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## Construction Site Workers' Awareness on Using Safety Equipment: Case Study

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**Abstract.** Construction sector is an important sector and contributed significantly to national development. However, this sector poses higher risk to accident. This is due to fact that construction site can be considered as a dangerous zone to workers and to the public. Due to the variety of cases occurs on site, the contractor will usually have to pay the cost related to accidents in the form of higher insurance premium. Despite various measures, accidents still occur at construction sites. Personal Protective Equipment (PPE) is one of the important means to protect the wearer from hazards in the workplace. Since this equipment is the last frontier of the wearer from worksite hazards, it is important to select it based on the job scope and the intended protection. Therefore, this study was formulated to find out the level of knowledge and awareness of construction workers on PPE usage. It was also important to know what make the workers would want or do not want to use the PPE. It was found in this study that the level of awareness and knowledge among workers on the proper use of PPE is moderate. Construction sites accident can be further be reduced with proper implementation of PPE voluntarily by all workers.

### 1 Introduction

The construction sector is one of the catalysts to the development and economic growth in Malaysia. In the 10<sup>th</sup> Malaysia Plan (Year 2011 until 2015) construction represent the sum of RM230 billion, in which RM138 billion currently in physical development or under construction. In Malaysia, the Construction Industry Development Board (CIDB) is responsible for making recommendations to government on matters related to the construction industry and manages the important parts of the industry including registration of contractors, helping advance the knowledge base of the industry, training, safety, and education [1]. Besides that, the National Institute of Occupational Safety and Health (NIOSH) is functioning to provide training place, examination, consultants, research and development and others relevant in construction. As development activities became more dynamic, there are variety of problems arises including problems from near misses accident and accident occurring at a construction site. Due to the variety of cases occur on the construction site, the contractor have to pay the accidents cost and loss of productivity. One of the reasons accident cases remaining as major issue in Malaysia is partly about the awareness of Personal Protective Equipment (PPE) among worker. PPE is the last ranks on the hierarchy of controls, as the workers are exposed to the hazard, with a barrier of protection.

It was confirmed by international research that small businesses are poorer than larger organizations in implementing formal OHS programmes (1). The large construction firms have implemented a wide range of OHS management initiatives; it seems that SMEs in construction undertake little in the way of formal OHS management activities. Employers or contractors are responsible for providing, replacing and paying for PPE. The workers are responsible for actually using the protective equipment based on their jobs. For equipment selection, employers need to make proper selections, they must survey for hazards, organize and analyze the data and then make a proper selection based on type of hazards. The employer must communicate to each employee (workers) what protective equipment is required and train each employee how to use the PPE, the limitations of the PPE, and how to care for the PPE. This is to ensure that the equipment can work efficiently and effectively when used, thus helping to protect them from near miss and serious accidents.

## 2 Literature Review

Safety and health in construction is a condition in which an employee needs a safe and healthy environment for herself and other people that be affected by its activities [2]. The factor affecting safety on construction site includes poor safety awareness of top management, lack of training, poor safety awareness of project managers and reluctance to input resources to safety and reckless operations [3]. There are three (3) elements to behaving safely; the knowledge, equipment on works, motivation (psychology) on how to operate safely [4]. These elements must be carried out, cooperate and attention to the workers as well as the management to enhance safety during the working on site.

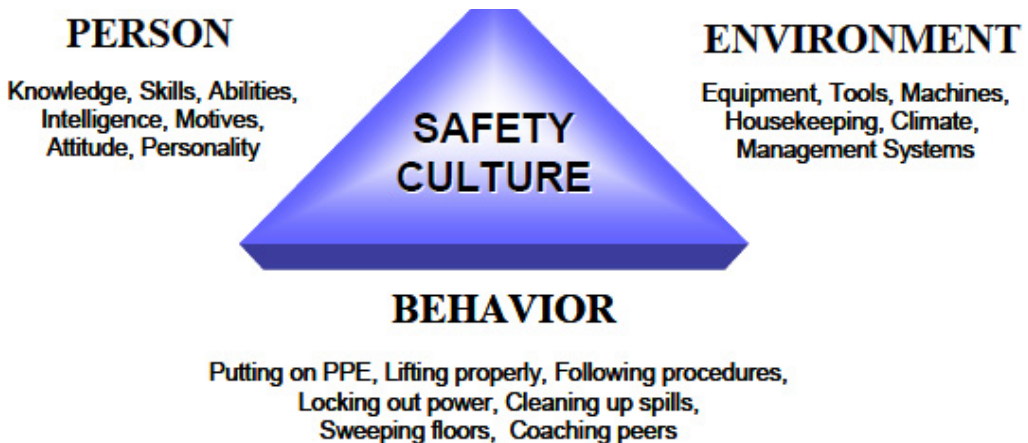
### 2.1 Personal Protective Equipments (PPE)

Personal Protective Equipment (PPE) is the equipment that needed for give a protection to the person from any hazard in workplace. The minimum for personal protection for workers or visitor to a construction site shall be safety helmet, safety shoes (boots), safety glasses and hand protection. Eight (8) steps of PPE Guideline [5]:

- Evaluate an exposure to the risk of accidents,
- Carry out an assessment of other controls, establish performance characteristics required,
- Determine the barrier of ergonomic, evaluate the PPE requirements based on work environment,
- Selecting the PPE equipment based on hazard, quality and effective cost, provide training, then;
- Surveillance on the PPE application

There are (3) more items that required when applying criteria for PPE; through application, employee-owned equipment and safe design. The factors that influence of PPE practice on site: -

- The physical and psychological about the PPE usage.
- Perception of younger age in affecting use of PPE.
- Lack of enforcement and safety training by employer.
- The employee knowledge, belief and attitudes through perceptions of hazards and risk.
- Lack of support by management in supporting the safety culture.



**Figure 1:** The relationship between person, environment and behavior on safety culture

A guideline to create awareness of the PPE usage among workers on site: -

Develop a Project Culture that supports worker safety. It was thoroughly on the values of good working relationships and clear communication to each of them. PPE hazard assessment and training. The assessment should apply to set a standard operating procedure for personnel, and then train employees on the protective limitations of the PPE, its proper use and the maintenance. All parties involved must be totally committed to safety. When the planning was carry out involving all parties, employee awareness would be created because they feel that employers are very concerned about occupational safety. Employee responsibilities. an employee needs to express their concerns and ideas to management, the program implementer, or the noise-control engineer. Besides that, they must have a sense of responsibility to comply with all rules and regulations.

### 3 Research Methodology

The questionnaire form for the respondent was prepared with 20 questions on safety and PPE at construction site. The respondents consist of workers on all construction site projects. There were 80 forms distributed among workers, and 60 of the respondent gave a good cooperation. Observation method that was used in this study is to make an observation and surveillance at the construction site. This is divided into two categories of projects known as SME's and Large Project in Penang. There are some special aspects included in this observation, such as: -

- The workers awareness on the use of PPE during working on construction sites. It can be seen through to the habit (behaviour), mode of application, their initiative on getting the PPE as a personal protective.
- Some other parties that concerned with the wear of PPE among workers. The parties can be the employers, Safety Officer (SHO), Site Supervisor and others.
- The safety management by employer, SHO and other parties to surely the environment workplace was in safe and satisfied. Besides that, the observation from this parties through about wearing on PPE among workers during working.
- Preparing a proper working system and affect to workers in order to protect them from accidents or related on near misses. This is surely accountable to management parties.
- Identified any factors that influence workers to wearing the PPE on site.

An interview session was carried out with the Safety Officer and Site supervisor. They gave feedback in terms of PPE supply from employer, the workers' awareness on using PPE, toolbox meeting in periodically, and others information about safety and workers.

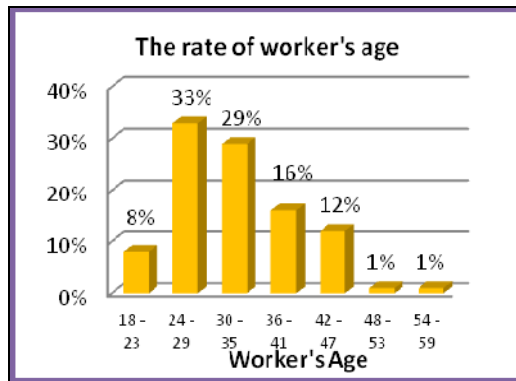
## 4 Result and Discussion

60 questionnaire forms returned were considered a good received considering some workers on site could not understand Malay or English or could not read. Most of the works couldn't afford to spent time on answering questionnaires.

**Table 4.1:** The number of respondent based on criteria and total respondents.

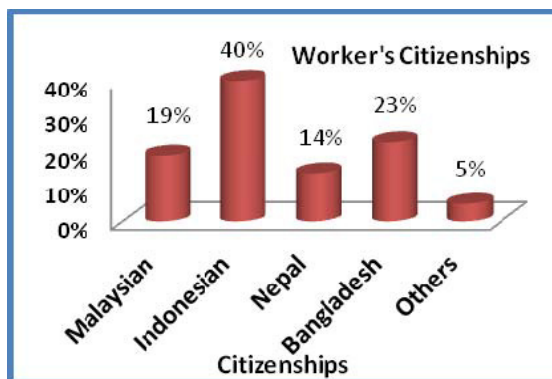
Criteria Respondent	Number of Respondent
Satisfied Respondents	60
Unsatisfied Respondents	20
<b>Total Respondents</b>	<b>80</b>

The data collection based on the questionnaires:-



**Figure 2:** Rate of worker's age

Figure 2 shows the view of worker's age in the study area. The average worker in the study area is between 24 to 29 years old at 33% of the respondents (total respondents: 80 persons). While only 1% just recorded for workers aged between 48 to 53 years and 54 to 59 years old. This case shows that the construction worker in around Penang was the categorized as a young people. Many speculations were arising; they are still young and have a better nature than those aged 40 years old and above. However, those who are range of 40 years; they have a lot working experience deeper than young worker does.



**Figure 3:** Worker's Citizenships

The worker’s citizenships status been classified as Figure 3. There have five (5) main categories based on worker’s citizenships status; Malaysian, Indonesian, Nepal, Bangladesh and others. For the ‘Others ‘category was consisted of Burma and Indian’s worker. Majority the workers are from Indonesian, which is consist by 40% of total respondents. While the minority 5% of the respondents are from ‘others’ countries. Based on the results of respondents, the mostly Indonesian workers have a higher skills on construction compared to workers from other countries. Besides that, workers from Indonesian are also easily able to work compared than workers from other countries. So that, the contractors was preferred to hire workers from Indonesian to works on construction project. In addition, the communication between employers to employee is easier because they (Indonesian workers) could understand and communicate in Malay Language. The Indonesian’s native language almost been same with Malaysian’s language. Therefore, this situation through can be more smooth to the construction project on worksite.



Figure 4: Working experience on construction site

Figure 4 shows the Pie chart of period working experience on construction site among workers. There have 28% of respondents have the working experience for 3 until 5 years on construction sites. This situation was reflecting that the level can be classified as a middle level. They can be describes as a person that beneath in learning process to get an improvements to their construction’s skills. This case can be related on the worker’s average as shown in Figure 4.1 (The rate of worker’s age) which is the highest workers was around 24 until 29 years old. The working’s experience among this respondent may be not enough in terms of many aspects on construction process. While, there is only 5% of respondents have the working’s experience on site around 20 years and above. The period’s of working through been simplify as a skilled worker regarding to various aspect especially in work safety.

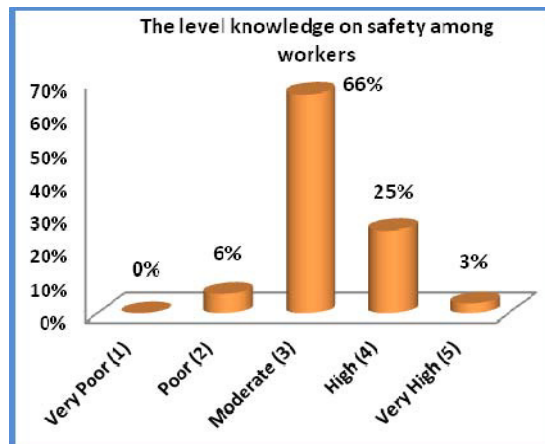


Figure 5: Level of knowledge on safety among workers

Figure 5 shows the Bar chart of level knowledge on safety among workers. The mean score is 3, which is equal to 66% in moderate level. This indicates level of knowledge on the safety been classified in intermediate level. Generally, workers knew not all applicable laws on safety at construction sites. However, they are also be labeled as a workers who cares about safety. Although their level of knowledge is not comprehensive, but they know about the risk of accidents at construction sites. In this case, the employer plays an important role to promote safety awareness among workers. Besides that, the initiative taken by workers also important to prevent any accidents during working should be practices. Although they are new workers who had worked less than 6 months, they have the basic knowledge on safety at construction sites. This statement can be proved through the Pie Chart shown nothing worker were very weak (1) to the knowledge of safety at construction sites.

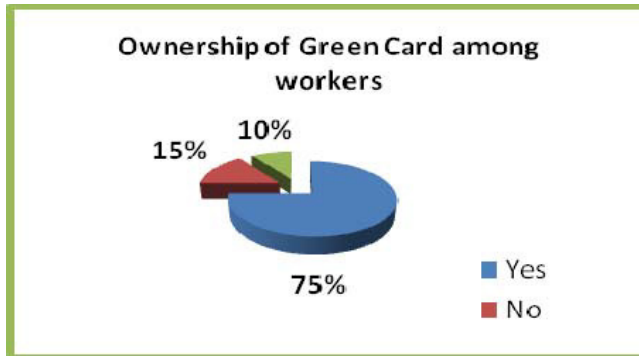


Figure 6: Ownership of Green Card among workers

Figure 6 shows the Pie chart of ownership Green Card among workers. As we know that, the use of Green Card issued by Construction Industry Development Board (CIDB) is very important to the construction sector in Malaysian. Any parties and persons that involved in the construction industry should have a Green Card. The findings of the respondents indicated that the majority workers 'have' Green Card is 75% of total respondents. Then 15% of them indicated that they 'does not have' Green Card required by CIDB.



Figure 7: Stressing on safety aspects to workers by employers

Small amounts of 10% of the respondents are 'not sure' whether they have Green Card or not. A green card was obtaining after attending a course organized by the safety and health under the CIDB. Those involved in the construction site would have Green Card. Especially construction workers (construction labour). Those workers had a Green Card would be exposed to the knowledge about the

importance of wearing safety equipment and PPE. The Pie chart above refers to the percentage that had a Green Card is high, it can be interpreted that they have a basic knowledge of the application on PPE and safety matters at the construction site. The course organized by CIDB will expose participants on PPE attire and its functions according to the scope of work, place and situation. Duties of a Green Card can also cultivate self-awareness about safety while working on sites. Those workers not sure whether having a green card or not, they are sorely lacking been exposed on basic safety by CIDB. In addition, employers might be less emphasis on the issue of Green Card; in fact, they could convict by CIDB because the workers do not have a Green Card.

Figure 7 shows the Bar chart of stressing on safety aspects to workers by employer. Based on Bar chart above, there have 69% of respondents was agree that employer stressing on safety aspects while at work. Then, 25% of them indicate that the employer was 'sometimes only' stress on safety. Lastly, 6% of them were disagreeing about this issue. Majority, which is consist 69% of respondents was agree because of monitoring and surveillance on safety and worksite usually stressing by SHO and Site Supervisor or employers representatives. However, probability monitoring by the parties might be less than 15 hours per week; not fulfil and compliance based on regulation 25 (i), Factory and Machinery Regulations 1986.

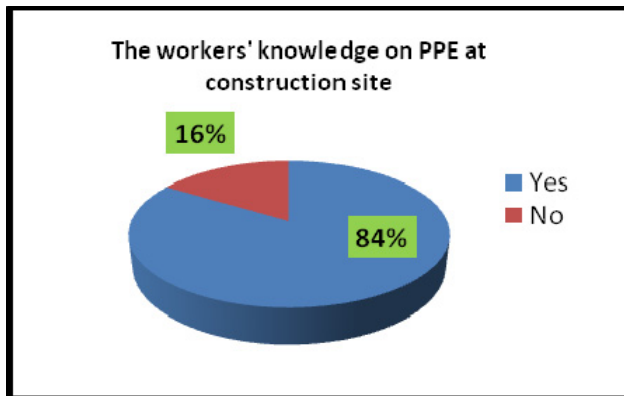


Figure 8: Worker's knowledge on PPE at site

Figure 8 shows the Pie chart of workers' knowledge on PPE at construction site. Based on Pie chart above, 84% of respondents were agreeing that they have knowledge about PPE on site. While 16% of respondents indicated that, they do not have knowledge on PPE. Definitely, those who had a Green Card (Green Card owner) probability have a greater knowledge into PPE. This is because they were given an exposure and initial safety training basic in the worksite. PPE is the important basis for safety at worksite.

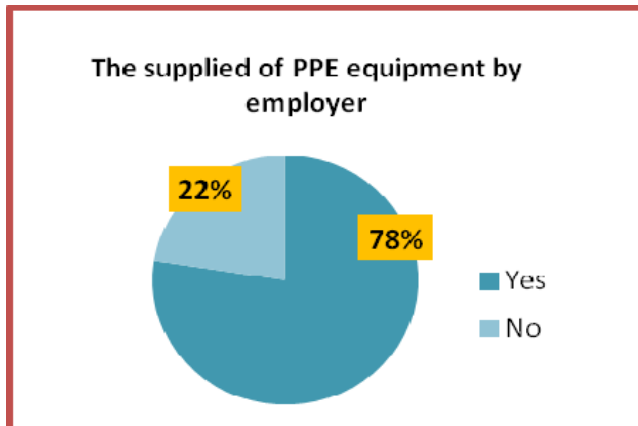


Figure 9: Supply of PPE equipment by employer

However, it is difficult to ensure either the workers have knowledge of this PPE aware while working or not. There is a possibility that they just worn the PPE equipment when instructed by the SHO or from an authorities visited. However, when surveillance and monitoring does not carried out, they indiscriminately violate the regulations; not wearing PPE equipment during working. While there have some respondents did not know on PPE; might be not attend the course by CIDB. Nevertheless, an employer still provide the PPE equipment to workers either they are already attended the course or not.

## 5 Conclusion

PPE usage within construction sites is in the interest of all parties including workers, employers and authorities. Awareness of the PPE application should constantly be stressed to the employees be it in the SME's or large project. An efficient and effective action needs to be planned and implemented to ensure the employees comply with wearing PPE during working. The use of PPE should become the main priority to protect workers and prevent from serious accident. Therefore, all parties (DOSH, CIDB, NIOSH, PWD, employer etc.) should take the lead collaborate in achieving the objectives to ensure PPE application among workers in worksite. When the parties were cooperating, this issue can be overcome and the number of accident in our country can be reduced.

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