

SAFETY CULTURE AND ITS CONTRIBUTING FACTORS IN MANUFACTURING WORKPLACE IN MALAYSIA

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Abstract: *Minimizing accident and injuries are among the main goals of most companies, especially those with high risks such as manufacturing companies. Despite the strives, statistics still shows a high rate in accidents and injuries in Malaysia, dominated by manufacturing and construction sectors. Safety culture is one indicator of a safe workplace. When safety culture of the workplace is high, accidents and injuries can be minimize. Therefore, in this study, we looked into the contributing factors of safety culture at workplace. The data for this study were collected by distributing a set of questionnaire to production line workers of a manufacturing company in Selangor, Malaysia. Utilizing SEM-PLS approach for our quantitative study, we found that both safety training and the availability of personal protective equipment are the direct contributing factors of safety culture. We also found that management involvement is highly link with safety training indicating the importance of management in ensuring the knowledge the workers received about safety at workplace.*

Keywords: *Safety culture, accidents, management, safety training, workplace safety*

INTRODUCTION

Organizations strive for minimum accidents at workplace. Workplace safety can boost employees' performance in which workers are not burdened by the harm or danger on their wellbeing. Hence, it is important for organizations to build high safety culture at workplace. One asset that an organization utilizes to improve safety culture is by instilling adequate knowledge in occupational safety and health management. Organizations can manage occupational safety and health aspects through proper planning, strong leadership, good organizing, effective coordination, and control of all employees. Employees also need to possess some basic awareness and knowledge on occupational safety and health and management for personal safety, safety at home, safety on the road, and safety and workplace while working.

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Despite the strive of organizations and employees to avoid accidents, hazards, risks, and danger exist in almost all types of occupations, jobs or work activities. Working in a high risk industry, moreover, poses challenges for workers to pay more attention on their safety. Hui-Nee (2014) reported that, among the industrial sector, manufacture recorded the highest number of accidents (31%) as compared to other sectors. These high rate of fatalities or injuries do not only demoralized the employees and their families but the accidents can negatively influence daily production of employers which are the main concern of most manufacturing companies.

One factor that contributes to the success or failure of an organization is its safety culture (Sukadarin, Suhaimi, & Abdul, 2012). When an organization does not emphasis on the importance of safety culture, more accidents may occur which can lead to fatalities. This statement is supported by Dupre (2011) who reported that most cases of accidents that happen in work place are related to workers who are not concerned about the safety, and they tend to take easy on safety issues. Accidents that happen to workers at workplace can give a negative impact on employers, which can lead other organizations to be afraid to deal with the company, hence, will affecting the company's profits.

In addition, most workers do not understand about safety, and safety are often taken for granted. Employers, on the other hand, do not provide sufficient information and trainings for employees because the cost to send an employee to take a course on safety is high. In addition, improper working conditions can also cause accidents in the workplace because employees cannot pay full attention on their work.

In this study, our main purpose was to identify factors that can influence safety culture of workers at workplace. Specifically, the study focused the investigation on examining whether trainings can contribute to workers' safety culture at work; evaluating whether management involvement can influence workplace safety culture of employees; and investigating whether availability of personal protection equipment can contribute to workers' safety culture.

Safety Culture and its Contributing Factors

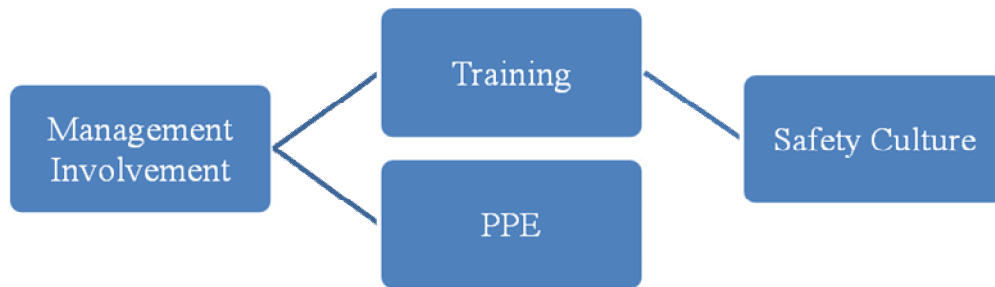
Many debates have emerged among researchers on the definitions of safety culture. This paper particularly adopt definitions by Fang et al. in which safety culture is referred as a set of prevailing indicators, beliefs and that the organization owns its safety. In practice, organizations can engineer a safety culture at workplace through various organizational goals governed by considering their effects on

safety management practices. The key practices include reducing the number of fatalities and injuries, making sure safety issues receive proper attention, and ensuring that members of organization share the same beliefs about risks and accidents. Numerous studies have concluded several factors to have key influence in creating a conducive workplace to a positive safety culture. The key factors are management (Cox & Cheyne, 2000), individual and behavioral workforce (Cooper, 2000), and rules and procedures (HSE, 1997).

More recently, Cristian, Bradley, Wallace, and Burke (2009), a result of a meta-analysis study, concluded an integrative model of workplace safety. The model includes 8 domains as factors leading to safety outcomes namely safety climate, leadership, personality characteristics, job attitudes, safety motivation, safety knowledge, safety compliance, and safety participation. However, Cristian et al. (2009) did not include safety culture as the outcome, instead they included only accidents and injuries as the key indicators for safety outcomes. As a result, they found that safety motivation and safety knowledge are stronger contributors for safety performance and outcomes as compare to other contributing factors.

Despite their less strong effect, safety climate and leadership are among the significant factors influencing safety performance of employees (Clarke, 2006). In Cristian et al.'s (2009) model, safety climate covers aspects of management involvement, HRM practices, safety system, supervisor support, internal group processes, job risk, work pressure, as well as leadership. Researchers have consistently reported that the above aspects can positively influence safety performance behaviors (which can lead to a better safety culture) at workplace (cf. Griffin & Neal, 2000; Hofmann, Morgeson, & Gerras, 2003; Zohar, 2000).

Using Cristian et al.'s (2009) model as a baseline, this study specifically looked into management involvement, training, and protective equipment availability as key contributors to safety culture at workplace. Specifically, we hypothesized that safety training and personal protective equipment (PPE) availability directly contribute to safety culture; and management involvement has a direct influence on both training and protective equipment availability and an indirect effect on safety culture. The framework of this study is illustrated below.



METHOD

To evaluate which among the three variables (management involvement, training, and protective equipment availability) that significantly contribute to safety culture, we utilized a quantitative approach. We developed a questionnaire that was adapted from previously published questionnaires addressing the issues on variables of our interests. The data was collected in a manufacturing company in Selangor, Malaysia. We distributed the questionnaire to 169 production line workers. All questionnaires were returned back; however, 10 of them were not useable for data analysis due to severely incomplete answers.

The questionnaire consisted of a set of demographic items and four main area of interest of the present study, namely management involvement, training, personal protective equipment, and safety culture. Under each section, we included five items. The questionnaire was piloted on 30 respondents and we found a good reliability for each of the four subsets (see table 1).

Table 1. Cronbach's Alpha

<i>Variable</i>	<i>No. of Items</i>	<i>Coefficient</i>	<i>Remark</i>
Management Involvement	5	.878	Good
Safety Training	5	.915	Good
Safety Culture	5	.841	Excellent
PPE	5	.757	Acceptable

To analyze the data collected, we used SPSS for descriptive statistics purposes and SmartPLS3 for SEM-PLS model evaluation. SEM-PLS by SmartPLS allows for indirect effect estimation unlike the multiple regression. Hence, SEM-PLS is suitable for our model estimation because we hypothesized an indirect effect of management involvement on safety culture.

The measurement model in PLS is assessed in terms of item loadings and reliability coefficients (composite reliability), as well as the convergent and

discriminant validity. Individual item loadings greater than 0.7 are considered adequate (Fornell & Larcker, 1981). A composite reliability of .70 or greater is considered acceptable (Fornell & Larcker, 1981). The average variance extracted (AVE) measures the variance captured by the indicators relative to measurement error, and it should be greater than .50 to justify whether a construct is good (Barclay, Thompson, & Higgins, 1995). The discriminant validity of the measures (the degree to which items differentiate among constructs or measure distinct concepts) is assessed by examining the correlations between the measures of potentially overlapping constructs. Items should load more strongly on their own constructs in the model, and the average variance shared between each construct and its measures should be greater than the variance shared between the construct and other constructs (Compeau, Higgins, & Huff, 1999). The structural model in PLS is evaluated by examining the path coefficients. *T* statistics are also calculated to assess the significance of these path coefficients. In addition, R^2 is used as an indicator of the overall predictive strength of the model.

RESULTS

The number of final respondents included in the analysis was 159. We dropped 10 respondents due to severe incompleteness of the questionnaire (they only responded to one half of the demographic questions). Of the 159, we found 71% were male and 29% were female. The dominance of male workers indicates that our data represent the population. By observation, production line jobs in manufacturing companies in Malaysia are dominated by male workers. The mean age of the workers was 39 ($SD = 6.9$) with a range of 25 to 54 years old. The secondary school graduates were the majority of the workers (81.7%) while degree holders were the least (1.2%).

1. Model Evaluation

As mentioned above, we used SEM-PLS to estimate the model. In the model, safety culture, the dependent variable, was hypothesized to be influenced by management involvement, safety training, and personal protection equipment. Besides, we also examined the relationship between the three variables in the model. First, we evaluated the measurement model by assessing item loadings, reliability (composite reliability), and discriminant validity.

Table 2
Item Loadings

	<i>Management Involvement</i>	<i>PPE</i>	<i>Safety Culture</i>	<i>Training</i>
A1	0.871			
A2	0.888			
A3	0.878			
A4	0.906			
A5	0.721			
B1				0.820
B2				0.784
B3				0.836
B4				0.831
B5				0.829
C1			0.805	
C2			0.798	
C3			0.770	
C4			0.814	
C5			0.819	
D1		0.880		
D2		0.765		
D3		0.863		
D4		0.707		
D5		0.837		

Table 2 shows that all item loadings were larger .70. The results also indicated that internal reliability (assessed by composite reliability) for all construct were larger than .70 (see Table 3); and demonstrated satisfactory convergent and discriminant validity of the measures. Average variance extracted (AVE) for all constructs exceeded 0.50. As for the discriminant validity, Table 3 shows that all constructs were more strongly correlated with their own measures than with any of the other constructs. Therefore, discriminant validity was observed.

Table 3
Reliability, Convergent and Discriminant Validity Coefficients

	CR	AVE	1	2	3	4
1. Management Involvement	0.931	0.732	0.856			
2. PPE	0.906	0.661	0.680	0.823		
3. Safety Culture	0.900	0.642	0.703	0.819	0.821	
4. Safety Training	0.911	0.673	0.720	0.764	0.813	0.820

CR: Composite Reliability; AVE: Average Variance Extracted.

The R-square value (.755) indicates that 75.5% variance in safety culture was directly explained by safety training and PPE, and indirectly by management involvement. The path coefficients (see Table 4) show that both safety training and PPE were significant predictors for safety culture (.449 and .476, respectively). However, management involvement did not have a significant direct link to safety culture, but it did have a significant indirect effect. The model also indicates that management involvement had a significant contribution to both safety training (.720) and PPE (.271).

Table 4. R Squares and Path Coefficients

	R ²	Path Coefficients		
		PPE	Safety Culture	Training
Management Involvement		0.271		0.720
PPE	0.619		0.476	
Safety Culture	0.755			
Training	0.518	0.568	0.449	

All of the path coefficients were statistically significant at $p < .05$ except for management involvement on safety culture.

The f square values (see Table 5) are the effect size used for SEM-PLS. Values of .02, .15, and .35 can be viewed as whether a latent variable has a weak, medium, or large effect at the structural model (Henseler, Ringle, & Sinkovics, 2009). Our results indicates that PPE has a large effect on safety culture while safety training has a medium effect. Further, we found that management involvement has a very strong effect on safety training but medium effect on PPE.

Table 5. *f* Square

	2	3	4
1. Management Involvement	0.093		1.075
2. PPE		0.387	
3. Safety Culture			
4. Training	0.408	0.344	

DISCUSSION AND CONCLUSION

Overall, the proposed model was able to explain a very large amount of variance (75.5%) in safety culture. Safety training and PPE significantly contribute to safety culture. Management involvement, however, did not have a direct link but indirectly had significant influence on safety culture. Further, the results documented the importance of management involvement in safety training and PPE, with a stronger effect on safety training.

The significant effect of safety training on safety culture has been consistently reported in previous studies (cf. Farrington-Darby et al., 2005; Sinclair et al., 2003). Availability of personal protective equipment was also documented to contribute to safety culture at workplace (Lam & Kam, 1998; Larson & Liverman, 2011). Availability of PPE can increase safety culture at workplace. The unique finding of the present study is the insignificant direct link between management involvement and safety culture. This finding contradicted with McDonald et al.'s (2000) study claiming that the reason for accidents and injuries at workplace is highly linked with organizational and management factors. However, our study did document an indirect link between management involvement and safety culture which is supported by Cristian et al.'s (2009) model. Further, we also found that management involvement had a very large effect on safety training, indicating the importance of management's role on workers' safety knowledge. When management provide safety training, it ensures worker to have better knowledge on how to work safely and minimize risks to their health and others at workplace.

In conclusion, this study added to the body of literature about safety culture and its contributing factors. The results of this study emphasizes on the importance of training and availability of protective equipment at workplace (no significant difference in effect sizes). In generalizing the study results, however, we need to be cautious due to the limitation: the data were collected only from one manufacturing company in Selangor, Malaysia. Despite the limitation, the results of this study can be used by manufacturing organizations' managements to gain knowledge on the importance of safety training and PPE on safety culture at workplace. Safety culture is a main goal of most companies, especially those with

high risks workplace like manufacture companies. Therefore, management of such organizations need to pay attention to what contributes to safety culture. Finally, we call future research to adress aspects that were not included in this study, to better evaluate the safety issues at workplace.

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