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The Importance of PPE Use in Construction Site

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Abstract: Employee safety issues in high-risk sectors such as the construction sector becomes a major concern as it involves hazardous work, prone to accidents, and the risk of injury. Safety is an important matter that needs to be emphasized by the employer in carrying out construction work. The Occupational Safety and Health Act (ACT 514) emphasizes on the importance and welfare needs of construction workers in the workplace. Therefore, this study is conducted to determine the use of Personal Protective Equipment (PPE) among construction workers while performing their work at the construction site. This study focuses on three aspects: knowledge, skills, and attitudes of construction workers on the importance of using PPE at construction sites. A questionnaire was employed as the main instrument to achieve the goals and objectives of the study. This study involved a total of 103 construction workers from three construction sites in the states of Johor and Selangor. All data obtained from the questionnaire were analyzed to obtain the frequency, percentage, mean score, and standard deviation. The results of the study found that the use of PPE among construction workers in the construction sector is high and at a satisfactory level. The mean score value for each construct in terms of knowledge, skills, and attitudes of construction workers towards the importance of PPE shows a high and good level. Overall, construction workers are concerned about using PPE while doing work on construction sites and are aware of the safety issues. This study is expected to provide useful input to all relevant parties in the construction sectors and in turn can improve safety management in the construction sectors for the sake of the workers and their careers, as well as for the employers.

Keywords: Construction Worker, Personal Protective Equipment (PPE), Construction Site, Safety.

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1. Introduction

The construction industry is a dynamic and innovative industry in contributing to the development of a country, such as Malaysia as a developing country. However, this sector contributes to the high risk of accidents. According to the Malaysian Social Security Organization (SOCSO), from 2000 to 2009 there were 656,555 accidents in all industries and 42,775 accidents in the Malaysian construction industry sectors. Working in the construction sector faces a higher risk of accidents than working in other sectors (Ali, 2018). Personal Protection Equipment (PPE) is one way to protect workers from chemicals, and physical injuries and minimize exposure to any unwanted accidents. It is also widely used in high-risk places such as manufacturing plant areas, and construction. Among the examples of PPE for work on construction sites are safety helmets, safety shoes, gloves, and others. This equipment should be provided by the employer and the companies involved in the construction work. The selection of PPE that is accurate and suitable for the job is very important. As employers and employees, they should know the purpose, use, and importance of PPE. PPE should be provided according to the suitability of the work done in the work area. As construction workers, they should be aware of the importance of the use of this PPE and the equipment maintenance measures provided according to the specified specifications.

1.1 Problem Background and Statement

According to statistics from the Department of Occupational Safety and Health (DOSH), one in ten workers at construction sites is injured every year. This can be evidenced by the accident statistics of construction workers showing an increase since 2012, and a total of 140 construction workers died in 2015, the highest value recorded since 2001 and the highest in the 21st century (DOSH, 2016). And Malaysia, which is developing rapidly to compete with Asian countries, is no exception to this accident problem. According to the Department of Occupational Safety and Health (DOSH, 2018), the construction sector is the third sector with high accident statistics. It recorded 3911 accidents and 169 deaths in 2018. Meanwhile, in the United States, in 2001 there were 1,225 fatal injuries in the construction sector with an incidence rate of 13.3 percent per 100,000 workers employed in the construction sector. Therefore, it can be suggested that the construction sector is one of the sectors with high accident statistics in various countries.

According to Tam and Fung (2018), many construction workers do not use PPE because they are less comfortable wearing it. They think this PPE will reduce their work performance. This is because they cannot carry out work in a comfortable and easy situation. Employees take the use of PPE carelessly and think it is not important. This can be proven by statistics in 2016 there are 40% of accidents occurred due to employees who are not wearing PPE properly and safely. One of the reasons is due to the lack of PPE equipment and lack of knowledge on the importance of the use of PPE to employees (Samuel, 2017). Therefore, the management of the construction site should emphasize the importance of the use of PPE to ensure that employees can carry out work in good and safer conditions.

Malaysia has a relatively high number of foreign workers which is increasing over time. Problems will begin to arise when they are unable to understand the manuals provided to them when they are required to be trained for the use of safety equipment. Therefore, the delivery of information is not clearly accepted by them. According to Misnan et al, (2016), there are four critical factors as indicators of safety culture, namely communication, organizational learning, organizational focus on safety and health, and external focus. Construction workers' safety will be more assured if PPE is provided in good condition without any damage. There are some companies that do not willing to spend extra budget on PPE for their employees. According to Tam and Fung (2018), through their study, company managers find it difficult to persuade to spend a high cost on PPE to control harmful conditions.

Based on the issues discussed above, it can be concluded that in general, the construction sectors contribute a lot of benefits to a country. Nevertheless, the accident rate in the construction sector recorded high statistics and increased from year to year. In addition, the company or employer should

provide quality and complete PPE as it can help to reduce the potential for injuries and accidents to occur. Poor training in machine operation and the use of PPE are also causes of injuries and accidents that can occur while performing works on construction sites. Furthermore, the use of PPE can reduce the risk of physical injury occurring. However, the use of PPE is sometimes taken lightly by some workers. There are also many construction workers who do not wear PPE because they are not comfortable wearing it (Tam & Fung, 2018). They think that PPE will reduce their work performance. Therefore, this study was conducted to find out the perceptions of construction workers on the importance of the use of PPE. In fact, this study also has the potential to provide awareness to construction workers as well as to the company or employer to supply complete and perfect PPE and safe to construction workers.

1.2 Objectives

The purpose of this study is to identify the awareness and practice of construction workers on the importance of using PPE on construction sites. Hence, the objectives of this study are:

1. To identify the knowledge of construction workers on the importance of using PPE
2. Identify the skill of construction workers in the use of PPE.
3. Identify the attitude of construction workers on the use of PPE.

2. Methodology

The research design used in this study is a survey using a quantitative approach using a questionnaire. A quantitative approach is a method in which quantity is the benchmark of evidence and information to be obtained. It was conducted on the sample of a study identified to obtain the necessary data. The questionnaire is used as the main tool to gather the desired information. This research is emphasized objective and is controlled through data collection and analysis. The survey is conducted by distributing the questionnaire to the respondents who are known as construction workers. Statistical Package for Social Science (SPSS) version 25.0 is used to analyze the data. This software is used to facilitate the work of data analysis and translate the data into a more detailed and structured form of information.

2.1 Research Sample

A population is a group of individuals or objects that have similar characteristics. The sample involved in this study consists of construction workers working on three construction sites in the states of Johor and Selangor. The construction site location that has been selected located in Segamat, Putrajaya, and Johor Bahru.

The targeted respondents in this study consist of different age groups, work experience, and races. Based on the needs of this study, the sampling method used is simple random sampling. This method was used by researchers at three construction site locations. This sample selection focuses on construction workers involved in construction projects. According to Kothari (2014) a sample number of 10% to 20% of the population is sufficient. Likewise, with the opinion of McMilla and Schumacher (2014) said that for survey research, the appropriate number of subjects is approximately 100 respondents. Therefore, a total of 103 construction workers were selected for this study, those who answered and returned the questionnaires that have been distributed.

2.2 Research Instrument

Research instruments are the process of forming, testing, and using tools or materials for the process of obtaining data. This study used the form of a questionnaire as a research instrument where the items are taken modestly from previous studies. Measurements were made after obtaining the data from the questionnaire to be analyzed. A questionnaire form is a method of collecting data from selected respondents to provide feedback on question items provided by the researcher based on the purpose of

the study. The questionnaire consisted of four sections, Section A, B, C, and D. For Section A was the demographic data of the respondents. Whereas Part B, C, and D involve variables in the importance of PPE in the construction site in the aspects of knowledge, skills, and attitude. Those parts used a five-point Likert scale to measure the items. Table 1 shows five selected Likert scale ratings. Whilst, descriptive data analysis was performed on demographic information and worker perceptions on the use of personal protective equipment (PPE).

Table 1: Five-point Likert Scale Interpretation (Yaakob, 2017)

Scale	Ratings
1	Strongly disagree (STS)
2	Do not agree (TS)
3	Unsure (U)
4	Agree(S)
5	Strongly agree (SS)

3. Results and Discussion

This section will present and discuss in detail the data that has been obtained from the questionnaire. All the data were analyzed using SPSS version 26.0. The following subsections elaborate further on the findings for every section in the questionnaire.

3.1 Analysis of Respondents' Demographic Data

Respondents involved in this study were randomly selected among the construction workers from three companies that carried out construction work. There are 103 construction workers involved in this study. Table 2 presents the demographic detail of the respondent.

Table 2: Descriptive Analysis of the Respondents' Demographics

Demographic information		Frequency (□)	Percentage (%)
Gender	Male	96	93.2
	Female	7	6.8
Age	20 and below	4	3.9
	21 - 30 years	44	42.7
	31-40 years	25	24..3
	41-50 years	19	18.4
	50 and above	11	10.7
Race	Malay	16	15.5
	Chinese	2	1.9
	Indians	1	1.0
	Others	84	81.6
Experience	Below 1 year	14	13.6
	1 - 5 years	43	41.7
	6-10 years	31	30.1
	More than 10 years	15	14.6

The majority of respondents are male workers with a total of 96 respondents. (93.2%). Meanwhile, there are only seven (6.8%) female workers involved in this study.Most employees are between the ages of 21-30 which is a total of 44 workers (42.7%). Next, followed by respondents aged between 31-40 years, which is 25 workers (24.3%), and respondents aged 41-50 years as many as 19 workers (18.4%). The least number of respondents are less than 20 years' old which is four workers (3.9%). This was followed by respondents aged over 50 years which is a total of 11 workers (10.7%)

Most of the workers are foreign workers which are 84 workers (81.6%). Among the foreigner are workers from Indonesia with a total of 36 workers (42.86%) and Bangladesh is 48 workers (57.14%). Meanwhile, for local workers, the majority of respondents were Malays, with a total of 16 workers (15.5%). Chinese respondents were two (1.9%), and only one (1.0%) were Indian workers.

Many workers have experience between 1-5 years which is 43 workers (41.7%). It is followed by construction workers who have 6-10 years of experience with a total of 31 workers (30.1%). Meanwhile, the fewest employees are those with less than a year of working experience 14 workers (13.6%). The rest, are construction workers who have more than 10 years of work experience which is 15 workers (14.6%).

Based on the analysis that has been made, the researcher found that respondents who have long working experience are more skilled and sensitive to the use of PPE and also issues related to safety while working on construction sites. According to Dharmawati and Wirata (2016), a person's knowledge is influenced by a person's education, age, and work experience. According to him, an experience is an event that someone has experienced, the longer the working time, the more knowledge will increase.

Besides that, all respondents were asked about the use of PPE. Figure 1 displays the finding for the PPE they used while at the construction sites.

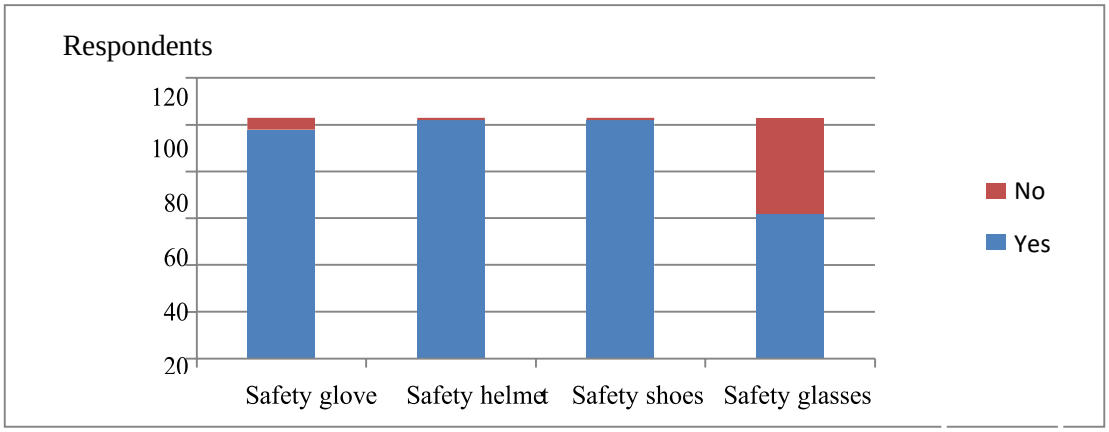

Figure 1: Use of PPE at Site

As a result of the analysis related to the use of PPE among the respondents, almost all of the respondents, 102 (99%) stated that they use safety helmets while doing work on construction sites. The use of safety shoes is also one of the most widely used PPE which is 100 (97%) respondents wear them while at the construction site. In addition, 98 of workers (95.1%) indicated that they wear safety gloves as one of the PPE required at the construction sites. However, the use of safety goggles is relatively low, with 62 (60.2%) respondents choosing to wear them while at construction sites. This may be because only certain works require to wearing of safety glasses compared to the PPE mentioned above.

3.2 Analysis of Construction Workers on The Importance of the Use of PPE

The questionnaire that has been distributed to respondents has 3 sections related to the perception of construction workers towards the use of PPE which is focused on knowledge, skills, and attitude. All data were analyzed using the mean score and standard deviation.

To help simplify the interpretation of the data obtained, the interpretation of the score means is used. Table 3 shows the interpretation of the mean score.

Table 3: Interpretation of the mean score (Harrell, 2017)

Interpretation	Mean score
High	3.68-5.00
Medium	2.34-3.67
Low	1.00-2.33

3.2.1 Knowledge of the Importance of Using PPE Among Construction Workers

A total of 10 items have been developed in Section B to identify the knowledge about the PPE and safety precautions while at the construction site. Table 4 presents the findings for this section.

Table 4: Knowledge of the Importance of Using PPE

No	Item	Score mean	Standard Deviation	Interpretation
B1	I know and clear about the scope of my work.	4.68	0.564	High
B2	I know the function of each PPE provided by the company.	4.56	0.518	High
B3	I know how to use PPE properly.	4.72	0.493	High
B4	I know how to store PPE well to prevent any damage.	4.61	0.581	High
B5	I know that I need to always use PPE while doing any work at any time.	4.69	0.524	High
B6	I know how to use the appropriate PPE when operating a tool / machine.	4.54	0.638	High
B7	I know to make a report if there is any damage to the equipment at the construction site.	4.46	0.725	High
B8	I know that work can be done safely if I use PPE.	4.62	0.526	High
B9	I know the safety guidelines in the manual provided.	4.64	0.575	High
B10	I know safety measures when doing work on a construction site.	4.73	0.528	High
	Average scores mean	**4.63**	**0.567**	**High**

According to Table 4, the highest mean value is for item B10 which is related to safety measures when performing work on construction sites with a mean value of 4.73 and a standard deviation is 0.528. While item B3 has the second highest mean value of 4.72 and the standard deviation is 0.493. It is related to knowledge of how to use PPE properly. From Table 4 it can also be seen that there are employees who cannot report well if there is any damage to the work equipment at the construction site (item B7), with the lowest mean value, 4.46, and the standard deviation is 0.725. However, overall findings indicate that the construction workers have good knowledge about PPE and its usage as the mean average is 4.63, which is a high level.

The results of the analysis that has been obtained show that construction workers have good and positive knowledge about the use of PPE. However, there are workers who lack understanding in reporting if there is any damage to work equipment at the construction site. This may be due to language issues, as most of the workers are foreign nationals. Communication is an important element in an organization, especially in the construction sector involving foreign workers. According to Marjuki (2019), communication problems are one of the impacts in hiring foreign workers in the construction sector and is a conflict that has existed for a long time until now.

The findings of the study also show that employees have a very positive and sensitive awareness about the use of PPE while working. Employees are always aware of the dangers they will face while working and ensure that the equipment used is suitable for their work needs. This opinion is supported by Ulang et al., (2014), who emphasize the priority to protect workers from exposure to accidents and prevent serious accidents. According to Salleh (2016), employers need to ensure employees comply with the law, policies, and proactive work policies in safety and knowledge aspects. This shows that the aspect of knowledge is very important in guaranteeing work safety on the construction site. In addition, Ali (2018) suggested, as an employer, they can take safety measures by exposing employees to first aid kits and checking safety equipment. Construction workers should work in safe conditions and in an environment free from the risk of danger.

Overall, based on the analysis, it can be concluded that construction workers can master the knowledge related to PPE and safety at the construction site well and positively while working at the construction site.

3.2.1 Analysis Of the Skill of Construction Workers in The Use Of PPE

A total of 11 items have been developed in Section C to identify the construction worker skills in the use of PPE. Table 5 displays the findings obtained for this section.

Table 5: Construction Worker Skills in The Use of Ppe

No.	Item	Score Mean	Standard Deviation	Interpretation
C1	I do the work according to the right scope of work	4.64	0.655	High
C2	I am proficient in the functions of each PPE equipment provided by the company/employer.	4.58	0.650	High
C3	I can use every PPE properly.	4.69	0.505	High
C4	I can store PPE well to prevent damage	4.54	0.638	High
C5	I wear PPE equipment while doing work	4.66	0.476	High
C6	I can choose the appropriate PPE when operating a	4.52	0.654	High

	tool/machine.			
C7	I can use the appropriate PPE when operating a tool/machine.	4.50	0.670	High
C8	I am good at making reports if there is any damage to the work equipment at the construction site.	4.48	0.752	High
C9	I can perform work comfortably while using PPE.	4.58	0.634	High
C10	I am good at reading the safety manual provided.	4.47	0.814	High
C11	I am good at taking safety measures when doing work on construction sites	4.68	0.489	High
	Average score mean	**4.58**	**0.670**	**High**

Table 5 has shown the feedback on skills proficiency among the respondents for all items. The highest mean value is item C3 which is a mean value of 4.69, and its standard deviation value is 0.505. While for the lowest mean value is item C10 which is 4.47 with a standard deviation is 0.814. Referring to table 3.3, item C8 has the second lowest mean value of 4.48. It is related to the skills to make a report if there is any damage to the work equipment on the construction site. However, overall findings indicated that construction workers are skillful to choose as well as use appropriate PPE and know how to operate them as the average mean score is 4.58, which is a high level.

Through the results of the analysis that has been obtained, it was found that the workers lacked skills in reading the safety manual provided and the skills to report any damage to the equipment at the construction sites. Most of the respondents are foreigners and they might have some problems understanding the safety manual because the language is different from their mother tongue. Construction workers need to be given more explanation and attention to understand the contents of the safety manual. The abundance of foreign workers in this country is seen to have created the effect of language diversity where this situation makes it difficult for employers to convey instructions including difficulties in implementing safety because the workers have difficulty understanding it due to language problems (Salleh et al., 2016).

Accidents can occur due to language problems due to difficulty understanding work instructions, and safety rules. A study conducted by Salleh et al. (2012), found foreign workers other than Indonesians who had just arrived and worked in the construction industry did not fully understand Malay or English. Therefore, employers need to send employees to attend training or courses before entering or starting work on a construction site. This is because according to Cheng et al. (2014), accidents that occur in the construction industry are caused by construction failure which is related to the failure of safety implementation carried out on the construction site. Therefore, Teo et al. (2015), affirmed that the effectiveness of communication in terms of language is one of the important factors that affect the implementation of safety.

However, the PPE storage item well shows a high mean score. This proves that construction workers are sensitive and responsible for taking good care of PPE equipment. This is also stated by Ali (2018), that employees are always aware of the dangers they will face while working and ensure that the equipment used is always in a good and safe condition. This requires them to protect themselves while doing work on the construction site. This can indirectly save costs for the production

or replacement of PPE repeatedly if it is not stored and maintained well and neatly. Employers or companies have to incur excessive costs if construction workers do not store PPE properly because it will easily get damaged.

3.2.2 Analysis Of the Attitude of Construction Workers on The Use Of PPE

A total of 10 items have been developed in Section D to assess the perceptions of construction workers' attitudes towards the importance of using PPE. Table 6 shows the statistics of construction worker skills perception on the importance of PPE use.

Table 6: The Attitude of Construction Workers in The Use of PPE

No.	Item	Score Mean	Standard Deviation	Interpretation
D1	I do the work according to the right scope of work.	4.83	0.430	High
D2	I use every PPE equipment provided by the company/employer according to its functions	4.66	0.476	High
D3	I use PPE properly while doing work on a construction site.	4.67	0.493	High
D4	I store PPE well to prevent damage.	4.58	0.634	High
D5	I do a good job when using PPE while doing a job.	4.62	0.596	High
D6	I make sure to use the appropriate PPE when operating a tool/machine.	4.68	0.564	High.
D7	I immediately make a report if there is any damage to the equipment	4.57	0.636	High
D8	I use PPE while doing work because I feel safe wearing it.	4.66	0.516	High
D9	I make sure to understand the manual provided.	4.58	0.603	High
D10	I am sensitive to the safety measures that need to be taken when doing work on a site.	4.67	0.584	High
	Average scores mean	**4.65**	**0.553**	**High**

From the table 6, the highest mean score was 4.83 along with a standard deviation value of 0.430 for item D1 related to knowledge of the scope of work. This indicates that these items are categorized with a high degree of the tendency among construction workers. Furthermore, item D6 is the second highest item with a mean score value of 4.68 with a standard deviation value of 0.564. This item relates to the use of appropriate PPE when operating a tool or machine. Meanwhile, items D4 and D7 recorded low mean score values of 4.58 and 4.57. The standard deviation value is 0.634 for item D4 and 0.636 for item D7. However, these two items still recorded a high level that shows a positive attitude among construction workers toward the use of PPE.

The results of the analysis obtained as a whole show that the level of safety practices and attitude of construction workers is very good and positive. According to Harun (2009), to reduce the risk of

accidents on construction sites, workers need to ensure that safety practices are carried out during the period of workers on construction sites. Therefore, employees and employers should always practice a safe work culture to ensure that accidents at construction sites do not occur and are under control. This opinion is also supported by Ahmad Nazrol (2013), which is that good safety attitudes and practices not only reduce the risk of accidents but also reduce project costs. According to Salleh, et al. (2016), the employer needs to apply to the employees the legal compliance policy, and a proactive work policy in safety. Therefore, construction workers can start to be aware of complying with safety measures and requirements while working.

According to Hofmann (2015), employee safety depends on the attitude and concern for safety practices and culture in the workplace. The issue of safety at the construction site should always be emphasized by the employer to facilitate the implementation of the practice at the construction site.

For the attitude item in the use of each PPE equipment provided by the company or employer according to its functions, shows a high mean value. This proves that construction workers comply with safety measures at the construction site. Salleh et al. (2016), stated that the average employee obeys all the employer's instructions and uses safety equipment while working, although there are some employees who still take this issue lightly. The results of Osman et al. (2020), found that several occupational safety and health practices were implemented such as safety policies, safety and health meetings, education and training, site safety inspections, and personal protective equipment. The main problem that contributes to the problem of accidents is due to the attitude of the workers and the low level of awareness among the workers. Therefore, an attitude that cares and is sensitive about safety is important to create a safe work culture on construction sites (Ali, 2016).

4. Conclusion

The study was conducted to identify the perception of construction workers towards the use of PPE from the aspects of knowledge, skills, and attitude. From the research findings that have been analyzed, it can be concluded that construction workers have a good awareness of the use of personal protective equipment. Furthermore, through the results of this study, it was found that the employers of these three companies provide complete and good PPE to construction workers. This shows that employers and construction organizations take seriously the issue of worker safety at the construction site. Although there are many foreign workers at the construction site who have language problems, they are found to comply with all safety regulations. But there are still some workers who take lightly the use of this PPE. Therefore, the employer needs to make enforcement against any employee who still does not comply with the set rules. Therefore, it is hoped that the results of the research findings and recommendations presented in this study can provide useful input and contributions to the parties involved to increase the use of PPE among construction workers as well as parties involved in the construction sector in ensuring the sustainability of construction projects.

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