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Evaluation of Safety Awareness Among Workers Related to Physical Injury Accident in Manufacturing Industry

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Abstract: Factors contributing to workplace accident due to lack of safety awareness was investigated. The main objective of this study is to investigate the level of safety awareness among employees and to analyze the association of hazard and policies towards safety awareness among workers in the manufacturing industry using statistical method. Two hypotheses in this study are namely workplace hazard versus workplace policy, and procedure. Method to assess the awareness of workplace safety among workers is via questionnaires. The data collection was conducted at Continental Alor Setar, Kedah. Continental Alor Setar produces tires for vehicles such as motorcycles, cars and trucks. The respondents are among the workers in the production department and the sample size is 50 workers. The Statistical Package for the Social Science (SPSS) was used to analyze the data. The results of the study found that the level of safety awareness among employees is at moderate level. In addition, this study found that workplace hazards are not in line with workplace policy and procedure. For future study, an alternative way can be studied to increase the level of safety awareness among workers in the manufacturing sector in order to reducing number of accidents.

Keywords: Safety Awareness, Evaluation of Safety Awareness, Safety Awareness Among Workers Related to Physical Injury

1. Introduction

This chapter is the beginning of the research in this study. Among the descriptions described in this chapter is started with the background of the study, followed by a statement of research problem, research question, research objective, significance of the research, research outline and organization of the study. Workers who feel safe on the job are more productive, more likely to take personal responsibility, and more likely to be engaged in their work.

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On the job, safety awareness was more vital than ever to keep you safe and, more crucially, to keep from hurting or killing someone else [1]. The purpose of the study is to investigate the safety awareness in the manufacturing sector, specifically in the manufacturing industry. The role of safety awareness as a moderator in the relationship between employee participation and safety performance will be investigated in this study. This study will cover Safety Awareness among Manufacturing workers who have been involved in physical injuries until the end. As a result, control measures will be implemented to know the cause and to enhance the safety awareness among workers in manufacturing industry, which is affecting employee performance. The effectiveness of control measures will be proposed based on the level of employee awareness.

2. Literature Review

Safety awareness was more important on the job to keep you safe and, more importantly, to keep you from hurting or killing someone else [2]. The factors that influence the level of awareness include safety and health conditions, working environments, communication, and care and service. Meanwhile, physical injury is defined as damage to any bodily tissue that requires a healing process in order to be restored to a sound and healthy condition, damage to any bodily tissue that cannot be restored to a sound and healthy condition, or damage to any bodily tissue that results in the death of the person who has sustained the damage [3]. Physical injuries are frequently the result of violent events, but they can also be the result of other events [4]. Thus, accidents are defined as unexpected occurrences that cause injuries, fatalities, lost production, or property and asset damage. Accident prevention is extremely difficult in the absence of a thorough understanding of the causes of accidents. Workers and employers alike want to feel safe and healthy in the workplace. Creating strong workplace safety and health cultures has the greatest impact on accident reduction [5]. Then, manufacturing is the large-scale production of goods that uses manual labour and/or machines to convert raw materials, parts, and components into finished merchandise. Manufacturing is any business that uses manual labour or machines to create items from raw materials, and it is usually done methodically with a division of labour [6]. Providing a safe and healthy workplace is one of the most effective strategies for keeping construction costs down. Accidents not only cause delays in operations and project completion, but also direct and indirect costs. As a result, all manufacturing or construction companies are required by the Occupational Safety and Health Act of 1994 (OSHA) to provide a safe and conducive work environment for their workers and subcontractors on construction and manufacturing sites. Safety awareness was more important on the job to ensure your safety and, more importantly, to prevent you from injuring or killing someone else.

2.2 Data Collection Method

The researcher used a descriptive analysis according to the working part of the operator. "A sample is a subset of a population" it is made up of some members drawn from the population, and a subject is a single sample member, just as an element is a single population member. The use of this descriptive analysis is to measures of frequency, central tendency, dispersion or variation, and position are the four forms of descriptive analysis. These methods are best for dealing with a single variable at a time. This descriptive analysis was also used to ensure that the sample obtained covered the working parts of each operator group. This method is used to ensure that subgroups in a selected population will be represented at a certain rate. This sampling is suitable for use for the population in this study that is looking at workers from mixing, curing, tire building, hot prep, cold prep and final finish. The data in this study came in the form of workers responses to a questionnaire. The total operator population was 20 persons in each department. Researcher selected a sample size of 10 respondents according to the sample size determination. According to layered random sampling, for the curing part of the sample required is 10 operators, mixing sample required is 10 operators, hot prep sample required is 10 operators, tire building

sample required is 10. operators, cold prep sample required is 10 operators and the final finish of the sample required are 10 operators.

2.3 Data Analysis

This study uses descriptive analysis and inferential analysis. Descriptive analysis can describe the characteristics of a variable which consists of frequency, percentage, mean and standard deviation. For inferential analysis, this study uses descriptive statistics, reliability statistics and the Pearson R correlation test. Below is the analysis calculated using the following formula

2.4 Conceptual Framework and Hypotheses

Based on the literature review discussed above, a conceptual framework in figure and several hypotheses have been developed.

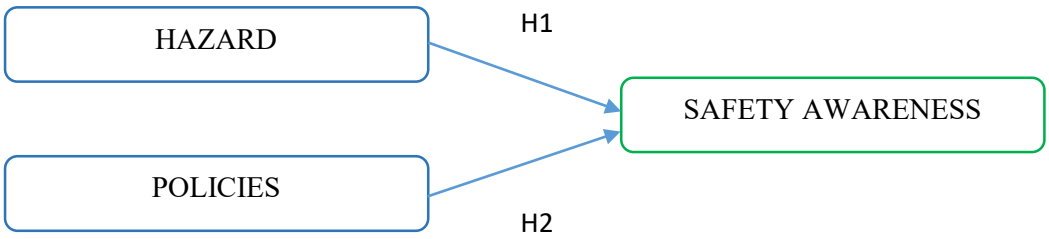


Figure: Conceptual Framework.

H1: There is significant correlation of hazard towards lack of safety awareness.

H2: There is significant correlation of policy towards lack of safety awareness.

This study uses descriptive analysis and inferential analysis. Descriptive analysis can describe the characteristics of a variable which consists of frequency, percentage, mean and standard deviation. For inferential analysis, this study uses descriptive statistics, reliability statistics and the Pearson R correlation test. Below is the analysis calculated using the following formula:

$$\tau = \frac{\bar{x} - \mu}{S_X}$$

Where,

$$S_X = \frac{s}{\sqrt{n}}$$

Where,

$\boldsymbol{n}$ = Sample size (i.e., number of observations)

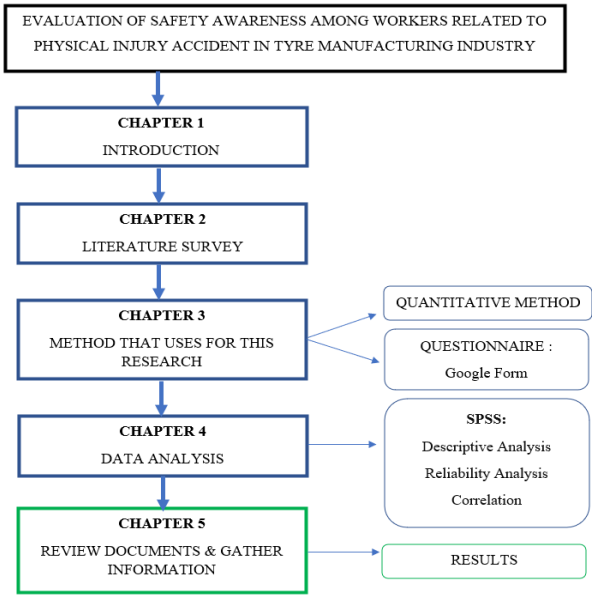
$\bar{\boldsymbol{x}}$ = Sample mean

$\boldsymbol{\mu}$ = Proposed constant for the population mean

$\boldsymbol{S}$ = Sample standard deviation

S_X = Estimated standard error of the mean

The following are the processes for data analysis in this study:



3. Results and Discussion

The survey was distributed through one platform which is google form. The analysis of questionnaire will be divided into 4 section which are section A, section B, section C and section D. The question is will based on the objectives on the research seeking of safety awareness among workers related to physical injury accident in manufacturing industry.

3.1 Reliability Test

The value of Cronbach Alpha test stated that the questionnaire is reliable since the value must be obtained is more than 0.6. For this research, the value of Cronbach Alpha reliability test is picked from section C and D are shown in table below.

Table: Internal consistency using Cronbach's Alpha

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.1.1 Section C: Workplace Policies and Procedures

Reliability Statistics

Cronbach's Alpha	N of Items
.853	5

3.1.2 Section D: Workplace Health and Safety Awareness

Reliability Statistics

Cronbach's Alpha	N of Items
.867	5

3.2 Descriptive Statistics

Table: Descriptive Statistics

Section B	N	Mean	Std. Deviation
1. Do you think being interact with chemicals or inflammable substances are dangerous? (B1)	51	4.63	0.631
2. Manually push or lift items that are more than 20 kg? (B2)	51	2.59	0.638
3. Work under high decibel environment? (B3)	51	2.39	0.802
4. Perform tasks that you are not familiar with? (B4)	51	2.41	0.638
5. Work in difficult positions (bending, twisting, heavy manual labour)? (B5)	51	2.90	0.964
Valid N (listwise)	51		

Table above shows, B1 has the highest mean among the others statement with a value of 4.63. It was mainly due to highest number of respondents agreed being interact with chemicals or inflammable substances were dangerous. Whilst, B3 has the lowest mean among them which was 2.39. The mean value still falls under low level. Thus, it can be assumed that most of the respondent were disagree with the statement that they work under high decibel environment. The workplace hazard would influence the respondent's safety awareness.

Table: Descriptive Statistics

Section C	N	Mean	Std. Deviation
1. Everyone receives compulsory health and safety training? (C1)	51	4.57	0.671
2. There is an active health and safety committee? (C2)	51	4.33	0.909
3. Management is extremely particular about the certification? (C3)	51	4.67	0.554
4. Workplace health and safety is considered extremely important? (C4)	51	4.55	0.642
5. Health and safety procedures are clearly communicated? (C5)	51	4.29	0.782
Valid N (listwise)	51		

Table above shows, C3 has the highest mean among the others statement with a value of 4.67. Thus, it can be assumed majority of the respondents agreed with the statement of management is extremely particular about the certification. Whilst, C5 has the lowest mean among them, which was 4.29. However, the mean value still falls under high level. It can be assumed that most of respondents agreed that health and safety procedures are clearly communicated. The workplace policies and procedure would influence the respondent's safety awareness.

Table: Descriptive Statistics			
Section D	N	Mean	Std. Deviation
1. I am clear about health and safety regulations at work (D1)	51	4.39	0.666
2. I know I can refuse to work in an unsafe environment? (D2)	51	4.82	0.478
3. If I notice a workplace, I am obligated to report it? (D3)	51	4.59	0.606
4. I help my teammates understand the importance of health and safety (D4)	51	4.63	0.564
5. Do you know about the basic safety rules at the Continental Tire Alor Setar (D5)	51	4.43	0.728
Valid N (listwise)	51		

Table above shows, D2 has the highest mean among the others statement with a value of 4.82. Thus, it can be assumed majority of the respondents agreed that they can refuse to work in an unsafe environment. Whilst, D1 has the lowest mean among them, which was 4.39. However, the mean value still falls under high level. It can be assumed that most of respondents agreed that they were clear about health and safety regulations at work.

3.3 Pearson Correlation Coefficient Analysis

Table: Rule of Thumb for Interpreting Pearson's Correlation Coefficient

Correlation value (r)	**Interpretation**
0 - 0.19	Very weak
0.2 - 0.39	Weak
0.40 - 0.59	Moderate
0.60 - 0.79	Strong
0.80 - 1.00	Very Strong

Source: From International Education Studies Journal [7].

Table: Pearson Correlation Coefficient Analysis between Independent Variable and Dependent Variable

		IV1	**IV2**	**DV**
Hazard **(IV1)**	Pearson Correlation	1	0.180	0.170
	Sig. (2-tailed)		0.207	0.232
	N	51	51	51
Policies and Procedures **(IV2)**	Pearson Correlation	0.180	1	0.697**
	Sig. (2-tailed)	0.207		0.000
	N	51	51	51
Health and Safety Awareness **(DV)**	Pearson Correlation	0.170	0.697**	1
	Sig. (2-tailed)	0.232	0.000	
	N	51	51	51
**. Correlation is significant at the 0.01 level (2-tailed).				

Table: The Interpretation of the Correlation value

Variable	Conclusion
Hazard	● The correlation coefficient, *r* was 0.170. ● The significant value, *p*-value was 0.207 higher than the significant level, 0.01. ● Hazard was not significant.
Policies and Procedures	● The correlation coefficient, *r* was 0.697. ● The significant value, *p*-value was 0.000 lower than significant level, 0.01. ● Policies and Procedures was significant. ● There was a strong positive relationship.

The *p*-value for the relationship between hazard and safety awareness is higher than significant value (*p*-value > 0.01). Thus, $\boldsymbol{H_1}$ is rejected. Hence, there is no significant correlation of hazard towards safety awareness. However, the *p*-value for the relationship between policies and procedures towards safety awareness is lower than significant value (*p*-value< 0.01, $r = 0.697$). Thus, $\boldsymbol{H_1}$ is accepted. Therefore, there is significant correlation of policy and procedures towards safety awareness.

4. Conclusion

Finally, using a questionnaire distributed to employees, the study of lack of safety awareness among workers in relation to physical injury among manufacturing workers was identified, and the lack of safety awareness was inspected to determine the effectiveness of control measures to be implemented in the factory. The findings of this study indicate that, despite the high results, workers' safety awareness should be increased. Therefore, there is significant correlation of policy and procedures towards safety awareness. The mean value of safety awareness based on every section is more than low level and for all section can be summarized as high. The level of safety awareness of an employee refers to their understanding of the significance of safety issues and the safety interventions supported by the company [8]. The relationship between hazard and safety awareness has a p-value that is greater than 0.01. As a result, the first hypothesis is proven false. As a result, there is no link between risk and safety awareness. However, the relationship between policies and procedures related to safety awareness has a p-value that is less than a significant value (p-value = 0.01, r = 0.697). As a result, the second hypothesis is correct. As a result, there is a strong connection between policy and procedures and safety awareness. Furthermore, accidents in the manufacturing industry should be avoided by adopting an awareness mindset [9]. Preventing or eliminating a hazard at its source may reduce the number of accidents that occur [10].

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