

EVALUATION OF RISK BEHAVIOUR DEPENDING ON SAFETY CLIMATE FACTORS AMONG SHIPYARD INDUSTRIES IN LUMUT, PERAK

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Abstract This study examined the relationship between two dimensions of safety climate (management commitment to safety and safety training) towards the risk behaviour of the worker. The research study is focuses on the safety climate mainly in Lumut, Perak in context of shipyard industry. A survey questionnaire instrument was developed and 120 responses were collected. Pearson correlation analysis and linear regression were used to analyse the data collected using SPSS software. The safety climate factors (management commitment to safety and safety training) were able to explain 24.6% of variation risk behaviour based on the result. It was found that the safety climate factors have significant relationship and able to predict on risk behaviour. Nonetheless, more supporting evidence and elaborate methodological approach are necessary for further study. The finding of this study provides the organisation's useful framework for performing safety climate.

Index Terms— Linear Regression; Pearson Correlation; Risk Behaviour; Safety Climate Factors; Shipyard Industries.

I. INTRODUCTION

Shipyards are one of the main important components where there is port in the country. The issues discussed is the low awareness of safety issues among the workers itself. Rahlin, Omar, Muda and Endut (2014) states that, the workers in developing countries tend to have a lower level of safety awareness than those in developed countries such as America. The weak awareness of safety in the organization still exist even the employer already create an insight about the problem. The problem is that the shipyard industry requires large numbers of worker for the production of the ship and ship repairing that makes the issues worst and accident still happened.

The specific objectives of this study was to: 1) determine the relationship between risk behaviour and safety climate factor in shipyard industries at Lumut, Perak; and 2) identify significant safety climate factors that contribute to risk behaviour in shipyard industries at Lumut, Perak. This research tried to answer these two questions: 1) what is the significant safety climate factors that contribute to risk behaviour in shipyard industries at Lumut, Perak?; and what is the relationship between risk behaviour and safety climate factor in shipyard industries at Lumut, Perak? The hypothesis has been construct based on the relationship of the safety climate factors and the risk behaviour of the study. The hypothesis that has been identified is H1: Safety climate factors are related with risk behaviour.

II. LITERATURE REVIEW

A. Safety climate

Safety climate have been researched since the early 1980's in industrial organizations. Zohar (1980) defined it as "a summary of molar perceptions that employees share about their work environments". Since then, other researcher, that gain interest with the topic has made the definition. Similarly, A. Neal, Griffin and Hart (2000) claims that safety climate describes individual view of the safety value in the workplace and is a particular form of organizational climate.

B. Safety Climate Factors

The study by Omidi et al. (2006) used eleven factors of safety climate. The research was done in construction site in Iran in two-construction firm's sites. In addition, the research that conducted locally inside the country itself in Pasir Gudang, Johor also use

same safety climate factors. Tayaparan, Rohani, Zakaria, Rashid and Ithnan (2018) examine the progress of survey instrument, which consisted six scales of safety climate factors, which are safety supervision, safety commitment, safety communication, work pressure, safety competence and safety procedures and safety performance indicator.

C. Safety Climate Measures

The five-point Likert scale type questionnaire is the most found in the research for the respondent to answer the questionnaire. The initial research by survey questionnaires using five Likert-scale type is by Zohar (1980) that conducted a study in 5 factories in Israel which categorised under metal fabrication, food processing, chemical industry and textile industry. The researcher has made the questionnaire limited to production workers and the workers represented various departments in the factory. The response of the questionnaire by the workers were recorded using a five point-scale.

D. Risk Behaviour

Hopkins (2002) stating the human factors lead to most of accidents based on behaviour modification approach derives from the widespread opinion. The factor is mostly cause by the human behaviour that took action towards the work risk. Besides, even the behaviour is put to rights, the environment experienced by the worker can be the consideration measure for the occurrence of accident. Perez-floriano (2018) proves that the behaviour of workers in industry is major determinant of worker safety in industry, but instead the element cannot make the unsafe place to a safer one.

III. METHODOLOGY

A. Population and Sampling of the study

The method of sampling used in this analysis is the random sampling method. A test of the likelihood defines as one in which each unit of the population has an opportunity ($0 < x < 1$) to be chosen correctly in the sample. From the population of 14 companies selected around Lumut area, this study choose 5 companies through random sampling. The population of this study was assumed around 170 people from the production department to be in the population of this study. This study sample size of the production workers is 120. The sample of size for this study taken ranging near to the value based on the Krejcie and Morgan's sample size determination Table 1.

Table 1 Cronbach alpha value

Variables	Cronbach's Alpha value
Safety Climate	0.879
Risk Behaviour	0.716

B. Instrument of study

This research study uses questionnaire survey as the instrument for gaining the data and research information. The questionnaire survey has been adopted by Kines et al. (2012), Garcia, Boix and Canosa (2004) and Davies, Spencer and Dooley (1999) and has been modified for this study to be used as the study instrument. The questionnaire that had been composed provides five options based on Likert Scale. The questionnaire consisted of three sections: Section A (Demographic Information), Section B (Safety Climate) and Section C (Risk Behaviour). The section A consisted of 4 questions, Section B 14 questions and Section C 11 questions.

C. Pilot Study

The pilot study was conducted to distinguish the validity and reliability of the questionnaire survey. The respondents were selected randomly on 11 workers that related to shipyard industries.

D. Reliability analysis

Based on the results of the reliability analysis of the actual study it was found that the values of Cronbach's Alpha are as in Table 1. According to Table 1, both variables had a value of Cronbach's Alpha greater than 0.60. According to (Bland, Altman, & Altman, 1997), the α range between 0.7 to 0.8 considered as satisfactory and above 0.9 are practicable. This study showed that all the questionnaire items were in good reliability level and applicable to the next step of research.

E. Analytical method

Data collected was analysed using Statistical Package for Social Science (SPSS) version 21. Three analyses were applied in terms of descriptive analysis, Pearson correlation and linear regression.

IV. RESULTS

A. Demographic information analysis

Based from the responds received, most of the respondents are male workers, 78.3%. The data obtained from the respondents were workers aged 25 to 29 is the highest worker that answered the questionnaire, which total about 52 workers that equal to 43.3%. The second highest is the workers aged 18 to 24, which total about 25% and followed by workers aged 30 to 34, 15.8%. The young age worker dominated the percentage of the worker in the shipyard industry due to the energy required to do the job completely in short period of time. The nationality of the respondents are mostly local workers because of the availability of employment for the increase of the shipyard production project and the percentage of the local workers consists of 97.5%. Based on the data taken from the respond of the questionnaires, the longest years of the worker working in the company is 0 to 2 years, which is about 51.7%.

Table 2. Demographic information table

<i>Demographic Information</i>		<i>Frequency</i>	<i>Percentage</i>
Gender	Male	94	78.3
	Female	26	21.7
Age	18-24	30	25
	25-29	52	43.3
	30-34	19	15.8
	35-39	11	9.2
	40-44	5	4.2
	45-49	2	1.7
	50-54	1	0.8
Nationality	Malaysian	117	97.5
	Other	3	2.5
Years of working for the company	0-2 year(s)	62	51.7
	3-5 years	37	30.8
	6-10 years	18	15
	11-20 years	3	2.5

B. Inferential analysis

1) Descriptive Statistics analysis

Table 3. Mean score

Mean Score	Interpretation
1.00 - 1.80	Very Low
1.81 - 2.60	Low
2.61 - 3.20	Medium
3.21 - 4.20	High
4.21 - 5.00	Very High

Table 4. Descriptive statistics

Scale	Mean
Safety Climate Factors	3.9923
Risk Behaviour	4.1508

Correlation is significant at the 0.01 level (2-tailed).

Table 5. Descriptive Statistics Research Question Section B

Item	Mean Score	Mean Score Level
B 1.2 The management ensures employees receive fundamental information on safety.	4.3750	Very High
B 2.6 Training in health and safety is a high priority for the management.	4.3583	Very High
B 1.3 The management prepares the safety equipment completely.	4.2667	Very High

Table 6. Descriptive Statistics Research Question Section C

Item	Mean Score	Mean Score Level
C 1.2 I always wear the PPE properly	4.5750	Very High
C 1.1 I always wear the right necessary PPE	4.5500	Very High
C 1.8 I always ensure the highest levels of safety when I carry out my job.	4.4667	Very High

Based on the data, the respondents answered strongly agree with the questions and the total mean got 3.9923 that means the safety climate whether for management commitment to safety and the safety training are positive. The highest mean in section B are B1.2, B2.6 and B1.3. B 1.2 shown that their company management ensure the employee receive fundamental information on safety. For B2.6, the respondents convinced that the management have well implemented the safety training within the workplace. For item B 1.3, mainly it is because the respondents feeling positive of what the management have done by preparing complete safety equipment.

The data total mean for section C data above obtained score of 4.1508. Based on data analysis, the highest mean score in section C are C1.2, C1.1 and C1.8. C 1.2 obtained mean score of 4.5750. This shows that the worker always wear their protective personal equipment properly in the workplace in order to do the job safely. For C1.1, the respondents understand that every type of task in the workplace requires different types of PPE and C1.8 the respondents ensuring safety is on the highest level in the workplace to avoid occupational injuries and they believe that they were always equipped with required PPE to ensure the high level of safety.

2) *Pearson Correlation analysis*

Table 7. Interpretation of Pearson Correlation coefficient

Correlation Coefficient R	Interpretation Relations
0.00-0.19	very weak
0.20-0.39	weak
0.40-0.59	moderate
0.60-0.79	strong
0.80-1.0	very strong

Table 8. Correlations result among variables

	Risk Behaviour	
	Significant, p	Pearson Correlation, r
Safety Climate factors	0.000	0.496**

Correlation is significant at the 0.01 level (2-tailed).

Table 8 above shows that the correlation result obtained is 0.496. The R-value shows that it has moderate positive relationship. This signifies that the safety climate (management commitment to safety and safety training) towards risk behaviour for the worker in shipyard industry are positively related since the value is in the positive relationship value and the value is close to 1. Besides, the value of 0.000 that is less than significant level at 0.01 shows that there is significant relationship between the safety climates to the risk behaviour. Hence, the first objective that have been built for this research is achieved.

3) *Linear Regression analysis*

Linear Regression formula

$$Y = mx + c \quad (1)$$

Table 9. Linear Regression model summary

R	R Square
0.496	0.246

Table 10. Anova

F	Sig.
38.506	0.000

Table 11. Linear Regression coefficients

Model	Beta, B
Constant	2.295
Safety_Climate	0.464

Linear Regression model

$$Y = 0.464x + 2.295 \quad (2)$$

The value of R square value has a 0.246 or 24.6%. The percentage value indicates the value of the data fitted around the regression line and independent variables (safety climate factors) is accounted for the 24.6% of the variation in the shipyard production worker's risk behaviour. Based on Table 11, the p-value shown below is 0.000. The p-value, which is less than a alpha value ($\alpha < 0.05$), indicates that the model is statistically significant and thus, second objective has been achieved. Based on Table 12, the unstandardized coefficients of the beta 0.464 is the slope for the safety climate and 2.295 that is the y-intercept. Further, the model (2) able to predict the risk behaviour for this study based on the safety climate.

V. DISCUSSION AND CONCLUSION

A. Discussion

Both of the items for management commitment to safety and safety training total mean shows semblance that makes it important to influence on the risk behaviour. The mean value of this study gained a higher value from previous researcher, Rahlin et al. (2014) that study about safety climate in automotive manufacturing. The distinctive values is because the shipyard industries is higher in safety risk for the worker than the automotive manufacturing that using more automated machinery.

In support of the hypothesis, this study found that the safety climate are related with risk behaviour. The correlation analysis conducted revealed that the safety climate is associated with the risk behaviour. The analysis shows that the correlation between the safety climate and risk behaviour have moderate positive relationship for the study among shipyard production worker in Lumut, Perak. This shows that this study has found evidence that the first objective has been achieved. The moderate positive relationship between the both variables is because the organization involved has dissimilarity for the implementation of safety in the workplace. Some of the shipyard companies may not have truly emphasizing workers safety in the workplace that resulting the outcome to be moderate.

The regression analysis has identified that the safety climate for this study influenced the risk behaviour. The result indicates that the direct impact of management commitment to safety and safety training towards the risk behaviour were significant. The result clarifies that the second objective of this study has been achieved. The result of this study is consistent with previous study from Zhu et al. (2010), who found that the management commitment to safety and safety training have significant relationship with safety behaviour. Even though there are differences in finding the result in every research, the factors for the item is the same. Also, Tayaparan et al. (2018) claims that the safety performance is contribute by the safety climate factors. In addition, the study variation by Tayaparan et al. (2018) indicates 47.2% compared to this study that obtained lower variation, 24%. This study only includes two safety climate factors and the previous research included four safety climate factors.

B. Limitations and future research

Firstly, the companies mostly did not exposing the data of the accident and safety issues related to worker to the public to ensure the flow of information is only circulating inside the company. In addition, the reason is to protect the company from its competitor from recognizing the weaknesses and internal problem of the company.

Then, the limitation of the safety climate factors for this study are not fully cover the dimensions of the safety climate. For future studies, incorporating the demographic information, more dimensions and the item inside the questionnaire of safety climate for the risk behaviour research would be needed.

Third, the survey questionnaire method may cause the respondents to provide dishonest answer in order to magnify the result to cover up the real environment at the workplace and it is possible to affect the result by answering against the worker good intention about the risk behaviour. Thus, the future research need to include other types of survey to achieve high quality outcome such as by face-to-face interview. The complex data could be gain by interviewing the worker to ensure the information is more accurate even though the interview method is hard to conduct (Nigel et al., n.d.).

C. Research Contribution

This study contribution are towards the management department in shipyard industries particularly in Malaysia. The responsibility of the management in the shipyard workplace is important that associated to the safety of the worker. The current study suggest that the management need to engage with the production worker in a joint effort to prevent any accidents.

Furthermore, the assessment of this study can be adopt in the shipyard industry to investigate the relationship of the safety climate and the risk behaviour in the workplace. The item in the survey questionnaire that adopted from previous researcher has been proven to identify the safety climate in industry. This study could help the shipyard organisation to design the safety assessment by adding several item from this study to effectively manage the factors that affecting the safety in workplace.

D. Conclusion

The findings of this study gives implication to the priority of the management for the responsibility of management to play part on ensuring the safety in the workplace. This is because the management that actives on supporting and motivating to ensure the worker obey to the safety will eventually impacting the risk beha viour to decline. Furthermore, the accident can be reduce when the organisation or the worker emphasizing the safety training to utilize it in the workplace. The safety training is vital for organization to ensure the workers competency to work in heavy shipyard industries. The result are still important because the result provide evidence of the safety climate factors that able to influence on the risk behaviour. Indeed, these safety climate factors can serve as core and provide useful framework for organisation practicing safety climate in future research.

REFERENCES

- [1] A. Beldjazia and D. Alatou. (2016). *Precipitation variability on the massif Forest of Mahouna (North Eastern-Algeria) from 1986 to 2010*. Retrieved from <http://www.ijmsbr.com>
- [2] Bland, J. M., Altaian, D. G., & Altman, D. G. (n.d.). *General practice 2 RawlesJ. Magnitude of benefit from early thrombolytic treatment in acute Statistics notes Cronbach's alpha This is the 28th in a series of occasional notes on medical statistics*.
- [3] Davies, F., Spencer, R., & Dooley, K. (1999). *HSE Health & Safety Executive Summary guide to safety climate tools Summary guide to safety climate tools. HSE Health & Safety Executive*.
- [4] Garcia, a M., Boix, P., & Canosa, C. (2004). Why do workers behave unsafely at work? Determinants of safe work practices in industrial workers. *Occupational and Environmental Medicine*, 61(3), 239–246. <https://doi.org/10.1136/oem.2002.005629>
- [5] Hamzah, M. I. M., Juraime, F., & Mansor, A. N. (2016). Malaysian Principals' Technology Leadership Practices and Curriculum Management. *Creative Education*, 07(07), 922–930. <https://doi.org/10.4236/ce.2016.77096>
- [6] Hopkins, A. (2002). Safety Culture, Mindfulness and Safe Behaviour. *Journal*, (December).
- [7] Kines, Pete; Lappalainen, Mikkelsen, Pousette, Tharaldsen, TÅ³masson, T. (2012). Instrument Title : Instrument Author : Cite instrument as : Nordic occupational safety climate questionnaire, 0–8.
- [8] Neal, A., Griffin, M. A., & Hart, P. M. (2000). The impact of organizational climate on safety climate and individual behavior. *Safety Science*, 34(1–3), 99–109. [https://doi.org/10.1016/S0925-7535\(00\)00008-4](https://doi.org/10.1016/S0925-7535(00)00008-4)
- [9] Nigel, A., Mathers, N., & Fox, N. (n.d.). *Surveys and Questionnaires*. Retrieved from www.rds-yh.nihr.ac.uk
- [10] Perez-floriano, L. R. (2018). Preventing Health and Environmental Risks in Latin America, 23(July). <https://doi.org/10.1007/978-3-319-73799-7>
- [11] Rahlin, N. A., Omar, N. W., Muda, A. A., & Endut, A. (2014). Exploratory Study on Safety Climate in Malaysian Automotive Manufacturing. *International Journal of Occupational Safety and Health*, 3(2), 30–34. <https://doi.org/10.3126/ijosh.v3i2.6101>
- [12] Tayaparan, S., Rohani, J. M., Zakaria, K., Rashid, F. A. A., & Ithnan, M. I. M. (2018). Relationship between safety climate factors and safety performance in chemical industries. *Proceedings of the International Conference on Industrial Engineering and Operations Management, 2018-March*, 2956–2967. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85051480534&partnerID=40&md5=e45f7bd130cb047520888fcf109df8f6a>
- [13] Wan Ismail, W. N. I. (2014). Human trafficking policy implementation: A case study of Malaysia / Wan Nur Ibtisam Wan Ismail. Retrieved from <http://studentsrepo.um.edu.my/4625/>
- [14] Zhu, C. J., Fan, D., Fu, G., & Clissold, G. (2010). Occupational safety in China: Safety climate and its influence on safety-related behavior. *China Information*, 24(1), 27–59. <https://doi.org/10.1177/0920203X09354952>
- [15] Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology*, 65(1), 96–102. <https://doi.org/10.1037/0021-9010.65.1.96>