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The Effectiveness of Occupational Safety and Health on Employees' Safety in Manufacturing Firms at Penang, Malaysia

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ABSTRACT

This study evaluated the relationship between occupational safety and health effectiveness on employees' safety in manufacturing firms in Penang, Malaysia. A sample size of 222 respondents was taken from 28 electrical manufacturing firms with a 6322 population and 361 samples to examine the relationship. A questionnaire was designed for data collection to measure safety and health procedures, safety and health policies, and work hazards and risk control on employees' safety in manufacturing firms. A stratified sampling method was used, and the data was analyzed using SmartPls 3.7.8. The study showed that safety and health procedures, safety and health policies, and work hazards and risk control have a significant relationship with employees' safety in manufacturing firms. However, the limitation of this study only covers electrical manufacturing firms. Suggested for future study focus on electronic, plastic, and fabricated manufacturing firms to be more effective in improving manufacturing firms' learning and development practices.

KEYWORDS: Safety and Health, Safety and Health Procedures, Safety and Health Policies, Work Hazards and Risk Control, Employees' Safety, Manufacturing Firms In Penang

I. INTRODUCTION

Safety and health are a broad spectrum of disciplines involving various fields, especially safety and health procedures, safety and health policies, and work hazards and risk control. Safety and health aim to protect every employee in the workplace from accidents, injuries, and exposure to hazardous substances. Because incidents or accidents in the workplace can occur at any time, manufacturing firms should be responsible for taking the necessary steps to reduce the risk of accidents and injuries, provide a safe work environment and enforce discipline for employees who do not comply with the Standard of Procedures (SOP) which the safety and health department have set (Yang,Weston,Cude& Kincl,2020;Nasution& Mahyuni,2020).Every manufacturing firm needs to prioritize safety and health in the workplace because safety and health activities can reduce the risk of accidents or injuries by identifying hazards in the workplace. A safe workplace environment contributes to increased work efficiency and productivity because employees' health is guaranteed physically, mentally, and emotionally. Employees will work with minimal work stress and feel happy to work in the workplace. In turn, employee relations with manufacturing firms will also be more harmonious. In addition, manufacturing firms can undoubtedly reduce the cost of losses related to accident or injury management that are closely related to the cost of health care and rehabilitation, losses in productivity, impact on employee well-being, and law enforcement related to safety and health in their workplace (Kelwon,2020;Zhou,Cao,Yu,Wang& Wang,2018;Mukhtar,Yusof& Isa,2020). In Malaysia, the compliance of manufacturing firms and employees on occupational safety and health is subject to the Occupational Safety and Health Act 1994 (Act 514). The primary purpose of the application of Act 514 is to ensure the safety, health, and welfare of workers at risk while carrying out employment activities, as well as to protect individuals who are in manufacturing firms from any accidents. In addition, Act 514 is intended to promote a workplace environment conducive to the physiological and psychological needs of employees. The existence of specific acts related to occupational safety and health like this is because the reality of the employment sector in manufacturing firms is constantly exposed to safety risks and dangers. The most crucial aspect that needs to be emphasized in good work practices is to ensure that each employee is provided with the training, safety equipment, and other support resources required working safely.

2. RESEARCH OBJECTIVES AND RESEARCH QUESTIONS.

2.1 Research Objectives

1. To evaluate the relationship between safety procedures on employees' safety in manufacturing firms.

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2. To examine the relationship between safety and health policies on employees' safety in manufacturing firms.
3. To identify the relationship between work hazards and risk control on employees' safety in manufacturing firms.

2.2 Research Questions of the Study

Research questions in this study covered:

1. Is there any relationship between safety and health procedures on employees' safety in manufacturing firms?
2. Is there any relationship between safety and health policies on employees' safety in manufacturing firms?
3. Is there any relationship between effective work hazards and risk control on employees' safety in manufacturing firms?

3. LITERATURE REVIEW.

3.1 Safety and health Procedures.

A previous study showed a significant relationship between safety and health procedures on employees' safety in the firms. Among the importance of safety and health procedures is to ensure the well-being of every employee in their firm. A safe, healthy, and conducive work environment will benefit employees by increasing employee confidence to perform work productively and ensuring the ability to work through the prevention of accidents and occupational diseases that can cause adverse health, injury, and death. Safety and health procedures are facilities such as providing safety equipment and medicine to help employees work more calmly and safely (Ghesmaty, Sangachin,Cavuoto& Wang,2018;Liu, Nkrumah,Akoto, Gyabeng& Nkrumah,2020). The study also found that flexible jobs such as working over the phone are increasingly prevalent in industrialized countries. Yet, the impact on their safety and health is mainly unknown. The results of studies that have been done show that working overtime, flexible working hours, and fixed-term contracts do not significantly affect physical, mental, or general health. Studies have also found that flexibility in jobs that give employees more choice or control is more likely to impact employee health and well-being positively (Schulte, Cunningham, Guerin,Hennigan & Jacklitsch,2018;Feriyanto, Abdulmalik& Zakaria,2020). With this, flexible working conditions greatly help employees ensure safety and health remains guaranteed. Safety and health procedures covering how to work and emergency plans are given due consideration in addressing the level of risk associated with the occupational safety of the workplace and the employees on duty. Safety and health procedures include a safe work culture that requires the contribution of every employee at all levels of firms working in a group according to procedures designed to ensure accidents and injuries in the workplace can be avoided. Safety and health

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procedures symbolize the readiness of a firm to develop and learn from the mistakes of incidents and accidents by providing immediate prevention planning (Li, Chen, Huang& Long,2018).Previous studies have also found that safety and health procedures can reduce the risk of accidents and injuries in the workplace due to strict disciplinary enforcement for each employee so as not to violate safety and health procedures to prevent accidents from recurring (Obolewicz & Dąbrowski,2018;Gidi,Suraya,Mutayoba,Espinoza, Meggi,Sabi, Noller,Schmieding,Tukhanova,Manhart& Heiber, 2020).

3.2 Safety and Health Policies.

A previous study stated that safety and health significantly correlate to employees' safety. Therefore, it is the policy of the occupational safety and health department to continuously increase awareness of safety and health policies in the workplace. The safety and health department management work together to prevent any potential non-compliance of its products and services and any possible injuries and illnesses from incidents that occur in the workplace through the establishment of apparent safety and health policies (Danaj,2018;Lindholm,Reiman& Vayrynen,2020). Among the security and health policies are to provide and maintain a place and work system that is quality, safe, and healthy from any hazards and risks; ensure that all staff is equipped with information, instruction, training, and supervision on how to perform their duties safely and without threat to health; investigate all non-conformities of its products and services, incidents, occupational diseases, occupational poisonings, and dangerous occurrences and take steps to ensure that they do not recur; identify, comply with customer requirements, legislation as stipulated in the Occupational Safety and Health Act 1994, its regulations and codes of practice of approved firms and promote and achieve the objectives of occupational safety and health policies, work procedures, rules and guidelines for occupational safety and health among employees in the firms (Rupakheti, Singh, Pradhan& Basel, 2018). It is the goal of the Department of safety and health through policies that have been designed to develop an efficient, trained, integrity, and professional workforce through systematic and planned training management in line with the mission and objectives of firms to achieve the intended goals such as providing a qualified crew, knowledgeable, capable and with integrity, improve skills, competencies, and expertise, achieve productive and high-quality work results and enhance career development. Indeed, the Department of safety and health is committed to providing the resources and facilities needed to achieve the above goals through safety and health policies that have been created to prevent any accidents and injuries from occurring in the workplace (Karim & Hariyono, 2018). Safety and

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health policy is a priority for firms in providing a safe work environment in addition to improvement in the quality and productivity of work in producing quality products to be marketed in the business market (Aurice, Wekoye,Nyaora Moturi& Makindi,2020).

3.3 Effective Work Hazards and Risk Control

A previous study stated a significant relationship between effective work hazards and risk control on employees' safety at the workplace. The study also found several types of workplace-related hazards, including physical, biological, chemical, ergonomic, and psychological hazards. Physical hazards consist of mechanical and electrical. Hazards of this category involve environmental factors that can cause injury. These include noise levels, exposed electrical wiring, falling objects, wet floors, and other conditions that can cause slips, falls, injuries, or injuries. Biological hazards can cause illness, infection, and severe health conditions(Rahlin,Mustafa&Majid,2018;Indrayani & Kusumojanto,2020). These hazards involve exposure to airborne and blood-borne pathogens such as viruses, bacteria, and fungi. This hazard also contributes significantly to sick building syndrome. Chemical hazards involve some chemicals that are carcinogenic and corrosive. These chemicals can be inhaled as gases or vapors or in contact with the skin as liquids or solids. Exposure to chemical hazards can cause skin irritation, respiratory problems, blindness, or severe health complications. Ergonomic hazards put pressure on muscles, tendons, and other connective tissues. This condition occurs due to repeated exposure to abnormal postures and abnormal movements and improper design of the workplace, equipment, and tasks. And the last is a psychological hazard involving stress, fatigue, bullying, sexual harassment, and violence in the workplace. This condition can lead to depression, reduced concentration, lack of attention, or negligence at work. This, in turn, results in moral problems, decreased productivity and quality of work, and an increased risk of injury (Kim, Lim, Park, Park, Park & Cho,2018;Jahangiri, Mostafavi, Choobineh,Shakerisn,Tabatabaei& Derisi,2020).

Risk control is introduced to help firms make accurate and low-risk decisions to control the risk as best as possible. The risk assessment results produce a priority list of risk control actions. This, in turn, can help firms take accident prevention measures systematically. For example, a risk assessment is done for the activity of changing a new light bulb. During the risk assessment, it was found that electric shock and bulb explosion hazards exist. The risk assessment results found that the danger of electric shock has a higher risk value than the danger of an exploding bulb. As a result, firms can determine the action that needs to be taken in advance between the two hazards that have been identified in the activity of changing

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new light bulbs (Vah-Jevsnik, & Rogelja,2018; Holzer,2020). Firms need to pay attention or take accident prevention measures to prevent employees from getting electric shock before taking accident prevention measures to prevent employees from being hit by an exploding light bulb. In addition, risk assessment can help evaluate existing accident prevention and control measures—for example, personal protective equipment such as placing a machine guard on a rotating machine. This machine guard is a risk control action that the firms have determined. However, accidents still happen. Therefore, risk assessment is used to -evaluate the effectiveness of existing accident control actions. Suppose the risk assessment results show that the probability of an accident is still high. Then, other alternative accident prevention and control measures should be taken, such as training employees, replacing new machines, or adding additional safety controls to used machines. Risk assessment helps a person assess the decisions that have been made, whether they are high risk or not. It can also allow employees to make preparations or actions on decisions that have been created. The wisdom of employees in managing risk can avoid mistakes or accidents, which will positively impact employees, the environment, and firms (Sun,Arning,Bochmann,Borger&Heitmann,2018; Kretschmann,Plien,Nguyen& Rudakov,2020).

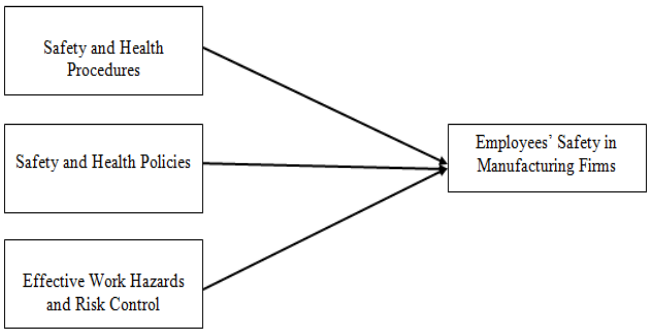
4. CONCEPTUAL FRAMEWORK.

4.1 Independent Variables.

- Safety and Health Procedures
- Safety and Health Policies
- Effective Work Hazards and Risk Control

4.2 Dependent Variable

Employees' Safety in Manufacturing Firms.



4.3 Hypothesis Development .

H1. There is significant relationship between safety and health procedures on employees' safety in manufacturing firms.

H2. There is significant relationship between safety and health policies on employees' safety in manufacturing firms.

H3. There is significant relationship between effective work hazards and risk control on employees' safety in manufacturing firms.

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5. RESULT.

5.1 Participants.

The data was collected from 28 electrical manufacturing firms, 361 questionnaires were distributed, and 222 questionnaires were analyzed among the employees. The respondents were selected using the stratified sampling technique.

5.2 Measurement Scale .

Questionnaires are designed in Linkert Scale (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree).

5.3 Data Analysis .

The data obtained were studied using SmartPLS version 3.7.8 to discuss the findings obtained. Statistical scholars highly recommend SmartPLS in producing an accurate analysis of each variable's cause and effect relationship. SmartPLS is also a sizeable multivariate analysis technique in social and psychological research. In addition, SmartPLS can analyze measurement model evaluation and structural model evaluation.

Table 1 shows the Loading, Composite Reliability (CR), Average Variance Extracted (AVE) values for each construct studied; and the lowest value is **0.6098**, and the highest value is **0.8199**. These values are more significant than 0.5 (> 0.5), confirming that the study construct can explain the mean change of variance within the items (Fornell & Larcker, 1981; Gefen & Straub, 2005; Henseler, Ringle & Sinkovics, 2009).

Table 1

Loading, CR & AVE Results

	Loading CR AVE	*Loading CR AVE*	*Loading CR AVE*
Safety and Health Procedures		0.8992	0.5284
SAHP1	0.6949		
SAHP2	0.6098		
SAHP3	0.7478		
SAHP4	0.7446		
SAHP5	0.7502		
SAHP6	0.6798		
SAHP7	0.7703		
SAHP8	0.7998		
Safety and Health Policies		0.9288	0.6154
SHP1	0.7886		
SHP2	0.7924		
SHP3	0.7816		
SHP4	0.7667		
SHP5	0.8104		
SHP6	0.7835		
SHP7	0.8002		
SHP8	0.7455		
Effective Work Hazards and Risk Control		0.9028	0.5394
EWH1	0.7892		
EWH2	0.8199		
EWH3	0.6115		
EWH4	0.5932		
EWH5	0.7002		
EWH7	0.7988		
EWH8	0.7900		

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Employees' Safety	0.9199	0.5322	
ESMF1	0.7288		
ESMF2	0.7852		
ESMF3	0.7634		
ESMF4	0.7086		
ESMF5	0.7182		
ESMF6	0.7684		
ESMF7	0.7546		
ESMF8	0.7612		
ESMF9	0.6328		
ESMF10	0.6618		

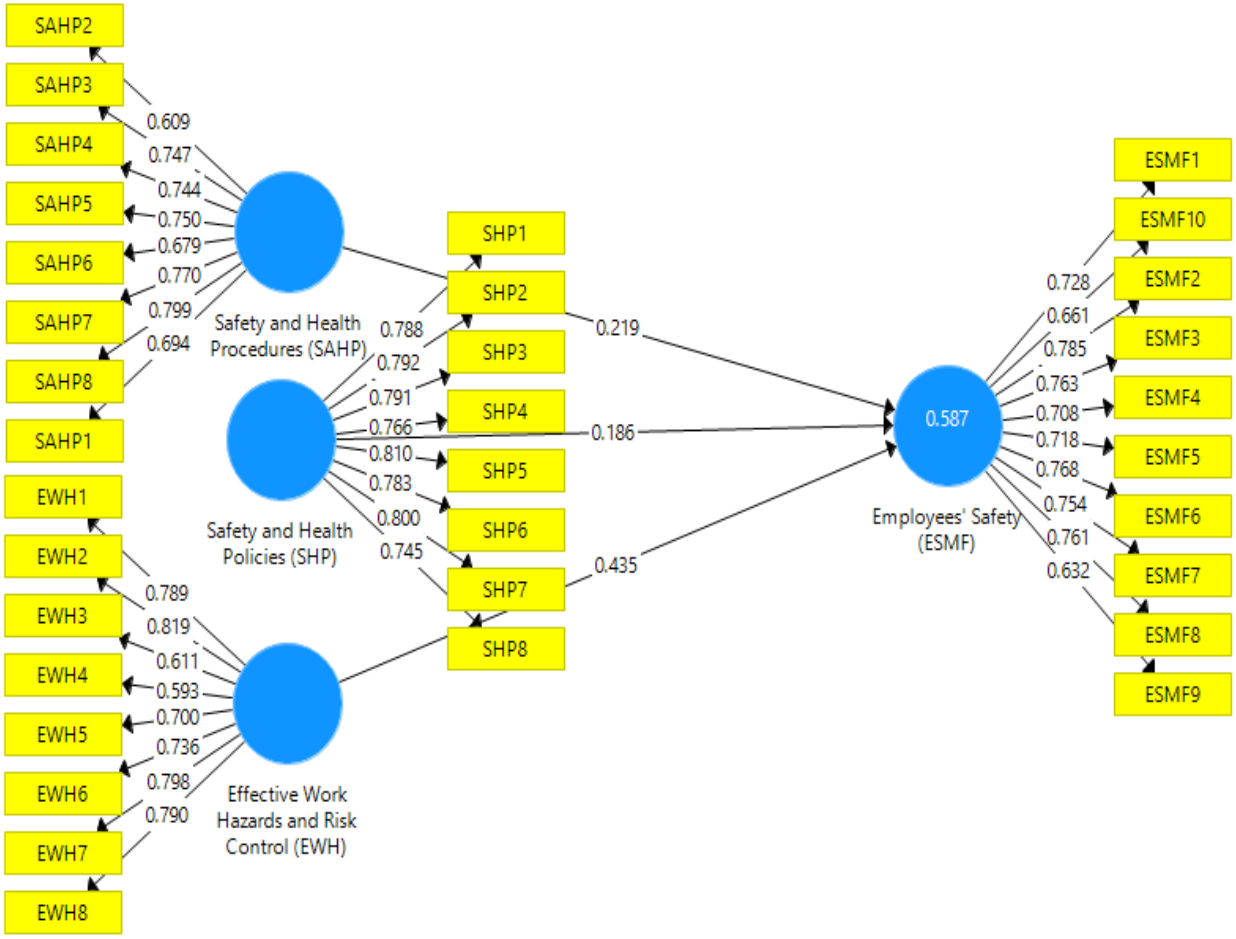

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Figure 1: Structural Model Direct Effects

The discriminate validity test was measured using the Heterotrait-Monotrait (HTMT) criterion test and cross-loading (Henseler et al., 2009). Table 2 below shows the output from the HTMT analysis. The results can be calculated easily using the formula (Henseler, Ringle & Sarstedt, 2015).

Table 2

Discriminate Validity

Constructs	EWH	ESMF	SHP	SAHP
EWH	**0.7344**			
ESMF	0.7252	**0.7292**		
SHP	0.7124	0.6667	**0.7846**	
SAHP	0.7228	0.6788	0.7802	**0.7260**

Note: Values in Bold face are the square root values of average variance extracted.

5.4 Assessment of Structural Model.

The findings for testing this direct effect model using Smart PLS software package version 3.7.8 through the structural equation model. This measurement aims to test the direct effect model and the effective model of the mediated variable. Therefore, empirical evidence has been used to construct a direct effect model, as shown in Figure 3.

Table 3

Summary of Hypotheses

Relationship	*Summary of Hypotheses*				
	βeta	Std Error	T-Value	P-Value	Decision
SAHP->ESMF	0.4444	0.0962	4.5342	0.0000	Significant
SHP->ESMF	0.1798	0.0883	2.1202	0.0000	Significant
EWH->ESMF	0.2212	0.0846	2.6114	0.0000	Significant

6. DISCUSSION.

6.1 Safety and Health Procedures.

The results obtained showed that the safety and health procedures variable significantly affects employees' safety in manufacturing firms (β = 0.0962; t = 4.5342; p = 0.0000). H1 Accepted. The results also showed that safety and health procedures contributed 21.9% (R2 = 0.219) to employees' safety in manufacturing firms.

The results of this study showed that there is a significant relationship between safety and health procedures on employees' safety in manufacturing firms. Safety and health procedures are preparing procedures for each employee to comply with to avoid any accidents and injuries in the workplace. In addition, safety and health procedures involve Standards of Procedures (SOP) which are guidelines that all employees must follow in manufacturing firms.

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6.2 Safety and Health Policies

The results showed that the safety and health policies variable has a significant relationship with employees' safety in manufacturing firms (β = 0.0883; t = 2.1202; p = 0.0000). H2 Accepted. The results also showed that safety and health policies contributed 18.6% (R2 = 0.186) to employees' safety in manufacturing firms.

The results of this study showed that there is a significant relationship between safety and health policies on employees 'safety in manufacturing firms. Safety and health policies are essential principles in manufacturing firms where policies have been established as the primary guide for each employee to comply. In addition, safety and health policies strongly emphasize safety and health policies consist of the characteristics and characteristics of manufacturing firms in determining the target of zero accidents in the workplace.

6.3 Effective Work Hazards and Risk Control

The results showed that effective work hazards and risk control variables have a significant relationship to employees' safety in manufacturing firms (β = 0.0846; t = 2.6114; p = 0.0000). H3 Accepted. The results also showed that effective work hazards and risk control contributed 43.5% (R2 = 0.435) to employees' safety in manufacturing firms.

The results of this study showed that there is a significant relationship between effective work hazards and risk control on employees 'safety in manufacturing firms. Therefore, effective work hazards and risk control is a critical analysis conducted by manufacturing firms to test work hazards and risk control to avoid any unwanted incidents involving accidents and injuries in the workplace; Risk control is studied in detail so that each accident risk can be identified and guidelines to prevent the risk of accidents can be implemented more effectively.

7. CONCLUSION

This research study found safety and health procedures. Safety and health policies and practical work hazards and risk control have a significant relationship to employees 'safety in manufacturing firms. In manufacturing firms, the protection and health department have to provide a safe workplace environment through guidelines that have been made to prevent employees from being exposed to accidents and injuries in the workplace. The management of manufacturing firms gives all procedures and policies created involving SOP full attention, and the results showed all variables have a positive impact on employees 'safety in manufacturing firms.

Safety and health procedures are basic guidelines developed and created by the safety and health department as the main procedures in providing a safe workplace environment. Each employee

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follows safety and health-involved procedures, so the results of this study show a significant relationship to employees' safety. With the existence of procedures that include safety features in the workplace, every employee in manufacturing firms is guaranteed from any accidents if they always follow each of the procedures set.

Safety and health policies are a list of guidelines made by the safety and health department that are the basis to be followed by every employee in manufacturing firms. The safety and health policies can help every employee to have a strong spirit to avoid any injuries in the workplace. In addition, safety and health can help manufacturing firms reduce the number of accidents to zero incidents. Every employee is also found to have a strong spirit to continue working because their firms provide a safe workplace. This situation can improve the quality and productivity of their work in helping manufacturing firms increase profits and wealth.

Practical work hazards and risk control are significant to every employee to assess accident risk in the workplace. Therefore, work hazards and risk control are critical factors in manufacturing firms as a basic assessment of an accident rather than passing. By taking into account the attitude of employees, practical work hazards and risk control made by the safety and health department can reduce accidents each employee from any accidents that may occur. In addition, applicable work hazards and risk control implemented by manufacturing firms have a motivational effect on every employee because the firms where they work to value the lives of their employees from the exposure to accidents that may occur unknowingly.

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