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SAFETY LEADERSHIP, SAFETY CLIMATE & SAFETY PERFORMANCE WITHIN TNB'S TECHNICAL WORKFORCE

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Abstract

Occupational health and safety are relevant to all branches of industry, business and commerce companies, and has been continued to be one of the most critical but highly criticized issues within the discipline of human resource management. This study aims to identify the influences of safety leadership towards safety performance mediate by safety climate within TNB's technical workforce. PLS-SEM is use to test relationships among variables, a series of statistical methods including mean, descriptive analysis, and structural model is conducted. This study confirmed that there is a significant influence between each study of variable. Furthermore, the study also shows that safety climate has a mediating effect on the relationship between safety leadership and safety performance. This study may influence and gives an implication towards an organization about the safety practices that apply in the organization. Considering the significance of all three variables, future studies can be carried out to focus on other industry sector.

Keywords: Safety leadership, safety performance, safety climate, technical workforce.

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1. Introduction

Occupational safety and health management can be seen as one of the most important elements and should be emphasized especially in activities involving high-risk jobs either in manufacturing, construction or service sectors such as electrical utilities. The Occupational Health and Safety Act, [Akta Kesihatan dan Keselamatan Pekerjaan (AKKP)] is responsible for establishing a safety culture within the established organization. AKKP's philosophy is to emphasize the concept of self-regulation, the employer is given a complete mandate to ensure safety at work is guaranteed (Rahmathunisa Beevi, 2013). In a broader context, AKKP promotes the existence of an atmosphere or a working environment that is more in line with the physiology and phycology of the worker. AKKP 1994 acts towards the establishment of systematic occupational safety and health management. However, a comprehensive act will not be successful without support from both employers and employees. The culture of safety practiced by an organization is the main criterion to avoid the occurrence of job disruption as well as the illness caused by the work. If these elements are look without enthusiasm, accidents and occupational injuries is likely will be increased. Previous studies have shown that increased workplace safety performance is greatly influenced by a positive safety culture (Weinberg, 2002). Workplaces health and safety is mandatory for every employer in order to ensure that the health, safety and welfare requirements each of the employees are met. Attention to the health and safety of employees is crucial in order to improve the productivity of employees, as it underlines the efficiency of the organization. Therefore, employers need to be conscious of their responsibilities towards their employees in order to attain world-class efficiency in terms of health and safety. Hence, this study is conducted with the objective to identify the influences of safety leadership towards safety performance mediate by safety climate within TNB's technical workforce. Besides, the results of this study will also lead to a number of suggestions and remedial measures that can be implemented by the management in dealing with or at least reduce the rate of accident and health problems arising from the workplace.

2. Problem Statement

In today's modern world, manufacturing sector in Malaysia provide a major commitment to the economy of Malaysia. The manufacturing sector experienced moderate improvement consistently and has contributed 7.3 % to the Malaysian economy in the second quarter of 2014 Bank Negara Malaysia (BNM). However, safety in the workplace is something that affects manufacturing sectors nowadays. By joining a positive safety culture in the workplace, the occupational safety and health management system can be effective. Many organizations have failed to show improved effectiveness when they have introduced new occupational health and safety management strategies because these strategies did not consider the impact of the organizational culture. Throughout the years, a lot of attention has concentrated on the reason of occupational accidents (Kang et al., 2017). Even though manufacturing industry is crucial for Malaysian economic growth, however, given the evidence it can't be denied that working environment in manufacturing industry is more dangerous and hazardous compared to another industries. Therefore, it seems that it is highly necessary to manage workplace safety with a focus on human approach in order to avoid this issue from getting worse.

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Besides that, although significant research on climate safety problems has been carried out in many nations, however, according to the author's understanding, there are very few safety climate studies have been performed in Malaysia, and to be more specific, there is almost none of the study that have been performed on the manufacturing sector. It can't be denied that the manufacturing industry is one of the most crucial industry where it has enhance the local economic development in Malaysia even though with the highest rate of accidents at the workplace. Therefore, it would appear that further research is required to examine the extent to which long-term effects of safety training could contribute to affect the climate of safety and then serve as a mechanism for facilitating and promoting a good safety culture within an organization.

3. Research Questions

The research question for this study:

1. What are the influences of safety leadership on safety performance?
2. How does safety leadership influence safety climate?
3. What is the influence of safety climate on safety performance?
4. Does safety climate mediate the relationship between safety leadership and safety performance?

4. Literature Review

4.1. Safety Climate

Safety climate refers to employees' shared perceptions of safety, policies, procedures, practices, as well as the overall importance and true priority of safety within the organization (Jiang et al., 2010; Larsson et al., 2008; Zohar & Luria, 2005). The importance of safety climate and its relationship with occupational safety has been established across a range of industry settings (Clarke, 2006; Eid et al., 2012; Zohar, 2010). Safety climate can be seen as an aspect of the safety culture or as an indication of the real implementation of the safety culture (Lee & Harrison, 2000).

4.2. Safety Leadership

Safety leadership is defined as a process of interaction between leaders and followers, through which leaders can exert their influence on followers to achieve organizational safety goals (Jimmieson et al., 2016). According to Hoffmeister et al. (2014), such leadership refers to the way in which supervisor's influence and promotes safety to their followers at the workplace. Meanwhile, safety leader refers to leaders who engage in safety-related matter with enthusiasm and inspiration and fully concentrate on supervising their followers (Conchie, 2013). In recent years, the important role of safety leadership in the field of occupational health and safety is increasingly gaining acceptance.

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4.3. Safety Performance

Generally, safety performance means the outcomes of safe working records over a period of time, so that if there are many reported incidences in a period of time, therefore the safety performance can be considered as poor (Atak & Kingma, 2011; Fogarty & Shaw, 2010). There are many factors of safety performance, and one of them including safety culture. Safety performance is a result that comes from summarisation of accidents and incidence that occur from organization that operates in a certain industry (Bellamy et al., 2008). Safety performance can be described as a self-reported rate of accident and occupational injuries. Smith et al. (2006) have done their researched safety in many workplaces, including the manufacturing, construction, service and transportation industries. They defined safety performance as employee safety control and self-reported occupational injury (Shang & Lu, 2009).

Based on the literature above, the following hypothesis is proposed:

H1: There is a significant effect of safety leadership on safety performance

H2: There is a significant effect of safety leadership on safety climate

H3: There is a significant effect of safety climate on safety leadership

H4: Safety climate mediate the relationship between safety leadership and safety performance

5. Research Methods

This quantitative study conducted with a cross sectional approach. A stratified random sampling method is employed in order to collect the sample for this study. For this study, the population involves employees from TNB based manufacturing companies chosen from Federation of Malaysian Manufacturers (FMM) directory. A major reason for selecting these industries is that the number of accidents which occur in these industries is the highest among all other manufacturing industries in Malaysia in 2018 (Department of Occupational Safety and Health, 2018). Survey question for this study, was adopted from Wu et al. (2011) (safety leadership), Vinodkumar and Bhasi (2010) (safety performance), and Cheyne et al. (1998) (safety climate). All questions were measured using 5-point Likert scale, ranging from 1 strongly disagree to 5 strongly agree. Data collected from questionnaires are analyzed using Partial Least Square Structural Equation Modelling (PLS-SEM).

6. Findings

6.1. Demographic

The participants of this research had different background with regard to gender, age, race, marital status, education, working hours and distribution of all these variables were deliberate using descriptive statistics such as frequency and percentage. Results from the analysis of respondent's gender, majority is male with (73%). As for age the respondents who aged between 31 to 40 years had the highest frequency (57.1%) followed by respondents aged between 20 to 30 years (25.4%). For race, it is divided to four categories which is Malay, Chinese, Indian and other, where the highest number of respondents were Malay with frequency of (88.9%). For marital status, the highest percentage belonged to respondents who were married (65.1%) and 34.9% were single. Regarding their education, 54% had a degree followed by

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respondents with diploma (28.6%). The majority of respondents work in normal working hours (69.8%). Lastly, from total of 61 respondents, (98.4%) does not involve in accident for the past 12 months

6.2. Measurement Model Analysis

To evaluate the measuring model, the reliability and validity of the latent variables must be tested to complete the structural model examination. The reliability of the measures in this study is assessed using internal consistency analysis and indicators. Convergent validity and discriminatory validity analyzes of the measurement model for this study are evaluated using the procedures recommended by (Chin, 2010).

For reliability, internal consistency reliability was the first criteria to be assessed. The measurement model has sufficient internal consistency reliability when each variable 's composite reliability (CR) surpasses the threshold value of 0.6. Table 01 shows that each variable 's CR for this study is above the recommended threshold value of 0.6. The results show, therefore, that the elements used to represent the variables have satisfactory internal consistency reliability.

Next is validity, it is done by analyzing both convergent and discriminant validity. Convergent validity can be evaluated via the average variance extracted (AVE) (Hair et al., 2010). The result in Table 01 shows that the outer loadings of all items for all variables in initial and modified measurement model according to these results all outer loadings, except three items related to safety leadership (SCH6, SCR5 and SCO7), seven items related to safety climate (MP6, MP14, SP1, SP3, SP4, SP5, and SP6) and two item related to safety performance (SR6 and SM4) were deleted from initial measurement model due to low loading factor which were less than 0.5 which confirmed their low contribution to related constructs. From Table 2 the result shows that all variable AVE is range from 0.391 to 0.558, some of the AVE result are less than 0.5, however, all the value of AVE is accepted as according to Fornell and Larcker (1981) if AVE is less than 0.5, but composite reliability is higher than 0.6, the convergent validity of the construct is still acceptable. Thus, the results proved that convergent validity exist for the constructs of this study.

Discriminant validity in this study was assessed through Heterotrait-Monotrait (HTMT) ratio of correlations (Henseler et al., 2015). Henseler et al. (2015) have suggested the assessment of the HTMT correlations to examine the discriminant validity. This recent approach shows the estimation of the true correlation between two latent variables. A threshold value of 0.90 has been suggested for HTMT (Henseler et al., 2015). Above 0.90 shows a lack of discriminant validity (refer Table 02). This study therefore concludes that the measurement model has established its discriminant validity.

Table 01. Reliability and Validity

Construct	Items	Initial model	Modified Model	CR	AVE
Safety leadership	SCH1	0.546	0.546	0.906	0.393
	SCH2	0.669	0.66		
	SCH3	0.621	0.607		
	SCH4	0.640	0.632		
	SCH5	0.569	0.549		
	SCH6	0.464	**deleted**		
	SCR1	0.640	0.636		
	SCR2	0.540	0.544		
	SCR3	0.660	0.679		

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	SCR4	0.645	0.669		
	SCR5	0.407	**deleted**		
	SCO1	0.770	0.772		
	SCO2	0.591	0.582		
	SCO3	0.598	0.602		
	SCO4	0.680	0.71		
	SCO5	0.594	0.62		
	SCO6	0.570	0.545		
	SCO7	0.015	**deleted**		
Safety climate	MP1	0.617	0.661	0.926	0.391
	MP2	0.505	0.527		
	MP3	0.698	0.718		
	MP4	0.620	0.673		
	MP5	0.606	0.641		
	MP6	-0.309	**deleted**		
	MP7	0.621	0.584		
	MP8	0.617	0.647		
	MP9	0.574	0.579		
	MP10	0.587	0.588		
	MP11	0.530	0.544		
	MP12	0.654	0.65		
	MP13	0.515	0.532		
	MP14	-0.207	**deleted**		
	MA1	0.723	0.691		
	MA2	0.634	0.631		
	MA3	0.725	0.724		
	MA4	0.599	0.602		
	MA5	0.510	0.535		
	MA6	0.695	0.708		
	MA7	0.664	0.676		
	MA8	0.601	0.617		
	MA9	0.646	0.625		
	SP1	-0.221	**deleted**		
	SP2	0.532	0.542		
	SP3	-0.343	**deleted**		
	SP4	-0.394	**deleted**		
	SP5	-0.188	**deleted**		
	SP6	-0.395	**deleted**		
Safety performance	SK1	0.827	0.796	0.927	0.558
	SK2	0.760	0.74		
	SK3	0.726	0.725		
	SK4	0.633	0.684		
	SK5	0.676	0.715		
	SK6	-0.338	**deleted**		
	SM1	0.671	0.707		
	SM2	0.680	0.709		
	SM3	0.702	0.73		
	SM4	-0.277	**deleted**		
	SM5	0.843	0.832		
	SM6	0.832	0.816		

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Table 02. Discriminant Validity- Heterotrait-Monotrait (TMT)

	Safety Climate	Safety Leadership	Safety Performance
Safety Climate			
Safety Leadership	0.638		
Safety Performance	0.710	0.684	

6.3. Structural Measurement Model Analysis

The structural model has been conducted as to validate the proposed hypothesis. The bootstrapping procedure "estimates the standard errors of the parameter estimates, calculates the ratio of a parameter estimate to its standard error, and compares this statistic to the t distribution to obtain the p-value" (Rönkkö & Evermann, 2013, p. 15). The results of boot strapping method have been shown in Table 04, where it demonstrates a p-value for each path. All structural model relationships were significant considering a p-value <0.05.

In the model, the first hypotheses (H1) had a significant a positive coefficient. According to the results the effect of safety leadership on safety performance is significant (β=-0.349, t=2.661**, p<0.001). These results receive support from several authors (Barling et al., 2002; Griffin & Hu, 2013; Neal & Griffin, 2006; O'Dea & Flin, 2001; Zohar, 2002b). It is known that safety performance in this study is adopted with the purpose to measure workplace safety. Thus, it can be concluded that the higher level of safety leadership will ensure the lower level of workplace accidents.

As for hypotheses 2 (H2), according to the results the effect of safety leadership on safety climate is also significant (β =0.603, t=5.744**, p<0.001). It is supported by previous studies, which indicates there is a significant relationship between both variable (Barling et al., 2002; Hofmann et al., 2003; Komaki et al., 1982; Zohar, 2002a).

The last hypotheses in this model (H3) which is the effect of safety climate on safety performance had a significant effect (β =0.479, t=3.104**, p <0.001). It is similar with the findings by (Brewer, 2006; Clarke, Sloane, & Aiken, 2002; Flin, Mearns, O'Connor, & Bryden, 2000; Hofmann & Mark, 2006; Savkur et al., 2004; Stone & Gershon, 2006; Zohar, 1980). A positive safety climate has direct and indirect relationship with safety performance of the workers by giving knowledge and by motivating the workers to perform their work in safe manner.

R^2 represents the amount of variance in the dependent variable, in this thesis strategic decision making, that is explained by the model. According to Hair et al. (2017), R^2 values of 0.75, 0.50, or 0.25 for dependent constructs are considered substantial, moderate, and weak, respectively. As shown in Table 03 below R^2 value for safety performance is 0.539, which can be considered moderate; it indicates that 54% of the variance in the safety performance is explained by safety leadership.

Table 03. Test of The Total Effects Using Bootstrapping

Hypothesis		Path Coefficient	Standard Error	t-Value	Decision	R2
H1	Safety Leadership -> Safety Performance	0.349	0.131	2.661**	Accepted	0.539
H2	Safety Leadership -> Safety Climate	0.603	0.105	5.744**	Accepted	
H3	Safety Climate -> Safety Performance	0.479	0.154	3.104**	Accepted	

Note: t-value 2.33 at **p<0.01

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6.4. Mediating Analysis

As shown in the Table 03, the result shows that safety leadership positively affect safety performance (β=-0.349, t=2.661**, p<0.001). Next, the mediating effect of safety climate on the relationship between safety leadership and safety performance is tested. The results as shown in the Table 04, shows that the indirect effect β=0.289 are significant with t-value of 2.864, indicating that there was a mediating effect. Next, the 95% bootstrapped confidence interval bias is calculated. The result as in Table 4.24 below indicates that the indirect effects 95% bootstrapped confidence interval bias is [LL=0.066, UL=0.515], the result shows that it does not straddle between 0 indicating there is a mediating effect (Preacher & Hayes, 2008). Thus, it can be concluded that the mediating effect are statistically significant at t-value >2.33 and p-value <0.001.

The results of this study confirm that there is a mediating influence of safety climate on safety leadership and safety performance (Neal et al., 2000; Probst & Estrada, 2010; Wu et al., 2008). Hypothesis 4 is supported by a positive coefficient path (β = 0.289), which was significant at 0.01 (t = 2.864**). Past studies have also studied safety climate as a mediating variable effects (Cooper & Phillips, 2004; Meliá et al., 2008; Nielsen et al., 2008). A positive safety climate will make contribution to the individual safety awareness and behaviour and then strengthen the relationship between them. As a result, it can be concluded that the safety management should not only concentrate on the individual behaviour and awareness but also take safety climate into consideration.

Table 04. Result of Mediating effect using Bootstrapping

	H4 : BOL-> OP-> SDM			Confidence interval	
	Std. Beta (β)	**t-Value**	**p-Value**	**95% LL**	**95% UL**
Without mediator ***Direct effect*** **(SL- > SP)**	0.349	2.661**	0.001	0.150	0.675
With Mediator ***Indirect effect*** **(SL-> SC-> SP)**	**0.289**	2.864**	0.001	0.066	0.515
Mediation Effect	Yes				
Hypothesis Result	H4 accepted				

Note: SL=Safety leadership, SP= Safety performance, SC= Safety climate, LL= Lower level, UL= Upper level, ** p < 0.05, t-value > 1.96*

7. Conclusion

In conclusion, this research study has succeeded in answering all of the research objectives, which aimed at analysing the influences of safety leadership on safety performance and how safety climates mediate safety leadership and safety performance. This study is focused on investigation of the influences between safety leadership and safety performance that are focusing in TNB based manufacturing companies chosen from Federation of Malaysian Manufacturers (FMM). The finding enhances researcher's understanding of the variables which are safety leadership, safety performance and safety climate. Result from this study may lead to understanding of the relationship all the independent variables and a dependent variable. This study also may influence and gives an implication towards an organization about the safety

practices that apply in the organization besides the role of Human Resource as the changing agent in an organization. Furthermore, it is very important for Human Resource to make sure the organization apply the safety practices at the workplace in order for them to work in a safety, healthy and happy work life.

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