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DETERMINING FACTORS ON WORKERS' SAFETY BEHAVIOUR USING A STRUCTURAL ANALYSIS APPROACH

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Abstract: *Behaviour-based safety refers to the process that assists employees in identifying and choosing a safe behaviour over an unsafe one. The workplace safety refers to elements such as the person, the environment, and individual behaviour. Only when these elements are harmonized, then the workplace accidents or injuries can be avoided. Therefore, the objectives of this study are fourfold; a) to examine the relationship between the organizational context toward employee safety behaviour, b) to examine the relationship between the social environment toward employee safety behaviour, c) to examine the relationship between the individual appreciation toward employee safety behaviour, and d) to examine the relationship between the work environment toward employee safety behaviour. The participants were among employees in an electrical company in the East Coast of Malaysia. The data collected were analysed using SPSS and PLS software. The results concluded that all the variables were significantly correlated and contribute towards the employees' safety behaviour. Therefore, any organizations that uphold a strong safety environment practices would experience less accidental rates, turnover, absenteeism and better performance or productivity.*

Keywords: *Safety behaviour, organizational context, social environment, individual appreciation*

INTRODUCTION

A combination of workplace safety and large scale disaster has encouraged high risk industries to reduce the potential workplace incidents and accidents with routine tasks. A goal of positive safety culture is to create an atmosphere in which employees are aware of the risk in their workplace, continually on guard against them, and avoid taking any unsafe actions. Researchers have speculated that safety attitudes may predict safe behaviour in the workplace (Neal & Griffin, 2006) and have found some empirical evidence to support these claims.

There are some methods to prevent such an industrial accident and the most effective method is to understand the human behaviour and ultimately improve the safety culture in industry. In order to improve the safety culture and behaviour of the employee, industry needs to provide training, education, monthly meeting, etc. Previous studies show that there between 5% to 15% of accidents are caused by inherent job hazard and 85% to 95% are caused by the failure of employer. The outcome of the accident correlated between safety and productivity, suffering and cost (Fayad, Nuwayhid, Tamin, Kassak & Khogali, 2003). Even though several approaches have been employed to safety performance evaluation, absolute safety for human and property are still an illusion where factory machines and oil exploration facilities are still claiming worker's life or injury. In USA alone, about 6500 American workers die each year because of accident, and the National

safety council also reported on an average day, 14 people died and more than 10,400 people are disable because of work accident (NSC, 2004). All these accidents produce the major economic and social burden in the development of the country (Fayad *et al.,* 2013).

2. Problem Identification

An annual report by Malaysian Social Security Organization or known as *Pertubuhan Keselematan Sosial Malaysia* (PERKESO) in 2010, stated that the transportation and storage industry had 3,642 accidents, and 6.3% of all workplace-related accidents. The workplace-related accidents in Malaysia recorded 57,639 cases compared to 55,186 in 2009. Industrial accidents in Malaysia had declined for the period of 2000 to 2009. In year 2010, there was 3.57% increase of the number of industrial accidents to35, 603 cases compared to 34,376 cases in 2009. The number of work related commuting accidents increased by 5.89% from 22,036 cases in 2009 as compared to 20,810 cases in 2010. Industrial accidents comprise 61.77% of accidents occurred at the workplace reported while 38.23% occurred during commuting. Though the accident rate has marginally increased to 1.05% in 2010 from 1.04% in 2009, fatal cases reported recorded 1,194 cases which were less compared to 1,231 cases in 2009 (PERKESO, 2010). From the year 2000 to 2008, the occupational accidents in Malaysia showed a continuous decline. However, the statistics has remained stagnant since 2009. By industrial sectors, manufacturing recorded the (31%) highest number of accident, followed by public services and social security (18%), commercial (17%), real-estate, rental and business (8%), construction (7%), transportation (7%) and other sectors (12%) (PERKESO, 2010). The statistics from the Ministry of Human Resources indicated that the industrial accident rate has fallen from 4.15 cases for every 1,000 workers in 2008 to 3.31 cases in 2012 while the commuting accident rate stood at 5.48 cases per 1,000 workers in 2012, and National Institute of Occupational Safety and Health (NIOSH) said that the country need to benchmark against developed countries, which have only two to three accidents per 1,000 workers (New Straits Times, 2014). The government had conducted several campaigns and protective measures in ensuring zero cases of accident rate but the rate still increasing years by years.

3. Literature Review

A major main determinant of safety commitment is employee behaviour. However, many studies in occupational safety concluded that human behaviour was the main cause of occupational injuries (Cooper, 2006; Jacobs, Hassell, Ashcroft, Johnson and O'Connor, 2014). According to Vinodkumar & Bhasi (2010), behaviour-based safety is the most effective approach to reduce occupational injuries. In fact, safety behaviour is the key for reducing the injuries at the workplace and indirectly influencing the outcomes of the event before the injuries or accidents occurred. By using observation critical behaviour check list, the enforcement on safety behaviour plays the crucial for accident prevention programs (Glendon, 2008). The results from safety observation program revealed that the effective solution for reducing the accident rate was changing unsafe behaviour among the employees. According to Christian, Bradley, Wallace & Burke (2009), it is fairly commonly accepted that the relationship between management and safety outcomes has some form of intricate linkage, and the effectiveness of leadership among supervisors who concern about the welfare and safety of their subordinates improve safety records. A study on vehicle maintenance employees by Komaki, Heinzmann and Lawson (1980) found that safety training and employees' competency have strong linkage with safety behaviour improvement. Whereas, Miozza and Wyld (2002) findings stated that the success of behaviour-based safety for reducing injuries rate need commitment and involvement for each level of management. This supported by a study by Hofmann and Morgeson (1999) towards manufacturing employees producing commercial heating and air conditioning systems found that organization support on employee safety and the quality of exchange relationships among supervisors and subordinates improved safety behaviour and reduced accidents.

Further, study by Michael, Guo, Wiedenbeck and Ray (2006) among blue collar employees in wood product manufacturing facilities found that positive leader-member exchange relationship improved the safety behaviours of the employees. Accordingly, only the strong support and commitment from each level of management on safety would drive employees to reciprocate the deeds by demonstrating safety behaviours at

the workplace. Additionally, Diaz-Cabrera, Hernandez-Fernaud & Isla-Diaz (2007) stated that some findings showed that low-accident companies had precise management safety commitment, safety training and selection procedures. This is supported by Clarke (2006) whereby the railways safety practice and manager's safety commitment influence the employee's perception upon safety practice. Therefore, it showed the role of manager in ensuring safety of their personnel, and managers commitment and actions are the main element on improving the employee's attitude towards safety awareness (Edwards, Davey & Armstrong, 2013).

4. Methodology

For the purpose of the study, data were collected with a structured questionnaire survey. Questionnaire was adapted from previous studies that showed high internal consistency. Unit of analysis are the employees working in an electrical company in East Coast of Malaysia. A total of 140 sets of questionnaires were distributed and only 80 questionnaires was returned and accepted for further analysis based on simple random sampling technique. The data collected are analyzed and interpreted using Statistical Package for the Social Sciences (SPSS) software package version 21 and path analysis using PLS Smart 2.

5. Results and Findings

A structural equation model with latent constructs has two components. The first component is the structural model typically referred to as the inner model in the PLS-SEM context which shows the relationships (paths) between the latent constructs. Therefore, the structural paths between the latent constructs can only head in a single direction. In the structural model, we distinguish between exogenous and endogenous constructs. The second component of the structural equation model comprises the measurement models, also referred to as outer models in the PLS-SEM context.

The measurement models include the unidirectional predictive relationships between each latent construct and its associated observed indicators (Figure 1.1 below). This segment focused on the construct validity analysis of all the indicators in this subject area. As illustrated in the research framework, the variables were safety behaviour (SB), organizational context (OC), social environment (SE), individual appreciation (IA) and work environment (WE). Firstly, the overall constructs were identified. The construct validity explained the convergent validity by measuring the average variance extracted (AVE). The average variance extracted (AVE) reflects the variance captured by the indicators relative to measurement error. For this study, the average variances extracted (AVE) values ranged should be ranged between 0.5 and 0.7 indicating a good level of construct validity of the measures used (Barclay, Thompson & Higgins, 1995). However, if the AVE values are less than 0.5, as Barclay et al. (1995) proposed, this set of items has an adequate convergence in measuring the concern construct. Since the factor loading send the aspect of the convergent validity, the items that have loading below than 0.4 can be deleted (Hair, Black, Babin & Anderson, 2010). Therefore, the researcher had deleted few items that have loading below 0.4.

Figure 1.1: Initial Reflective Outer Model

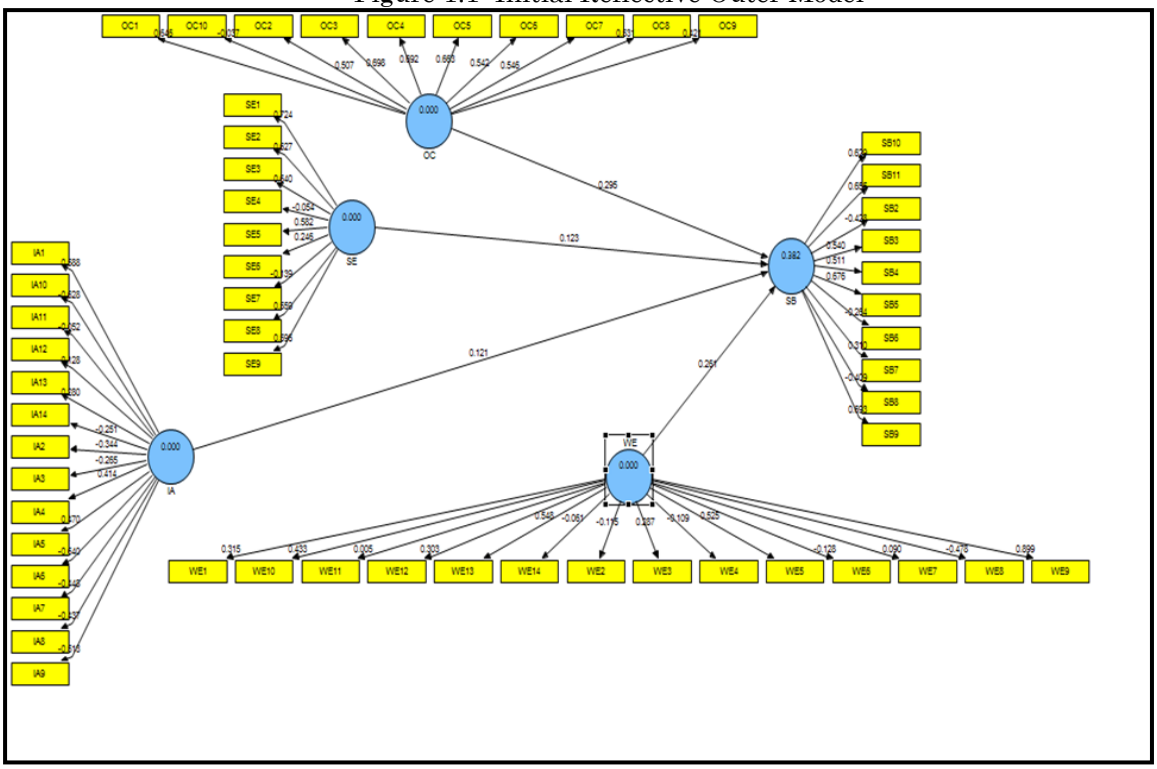
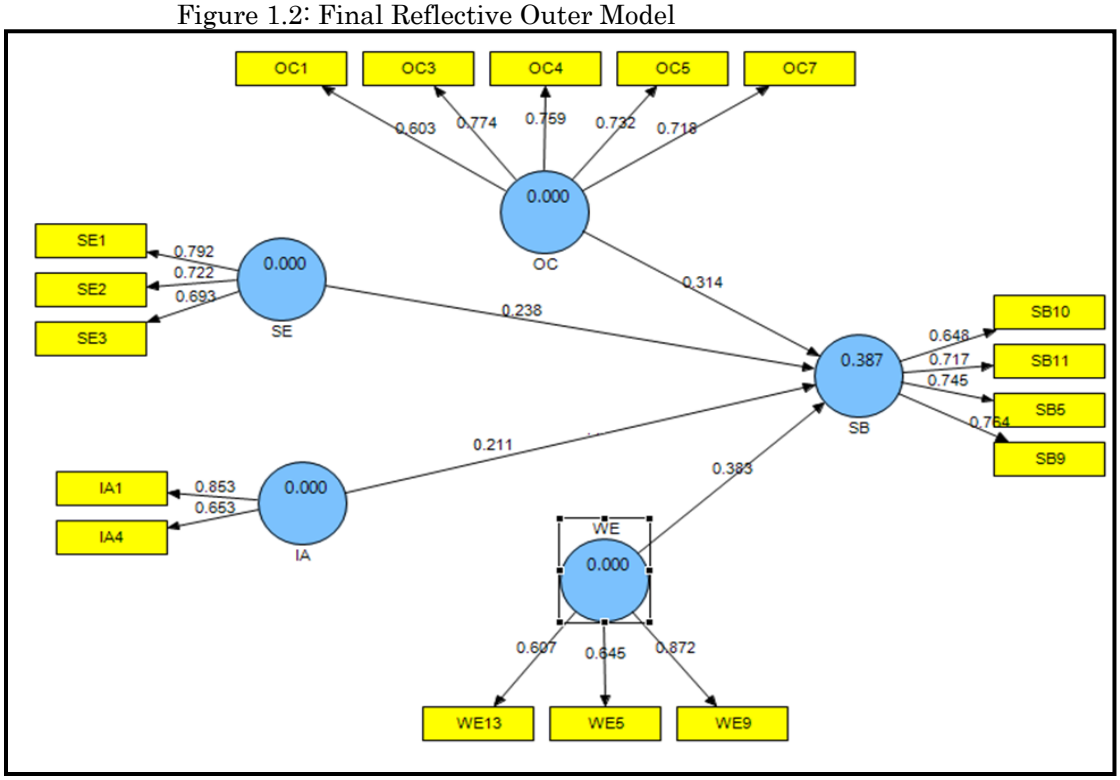


Figure 1.2: Final Reflective Outer Model



Additionally, Figure1.2 above shows the summary result from the final outer model of this study. It showed that the factor loading (more than 0.4), Cronbach alpha (more than 0.6), composite reliability (more than 0.7) and AVE (more than 0.5) achieved a minimum threshold stated by previous studies.

On the other hand, Table 1.1 has indicated that the value of every construct was greater than 0.5 where SB (0.5181), OC (0.518287), SE (0.543191), IA (0.577035) and WE (0.515052). These results confirmed the convergent validity of the outer model.

Table 1.1: Result Summary for Reflective Outer Models

Variables	*Items*	*Loading*	*Cronbach's Alpha*	*Composite Reliability*	*AVE*
Safety Behaviour (SB)	SB5	**0.744594**	0.688161	0.810762	0.518100
	SB9	**0.764094**			
	SB10	**0.647720**			
	SB11	**0.717355**			
Organizational Context (OC)	OC1	**0.603079**	0.771361	0.842313	0.518287
	OC3	**0.774409**			
	OC4	**0.759196**			
	OC5	**0.731947**			
	OC7	**0.718260**			
Social Environment (SE)	SE1	**0.792264**	0.68199	0.780504	0.543191
	SE2	**0.722364**			
	SE3	**0.692878**			
Individual Appreciation (IA)	IA1	**0.853166**	0.67856	0.728340	0.577035
	IA4	**0.652823**			
Work Environment (WE)	WE5	**0.645110**	0.62703	0.756194	0.515052
	WE9	**0.872010**			
	WE13	**0.607113**			

Table 1.2: Discriminant Validity Result

	IA	OC	SB	SE	WE
IA	**0.759628**				
OC	0.204675	**0.719922**			
SB	0.286236	0.438286	**0.719792**		
SE	0.474563	0.321082	0.386794	**0.737015**	
WE	0.379961	0.202465	0.502138	0.372256	**0.717671**

Table 1.2 above displays the discriminant result for this study. According to Compeau, Higgins and Huff (1999), the average variance shared between each constructs and its indicators should be greater than the variance shared between the construct and other construct or in other words, the items' loading should be more strongly on their own construct than other constructs. Based on Fornell & Larcker (1981) approach, in order to measure the discriminant validity, the square root of AVE of each construct should be greater than the correlation between a construct with another construct. This approach compared the squares root of the AVE values with the latent variable correlation and result showed the validity of this study.

5.1 Predictive Relevance

The predictive relevance was measured using blindfolding procedures. According to Chin (1998), blindfolding procedure ignores a part of the data for a particular block during parameter estimation. The ignored data part is then estimated using the estimated parameter and the procedure is repeated until every data point has been ignored and estimated.

Table 1.3: Predictive Relevance Result

R^2	*Redundancy* (Q^2)
0.386553	0.160836

Table 1.3. showed the result of the predictive relevance in this study. Chin (1998) suggested few criterion of predictive relevance where Q^2 is 0.02, then the model has small predictive relevance, if Q^2 is 0.15, then the model has medium predictive relevance and if Q^2 is 0.35, then the model has large predictive relevance. As shown in Table 4.5, the predictive relevance for this study was at medium level which 0.16. Table 4.5 also showed the R^2 value for this study. According to Cohen (1992) approach, the R^2 values for endogenous latent variables are assessed as follows; a) 0.26 above is substantial, b) 0.13 to 0.25 is moderate, c) 0.02 to 0.12 is weak. In this study, the value of R^2 was 0.386553. Based on Cohen (1992) approach, the value of R^2 is substantial for this study. This indicated that the proportion of variation in the dependent variable explained by the set of controlled independent variables taken collectively. This also indicated that 38.65% of employee safety behaviour was influenced by the four facets of organizational context, social environment, individual appreciation and work environment. The other 61.35% remains uninfluenced.

5.2 Results of Hypothesis Testing

PLS-SEM can be used in order to generate T-Statistics for significance testing for both the inner and outer model. This step can be done by using bootstrapping. The significance level for two-tailed t-test was 5% and the path coefficient will be significant if the T-Statistics is larger than 1.96.

Table 1.4: Path Correlation Coefficient

	PATH COEFFICIENT	STANDARD ERROR (STERR)	T-VALUE	P-VALUE	LEVEL OF SIGNIFICANT	DECISION
IA -> SB	0.211	0.12124	1.98317	0.05	**	Accepted
OC -> SB	0.314	0.09334	3.365649	0.001	***	Accepted
SE -> SB	0.238	0.110289	2.253308	0.03	**	Accepted
WE -> SB	0.383	0.096321	3.975887	0.0001	***	Accepted

**p<0.05 ***p<0.01

Based on Table 1.4, it shows that path coefficient for each construct (latent variable) shows the difference level of correlation. According to Lohmoller (1989), the range of path coefficient value should be p<0.10 to be significant. Result of the path coefficient for organizational context value is 0.314 and showed strong relationship between organizational context and safety behaviour. This is supported by similar study that stated safety climate conceptualized as the extent that employees believe safety is valued in the organization as reflected in their perceptions of safety related policies, procedures and rewards (Griffin & Neal, 2000). Although linkages between safety outcomes and employee trust have been explored by researchers (e.g. Conchie & Burns, 2008; Cox, Jones, & Collinson, 2006) have examined the linkages between occupational safety and quality programs or the relationship between employee trust and the implementation of quality programs. The significant value for organizational context is at 0.001.

The path coefficient shows the value of social environment as 0.238 and 0.03 which are significant values and indicate strong relationship between social environment and safety behaviour. Based on the previous findings, the positive relationship between social environment and safety behaviour, trust has several important implications for both workers and management (Griffin & Hu, 2013). Further, Conchie and Burns (2008) found that trust-related properties played a substantial role in the development of a safe workplace. Other safety researchers have found that trust effects safety related outcomes both directly and indirectly (Burns, Mearns & McGeorge, 2006; Cox et al., 2006).

For individual appreciation, the path coefficient is 0.211 and hypothesis is accepted. Based on this, when an employee perceives that an organization is concerned with their well-being, they will feel obligated to reciprocate by engaging in behaviour that benefit the organization. From the perspectives of the safety behaviour relationship, an employee believes that the organization is concerned for their safety from their perceptions of the safety procedures and policies the organization has in place, and therefore reciprocates by engaging in positive safety behaviours (Hofmann & Morgeson, 1999). There is a positive relationship between work environment and safety behaviour and supported from the path coefficient results that shows the value of work environment value is 0.383. The significant value is 0.0001 and supported from previous findings any workplace changes involves appropriate knowledge management strategies (Conchie & Burns, 2008) and safe workplaces would benefit both workers and the organization (Goetsch, 2008).

6. Conclusion

The safety of each worker at workplace is the main priority and important irrespective of the fact whether it is from difference background of industries. The importance of safety at workplace cannot be over exemplified. It is clear that employees are exposed at sustained risk in their daily task and operations. Strict regulations on safety not only ensure the safety of the worker life, but also their family and environment. Therefore, the study was conducted in determining the influence of organizational context, social environment, individual appreciation and work environment on safety behaviour among employees. The finding of the study has proven that the safety behaviour of the employees had been influenced by organizational context, social

environment, individual appreciation, and work environment. The management should play vital role in ensuring the safety procedures followed by every employee and conduct continuous improvement of their safety management system. Future study is needed to expand on other sector or industries and involve all the employees including the top management.

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