The Influence of Safety Management Practices on Safety Behavior: A Study Among Manufacturing SMES in Malaysia

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***Abstract*— Safety at work is one of the key issues in many organizations. This is because accidents and injuries in the workplace can cost the organization financially and non-financially. Although workplace safety has been widely investigated, less attention is given to the small and medium enterprises. Such neglect is unfortunate because many accidents and injuries around the world, including Malaysia, happen in this organizational milieu. A survey of 74 employees of SMEs in the northern region of Peninsular Malaysia was carried out. Self-reported measures were used to obtain data on workplace safety dimensions and safety behavior. The Partial Least Square (PLS) structural model analysis was used to ascertain the proposed relationships. The present study found that only three dimensions of safety management practices (management commitment, safety training, and safety rules and procedures) were significantly related to safety behavior. Implications for managers and practitioners are discussed.**

***Keywords*—** *Safety management practices; safety behavior; small medium enterprises (SME); Malaysia.*

1. Introduction

There is no doubt that small and medium enterprises (SMEs) play a critical role in the economic development and progress of any nation [1]. Like in other countries, SMEs contribute to the economy in various ways, such as by providing employment to the people [2]. In Malaysia, the growth of SMEs is projected to increase by 5.5 percent and 6.5 percent in 2014 in comparison to 6.3 percent in 2013 [3]. However, despite this positive outlook, this sector is plagued by many occupational accidents and injuries [4, 5]. [4] reported that during 2010 and 2012, between 80 and 90 percent of occupational accidents were reported in SMEs in Malaysia. In this regard, Malaysia is not unique because SMEs in other countries, such as Europe, are 4.9 times likely to experience fatal industrial accidents [6].

When industrial or occupational accidents and injuries take place, the costs incurred by SMEs are enormous. Not only they have to bear financial costs in terms of compensation pay-out, work-days lost, and productivity [7], they also have to face the non-financial consequences [8]. For instance, employees who are injured may suffer psychological trauma of coming back to work after recovery. The family members are also affected as a result of accidents and injuries at work. Other employees have to pick up the slack as a result of employee absence due to injuries, and they may also become traumatic as a consequence of the accident that has taken place. Because of these consequences, safety research is a crucial scientific activity.

Literature indicates that occupational accidents and injuries can be avoided if employees comply with safety standards, procedures, and regulations at work [9]. In order to promote safety compliance behavior, one of the factors that have been widely

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studied is safety management practices. However, studies that have considered the effect of the practices on safety compliance behavior tended to be conducted in large organizations which are likely to have a formal and structured OSH system. Because SMEs have many resource limitations, they are less inclined to devote their resources toward implementing such system [10], [11]. But, it does not mean that SMEs do not have a system of OSH at all; at best, their system may be informal and unstructured [11]. Thus, it is intriguing to examine the degree of safety practices they have and whether these practices are able to encourage safety compliance of the employees. By doing so, the present study aims at contributing to safety research, particularly in SMEs, as studies in safety in SMEs are far and few between.

2. Literature Review

Safety compliance is defined as adhering to safety procedures and carrying out work in a safe manner [12]. Previous researchers have demonstrated that when employees follow safety rules and procedures, they are less likely to be injured or hurt in a workplace accident [13], [14]. By putting on safety equipment or using proper safety gear, the employees can protect themselves while at work, resulting in fewer occupational accidents as a whole in the organization.

According to the management perspective in safety, occupational accidents are primarily the result of human error [15], which can be reduced when employers institute a proper safety system [16]. Consistently, this perspective is in line with the Occupational Safety and Health Act 1994 which explicitly mandates that employers are responsible for ensuring the safety of the employees at work. The 1994 Act does not make an exception for employers, which means that employers in the SMEs are also covered by this Act. One way how this can be achieved is by instituting safety management practices, which refer to the safety-related approaches, policies, strategies, procedures, and activities implemented in the organization with the aim of reducing accidents and injuries at work [17], [18]. Based on [18]18] work, safety management practices are composed of many safety-related components. They are management commitment, safety training, safety rules and procedures, workers' involvement, safety promotion policies, and safety communication and feedback.

Even though the OSH Act 1994 does not make an exception to any employers, SMEs may face significant challenges in instituting a comprehensive and structured OSH system. It is generally understood that SMEs tend to have a number of constraints, such as resources. Hence, their so-called safety system or practices are likely to be informal and unstructured [10], [11]. It is against this backdrop that the role of safety management practices in promoting safety compliance behavior should be understood. Past studies on the role of safety management practices in fostering safety compliance in the context of SMEs are rather limited. Hence, we draw our argument from safety research conducted in different organizational contexts and milieus to help us with the hypotheses development.

2.1 Management Commitment and Safety Compliance

There seems to be a general consensus that management commitment is critical to reducing occupational accidents at work [18]. This is because management commitment reflects the seriousness of the management of safety-related issues, reflected in the attention and support given to the implementation of safety-related programs and projects in the organization [19]. When management is committed toward safety, management is likely to be proactive in identifying, managing, and controlling hazards that are likely to result in accidents. When employees perceive that the management is committed to their safety, they tend to take safety matters seriously, thus leading to an overall reduction in accident and injury rates [20]. In the context of SMEs where a lack of resources is likely to hinder them from putting in place a more formal and structured OSH system, management commitment towards safety is, therefore, a critical component of accident prevention and reduction. Hence, we propose the following:

H1: Management commitment is positively associated with safety compliance.

2.2. Safety Training

The role of safety training in promoting safety behaviors among employees has been widely documented [17], [18], [21]–[23]. Safety training often provides the means for organizational accident prevention and control [24] by informing employees about the importance of adherence to safety rules and procedures [17]. According to [18], effective safety training is of utmost importance to the success of the OSH programs is because it leads to the improvement of behavioral skills, related knowledge, and/or attitudes, and acts as a catalyst for predicting accidents, especially for new employees. Hence, we propose the following:

H2: Safety training is positively associated with safety compliance.

2.3. Worker Involvement

In safety literature, worker involvement is defined as a behavior-based technique which involves individuals or groups in an upward communication flow and decision-making process within an organization [25]. In SMEs, worker involvement can be used as an essential tool for promoting safety compliance among employees. According to [25], since the employees are the ones who perform work tasks and activities, they are the best source of information for safety improvements at work. Due to the size of the SMEs, the employer-employee relationship tends to be less formal and more personal [26], which allows the employees to communicate directly their opinion and suggestions on matters related to safety to the management. It has been demonstrated that when employees are involved in a decision-making process on issues that directly concern them, they tend to be more committed and receptive of the decision made, leading to better job performance [27]. This is because when employees are involved in matters related to safety, they will have ownership of the solution, leading to reduced accidents and injury rates [28]. [29] found that involving workers in the safety management process was the key to organization's safety performance because such involvement empowered the workers psychologically via their participation in safety committees. Minter [30] reviewed various occupational safety and health studies done by HSE and found that companies that promoted workers' involvement in safety and health-related matters were mostly characterized by a reduction in accidents and injury rates. He also noted that there were improvements in hazards awareness and productivity. Hence, we propose the following:

H3: Worker involvement is positively associated with safety compliance.

2.4. Safety Communication and Feedback

Safety communication and feedback has been recognized as an effective way of improving safety performance in organizations [31]. Dissemination of information through various communication media, such as safety meetings, regular personal contacts, and sign posts, etc. on safety rules and regulations can serve as a reminder to employees of the need to be safety conscious and work safely [32], [33]. But, to be effective, safety communication and feedback should be a two-way process rather than simply a top-bottom approach [18]. Employees should also be encouraged to give their feedback on safety-related matters to the management and suggest ways of improving the work processes and activities that can be made safer. Safety feedback, whether it comes from the employer or employee, serves as a reinforcement tool for appropriate behavior modification [34]. Hence, we propose

H4: Safety communication and feedback is positively associated with safety compliance.

2.5. Safety Rules and Procedures

Safety rules and procedures refer to the degree to which an organization creates a clear mission, responsibilities, and goals, sets up standards of behavior for employees, and establishes safety system to correct workers' safety behaviors [35]. Even though employers have the legal duty to fulfill their duty of care [33], the OSH Act 1994 is silent on how employers should enforce it. Despite the absence of explicit legal provision, enforcing of safety rules and procedures reflect the management commitment toward safety at work [35], [36]. In order to help employees understand the safety rules and procedures, and, hence, comply with them, the management has to communicate them in a language that the employees can easily understand. This is because studies have found that safety rules and procedures influenced workers' safety

behaviors [11], [35]. Hence, we propose the following:

H5: Safety rules and regulations are positively associated with safety compliance.

2.6. Safety Promotion Policies

Safety promotion policies are policies that aim to ensure the presence and maintenance of conditions that are necessary to reach and sustain an optimal level of safety [37]. Studies indicate that safety reporting by employees plays a crucial role in accident prevention at work [38], [39]. In SMEs where employer-employee relationship tends to be personal and informal, employee reporting should be encouraged as long as it does not threaten the esprit de corps of the organization. The implementation of safety promotion policies reflects not only the management commitment toward safety, but it also signifies the proactive attitude toward safety. Indeed, studies have demonstrated the positive contribution of safety promotion and policies toward reducing workplace accidents and injuries [18], [40]. Hence, we propose the following:

H6: Safety promotion policies are positively associated with safety compliance.

3. Methodology

3.1. Participants and Data Collection Procedure

Employees of small and medium enterprises (SMEs), located in the four states in the northern region of Peninsular Malaysia, were recruited in this study. The SMEs specifically classified under the manufacturing sector were chosen. The manufacturing sector was particularly chosen because of the high occupational accidents and injuries reported [5]. Because some of the SMEs contacted were not willing to participate in the study, we decided to use non-probabilistic sampling in sample selection.

Several visits were made to the participating companies to obtain the relevant data. At the beginning of the study, we interviewed the employees to get a first-hand understanding of the area of the investigation. In the subsequent visits, we administered the questionnaires via a contact person in the company who agreed to collect the completed survey. By doing so, we avoided disrupting the working time of the employees. After a duration of two weeks, we collected the questionnaires from the contact person. Seventy-four completed questionnaires were returned and used in the final analysis Because we personally administered the questionnaire, it was not possible to statistically assess the non-response bias in the sample. However, the survey results were compared with the population characteristics to ascertain any significant differences. Generally speaking, the sample and population characteristics were not significantly different with an exception of over-representation of female participants. See Table 1 shows the demographic profile of the participants.

Table 1 Demographic profile of participants (n=74)

Description of Samples	Number	Percentage
Gender		
Male	15	20.3
Female	59	79.7
Marital status		
Single	20	27.0
Married	47	63.5
Divorced/widowed	7	9.5
Occupational accident exposure		
Yes	52	70.3
No	22	29.7
Safety training experience		
Yes	68	91.9
No	6	8.1
Age (years)	Mean = 35.12	Std. dev.= 7.54
Work experience (years)	Mean = 10.61	Std. dev. = 6.84
Experience with current SME (years)	Mean = 6.38	Std. dev. = 3.99

3.2. Measures

The review of the literature was the fundamental to the instrument development to identify the relevant measures for each concept. Established measures were used because their psychometric properties have been ascertained. Overall, safety management practices were measured using 35 items, of which nine items were used to measure management commitment, six items for safety training, five items for worker involvement, five items for safety communication and feedback, five items for safety rules and procedures, five items for safety promotion policies. For safety compliance, seven items were used, and for safety participation, five items were employed. All of these items were taken from [18], and measured on a five-point Likert scale, ranging from '1' "strongly disagree" to '5' "strongly agree." Before the items were used, they were content verified by a number of safety officers who had experience working with the SMEs. Their responses were recorded in detail, and necessary changes to the wordings were later incorporated in the final questionnaire. In addition to these measures, demographic items presented in Table 1 were also included in the final questionnaire. Some items were categorical in nature, and some used a ratio scale.

4. Data Analysis

The study utilized the Partial Least Squares (PLS) which is a variance-based structural equation modeling technique [41] in testing the research model depicted in Figure 1. According to [42], PLS allows the assessment of both the measurement model and the structural model. Usage of PLS in this study was justified for the following reasons: (1) the aim of the study is orientated towards the prediction of the dependent variables [43]; (2) the research model is complex [44] as it has six independent variables and one dependent variable with two dimensions; and (3) the sample size (n = 74) is small. It is also suggested that PLS should be applied when the number of observations is lower than 250 [45]. These arguments have contributed to the widespread acceptance of PLS in safety research see [46–48]. In this study, we used the SmartPLS [49].

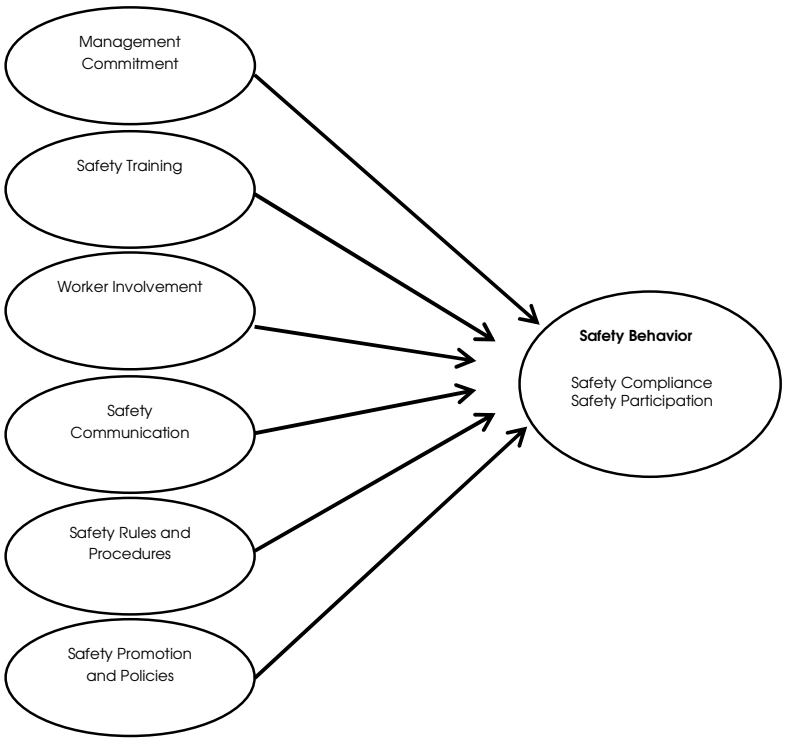

Figure 1. Research Model

4.1. Measurement Model

The reliability and validity of the constructs were evaluated through the reflective measurement models. The process started with assessing the individual item reliability as shown in Table 2. The loadings were found to be well above the acceptable threshold value of 0.707 [50], [51]. With regards to construct validity, all constructs achieved the value of composite reliability greater than 0.707, required in exploratory research and 0.8 for basic research [52]. The convergent validity was assessed by the average variance extracted (AVE), whose value is suggested to be greater than 0.5 [53]. In this study, all variables indicated AVE values greater than 0.587 (Table 2).

Table 2 Measurement model: loadings, construct reliability and convergent validity

Construct	Item	Scale	Loading	AVE[a]	CR[b]
Management Commitment	MCS2	Reflective	0.739	0.587	0.877
	MCS3		0.805		
	MCS5		0.768		
	MCS6		0.772		
	MCS9		0.747		
Safety Training	ST4	Reflective	0.853	0.697	0.873
	ST5		0.833		
	ST6		0.819		
Worker's Involvement	WI1	Reflective	0.828	0.757	0.926
	WI2		0.903		
	WI3		0.877		
	WI4		0.871		
Safety Communication and Feedback	SCF2	Reflective	0.841	0.660	0.853
	SCF3		0.761		
	SCF5		0.832		
Safety Rules and Procedures	SRP1	Reflective	0.755	0.626	0.870
	SRP2		0.789		
	SRP4		0.795		
	SRP5		0.824		
Safety Promotion and Policies	SPP1	Reflective	0.844	0.679	0.913
	SPP2		0.863		
	SPP3		0.845		
	SPP4		0.821		
	SPP5		0.741		
Safety Participation	SP1	Reflective	0.838	0.683	0.866
	SP2		0.850		
	SP4		0.789		
Safety Compliance	SC2	Reflective	0.796	0.630	0.872
	SC3		0.817		

	SC5	0.741
	SC6	0.819

a Average variance extracted (AVE) = (summation of the square of the factor loadings)/{(summation of the square of the factor loadings)+(summation of the error variances)}
b Composite reliability (CR) = (square of the summation of the factor loadings)/{(square of the summation of the factor loadings) + (square of the summation of the error variances)}

In order to satisfy the discriminant validity, the diagonal value should be significantly greater than the off-diagonal values in the corresponding rows and columns [42]. This condition was met as shown in Table 3. As such, it can be assumed that each construct relates more strongly to its own measure than to others.

Table 3 Measurement model: discriminant validity

	MCS	SC	SCF	SP	SPP	SRP	ST	WI
MCS	**0.766**							
SC	0.607	**0.794**						
SCF	0.668	0.532	**0.812**					
SP	0.584	0.981	0.505	**0.826**				
SPP	0.421	0.358	0.580	0.307	**0.824**			
SRP	0.474	0.539	0.579	0.515	0.512	**0.824**		
ST	0.488	0.616	0.550	0.571	0.430	0.650	**0.835**	
WI	0.662	0.404	0.712	0.344	0.753	0.538	0.466	**0.870**

Note: Diagonals represent the square root of the AVE while the off-diagonals represent the correlations.

4.2 Common Method Variance

Common Method Variance (CMV) is a major concern when a study utilizes self-reported measure, which is the approach of the present research. According to [54], CMV is an issue when a single latent variable accounts for the majority of the explained variance. The Harman's single-factor test is one of the most widely used by researchers to address the issue of CMV [55]. Following the suggestion of Podsakoff et al. [55], an un-rotated exploratory factor analysis was performed and it indicated that the first factor extracted only accounted for 32.45% of the total 78.75% variance. In this case, the CMV bias was deemed not to be a grave concern for this study.

4.3 Structural Model

After ascertaining the validity, reliability, and common method bias of the instrument, path analysis was conducted to test the six hypotheses. This was done through the structural model which was assessed based on the algebraic sign, magnitude, and significance of the structural path coefficients, R2 values, and the Q2 (redundancy) test for predictive relevance.

Figure 2 illustrates the results of the tests. A minimal level of explanatory power of a particular endogenous construct was achieved through the explained variance of R2 and deemed to be adequate. The R2 value of 0.547 indicates that 54.7% of the variance in Safety Compliance could be explained by the independent variables of Management Safety Commitment, Safety Training, Worker Involvement, Safety Communication and Feedback, Safety Rules and Procedures, and Safety Promotion and Policies. Similarly, the R2 value 0.501 indicates that 50.1% of the variance in Safety Participation was explained by the same set of independent variables. Besides estimating the R2, we also employed predictive relevance Q2 [56], [57] as an additional model fit assessment. Predictive relevance Q2 is a criterion that evaluates how well the omitted data are estimated by the model. If $Q2 > 0$, it shows that the model has predictive relevance. The blindfold procedure was performed in partial least square to assess

predictive relevance. The result indicated that the Q2 value was greater than zero, implying that the model has predictive relevance as suggested by Chin [58]. The predictive relevance of both Safety Participation and Safety Compliance is shown in Table 4. In sum, the model exhibited an acceptable fit and high predictive relevance.

Table 4 Blindfolding result

Construct	CV Red (Q^2)
Safety Compliance	0.323
Safety Participation	0.331

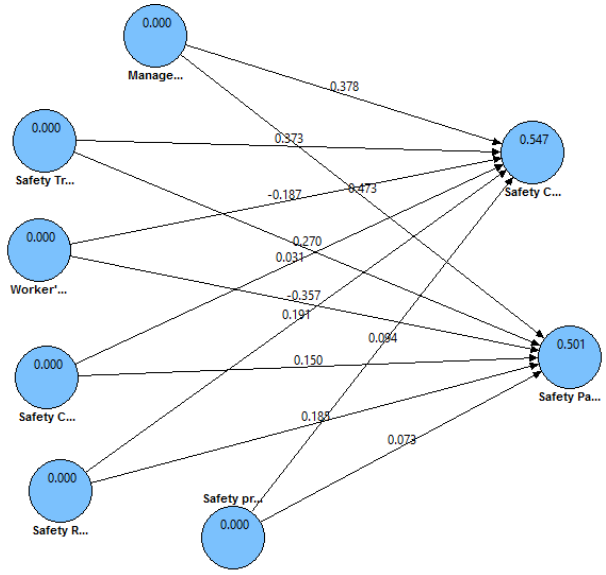

Figure 2. Results of the path analysis

The hypotheses were tested for statistical significance as suggested by [59]. Bootstrapping (5000 resamples) was deployed to produce standard errors and t-values, which allow the evaluation of the statistical significance of the path coefficients. The procedure permits the reporting of bootstrapping confidence intervals of standardized regression coefficients. A significant path is ascertained when a p-value is below 0.01 (t-value > 2.33) and 0.05 (t-value >1.65), respectively, for a one-tailed test. Table 5 presents a summary of the hypothesis testing. Three safety practices were found to be positively related to Safety Compliance and Safety Participation as follows:

a. Management Safety Commitment (MSC) and Safety Compliance (SC) ($\beta = 0.371$, $p < 0.01$) and Safety Participation (SP) ($\beta = 0.347$, $p < 0.01$)

b. Safety Rules and Procedure (SRP) and Safety Compliance ($\beta = 0.172$, $p < 0.05$) and Safety Participation ($\beta = 0.243$, $p < 0.01$)

c. Safety Training (ST) and Safety Compliance ($\beta = 0.462$, $p <0 .01$) and Safety Participation ($\beta = 0.416$, $p < 0.01$)

However, Safety Communication and Feedback (SCF), Safety Promotion and Policies (SPP), and Worker Involvement (WI) were not significant predictors of Safety Compliance and Safety Participation. Thus, H1a, H1b, H4a, H4b, H5a, and H5b were supported, whereas H2a, H2b, H3a, H3b, H6a, and H6b were not. In this study, Management Safety Commitment was found to be the most significant predictor of both Safety Compliance and

Safety Participation, followed by Safety Training and Safety Rules and Procedures.

Table 5 Structural model

Hypotheses	Relationship	Beta	Std. error	T-value	Decision
H1a	MCS → SC	0.371	0.109	3.409**	Supported
H1b	MCS → SP	0.347	0.119	2.925**	Supported
H2a	SCF → SC	-0.029	0.149	0.194	Not Supported
H2b	SCF → SP	0.057	0.150	0.378	Not Supported
H3a	SPP → SC	0.060	0.161	0.371	Not Supported
H3b	SPP → SP	0.037	0.164	0.227	Not Supported
H4a	SRP → SC	0.172	0.090	1.915*	Supported
H4b	SRP → SP	0.243	0.102	2.389**	Supported
H5a	ST → SC	0.462	0.086	5.383**	Supported
H5b	ST → SP	0.416	0.113	3.663**	Supported
H6a	WI → SC	-0.165	0.163	1.010	Not Supported
H6b	WI → SP	-0.275	0.199	1.381	Not Supported

**p < 0.01 (2.33), *p < 0.05 (1.645)

5. DISCUSSION

In this study, we examined the direct effect of six safety management practices (management commitment, safety training, worker involvement, safety communication and feedback, safety rules and procedures, and safety promotion policies) on safety behavior (safety compliance and safety participation). Of the six practices, we found management commitment, safety training, and safety rules and procedures directly affected both safety compliance and safety participation. The influence of these safety practices on safety performance demonstrated in this study is consistent with previous works [7], [17], [18], [22], [40], [59–61].

The role of management commitment, safety training, and safety rules and procedures in enhancing employee safety performance has been consistently emphasized in the literature. Without management commitment, safety interventions are not likely to be effective in preventing accidents and injuries. Management commitment reflects the values top management has on safety-related issues and the understanding that workplace safety is paramount toward organizational effectiveness and efficiency by providing the necessary support and encouragement to employees to engage in safe behavior while at work [19]. Closely related to management commitment toward safety is the significance of safety training in encouraging employees to help other employees and the organization toward complying with safety rules and procedures at work. Safety training is said to be effective when the transfer of training occurs, that is, when employees apply the knowledge and skills on safety gained by working safely at work [63]. Safety rules and procedures were observed to have a direct link with safety behavior in our study. When the rules and procedures are implemented well in the organization through regular safety inspections and enforcement of safe working procedures, employees are compelled to work safely. While advice and support from their co-workers are necessary, effective safety procedures and rules appear to be adequate in inducing the employees to comply with the safety standards in the course of accomplishing their job. In SMEs, the implementation of safety procedures is effective because the small number of employees enables close monitoring of employees' safety behavior.

Unexpectedly, no significant link was found between the remaining three safety management practices and safety performance. The lack of

resources to establish a comprehensive OSH management may explain why such link was not found. As demonstrated by [6] in their study of OSH management system in SMEs in Spain, the SMEs' preventa¬tive effort is limited in scope and intensity. The narrow OSH system may also be attributed to the perception that safety is the responsibility of individual employees. [64] also observed that the high standards of occupational safety and health culture that surpass the legal requirement were not widely practiced by SMEs in the chemical industry sub-sector in Malaysia.

6.0 Conclusion

The findings of this study have significant implications for SMEs, especially in relation to the OSH management system. The findings inform us on the need for SMEs to enhance their commitment to workplace safety, their safety training programs, and their safety rules and procedures, as part of the promotion of a safety culture. Although these practices may be short of a comprehensive OSH system recommended by the OSH regulators [64], [65], they can be thought of as a starting point for SMEs toward the development of such a system. However, in light of such constraints, SMEs are advised to make continuously an improvement to their existing practices.

As the literature on this topic is quite scarce, more studies are needed to understand safety in SMEs. Future studies could benefit from our research work by extending it to include potential moderators. For instance, we propose that the effect of management commitment and safety training may be different for different employees. Here, personality moderators may be considered to examine whether such postulated differences are valid or not. To what extent the transfer of safety training in the job actually takes place is also worthy of research. Apart from safety management practices, other organizational factors that may contribute to safety performance, such as the role of leadership, the use of technology, and HR system should also be considered.

We caution that the findings of the present study should be interpreted carefully by considering some limitations. We acknowledge that the sample size of 74 participants may be too small to establish external validity. Thus, we recommend that future studies consider SMEs in other industries, especially in the service sector that involves different types of risks and hazards. Secondly, the correlational nature of the study may refrain us from making a causal interpretation of the links. While safety performance can be theorized to trigger the establishment of safety management practices, such theoretical perspective tends to connote reactivity rather than proactivity of the decision-making process.

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