

# The Effects of Safety Climate on Safety Performance: An Evidence in a Malaysian-Based Electric Electronic and Manufacturing Plant

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## Abstract

The current paper aimed at investigating the effects of each dimension of safety climate on safety performance in a Malaysian-based electric and electronic manufacturing plant. The study was carried out as a non-experimental type research which employed questionnaire as the method of collecting data. A total of 313 production workers from a Malaysian-based electric and electronic manufacturing plant participated in the study. The obtained data were analyzed using simple linear regression analysis. The findings of the study demonstrated that each dimension of safety climate played a significant influence on safety performance.

**Keywords:** Safety at work; safety climate; safety performance; Malaysian electric and electronic manufacturing sector

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## 1.0 INTRODUCTION

Rapid economic growth due to industrialization have not only greatly impacted both income distribution and quality of life, but it has also led to an increase in the number of accidents at work (Amirah, Asma, Muda & Amin, 2013). According to the International Labour Organization (ILO), it was estimated that each year approximately 2 million workers are killed due to accidents and work-related diseases (Hämäläinen, Saarela & Takala, 2009). The authors added that, 270 million occupational accidents and 160 million work-related diseases were reported around the world.

In Malaysia, the Occupational Safety and Health Act (OSHA 1994) was established as a result of the explosion of the "Bright Sparkles" firecrackers factory in Sungai Buloh in 1991 (Ismail, 2006). The institution of the said act was to ensure that the safety, health and welfare of workers are protected from safety and/or health risks (Durrishah, Ashari, Zaini, Jamil & Muktar, 2004). Furthermore, according to the Social Security Organization (2014), the manufacturing sector has been reporting the highest and most consistent cases of accidents at work in Malaysian; 17,206, 17,569, 17106, 16,684, 16,145 and 15,323 number of cases from the year 2009 till 2014 respectively.

In relation to the aforementioned figures, the mishaps reported by the electrical and electronic division of the manufacturing sector were among the main contributors of accidents at work in comparison to that of other divisions (Social Security Organization, 2014). The account indicated existence of both risks and dangers in the manufacturing sector of electrical and electronics, particularly in Malaysian, and the need for action to reduce the accident rate in addition to improving safety performance.

In many countries, the issues of health and safety at work involving safety climate are among the subjects that are most noted by organizations (Hall, Dollard & Coward, 2010; Siti Fatimah & Clarke, 2013; Nazahah, Ng, Biggs, & Boots, 2014). Moreover, developments in safety management have also emphasized on safety climate as an important safety intervention in organizations (Siti Fatimah & Clarke, 2013). Additionally, many studies in the past have demonstrated that safety climate was one of the causes of accidents at work (Seo, 2005; Neal & Griffin, 2006; Huang, Ho, Smith & Chen, 2006; Meliá, Mearns, Silva & Lima, 2008; Jiang, Yu, Li & Li, 2010; Zohar, Huang, Lee & Robertson, 2014). Results of previous studies have also found that one of the causes of accidents was due to safety climate factors (Eng & Yusof, 2003; Intan Marzita, 2012; Rozlina, Awaluddin, Hassan, Abdul, & Norhayati, 2012; Arshad, Yeoh, Ali, Ripin & Haron, 2013; Siti Fatimah, 2013).

The lack of emphasis of safety climate on safety has resulted in accident (Arshad *et al.*, 2013; Siti Fatimah & Clarke, 2013). Previous studies have found that there were many factors that existed in safety climate itself, which subsequently triggered accidents at work (Siti Fatimah & Clarke, 2013; Intan Marzita, 2012; Rozlina *et al.*, 2012; Arshad *et al.*, 2013; Siti Fatimah, 2013; Siti Fatimah, 2011).

Firstly, there are issues related to employees' perception towards the commitment of top management and action of safety in a workplace (Wu, Liu & Lu, 2007). To elaborate, top management such as both chief executive officers (CEO) and managers were said to give less commitment and action towards safety in a workplace. Secondly, the issue of safety commitments and actions by employees themselves are low. According to Siti Fatimah and Clarke (2013), employees' perception of safety commitment and action, particularly in the first three years of their employment were low. Thirdly, risk-related issues, namely employees' perception of risks. Employees tended to assume that the risks inherent in their workplace were less dangerous, and the probability of the said risks threatening and causing an

accident at work was low (Siti Fatimah, 2011). Finally, problems during an emergency response, which is less emphasized in organizations, was also one of the focused issues in the current study.

The study utilized the five dimensions of safety climate introduced by Wu, Liu and Lu (2007), which were chief executive officers' (CEO), managers', and employees' safety commitment and actions respectively, perceived risk, and emergency response. The dimension used is the most holistic dimension to describe safety climate in a workplace (Wu, Liu & Lu, 2007). To the authors' best knowledge, at present, there is only a single study that examined the five effects of safety climate dimensions towards safety performance, which was conducted by Wu, Chen & Li (2008). However, the said study was done in the education sector in Taiwan.

Given that, the empirical studies that examined the effects of each dimension of safety climate towards the safety performance were not fully implemented until now. This is because most of the previous studies have examined safety climate per se and not per each dimension (DeJoy, Schaffer, Wilson, Vandenberg & Butts, 2004; Nahrgang, Morgeson & Hofmann, 2011; Golubovich, Chang & Eatough, 2014; Hon, Chan & Yam, 2014). Therefore, to the authors' best knowledge, there is a limited of studies, which investigated the effects of each dimension of safety climate on safety performance in the electric and electronic manufacturing industry in Malaysian. Hence, the current study was undertaken to fill the said gap, while utilizing the five dimensions introduced by Wu, Liu & Lu (2007). As such, the objective of the study was to examine the effects of the five dimensions of safety climate on safety performance among the production workers in a Malaysian-based electric and electronic manufacturing plant.

## ■ 2.0 LITERATURE REVIEW

In the following section, literature related to associated variables and their relationships between one another are discussed.

### Conceptual Of Safety Climate

Zohar (1980) was the first researcher to seriously discuss safety climate. He defined the term safety climate as a sharing between employee perceptions of their work environment. Accordingly, Neal, Griffin and Hart (2000) referred to safety climate as a sharing of perceptions among employees, in regards to policies, procedures, and practices of their organization, which are related with safety aspects. In the current study, safety climate referred to employees' perception about safety practices in their workplace, and it was measured by Safety Climate Scale (SCS), which was adapted from Wu, Liu and Lu (2007). As mentioned earlier, the dimensions included chief executive officers' (CEO), managers', and employees' safety commitment and action respectively, emergency response and perceived risk.

### Conceptual of Safety Performance

Safety performance is considered as a safety assessment process for both individuals and organizations (Yang, Wang, Chang, Guo and Huang (2009). In De Koster, Stam and Balk (2011), safety performance was used to assess the extent to which an organization could avoid accidents and mistakes. At an organizational level, safety performance is seen as a safety assessment, which is able to help organizations assess the effectiveness of management in the context of both controlling and eliminating workplace accidents (Khair, Shamsudin & Subramaniam, 2012). In the present study, safety performance indicated the level of safety condition in the organization, which was measured using Safety Performance Scale (SPS), adapted from Wu, Chen and Li (2008). The dimensions included safety organization and management, safety equipment and measures, safety training practice, safety training evaluation, accident statistics, and accident investigation.

### Relationship between Safety Climate and Safety Performance

Quality safety climate in an organization can affect the safety performance of an organization (Wu, Lin & Shiau, 2010). Under positive safety climate, employees were found to be more likely to exploit their potential to the maximum, and thus benefitting the organization to achieve its objectives. On the other hand, employees working under unhealthy or negative safety climate resulted in weak organization safety performance.

### *Chief Executive Officers' (CEO) safety commitment and action towards safety performance*

Employees' perception of safety commitment and action given and demonstrated by a CEO of an organization was found to have impacts on safety organisation and management as well as safety equipment and measure in safety performance (Wu, Chen & Li, 2008). The authors argued that when both commitment and action of good safety behaviors were exhibited by leaders, there was an inclination to create a situation of openness between both workers and leaders. In addition, the employees would also feel more respected and that their safety at the workplace is taken care of.

Next, employees' perception of a CEO's safety commitment and action towards safety was also found to affect both accident investigation and accident statistics (Yule, Flin & Murdy, 2007). As stated by previous researchers, when employees developed a positive perception in regards to their CEO's safety commitment and action, organizations were able to reduce the number of workplace accidents. For example, a leader of an organization, who is responsible for the safety aspects of his or her subordinates, has the tendency to obtain a positive response from the employees, and thus causing employees to be more cautious when engaging in their work tasks (Wallace, 2004). Indeed, such situation would directly decrease the number of workplace accidents.

In addition, according to Carder and Ragan (2003), employees' perception of safety commitment and action demonstrated by a CEO would also affect safety training practices and safety training evaluation in safety performance. They also stated that an employer's support towards safety was among one of the elements, which increased the effectiveness of safety training. In a particular investigation on safety

climate, Zohar (1980) found that a management's commitment towards safety was a major factor that affected the success of a safety training in an organization.

#### *Managers' safety commitment and action towards safety performance*

A study by Wu, Chen and Li (2008), discovered that managers' safety commitment and action in safety climate had impacts on the safety organisation and management, safety equipment and measure as well as accident investigation in safety performance. The said findings were also supported by Wu and Kang (2002), whose research was conducted in the manufacturing industry in Taiwan.

Wu, Chen and Li (2008) added that the perception of employee towards managers' safety commitment and action also affected the dimensions safety training practices and safety training evaluation in safety performance.

#### *Employees' safety commitment and action towards safety performance*

According to Wu, Chen & Li (2008), employees' safety commitment and action had impacts on safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics.

#### *Perceived risk towards safety performance*

Perceived risk can be defined as the perception of workers in relation to the risks in their workplace (Wu, Lin & Shiau, 2010). Indeed, according to Dahl (2013), perceived risk is an important feature as it allows workers to recognize and be mindful of the risk level that is associated with their jobs.

Furthermore, Mullen (2004) also ascertained that perceived risk was associated with employees' injuries experience, in which the accidents occurred at the workplace. In addition, a study by Wu, Chen and Li (2008) found that employees' safety commitment and action affected safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics.

#### *Emergency response towards safety performance*

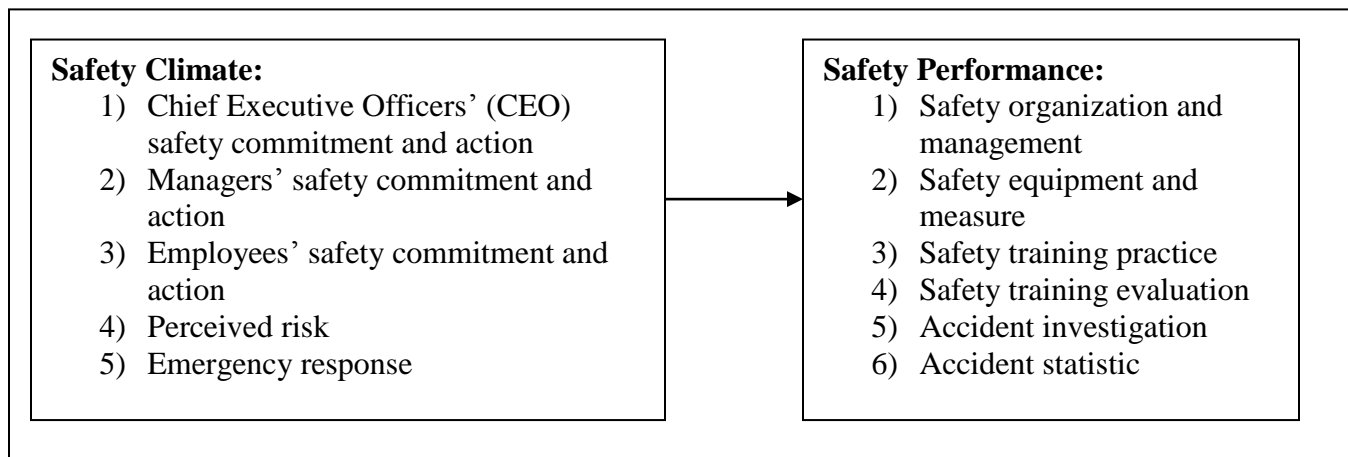
Emergency response is an action taken by an employee in case of an emergency such as fire, explosion, earthquake, and so on (Wu *et al.*, 2010). According to You (2010), accident investigation showed that emergency response was a main contributing factor to the occurrence of a disaster. This included understanding both the emergency response plans, emergency response equipment, procedures and first aid injury report (Wu, Lin & Shiau, 2010).

According to a study by Wu, Su and Chang in 2004 which involved Taiwan High Speed Rail Contract, it was determined that the dimensions of emergency response in safety climate had impacts on safety organisation and management as well as safety equipment and measure (Wu, Chen & Li, 2008). The results owed to emergency response being very closely related to the procedural aspects of safety, equipment safety, and working environment (Wu, Chen & Li, 2008).

Next, the dimensions of emergency response in safety climate also affected both safety training practices and evaluation as well as the aspects of both accident investigation and statistics in safety performance (Wu, Chen & Li, 2008). The authors explained that when employees perceive emergency response positively, it is an indication that they are satisfied with the actions and efforts demonstrated by their organization in case of an emergency.

To recapitulate, each safety climate dimension in the current study were predicted to be able to bring success in regards to safety efforts in the working environment, and thus could directly improve safety performance in organizations like conceptual framework in Figure 1 below.

#### **Conceptual Framework**



**Figure 1** Conceptual framework of the current study

### ■3.0 METHODOLOGY

The current study utilized quantitative method to gather the required data (questionnaire). The questionnaires used were adapted from Safety Climate Scale (Wu, Liu & Lu, 2007) and Safety Performance Scale (Wu, Chen & Li, 2008). Through pilot study, the questionnaires acquired Alpha Cronbach values of 0.933 and 0.927 respectively. Respondents were asked to answer the items in the said questionnaires based on a five Likert scale, which ranged from “extremely disagree” to “extremely agree”. The respondents of the study were 313 production employees from a Malaysian-based electric and electronic manufacturing plant. Data were analyzed using simple linear regression analysis to identify the effects of each dimension of safety climate on safety performance.

### ■4.0 RESULTS AND DISCUSSION

As previously explained in the literature review section, far too little attention had been given to explain the role of each dimension of safety climate on safety performance, especially in the industry of electric and electronic manufacturing in Malaysia. Simultaneously, the literature also assumed that the dimensions of safety climate had effects on safety performance. As such, simple linear regression analysis was carried out to investigate the ability of safety climate in predicting safety performance.

#### Effects of Chief Executive Officers’ (CEO) Safety Commitment and Action on Safety Performance

Table 1 indicates the findings on regression analysis concerning the prediction of Chief executive officers’ (CEO) safety commitment and action in influencing safety performance.

**Table 1** Effects of Chief Executive Officers’ (Ceo) Safety Commitment and Action on Safety Performance

Variable	B	P	R <sup>2</sup>	F	Sig
Chief Executive Officers’ (CEO) safety commitment and action on safety performance	.797	0.001	.636	543.395	.000

The R<sup>2</sup> value of 0.636 highlighted that CEO’s safety commitment and action contributed 63.6 percent of the total variance in safety performance (F = 543.395, p < 0.001). The observed significant value of 0.000 was less than the significant level (0.001). Therefore, it was concluded that CEO’s safety commitment and action had affects on safety performance.

The findings of the current study showed that CEO’s safety commitment and action affected safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation accident investigation and accident statistics. The results was in accordance to that found by Wu, Chen and Li (2008).

Commitment and action by a CEO plays an important role in all aspects of safety in an organization (Marsh, Robertson, Duff, Philips, Cooper & Weyman, 1995). This owed to the notion that individuals with higher ranks or positions in an organization would have the ability and power to influence and affect the actions of other individuals (Wu, Lin & Shiau, 2010; Zimolong & Elke, 2006). Indeed, it was ascertained that a in high-risked working environment, management's commitment to safety is desperately needed (Cox & Flin, 1998; Cox & Cheyne, 2000). Therefore, it could be concluded that the involvement of a CEO was able to provide a significant impact on safety in the workplace (Wu, Lin & Shiau, 2010).

#### Effects of Managers’ Safety Commitment and Action on Safety Performance

The regression analysis results concerning the prediction of managers’ safety commitment and action in affecting safety performance is summarized in Table 2.

**Table 2** Effects of managers’ safety commitment and action on safety performance

Variable	B	P	R <sup>2</sup>	F	Sig
Managers’ safety commitment and action on safety performance	.828	0.001	.686	680.599	.000

Managers’ safety commitment and action was found to contribute 68.6 percent of the total variance in safety performance (F = 680.599, p < 0.001). This was indicated by the R<sup>2</sup> value of 0.686. The related significant value was 0.000 (p < 0.001). Hence, the results showed that managers’ safety commitment and action did affect safety performance.

Similar to DeJoy *et al.*, (2004), the results of the current study ascertained that managers’ safety commitment and action affected safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics.

Commitment should be reflected in the awareness of managers in regards to problems involving the safety and wellbeing of workers. Managers should also be concerned about safety aspects, believe and strive that higher levels of safety could be achieved, possess the ability to demonstrate continued positive attitude towards safety, and actively promote safety at all levels in the organization (Fernández-muñiz, Montes-peón & Vázquez-ordás, 2007). Therefore, Wu, Lin & Shiau (2010) argued that if an organization wishes and hopes to achieve excellent safety performance and safety management system, it must emphasize on the important role played by managers.

### Effects of Employees' Safety Commitment and Action on Safety Performance

Table 3 shows the results of regression analysis in relation to the prediction of employees' safety commitment and action in affecting safety performance.

**Table 3** Effects of employees' safety commitment and action on safety performance

Variable	B	P	R <sup>2</sup>	F	Sig
Employees' safety commitment and action on safety performance	.538	0.001	.290	126.937	.000

The R<sup>2</sup> value of 0.290 dictated that employees' safety commitment and action contributed 29.0 percent of the total variance in safety performance (F = 126.937, p < 0.001). The results showed a significant value of less than 0.000 (p < 0.001), which also demonstrated that employees' safety commitment and action had impacts on safety performance.

As such, it was concluded that employees' safety commitment and action affected safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics, which was in accordance to the results obtained by Wu, Liu and Lu (2007).

According to Fernández-muñiz *et al.* (2007), employees' safety commitment and action included aspects such as their awareness of the importance of working safely, obeying rules and procedures, actively participating in meetings, and giving suggestions on how to improve safety in their workplace. Additionally, the authors added that if employees observe that the management of their organizations was also committed, and the commitment was supported with the implementation of safety management systems, the employees would be more likely to remain positive in their attitudes towards safety. They would also be less incline to partake in unsafe actions, and would more likely suggest and comment on ways to improve working conditions.

### Effects of Perceived Risk on Safety Performance

Table 4 illustrates the findings of regression analysis concerning the prediction of perceived risk in influencing safety performance.

**Table 4** Effects Of perceived risk on safety performance

Variable	B	P	R <sup>2</sup>	F	Sig
Perceived risk on safety performance	.612	0.001	.375	186.417	.000

From Table 4, it could be seen that the R<sup>2</sup> value of 0.375 indicated that perceived risk contributed 37.5 percent of the total variance in safety performance (F = 186.417, p < 0.001). The observed significant value was 0.000, which was less than the significant level (0.001). The results indicated that perceived risk had effects on safety performance.

In agreement with the results of Wu, Chen and Li (2008), the findings of the current study showed that perceived risk affected safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics. Thus, Mullen (2005) deduced that perceived risk was capable of influencing safety performance in a workplace.

### Effects of Emergency Response on Safety Performance

The results of regression analysis in regards to the prediction of the effects of emergency response on safety performance is highlighted in Table 5.

**Table 5** Effects Of emergency response on safety performance

Variable	B	P	R <sup>2</sup>	F	Sig
Emergency response on safety performance	.685	0.001	.470	275.547	.000

Emergency response was indicated to contribute 47.0 percent of the total variance in safety performance (F = 275.547, p < 0.001), given that it obtained a R<sup>2</sup> value of 0.470. In addition, the observed significant value was 0.000 (p < 0.001). The findings demonstrated that emergency response affected safety performance.

The results further indicated that emergency response had impacts on safety organisation and management, safety equipment and measure, safety training practices, safety training evaluation, accident investigation, and accident statistics. The said findings were similar to that of ascertained by Wu, Chen and Li (2008). Furthermore, according to You (2010), effective emergency response in organizations was found to be capable of reducing the number of workplace accidents, which reiterate the notion that emergency response was capable of improving an organization's safety performance.



## 5.0 CONCLUSION

To summarize, the current study indicated that all dimensions of safety climate, namely chief executive officers' (CEO), managers', and employees' safety commitment and action respectively, perceived risk and emergency response were important predictors of safety performance in the manufacturing sector of electric and electronic in Malaysia. It was ascertained that safety climate was vital to promote safety performance among production workers. Therefore, it was recommended that organizations take the initiative to enhance safety climate within the organizations to increase safety performance, which in turn would increase their productivity as well.

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