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Original Article

Exploratory Study on Safety Climate in Malaysian Automotive Manufacturing

Abstract:

Safety climate scrutiny has been given attention by the organization in increasing productivity and efficiency in the workplace. The purpose of this study is to determine the relationship between safety climate construct factors and safety climate. Safety climate measurement as developed by Vinodkumar and Bashi was used and distributed to the selected respondents in the national automotive manufacturing plant. Internal consistency of six safety construct factors and correlation between safety construct factors and safety climate were validated using reliability analysis and Pearson correlation, respectively. The survey instrument scores had acceptable overall internal consistency (a = 0.913). The correlation analysis indicated that only two factors in safety construct factors have significant with safety climate. Both factors are enforcement of regulation and procedure of safety and safeness of work environment. The finding of this study provides a useful framework for the organization in practicing safety climate.

Key Words: Automotive Industry; Safety Climate; Safety Construct Factors; Safety Regulation.

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Introduction

The workforce management is one of the most several options that should be concerned in terms of economic benefit which tends to focus on human resource outcomes such as reducing absenteeism and reducing health care cost. Recently in the United States, job related injuries and illnesses estimated to cost about US$250 billion per year [1]. In Malaysia compensation cost claimed from Social Security Organization (SOCSO) increases with the increasing year. In 2009, the nation lost almost RM 1.5 billion for cost of work related to compensation [2].

In Spain, the occupational accident rate has increased considerably in recent years, in spite of the legal reforms beginning in 1995. This large number of accidents has a significant human cost for Spanish society, and leads to a loss of economic potential and productivity for the country since apart from the decrease in human capital and the damage done to production equipment, a large number of working days are lost [3]. Employee health issues have the potential to both increase costs and decrease revenues for any organization. This is the fundamental economic incentive for organizations to manage employee health issues. Aldana and Pronk [4] found that relationship exists between health claims, medical expenditures, worker absenteeism, life insurance cost and health promotion programs. The incentive for ongoing support of weight maintenance and other health promoting activities in worksites is substantial, given that such programs might translate into cost savings for employers.

Management and employees need to understand safety fundamentals in order to ensure a safe workplace. An effective safety, health and environmental management system, coupled with sound leadership can pay rich dividends in the form of reduction in accident rate. The close cooperation between the employer and employee will play a fruitful role in any safety endeavor. Both management and employees must be knowledgeable in the techniques of safety, health and environmental management so that they can contribute efficiently towards a safe and healthy workplace. Therefore, the application of an effective management can lead to safer systems of manufacturing and reduce incidence of injuries and work related diseases. It is a good opportunity for the organization to take up the challenge and adopt safety climate at the work place.

Safety climate refers to recognized basic and complete way for improving workplace safety in diverse industries including manufacturing and especially in high risk industries such as

automotive manufacturing industry [5]. According to the pioneer researcher in this field of study [6], safety climate can be defined as share perception of the policies, practices, and the procedure regarding safety. Thus, Whitener [7] found that employee's trust and the commitment to the organization safety can be achieved when they perceived the organization support them.

Safety climate research has realistically expressed the importance of employee perception about the organization priorities as antecedence to safety outcome [8]. Regarding this principle of safety climate, many researchers have developed their own Work Safety Scale (WSS). According to Zohar [6], there are eight safety climate dimensions which emphasis on safety policies, procedure and practice in the area such as management attitudes, safety training, perceive work risk and work place as well as the status of work officer/safety committees.

Subsequent study by Vinodkumar and Bhasi [9] was adopted as principle to this study. This study is different from traditional safety climate studies, due to the former studies focusing on accident rate as indicator in measuring safety. However, the current study emphasized more on management commitment and participation (MCP), personal protective equipment (PPE), enforcement of regulation and safety procedure (RSP), employees and supervisor aspect (ESA), environment safety (ES), and job stress (JS). There is limited study on safety climate in manufacturing industry; moreover there is no other study about safety climate in the Malaysian automotive manufacturing industry. Malaysia, as a rapidly developing country in Asian is different from developed countries like the United Kingdom, United States, and Australia on the workers set of norm (belief, perception, and attitude) and culture toward safety [10]. Due to the cultural differences between populations may have an influence on safety climate, hence the authors had to adopt and adapted their questionnaire for their study in Malaysia.

The main purpose of this study is to develop safety climate measurement and to explore whether there is relationship between safety construct factors and safety climate in the risky automotive manufacturing plant. The specific objective of this study is to determine the critical factor related to the safety climate, so as to offer measurement tools in solving and reducing accident rate and occupational hazard at the workplace.

Methods

The participants in this study were frontline workers consisting of operators, assistance superintendents, general supervisors, assistance supervisors and line supervisors, who were divided to two main groups, namely; employee group and the supervisor group. Employee group consists of operator only, whereas the rest of them were in supervisor group. A sample from these two groups was determined proportionately based on the total workers in the organization. Thus, the percentages of supervisor and employee respondents were 30% and 70%, respectively. Finally, 200 workers were selected as respondents for this study as recommended by Tabachnick and Fidell [11].

A structured questionnaire was used to gather the relevant information in achieving the proposed objectives of the study. This questionnaire, which was adopted and adapted from Vinodkumar and Bhasi [9], was divided into three sections: A. Demographic factors, B. Safety construct factors and C. Safety climate in general. All questions in Section B and C used five-point Likert Scale, with the rate of answer from 1 (strongly disagree); 5 (strongly agree). Every point explained the degree of respondent's agreement with items in the questionnaire. For the purpose of this study, items in the questionnaire were restructured in detail as follows:

In Section A, the five demographic items consist of designation, marital status, accident experience, education level, and age group. Items in Section B relate to the safety construct factors, which consist of management commitment and participation (MCP), personal protective equipment (PPE), enforcement of regulation and safety procedure (RSP), employees and supervisor aspect (ESA), environment safety (ES), and job stress (JS), whereas items in Section C asked about general safety climate. Dual languages questionnaires contained 75 items with Bahasa Malaysia as main language together with English has been consistently used. Questionnaires were successfully distributed via post with the full cooperation and support from Safety, Health and Environment Officer in the automotive organization.

Data collected was analyzed using Statistical Package for Social Science (SPSS) version 17. Three analyses were applied in terms of descriptive analysis, internal scale reliability and Pearson correlation.

Results

Out of 200 questionnaires distributed, 195 or equivalent of 97 percent were returned. Prior to the data analysis, internal consistency of the item was validated using the internal scale reliability. The result showed that the instrument has high internal scale reliability, which was indicated by the value of Cronbach's alpha (a) of 0.913. This analysis was applied to ensure all items measured were in various aspects and in the same concept [12].

Further investigation of safety climate was analyzed on mean of safety construct factors and overall mean safety climate, which is shown in Figure 1.

From the completed questionnaires, the majority of the respondent's age was in the range of 26 to 30 years old, whereby more than half of them were married and they also had at least Penilaian Menengah Rendah (PMR) in education level. The detailed demographic factors are shown in Table I.

The mean value variable is vital in determining the level of employee perception on safety climate in the national automotive manufacturing plant. The mean scored of grand

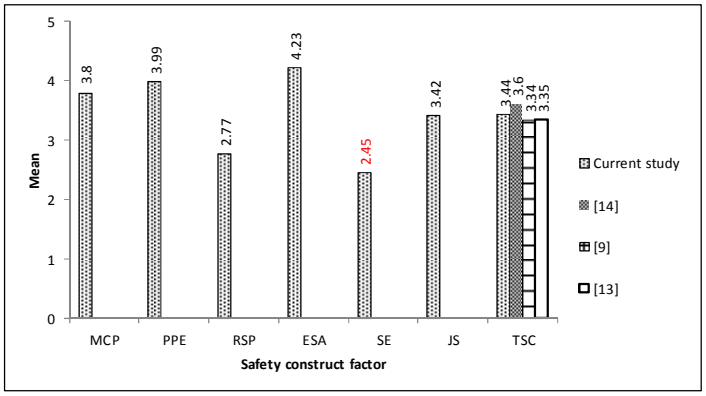
value was 3.44 and the means of six construct factors were 3.80, 3.99, 2.77, 4.23, 2.45, and 3.42, respectively. The grand mean value for the total safety climate 3.44, fell between neither agree nor disagree and agree.

Table I Demographic factors of the respondent

Demographic factors		Frequency f(x)	Percentage (%)
Age group	≤ 20	1	0.5
	21-25	20	10.3
	26-30	85	43.6
	31-35	48	24.6
	36-40	26	13.3
	41-45	7	3.6
	Missing data	8	4.1
Designation	Supervisor	63	32.3
	Employee	132	67.7
Marital status	Single	58	29.7
	Married	135	69.2
	Missing data	2	1.0
Education level	Degree and equivalent and above	20	10.3
	Diploma and equivalent	23	11.8
	STPM and equivalent	9	4.6
	SPM and equivalent	126	64.6
	PMR and equivalent and others	11	5.6
	Missing data	6	3.1
Accident experience	Yes	41	21.0
	No	154	79.0

Among them, ESA (employee and supervisor aspects) has the highest mean score, which was on the level of ‘‘strongly agree”, whereas SE (safety environment) which has the lowest mean, fell between ‘‘disagree” and ‘‘Neither agree nor disagree”. MCP (management commitment and participation), PPE (personal protective equipment), JS (job stress), and RSP (enforcement of safety regulation and procedure) fell between ‘‘uncertainty” and ‘‘agree”. These results suggested that the employees had the highest perception of employees’ and supervisors’ aspect and the lowest perception was on the environment safety in safety climate.

Figure 1.Mean of safety construct factors and safety climate



(Key: MCP; management commitment and participation, PPE personal protective equipment, RSP; enforcement of regulation safety and procedure, ESA; employee and supervisor aspect, SE; safeness of work environment , JS; job stress, TSC, total safety climate score).

A Pearson correlation was carried out to determine to what extent the six safety construct factors significantly correlated with the safety climate. The mean value, standard deviation and Pearson correlation coefficient (r) for the major variable in this study were presented in Table II.

Table II Pearson correlation coefficient between safety constructs factors and safety climate

	Mean	Standard deviation	Pearson correlation coefficient (r)					
			1	2	3	4	5	6
MCP	3.79	0.48	1					
PPE	3.99	0.59	-0.16*	1				
RSP	2.77	0.72	-0.12	-0.16*	1			
ESA	4.22	0.43	0.50**	0.39**	0.03	1		
SE	2.45	0.85	-0.12	-0.02	0.24**	0.01	1	
JS	3.41	0.64	0.46**	0.35**	-0.24**	0.32**	-0.20**	1
SC	2.84	1.14	0.08	-0.02	-0.25**	-0.05	-0.20**	-0.025

(Key : MCP; management commitment and participation, PPE personal protective equipment, RSP; enforcement of regulation safety and procedure, ESA; employee and supervisor aspect, SE; environment safety, JS; job stress, SC; total safety climate score).
* Significant at p <0.05. , ** Significant at p <0.01.

The value of r for MCP, PPE, RSP, ESA, SE and JS were 0.08, -0.02, -0.25**, -0.05, -0.20** and -0.025, respectively. The result showed that only two factors had significantly correlated with safety climate. Both factors were enforcement of regulation and procedure of safety (r =-0.25) and safeness of work environment (r = -0.20), which was significant at p < 0.01. Enforcement of regulation safety and procedure were widely discussed in safety climate studies. The result on enforcement of safety regulation seems to indicate a strong relationship with another two items in safety construct factor (Table 2). The two items were safety environment and job stress with the r values of 0.24 and -0.24, respectively. Likewise, the results revealed that all of the safety construct factors were negatively associated with the safety

climate, except for management commitment and participation, which were positively correlated. Job stress was correlated with all dependent variables; the r values with MCP, RSP, ESA, SE, and JS are 0.46, 0.35, -0.24, 0.32 and -0.20, respectively, which was significant at $p < 0.01$.

Discussion

The current study investigated the correlation between six safety construct factors and safety climate in Malaysian automotive plant. The finding of this study revealed a comparatively low value in grand mean compared to the other studies [13, 14] due to the difference of samples and industry, in which a bigger number of respondents were employed by former studies. However, this present study gained a higher grand mean value than study the conducted by Vinodkurma and Bhasi [9] in Kerala, India.

Several explanations could be made for the distinctive values. Workers in developing countries tend to have a lower level of safety awareness than those in developed countries such as America. This is because employees in America has higher academic qualification and might be more receptive to safety rules and regulation as they can understand the processes, hazards and their consequences. Another reason could be the implementation and enforcement of safety regulation in the organization. In addition the management of plant in developing countries such as China, Malaysia and India focus more on production and profit orientation compared to industries in America that place more emphasis and attention on safety production. Furthermore, local culture such as collectivism may lead to employee's refusal to change their traditional habit. As a consequence, further analysis will be required to study the effect and relationship between variables in the safety climate.

The finding of this study is in agreement with Clarke [15], which found that work environment was significantly correlated with accident in automobile manufacturing plant. In addition, Clake and Cooper [16] recognized the potential mechanism related to the low safety climate due to the lack of systematic workplace safety environment. This study also corroborates the finding of Varonen and Mattila [17], which found that employee perception on organization safety practice, has a strong relationship with safety work environment because environment directly involves them. Even though high management commitment and participation were given to compliance safety and health procedure in the work place, it still conflicts with the production. Lack of enforcement safety regulation and procedure is strongly correlated with the job stress and environment safety. It is evidenced that enforcement of safety regulation and procedure alone is not the answer to safety climate. Another finding by local researcher was also addressed, that safety rule and regulation was the most important determinant variable in Malaysia wooden furniture industry [18]. Procedure of safety in safety regulation is a part of precaution in manufacturing plant, as previously reported by Micheal and Leschinsky [19]. Variables selected in this study, appeared inter correlated to each other, which is parallel with the earlier outcome conducted by Clarke [15].

Conclusion

From this study it can be concluded that there are different sets of safety construct factors exist among countries in the world. No such similar safety construct factor valid in various type of industry oriented because they are vary in the local safety regulation, sample size, level of awareness, status of country and cultures. For all those reasons it is required for national automotive manufacturing to have their own safety climate measurement. Regarding the internal reliability analysis, the value of Cronbach a is 0.913, which had a high level of acceptance. The overall mean value of safety climate is 3.44, which shows a higher value compared to mean value of 3.34 (Chemical plant, Kerala, India). While other studies conducted in developing country like China (3.60) and in developed countries such as America (3.75) achieve higher mean value than this current study. Furthermore Pearson correlation analysis indicated that only two factors in safety construct factors are significant with safety climate. Both factors are enforcement of regulation and procedure of safety and safeness of work environment. The finding of this study provides useful framework for the organization in practicing safety climate. Organization should pay more attention to implementation and enforcement of regulation and procedure of safety as well as the safeness of work environment in order to improve safety climate.

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