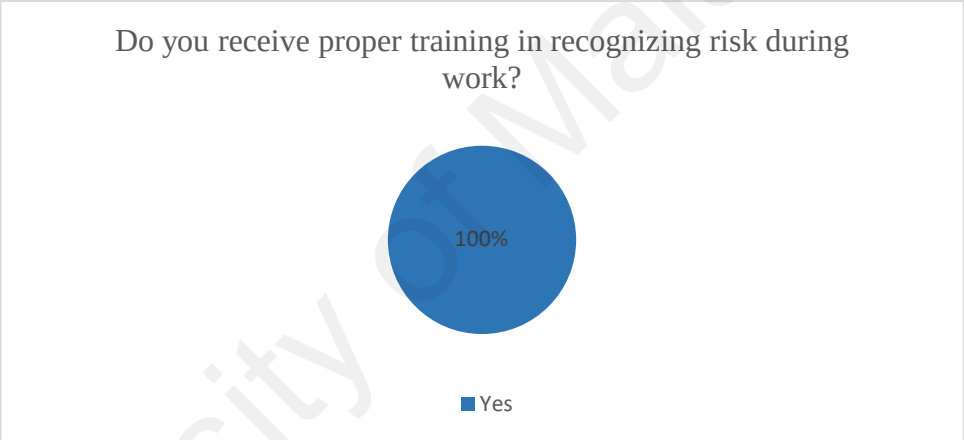

Figure 4.6 : Knowledge in recognizing risk

Figure 4.7 shows the evaluation of the ventilation system at working site while Figure 4.8 shows the percentage result of the question based on the light intensity of the workplace. Majority of the workers stated that the ventilation of the workplace in moderate condition which depict the site did not have a bad ventilation but could be improve. While majority of the respondent wanted the lighting on work site to be improve to ease their working task.

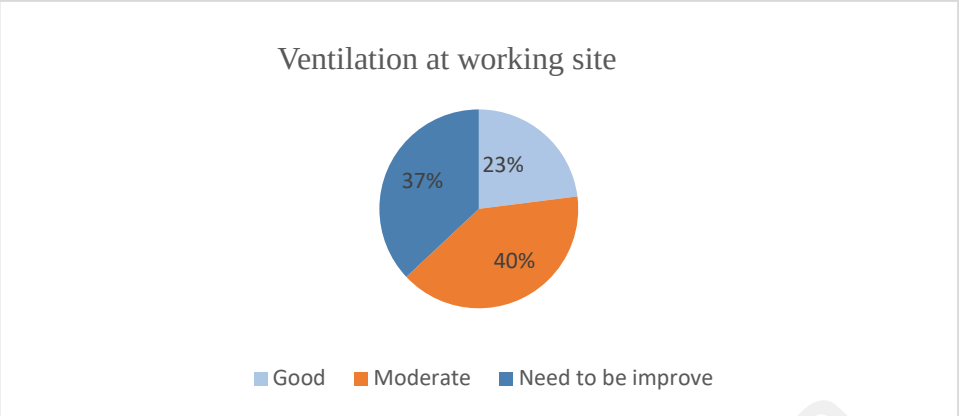

Figure 4.7 : Ventilation at working site

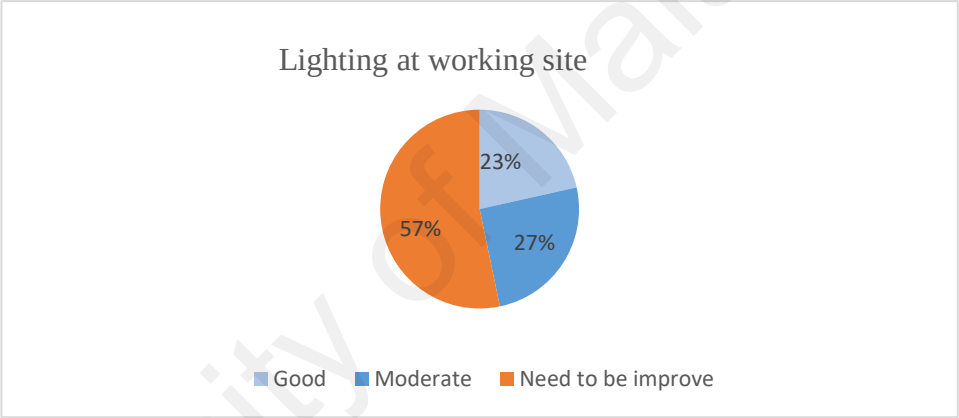

Figure 4.8 : Lighting intensity at working site

Question 8 and 9 of section B determined the level of awareness of the workers on the importance of housekeeping in any work environment. Figure 4.9 shows the result of the housekeeping routine of the workers. 73% of the respondent done the housekeeping every day after work, 23% of the respondent did once a week of work , while 17% of them did once every 2 to 3 days of work. The results explained that most of the workers are well trained and educated with the importance of keeping the work site clean to ease their working routine. Figure 4.10 represents the 100% of the respondent agreed that housekeeping helps to reduce the rate of injury occurence at workplace. However, there was one

respondent who doesnt agreed that the working site is clean and safe for work while majority of them stated otherwise shown in Figure 4.11.

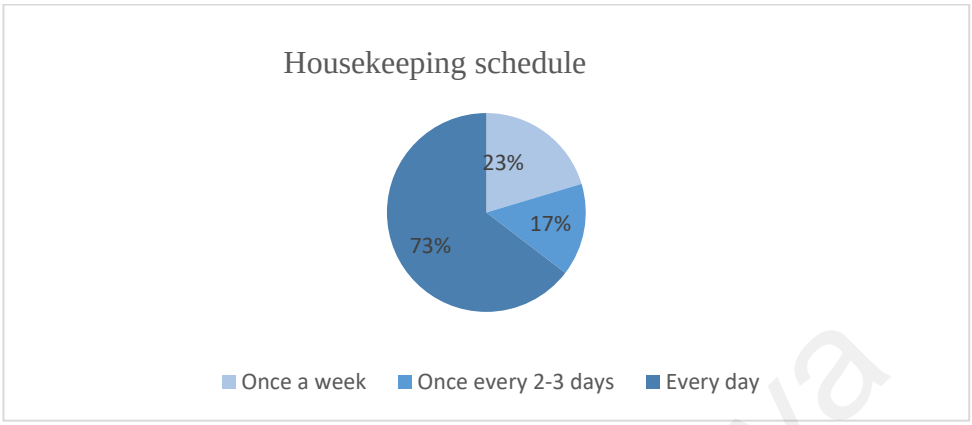

Figure 4.9 : Housekeeping routine of workers

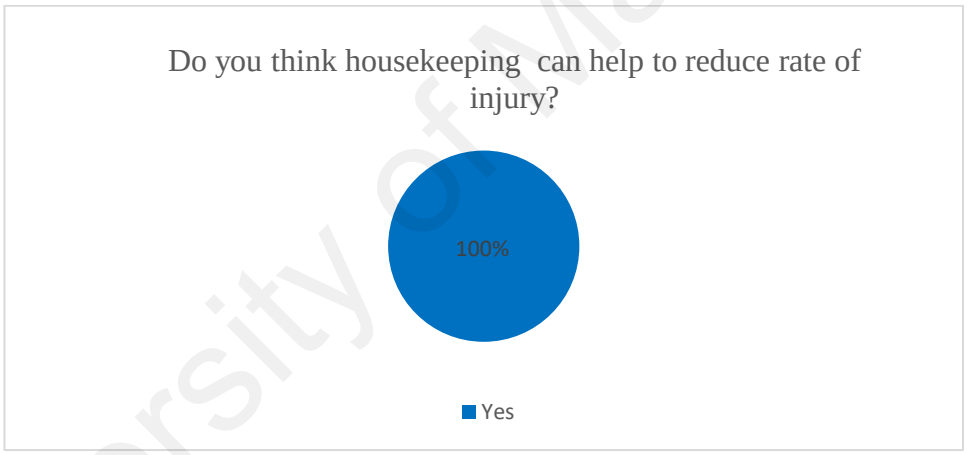

Figure 4.10 : Awareness on importance of housekeeping

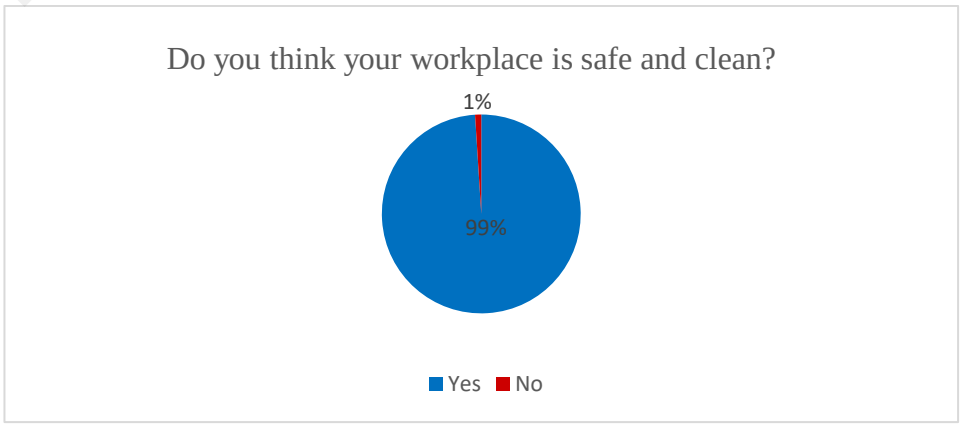

Figure 4.11: Awareness on working area

4.3.3 Section C: Safety in workplace

In this section, safety at workplace was being evaluated. Figure 4.12 shows the results obtained for the type of PPE the respondents usually wore during work. All of the workers stated to wore safety helmet, long sleeve, and safety shoes during work. 27 respondent wore safety harness, 19 respondents stated to wore safety gloves, 13 respondents wore face mask and ear plug , and only 4 of them stated to wore safety goggles during their work task.

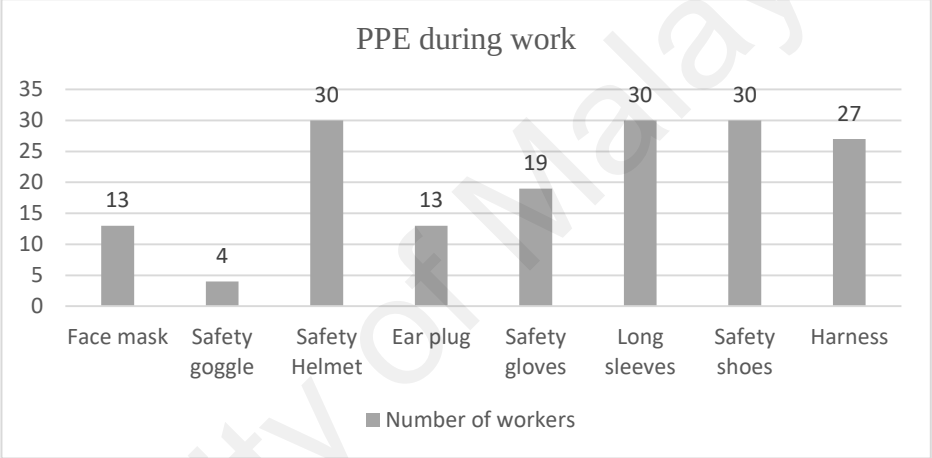

Figure 4.12 : Personal Protective equipment during work

Figure 4.13 shows that 87% respondent did not experienced any accident at workplace while 13 % respondent stated otherwise. The type of accident that had experienced by 2 workers, were slip or trip, another 2 workers fell from height, 1 respondent was hit by moving vehicle, and 1 respondent was hit by stationary object as shown in Figure 4.14. Besides the occured accident, near-miss incident was also being ask to determined if there were any workers almost injured while doing work. Figure 4.15 shows that 6 respondent almost slip and trip, 3 respondent almost being hit by a moving object, 7 respondents almost fell from

height, 1 respondent almost being hit by moving vehicle, and 5 of respondent almost hit by something stationary.

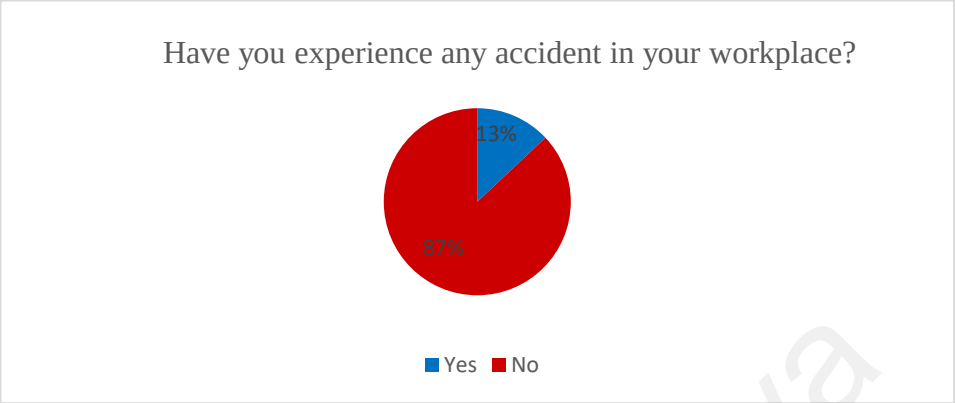

Figure 4.13 : Accident rate at workplace

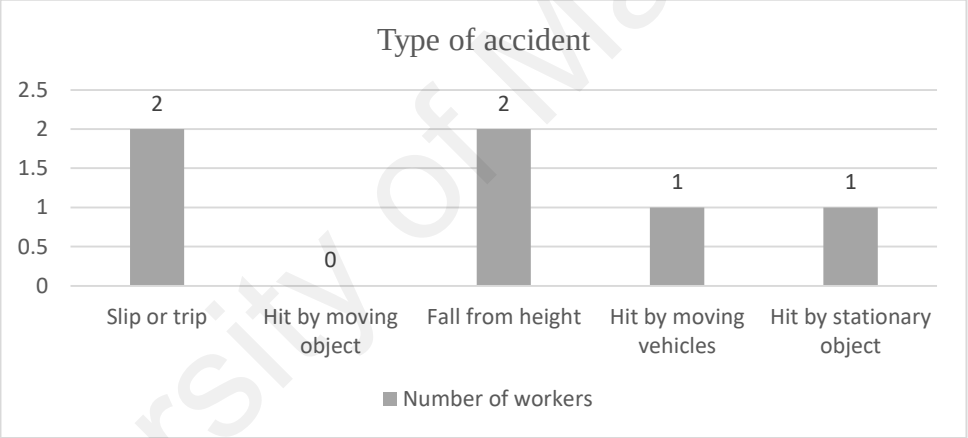

Figure 4.14 :Number of accident encounter at workplace

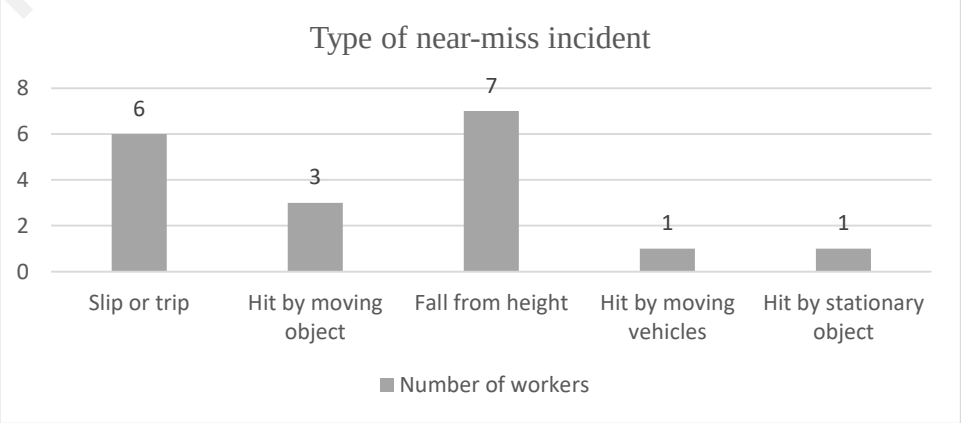

Figure 4.15 : Type of possible accidents happened at workplace

4.3.4 Section D :Health of workers

Section D of the questionnaire results based on the awareness of the workers of their health at work. Figure 4.16 shows that 60% of respondent did not experienced any injury while at work. Figure 4.17 shows that only 13% of the respondent experience dizziness during work . They stated the dizziness was due to lack of energy, and due to no consume of proper breakfast before work.

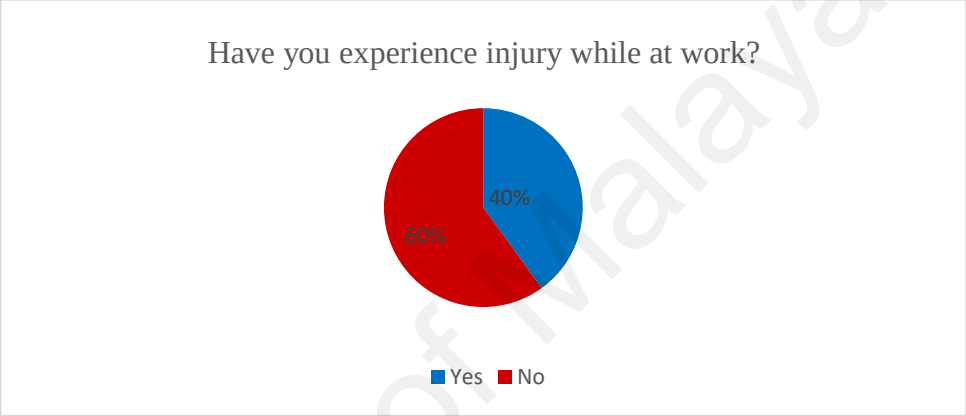

Figure 4.16 : Rate of injury at work

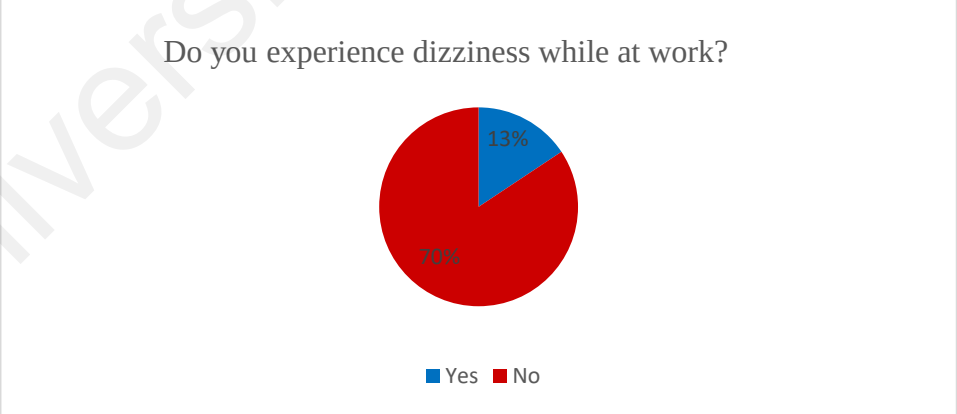

Figure 4.17 : Dizziness during work

There are several types of common injuries experienced by the respondent. Based on Figure 4.18, majority of the respondent obtained back pain cause by work, 9 respondent felt pain at their lower limb, 15 respondents experienced cuts,

while 10 respondent experienced neck pain during work. Figure 4.19 Shows that 57% of the respondent stated that the injury occur more than once. Based on Figure 4.20, 70 % of the respondent or 19 respondent took sick leave from work where 17 of them took 1 to 2 days of sick leave and 2 others took 3 days of sick leave. The results could be seen in Figure 4.21 .

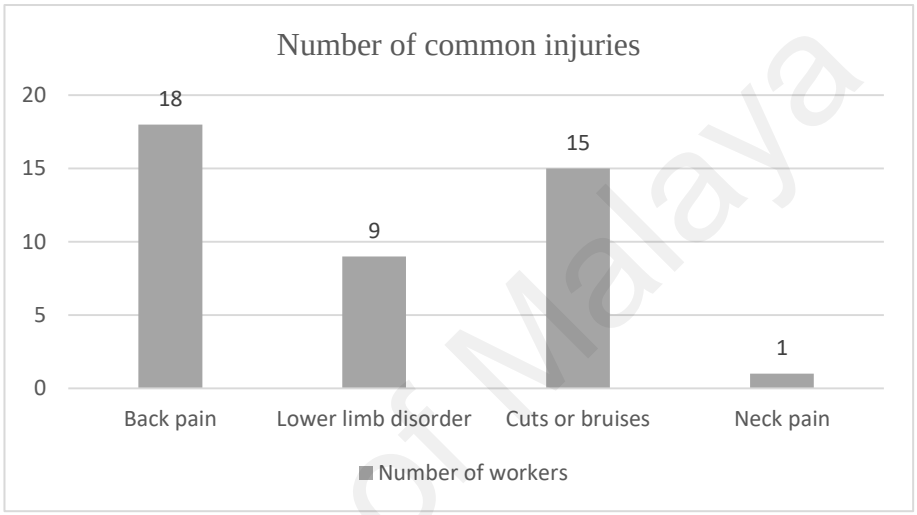

Figure 4.18 : Common injuries at work

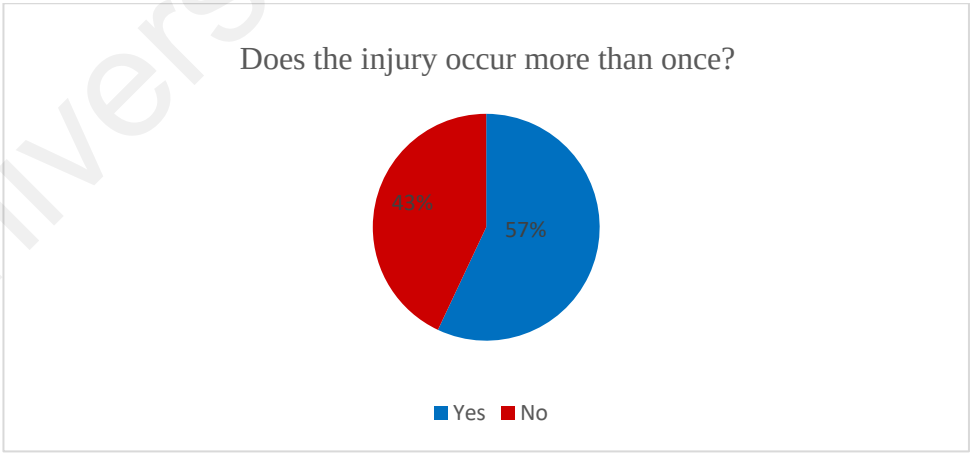

Figure 4.19 : Rate of injury occurence

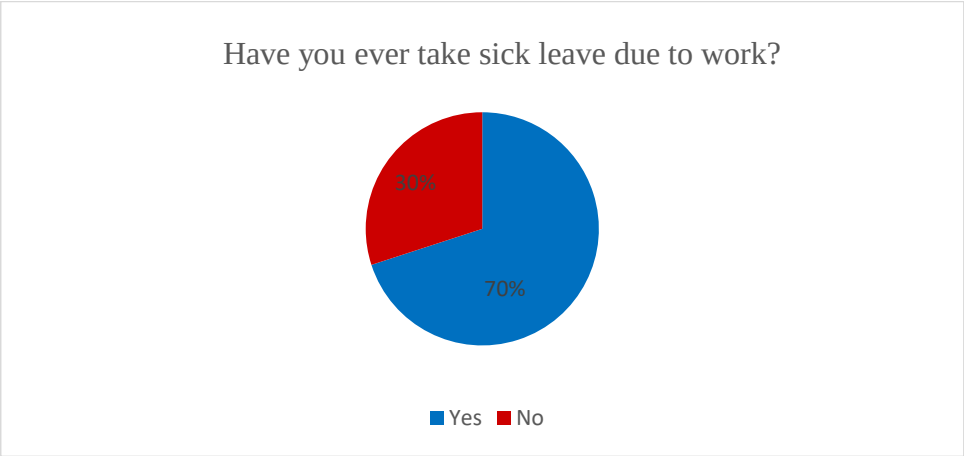

Figure 4.20 : Number of workers took sick leave

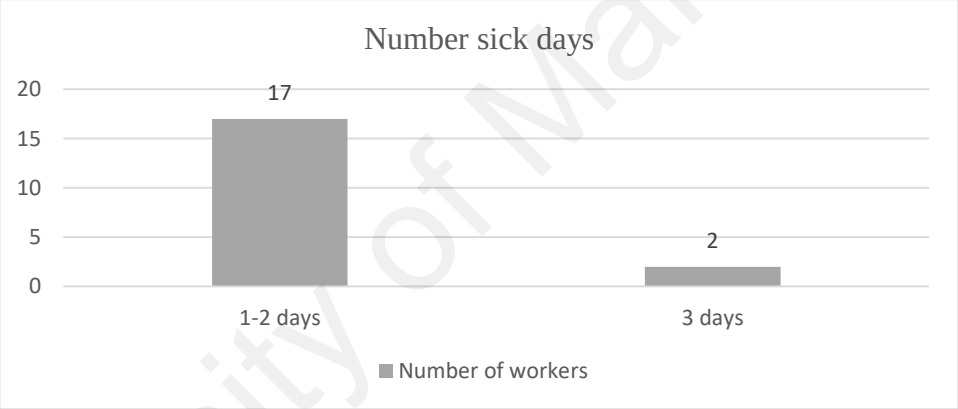

Figure 4.21 :Number of sick leave days

4.3.5 Section E: Safety on machinery and tools

In this section, the main concern was to analyse the safety of the workers when handling machinery and tools during racking installation. The first question of this section determined the number of workers handled which type of machineries and tools at work site. Figure 4.22 shows that 27 respondents used power drill and impact tool for work, 20 respondents used scissor lift, 18 respondents handled the reach truck, and 17 respondents used forklift for work. The majority of the respondent handled power drill and impact tool because the tools did not require specific training and work permit. While other machineries

such as forklift, reach truck, and scissor lift needs permit to work (PTW) for the workers to operate.

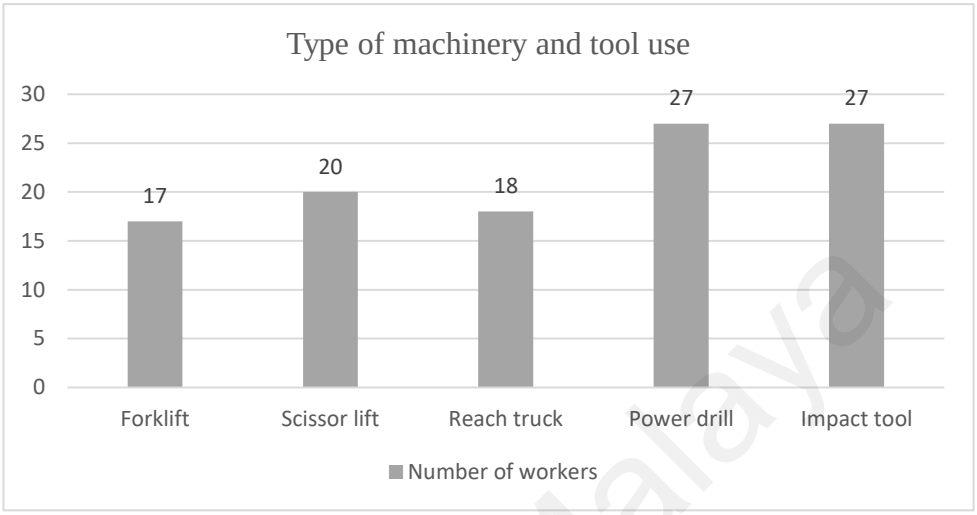

Figure 4.22 : Number of machinery and tools used by workers

Handling machineries and power tools required safety measures such as wearing PPE during handling. Figure 4.23 shows that all respondent wore safety helmet and safety boots at work site, 27 workers wore safety harness, 19 respondent wore safety goggle, and 14 of the respondent wore seatbelts when operate the machinery. Based on the result in Figure 4.24, 73% of the workers did not encounter any problem when handling machinery or power tool while the other 27% had difficulties when handling the machinery and tools.. Table 4.3 shows the problems the workers encountered when handling the machineries which varies from cuts, back pain, lower limb disorder, and awkward posture. The causes of injury were also stated and noted from their statement of experienced.

Figure 4.23 : Type of safety measures during work

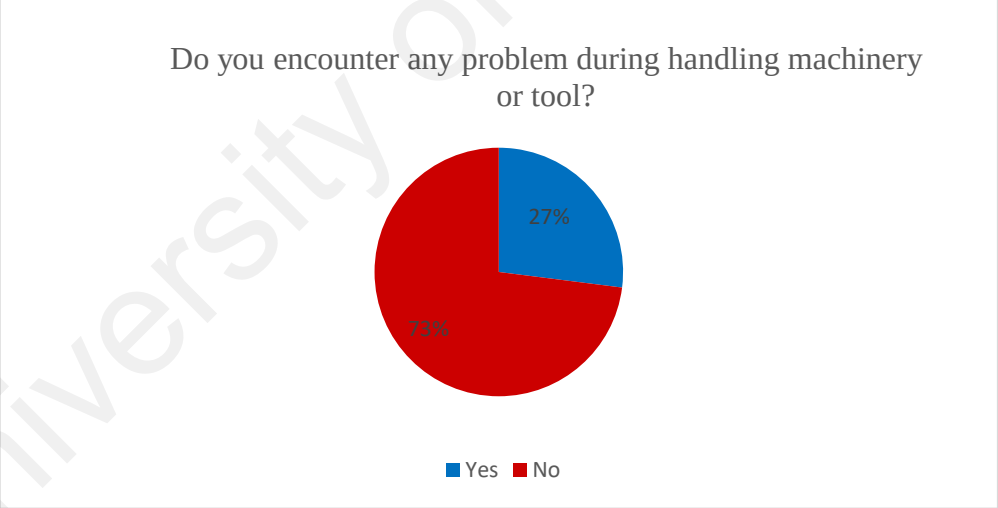

Figure 4.24 : Problem percentage when handling machinery

Table 4.3 Type of injuries during handling machinery or tool

Type of injury	**Cause of injury**
Cuts and bruises	Sharp beam edges when drilling and tightining bolt.
Awkward posture during work cause difficulty on movement	Tightining bolt and screw inside racking frame by bending frequently.
Heat that cause dehydration when doing work	When working using machineries that release heat.
Shoulder injury	Repetitive movement when bending to tighten screws and nuts.
Numb fingers	Frequent use of power drill.
Muscle cramp	Repetitive movement of bending when handling tools.
Back pain	Repetitive movement with awkward posture when handling tools.
Hip injury	Repetitive movement when handling tools.
Neck pain	Frequent bending when tightening nut and screw.

4.4 Control measures

Observation and inspection on each job task in Telok Panglima Garang site were done to determine the hazard control measure that could be applied to control the hazard and risk. Hazard identification and risk assessment was done by the HIRARC method and calculation of severity of risk level. The control measure proposed could be adopted by the site management in order to reduce the risk, prevent the possible risk, and eliminate the risk and hazard found on site.

4.4.1 Elimination and substitution

The most preferred method in controlling hazard is by elimination and substitution. This is due to the assurance of the level of risk to minimize using this measure. Through this control measure, the identified hazard or risk can be eliminated or substituted with a better method or solution.

Based on the observation on site, the elimination method is not applicable to the machineries or the task job. However, the workers had to wear a black long sleeve clothing when doing their task. Black clothing promotes more heat absorption thus made the workers become hot more faster. A brighter or cool colour t-shirt like blue may help to reduce the heat absorption to the body. Furthermore, the black t-shirt does not help to reflect any light . Thus by implementing wearing safety vest in work site will help other workers to identify them and reduce the risk of being hit by moving vehicles or objects.

4.4.2 Engineering control

Engineering control is the next measure if the hazard could not be remove as an option. Engineering control consist of many variety of methods to minimize and control the hazards. The example of the methods including process control, isolating hazard, improve ventilation and enclosure. The approach could be adopted by SSI SHAEFER management to remove or reduce the physical hazard and biologicalcal hazard due to high amount dust and poor ventilation during work. Face mask or dust mask should be wear by workers at all times to prevent them from inhaling too much dust. Goggles or safety spectacles should also be worn to avoid dust or other contaminants enter the eye.

4.4.3 Administrative control

Administrartive controls are measure that involves the substitution or change the existing system or job steps. This control measure may involved changing policies, training, standard operating procedures, and implement warning signs or labels. This type of control have a purpose to minimize the exposure of hazard without removing it.

Administrative control measure could be apply by the management to put up warning sign of moving forklift , reach truck, and scissor lift around the working site. This is necessary because the racking installation process need these machineries to move around frequently to lift heavy beams and frames for the installation process. Workers on the scissor lift may not be aware of the people that are walking around the area below them due to their main focus of the job is at a high level than ground floor.

4.4.4 Personal Protective Equipment (PPE)

Personal protective equipment will always be mistaken by workers as the first preventive method to control or eliminate risk. This method was meant to be the last method when no other options are available to eliminate the risk and hazard. PPE such as safety boots, safety helmet, safety mask, safety goggle, and safety harness are really important to prevent major injury to the workers when they are doing their job. This was due to the fact that safety coordinators or the person in charge with safety of the workers were not being paid to look out for them all day during their working hours. The PPE will help them to prevent themselves from unwanted incident that may cause from minor to major injuries.

Based on the observation, safety vest were not worn inside the working site. The lighting of the working site were determined by the sunlight that shines in the warehouse site. When outside weather is raining or gloomy, the workers had difficulty in seeing each other or even their own hand to do the job. Forklift, and reach truck always moved in a high speed which cause high chance of the workers being hit when the work site is dark. The workers were also caught not wearing the built in seat belts during handling the forklift and reach truck. This is a serious matter because if the are any unwanted collision happened , the result will be fatal.

CHAPTER 5

CONCLUSION

The machinery risk assessment of the warehouse racking installation was done by observing the site and the job scope. HIRARC was used to determine the hazard present in the work site and the significance level of risk of each task job. Questionnaire survey was done to determine the awareness of the workers towards their safety in workplace.

Based on the evaluation and analysis, SSI SCHAEFER have trained their workers well with safety measures on dealing with possible hazard and risk. Based on the questionnaire, the workers all have proper training, were educated well on risk and hazard, and obtained good housekeeping skills. Majority of the workers had never been into an accident that involves fatality which concludes that all workers were well trained on their job task.

Furthermore, SSI SCHAEFER provided adequate amount of PPE to the workers to assure their safety is the company's first priority. Penalty was also given to workers who did not comply with the safety rules by the safety coordinator. This type of disciplinary action helps in reducing the risk of the workers on inviting harm to come to them when working.

After analyzing all the results, SSI SCHAEFER methods on educating workers is very well organized. Majority of the respondent from the survey could recognize risk at workplace, were good in disciplinary act , were always be seen wearing PPE during work, fast learner in doing task, and had good housekeeping

routine. The hazard identification from the HIRARC found 25 types of job hazard in the medium risk levek, and 2 type of job hazard in the high level risk.

Reccomendation on creating a more safety workplace is to improve the work ventilation system by giving workers mask during work. This is to reduce the difficulty in inhalation during work. Other than that, SSI SCHAEFER could provide additional PPE such as reflective vest which will prevent workers from being hit by moving machinery or objects. Light intensity at work site need to be improve to ease the workers in doing their task. Lastly, implementing wearing safety gloves during racking installation will help to minimize minor injury such as cuts from sharp edges to the workers.

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Appendix A

Questionnaire

The questionnaire is a part of fulfillement in completing master course in Safety, Health , and Environment in Engineering.The purpose of this questionnaire is to collect information and opinion of employees that are working during the warehouse racking installation. This information may help in both management and workers to improve the safety in handling risk and hazard in the working area.

Directions: Please select the appropriate statement by [√] and write the answer at the space given.

Section A : General Information

1. **Sex of respondent:**

   [ ] Male [ ] Female

2. **Nationality:**

   [ ] Malaysia [ ] Others:.....

3. **Age /*Umur* :**

   [ ] < 20 years old [ ] 20-30 years old
   [ ] 31-40 years old [ ] > 41 years old

4. **Duration of working hours per day :**

   [ ] < 8 hours [ ] 8 hours- 12 hours [ ] > 16 hours

5. **Working days per week :**

   [ ] < 3 days [ ] 4- 5 days
   [ ] 6- 7 days

6. **Year of involvement in racking installation process :**

   [ ] Less than a year [ ] 1- 2 years
   [ ] 3- 4 years [ ] 4 year and above

Section B : Safety training/ Awareness

1. **What is your job scope?**

   [ ] handling machinery [ ] work at height [ ] racking installation

2. **Do you receive any related training before doing your task by your employer?**

   [ ] Yes [ ] No

3. **Does the work task given being brief clearly?**

   [ ] Yes [ ] No

4. **Do you receive proper training in recognizing risk during work?**

   [ ] Yes [ ] No

5. **How do you feel about the ventilation at your workplace?**

   [ ] Good [ ] Moderate [ ] Need to be improved

6. **How do you feel about the lighting at your workplace?**

   [ ] Good [ ] Moderate [ ] Need to be improved

7. **How frequent do you do housekeeping at your workplace**

   [ ] Once a week [ ] Every 2-3 days [ ] Everyday

8. **Do you think housekeeping can help to reduce rate of injury occurance at workplace?**

   [ ] Yes [ ] No

9. **In your opinion, do you think your workplace is safe & clean?**

   [ ] Yes [ ] No

Section C : Safety in Workplace

1. **Which Personal Protective Equipment do you wear during work?**

   [ ] Face Mask [ ] Safety Helmet [ ] Safety Gloves [ ] Safety Shoes

   [ ] Safety goggle [ ] Ear plug [ ] Long Sleeves [ ] Harness

2. **Have you ever experience any accident at workplace?**

   [ ] Yes [ ] No

3. **What are the accident you encounter previously ?**

   [ ] Slip/ trip [ ] Fall from height [ ] Hit by moving object

   [ ] Hit something stationery [ ] Hit by moving vehicles

4. **What are the common near- miss incident happen during installation activities?**

   [ ] Hit by moving vehicles [ ] Fall at height [ ] Slip/ trip

   [ ] Hit by moving object [ ] Hit by something stationery

Section D: Health

1. **Have you ever experience injury while at work?**

   [ ] Yes/Ya [ ] No/Tidak

2. **Have you ever feel dizzy or nausea when doing work?**

   [ ] Yes/Ya [ ] No/Tidak

3. **What are the common injuries you have from performing the task?**

   [ ] Back pain [ ] Cuts, Bruises, fractures

   [ ] Lower limb disorder [ ] Neck and upper limb disorder

4. **Does the injury occur more than once?**

   [ ] Yes/Ya [ ] No/Tidak

5. **Have you ever take leave because of sick or got injured from the installation activities?**

   [ ] Yes/Ya [ ] No/Tidak

6. **How many day do you normally take leave because of the sick or injury?**

   [ ] 1-2 days [ ] 3 days and above

Section E : Safety in Machinery and Tools

1. **What type of machinery / tools you handle during working installation?**

   [ ] Forklift [ ] Restruct [ ] Power drill

   [ ] Scissor lift [ ] Impact tool [ ] Other:.....

2. **When handling machineries/tools, what safety measures you imply?**

   [ ] wear seatbelts [ ] wear glove

   [ ] wear safety helmet [ ] wear safety harness

   [ ] wear safety boots [ ] wear safety vest

3. **Do you encounter any problem when handling tools or machineries?**

   [ ] Yes [ ] No

4. **What type of injuries you encounter when handling machineries/tools?**

   .....

Appendix B

Photo events at wearhouse racking installation site

1. SITE OBSERVATION

Induction



- Induction was done to receive permit to enter around site during the research.
- All new workers must go through induction before start their work on site.
- The importance of wearing personal protective equipment, and identifying hazards and risk during work were briefed clearly.

1. SITE OBSERVATION



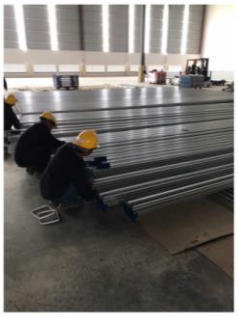
- Warehouse have 5 zones with 3 types of racking installed by SSI SCHAEFER which were SOS system, APR system, and free standing mezzanine platform
- The racking installation was done by completing one zone before starting the next zone.

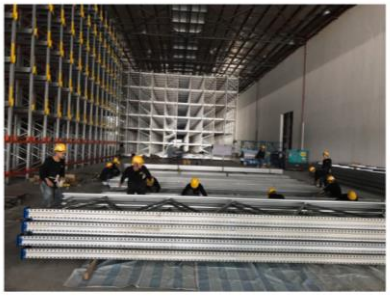
1. SITE OBSERVATION




- Type of machinery used during racking installation :
  - Scissor lift (work at height)
  - Forklift with combustible engine
  - Forklift using electricity
  - Reach truck

1. SITE OBSERVATION





- Type of work using hand tools (power drill and impact tool) to tighten the bolt and screw involves climbing, bending, and lifting