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Employees' Perceptions of the Manufacturing Industry on Workplace Safety Culture

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Abstract

Employees play important roles regarding safety culture in the manufacturing industry. The study was conducted among 108 manufacturing workers and aimed to determine employees' perceptions of safety culture in the manufacturing industry. The data obtained were analysed to see the relationship between sociodemographic factors and safety culture dimensions for safety culture. It was included five dimensions of management commitment, employee engagement, communication, and training and education. Demographic factors such as age and duration of work were not significantly related to variables related to staff perceptions ($p > 0.05$). In addition, the relationship between aspects of safety culture dimensions and performance showed that there was a significant relationship between communication having the highest relationship ($r = 0.403$, $P < 0.01$) and the lowest relationship by management commitment dimension ($r = 0.244$, $p < 0.01$). The overall studies show a significant relationship with workers' safety in the workplace ($r = 0.377$, $p < 0.01$). Therefore, companies are encouraged to increase training programs in the workplace to raise awareness of workplace hazard awareness and management commitment, employee engagement, communication, training and education as well as ongoing health and safety programs through helpful channels for employees to reduce workplace accidents.

Keywords: Safety, Perception, Culture, Communication, Manufacturing.

1.0 INTRODUCTION

The manufacturing industry has been identified as one of the major economic forces that have contributed to Malaysia's progress toward becoming a developed nation in the future. Unfortunately, the high rates of accidents and fatalities that have occurred on the sites have swept away its image and reputation. Even though the number of cases in the manufacturing industry has decreased in some years, it is still regarded as a highly dangerous and risky industry in Malaysia [1]. As a result, there is a need to look back into some ways and other methods of improving the industry's image and reputation. Most manufacturing sectors are unaware of safety by having safety indicators in measuring the degree or level of the hazard risks. This sector has the highest number of reported

occupational accidents because of lacking existence of a safety culture although it contributes expressively to government income [2].

Self-regulation has promoted a safety culture since the Act of the Occupational Safety and Health Act (OSHA) in 1994. This act also ensured that employers and employees were more aware of the significance of workplace safety practices. Furthermore, no measurement has been established to allow the industry to assess its current state of safety culture. Controlling workers' beliefs, attitudes, and behaviour can also be accomplished by promoting a safe culture in the workplace. Thus, organisational safety is critical because manufacturing is one of the most dangerous industries in the world [2].

Over the last few decades, there have been workplace safety violations, most of which occurred daily by workers. Studies identified the relationship between the business cycle and industrial injuries in the United States manufacturing industries [3]. The trend of injury frequency rate followed by the trend of industrial employment shows that the number of accidents tends to increase during economic upswings and vice versa [4]. The increased employment of inexperienced workers is the primary cause of workplace accidents. Research has shown that there are numerous factors that can contribute to the development of a safety culture [5]. The rate of occupational accidents and fatalities reported by the Department of Occupational Safety and Health (DOSH) from 2016 to 2017 been increasing and in 2018 the rate became decrease due to increased worker awareness of workplace safety [1].

Safety culture is the result of multiple interactions between functions, people, and organisations. The process of multiple interactions can affect the organisation's function and physical environment [6]. As a result, a safety culture should be prioritised alongside other critical factors such as quality and productivity. This culture is critical in determining whether an organisation's safety performance is successful or not. Malaysia has a diverse manufacturing industry, including electronics, plastics, petrochemicals, automotive, and others various sectors contributes different risks and hazards to the level of workplace injuries [7]. The study was conducted to determine the relationship between safety culture perceptions dimensions and the safety performance score among workers at a selected manufacturing industry in Kota Bharu, Kelantan and the relationship between management commitment score and safety performance score among workers.

2.0 METHODOLOGY

2.1 Study Design and Subject Recruitment

A cross-sectional study was conducted at one of Kelantan's largest manufacturing industries in Pengkalan Chepa Industrial Area, Kota Bharu. This company's workforce capacity ranges between 500 and 1000 employees.

Sample Size Calculation

The study began in September 2019 and was end in May 2020. The workers comprised the total sample size for this study. The formula used a single proportion in which:

$$n = [\frac{z}{\Delta}]^2 p(1-p)$$

n = sample size
Z = value representing the desired confidence level
Δ = precision
p = anticipated population proportion

$$n = [1.960/ 0.050]^2 \ 0.8592 \ (1.000 – 0.8592)$$
$$= 185.9 \ (186)$$

Sample size required = (20% x 186) + 186 = 223

Sampling method

The study used a combination of stratified and simple random sampling, which was chosen when the subpopulations were within an overall population. Each of the strata was selected from each line of production department including Dept A, Dept B, Dept C, Dept D, Dept E, Dept F, and Dept G. Then, 223 respondents were selected by using Sample Fraction calculation to determine the number of workers in each line. It had been numbered and selected using the lottery method and chosen based on the criteria. The inclusion criteria were staff aged 18 years and above, who had been working for more than 1 year and can understand and communicate either in Malay or English Language. Those who are part-time, and foreigners were excluded as a respondent.

2.2 Research Tools

Questionnaire Perception on Safety Culture among Roadcare (M) Sdn Bhd Syed Haamid Saggaff bin Syed Mohamad's workers from 2014 was used for this study [8]. This questionnaire was created by Roadcare (M) Sdn Bhd employees and has been used in ROSPA research (The Royal Society for the Prevention of Accidents). Part A and Part B each had two sections for each questionnaire set, which are as follows:

1) Respondent's Personal Profile
2) Safety Survey Questionnaire

Part A (Section 1), the personal profile, includes sociodemographic factors such as department, age, gender, job position, educational level, and years of service. Part B (Section 2) includes the following safety culture dimensions: Management Commitment (9), Worker Participation (11), Training and Education (6), and Communication (11). Part B contains another section called Safety Performance.

Part B (Section 2) included 37 questions with Likert scale responses ranging from Strongly disagree (1) to Disagree (2), Neither agree nor disagree (3), Agree (4), and strongly agree (5). Section 3 included 17 questions that could be answered with Yes (1) or No (0). This section is used to highlight organisation's safety and health management performance.

The questionnaire was pretested among workers in the selected manufacturing industry as a sample in this study. The reliability of the questionnaire was tested using the internal consistency approach by checking for the Cronbach alpha of the scale which was above 0.8. There were 23 selected manufacturing workers who were pre-test to enhance their understanding of their perception of safety culture at the workplace. The respondents were given 15 to 20 minutes to complete the questionnaire. The human Research and Ethics Committee of Universiti Sains Malaysia (JEPeM USM) granted ethical approval; (JEPeM code: JEPeM/ 18110653).

2.3 Data Collection

A special briefing was given to the head of the department to explain the overview of the research procedure.

Statistical Analysis

In this study, two types of measurement variables were used: the independent variable and the dependent variable. The dependent variable was safety performance while the independent variables were sociodemographics and safety culture dimension. All questionnaires and parameter measurements were analysed using the IBM Statistical Package for Social Sciences version 24 software used to summarise and define information using graphs and tables to visualise raw data gathered. It also presents evidence based on a large amount of data. After the respondents have been presented as a percentage, the descriptive data must be key in this SPSS. Because of the non-normal distribution of the sociodemographic variables (age and years of service), the analytical statistics were performed using Spearman's rank test. It was used to see the connection between numerical data. Finally, it was used to investigate the significance of all independent and dependent variables.

3.0 RESULTS AND DISCUSSION

3.1 Demographic Data

The questionnaire was distributed to 223 participants and the response rate was 48.4% with 72.2% female and 27.8% male. Most of the workers in the position of operator consisted of 75 respondents, the majority of whom were from the production department (69.4%). Most workers (48.1%) have worked between 0 and 5 years. (Table 1).

Table 1: Sociodemographic Data of the Respondents

Manufacturing Workers(N=108)		
Variables	**Mean (SD)**	**N (%)**
Gender		
Male		30 (27.8)
Female		78 (72.2)
Age	30.61 (7.120)	
Education Level		
SRP/PMR/SPM		65 (60.2)
STPM/Diploma		24 (22.2)
Degree		17 (15.7)
Others		2 (1.9)
Department		
Dept A		14 (13.0)
Dept B		7 (6.5)

Dept C	10 (9.3)
Dept D	32 (29.6)
Dept E	16 (14.8)
Dept F	4 (3.7)
Dept G	25 (23.1)
Position	
Driver	1 (0.9)
Executive	1 (0.9)
Lab Technologist	11 (10.2)
Line Leader	6 (5.6)
Manager Trainee	1 (0.9)
Manager	1 (0.9)
Officer	6 (5.6)
Operator	75 (69.4)
Quality Engineer	1 (0.9)
Store Handler	2 (1.9)
Supervisor	3 (2.8)
Years of employment	
0-5 years	52 (48.2)
6-10 years	28 (25.9)
11-15 years	21 (19.4)
15 years above	7 (6.5)

3.1.1 Safety Perception

Safety perception was divided into 5 dimensions namely, management commitment, workers' participation, training and education, and communication and safety performance. The mean score for management commitment, workers participation, training and education, and communication was 33.04, 42.48, 24.65, 42.55, and 34.99 respectively (Table 2). In comparison, the mean score for the safety culture dimension among workers in the gas station industry was high (151.1) [9]. Most of the respondents believed that management commitment is critical to ensuring worker safety in the workplace. Workers' participation should also be included in any management for employee and employer safety. Workers in the manufacturing industry received training on the job in accordance with their standards. Communication is important to avoid misunderstandings at the workplace. The effectiveness of communication may also have an impact on the continuous transfer of information between employees and employers. Overall, workers' safety performance was good due to their employers' assessment of safety, risk assessment, policies, and safety procedures.

Table 2: Mean Score of Safety Perception

Safety Perception	Mean (SD)
Management Commitment	33.04 (3.099)
Workers Participation	42.48 (4.415)
Training and Education	24.65 (2.273)
Communication	42.55 (4.320)
Safety Performance	34.99 (3.213)

Safety culture in management commitment has its priority and is important to safety and health at workplace overproduction due to good behaviour, thus influencing the employees' behaviour and perceptions as well as be as a top factor in the organisation [10]. The involvement of management in

the safety leads to decreasing in injury rate among workers. This can be achieved by improve safety and health in the workplace. In petrochemical industries, workers' perceptions showed that training was adequate and enough with respect due to strict rules and procedures for their own safety. Communication and worker involvement between employees and employers are considered the key factors to safety performance in the company [11].

3.3 Correlation Between Age and years of employment with Total Score of Safety Culture Perceptions

No significant correlation was found between age and year of employment with total safety culture for all dimensions (Table 3). No information transfer was observed from the bottom age range to the mid-range of age regarding safety and health at the workplace. In addition, no application on their job scope regarding the knowledge and information that they received from the employers even though the respondents have many experiences working at their workplace. In contrast, a significant correlation was found between safety culture with age and years of employment among employees in other manufacturing industries in Malaysia [12]. Other studies also revealed a significant relationship between age and safety culture, management commitment, and training and education [13]. The positive effect of age would improve their perception of the safety culture which gives good results in their safety performance at the workplace. Age also has been one of the factors that can influences safety performance regarding safety and health among employees. Furthermore, work experiences and safety culture could represent the effect of individual experience. Those who work more time would gain more knowledge and information regarding safety and health in their own workplace [14]. The differences in perception show that years of employment are the contributing factors that affect the relationship between the safety culture.

Table 3: Correlation between age and years of employment with a total score of safety culture perception

Safety Culture Perception	Age		Years of employment	
	r	*p*	r	*p*
Management Commitment	0.138	0.167	0.106	0.290
Workers Participation	-0.052	0.598	-0.040	0.687
Training and Education	-0.017	0.863	-0.036	0.708
Communication	0.024	0.808	-0.086	0.380
Safety Performance	-0.012	0.898	0.055	0.572

3.4 Correlation between total score of safety perceptions dimension and safety performance

All safety culture dimensions had a significant correlation with safety performance ($p < 0.05$) with positive and moderate (Table 4). In addition, there was a significant correlation between grand total safety perception dimensions and total score of safety performance ($r = 0.377$, $p < 0.001$) (Table 5). This showed that all dimensions had an impact on safety performance. A strong relationship has been reported between safety training and safety performance, workers' involvement, management commitment, and communication among the employees and employers themselves [15].

Table 4: Correlation between total score of safety perceptions dimension and safety performance

Safety Perception Dimension	Safety Performance	
	r	***p***
Management Commitment	0.244	0.014*
Workers Participation	0.310	0.001*
Training and Education	0.294	0.002*
Communication	0.403	<0.001*

* Significant at p <0.05

Table 5: Correlation between grand total safety perception dimensions and total score of safety performance

	Total score of Safety Performance	
	r	***p***
Grand total safety perception dimensions	0.377	<0.001**

** Significant at p <0.001

Management commitment is expressed that gives a strong relationship to safety performance by showing a continuous interest in working conditions that are related to the safety of their employees and they involve personally in activities and implementation of best safety practices including offering suggestions for improving their organisation to ensure no accident and incident be happening at the workplace [16]. The perception of these dimensions relates to many factors within organisation that may reduce accident rates in the work environment due to great performances by the workers. Others also reported a significant relationship between factor as commitment management because it is one of the priorities for the safety over production of the organisation [17]. Hence, management commitment is a crucial factor important to ensure all employees get the knowledge on safety and it plays a role in controlling any risk as includes not being a substitute for proper risk control in the working environment.

Good safety performance may give a positive perception of safety including less incline in unsafe actions during working then as one of the ways to improve their practices of working conditions. The active participation of workers can ensure workers in making the right decision on safety and they can improve their new skill based on their job requirement as well as prepare for extra precaution when unsafe condition or situation happens in the future. The right decision also will improve the management of their practices on safety and health at the workplace within the organisation. Furthermore, a significant relationship was found between safety climate score and safety training in two construction workers [18]. It revealed that safety training could improve the performances of workers due to information they got during training is important and can be managed correctly in a safe and healthy culture. Effective training programs could also change workers' unsafe behaviour in preventing any accidents to be happening at the workplace. Employees' safety training has been regarded as the "first line of defense" in opposition to accidents where associated costs accompany them. A strong and relevant relationship between the safety culture causes great performance during work [19]. Thus, training and education are essential factors depending on the workers' performance regarding safety during work.

Communication is one of the factors affecting the perception of the safety culture and safety performance of the workers. Communication in safety culture showed a positive relationship where employees freely communicate and discuss problems among the management teams without any argument [19]. In addition, effective communication could clarify between work groups concerning safety issues to make the appropriate and best decision. This can conclude that communication between employers and employees creates a sustainable and positive safety culture in the working environment.

3.5 Limitations of the Study

Further research is needed to determine other factors that can affect safety performance such as organisation policies. Therefore, a focus on safety culture perception among the workers should be highlighted to prevent any misclassification of all the elements in the safety culture dimensions. Moreover, safety culture perception should not only be evaluated by the knowledge and practices but need to rely upon workers' perception which could be biased in other aspects.

4.0 CONCLUSION

Communication had the highest mean score (42.55) as compared to other dimensions, while training and education of the safety culture have the lowest mean score (24.65). The mean safety performance score was 16.54, with most workers agreeing that all elements pertaining to workplace safety must be included. No significant correlation was found between the safety culture dimensions with age and years of employment. Most of the workers have a better perception of workplace safety, such as communication and worker participation dimensions. There was a contribution lead on the safety performance of this manufacturing industry workers to ensure workplace safety and health. Occupational safety is a strategy that focuses not only on safety but also on improving workers' motivation, productivity, and skills, thereby increasing the person's quality as a good employee and employer. As a result, greater actions and additional plans should be provided by management and individuals to improve their safety in this specific manufacturing industry.

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