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AN INTERACTION OF ERGONOMIC AWARENESS AND
SAFETY CULTURE

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Abstract

Ergonomics awareness substantially affects the business, association, administration, workers and general prosperity of the framework. Since there exist a very limited study on the issue of ergonomic awareness, this paper aim at investigating ergonomic awareness and its effect on safety culture. Questionnaires were distributed to employees from manufacturing company in Pahang, Negeri Sembilan and Terengganu. A total of 300 questionnaires were distributed but only 200 questionnaires were return and usable represent 67% of respond rate. Data analysis used IBM Statistical Packages for the Social Science (SPSS) version 22, and Partial Least Square Structural Equation Model (PLS-SEM) version 3.0. Finding of the study revealed that all factor loadings and average variance extracted (AVE) surpassed the prescribed estimation of 0.5 and AVE construct range from 0.960 to 0.983 which surpassed the suggested estimation of 0.7. All the hypothesis of this investigation is bolstered and acknowledged. It was discovered that usage and change were the most critical indicator of the degree of ergonomic awareness took after by supportability of occupation. The higher the degree of ergonomic awareness, the better is the firm's safety culture.

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Keywords: Ergonomic awareness, safety culture, workplace, PLS-SEM.

1. Introduction

Ergonomics has been introduced in Malaysia in 1992 over the formation of ergonomics department in the National Institute of Occupational Safety and Health; while its provision has been stated under Occupational Safety and Health Act 1994. Although ergonomics currently considered as government concern almost centuries ago, but it is still not widely implemented and practiced in Malaysia (Zafirah & Maimunah, 2013). Musonda and Smallwood (2008) contended that awareness is the display of behaviour and an ergonomics awareness support ergonomics provision and benefits safety and human wellbeing. Fernández-Muñiz, Montes-Peon, and Vazquez-Ordas (2007) proposed that a positive safety culture is an arrangement of qualities, recognitions, dispositions, and pattern of conduct with respect to security shared by individuals from the organization. It is an arranged of strategies, practices, and frameworks which related to reducing's related danger, executed at each level of the organization and becoming measure of concern and obligation in reducing accidents and complaint.

Dawal, Taha and Ismail (2009) noted that the actualizing great ergonomics rehearses lead to the capacity to attain work fulfillment, improved human wellbeing and security. Other than that, it also can improve value, efficiency, working conditions, decrease of cost and increase the company profits (Yeow & Sen, 2002). In the meantime, ergonomics risks concerns may give a huge effect towards businesses and industrial if the dangers are underestimated. This will prompt patterns of non-appearance, medicinal leave, unanticipated retirement and the circumstances will get more regrettable if the laborers make requests for compensation. Safety culture includes numerous definitions inside an impressive collection of writing; in certain case, the meaning of the term is still vague (Shappell & Wiegmann, 2000; Helmreich & Merritt, 2001; Zhang, Wiegmann, von Thaden, Sharma, & Mitchell, 2002). Rollenhagen (2010) defined a culture as a concern of what and how individuals trust, feel, think and how they act (after some time) and how this is reflected in aggregate propensities, rules, standards, images, and curios.

2. Problem Statement

Ergonomics awareness helps in ergonomics application and contributes significantly to human wellbeing and safety due to a comfortable work environment and ergonomically designed tools, man-machine interface design and suitable work method to human anatomy (Grandjean & Kroemer, 1997). Safety culture is defined as 'a set of value, perceptions and attitudes and patterns of behavior (Ahasan & Imbeau, 2003; DOSH, 2010; Fernández-Muñiz et al., 2007; Pearson, Nelson, Titsworth, & Harter, 2011) The purpose of inculcating a safety culture is to develop a nature whereby we repeatedly work safely while guided by a well-defined set of core values that protect and promote the health and well-being of the individual and the environment (DOSH, 2010). Safety culture required a development of individual safety attitudes and behaviours (Zohar, 1980).

Ergonomics is a term that most employers have heard tossed around by workplace safety and risk management experts, but many are not entirely clear on just what it means and why it is an important issue (Lechner, 2015). ergonomic principles in the design of work tasks and equipment can significantly reduce risk of musculoskeletal injuries. Ergonomics studies human abilities and limitations in order to serve this purpose. It focuses on the human body and behavior in order to adapt tools, equipment, and tasks for them. However many companies don't take this into consideration even though they should, as it can change

everything for a company (Mestre, 2017). People working in factories can easily get exhausted or injured, meaning a decrease in productivity. That is why ergonomics is so important: if their workstation allows them to have a good posture, less exertion, fewer motions and better heights and reaches, they will be less tired and more effective.

The capacity of overseeing safety is typically relegated to an individual in control on safety and health as embedded in Section 29 Occupational Safety and Health 1994. Currently an individual is assigned the specific post to cater issues related with safety. Study on ergonomic awareness and safety culture for example (Mustafa, Kamaruddin, Othman, & Mokhtar, 2009) aims at assessing the level of ergonomics mindfulness in Malaysian industry production and to manage the accepted procedures of ergonomics program utilizing Quality Function Deployment (QFD) among the industrial organizations with the most significant awareness of ergonomics. Hudson (2007) study aims at on the improvement of an advanced safety culture. Since limited research was done on connection between ergonomics awareness and security culture at working environment, this paper plans to fill the gaps.

3. Research Questions

- 3.1. What is the interaction between the Ergonomic Awareness and Safety Culture?
- 3.2. What is the interaction between the Implication and Improvement and Safety Culture?
- 3.3. What is the interaction between the Suitability of Workplace and Safety Culture?
- 3.4. What is the interaction between the Ergonomics Basic Consideration and Safety Culture?

4. Purpose of the Study

Ergonomic is needed to be understood by all industries due to many reasons. It is related for many safety and health issues in working area. Nowadays, many industries have applied these regulations but not all the workers know about the existence of it. Basically workers cannot understand the act stated and level of implementation among workers is low. Most of workers ignore safety procedures which been ruled by company due to lack of knowledge. This research attempt to measure the relationship between ergonomics awareness and safety culture at workplace

5. Research Methods

A stratified random sampling technique is adopted in selecting the sample for this study. The sample of the study covers the employees from private sector companies in Malaysia. Sample covers employees from manufacturing organization in Pahang, Negeri Sembilan and Terengganu. A total of 200 self-administered questionnaires is analysed. Questionnaire is divided into three sections. The first section was associated to the respondent's demographic profile. The second section is related to the ergonomic antecedents. Lastly, the third section is on safety culture. Question is adopted from Chapanis (1985) for ergonomics awareness, and safety culture is adopted from Turner and Pidgeon (1997). Data is analysed using IBM Statistical Packages for the Social Science (SPSS) version 22, and Partial Least Square Structural Equation Model (PLS-SEM) version 3.0, to measure the reliability and validity of the questions.

The following hypothesis is proposed in this study:

H1: There is a significant relationship between ergonomics awareness and safety culture.

- H1a: There is a significant relationship between implication and improvement and safety culture.
 H1b: There is a significant relationship between suitability of the job to the workers and safety culture.
 H1c: There is a significant relationship between ergonomics basic consideration and safety culture

6. Findings

6.1. Respondent profile

From the total of 300 questionnaire distribute only 200 question were return. Majority of the respondent are male with 135 respondents (67.5%), while 65 respondents (32.5%) were female. For race, most of the respondents were Malay with 96 respondent (48%), and least number of respondent are for Chinese, Indian and others with 27%, 17.5% and 7.5%. Average number of respondent for this study are with the age ranged between 21 to 25 years old with 36 respondents (18.0%). As for marital status highest of respondents are married with 119 respondent (59.5%), followed with single with 60 respondent (30.0%), divorced with 12 respondent (6.0%) and widowed with 3 respondent (1.5 %). For academic qualification highest number of respondent are respondent with SPM levels, 61 respondents (31%) and least number of respondent are respondent with Master level with 8 respondents (4%). Last question are for awareness regarding the ergonomic policy, the result shows that, most of the respondent are aware that there are having ergonomic and safety policy at their workplace with 105 respondents (52.5%) and only 22 respondent (11.0%) are not aware the workplace are having the ergonomic and safety policy.

6.2. Convergent Validity

Firstly, it is important to test the convergent validity which is how much various things to gauge a similar idea is in understanding. As proposed by Hair, Sarstedt, Ringle, and Mena (2012) the important criterion to measure the convergent validity is factor loadings and AVE. The loadings value for this study indicated that, all items surpassed the prescribed estimation of 0.5. Next for value of composite reliability as in Table 1, it ranged from 0.960 to 0.983 which surpassed the suggested estimation of 0.7 (Hair, 2007). The AVE analysed the change caught by the construct in respect to estimation error, and it ought to be more prominent than 0.50 therefore acceptable (Barclay, Higgins, & Thompson, 1995). In this study the AVE is ranged between 0.806 and 0.889..

Table 01. Outer loadings, composite reliability, average variance extracted

Construct	Item	Loading	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Basic Ergonomic Consideration	Bec17	0.942	0.937	0.96	0.889
	Bec18	0.948			
	Bec19	0.938			
Implication and Improvement	Ii1	0.873	0.97	0.974	0.806
	Ii2	0.892			
	Ii3	0.918			
	Ii4	0.89			
	Ii5	0.923			
	Ii6	0.918			
	Ii7	0.844			

	Ii8	0.893			
	Ii9	0.929			
Safety Culture	Sc1	0.939	0.981	0.983	0.854
	Sc10	0.898			
	Sc2	0.94			
	Sc3	0.938			
	Sc4	0.946			
	Sc5	0.929			
	Sc6	0.9			
	Sc7	0.909			
	Sc8	0.901			
	Sc9	0.94			
Sustainability of Job	Sjw10	0.89	0.969	0.974	0.844
	Sjw11	0.939			
	Sjw12	0.894			
	Sjw13	0.925			
	Sjw14	0.933			
	Sjw15	0.927			
	Sjw16	0.921			

6.3. Discriminant Validity

The discriminant validity (how much things separate among construct or measure unmistakable ideas) was surveyed by inspecting the relationships between's the measures of conceivably covering construct. Items should stack all more firmly on their own construct in the model, and the AVE among each construct ought to be more significant than the variance shared between all constructs (Compeau, Higgins, & Huff, 1999). As appeared in Table 2, the squared correlation for all construct is not as much as the AVE by the pointers measuring that construct show sufficient discriminant validity. Altogether, the estimation exhibited satisfactory convergent validity and discriminant validity.

Table 02. Discriminant validity

	#1	#2	#3	#4	#5
Basic Ergonomic Consideration	0.943				
Ergonomic Awareness	0.898	0.965			
Implication and Improvement	0.928	0.898	0.988		
Safety Culture	0.755	0.762	0.736	0.924	
Sustainability of Job	0.954	0.919	0.958	0.759	0.989

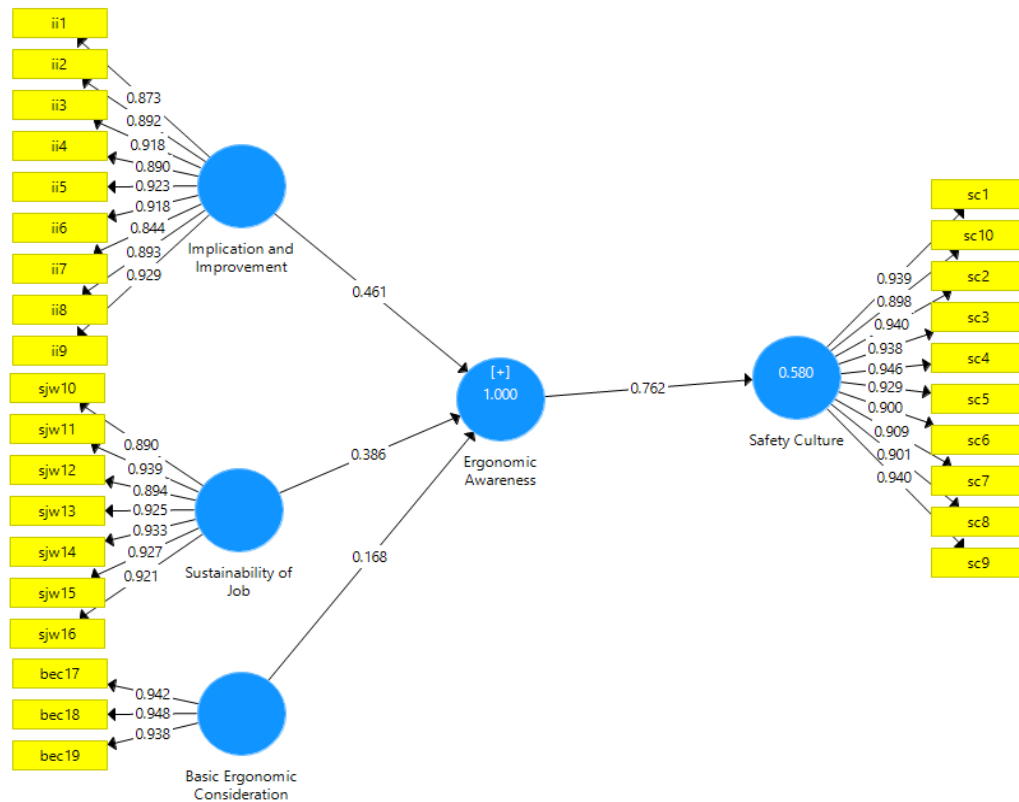


Figure 01. Path Analysis

For hypothesis testing, the path analysis was used to test the four hypothesis created. Table 3 display the outcomes. The R² value was 0.580 proposing that 58% of the fluctuation in the degree of safety culture that can be clarified by ergonomic awareness. A nearby look demonstrates that ergonomic awareness was emphatically related ($b = 0.762$, $p < 0.01$) to the degree of safety culture. In any case, basic ergonomic consideration influenced the ergonomic awereness ($b = 0.168$, $p < 0.01$), implication and improvement emphatically related (0.461 , $p < 0.01$) and sustainability of job ($b = 0.386$, $p < 0.01$) to degree of ergonomic awareness. Hence, all the hypothesis of this investigation is bolstered and acknowledged. In this investigation, it was discovered that usage and change were the most critical indicator of the degree of ergonomic awareness took after by supportability of occupation. The higher the degree of ergonomic awareness, the better is the firms safety culture.

Table 03. Hypothesis Testing

	Hypothesis	Standard Data	Standard Error	t-value	Result	R2	Q2
H1	Ergonomic Awareness -> Safety Culture	0.762	0.035	21.804**	Accepted	0.58	0.75
H1a	Basic Ergonomic Consideration -> Ergonomic Awareness	0.168	0.003	53.022**	Accepted		
H1b	Implication and Improvement ->	0.461	0.005	96.91**	Accepted		

	Ergonomic Awareness						
H1c	Sustainability of Job -> Ergonomic Awareness	0.386	0.004	87.205**	Accepted		

7. Conclusion

Findings indicated that all dimensions ergonomic awareness have significant positive relationship with employee. All variables in ergonomic awareness were found to be related with safety culture. This finding is important to show the level of ergonomics awareness and its role in shaping safety culture (Rozlina, Awaluddin, Hassan, Abdul, & Norhayati, 2012) However, the variables that should be considered most are implication and improvement and suitability of job to the workers because as these variables could have more influence on safety culture. Ergonomics in the workplace has also been shown to yield significant increases in productivity, reductions in employee absenteeism, and decreases in employee turnover rates (Lechner, 2015).

The finding is expected to serve as guideline to improve safety, quality of work and awareness about safety culture and ergonomic at workplace. Addressing ergonomics in the workplace design and equipment is important to ensuring employees understand and employ good body mechanics in the workplace. Providing employee training in the principles of ergonomics, especially proper posture, appropriate desk and chair heights, along with taking stretch and walk breaks during the workday, all have a place in improving the work environment. The significance of the study hoped to provide evidence in explaining the relationship between Ergonomic Awareness and Safety Culture at workplace. After all, poor worksite design can lead to injured, frustrated and fatigued employees. For this reason ergonomics should be implemented in companies. This way, tasks can be adapted to human capacities and make people more safe, productive and efficient. The multiple benefits for both, the company and its employees..

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