Validity and Reliability Analysis of Safety Climate Factor at Small and Medium-sized Enterprises (SMEs) Wood Based Furnitures

Alfian Destha Joanda and Bambang Suhardi
Faculty of Industrial Engineering
Sebelas Maret University (UNS)
Jl. Ir Sutami No.36A Jebres, Surakarta, Indonesia
desthajoanda@student.uns.ac.id, bambangsuhardi@staff.uns.ac.id

Jafri Bin Mohd Rohani
Mechanical and Industrial Engineering Department
Universiti Teknologi Malaysia (UTM
81200 Skudai, Johor Bahru, Malaysia
jafrimr@utm.my

Abstract

The importance of the validity and reliability test in measuring the research instrument is to prove that the data collection through the survey using questionnaires to obtain the valid data. This pilot study aimed to measure the validity and reliability of the questionnaire on the relation of safety climate factors and their relationship with personal attributes in the small and medium enterprise (SMEs) furniture industries. The object of this study was 100 wood workers taken in the center of SMEs furniture industry in Indonesia such as Jepara, Sukoharjo, Sragen and Surakarta. The questionnaire consisted of 36 questions with 8 variables. Method of taking the data in this research was using judgment sampling. In measuring the test of the validity of the questionnaire, Pearson Product Moment test was used, while to measure the reliability test Cronbach's Alpha was used. The results of this study showed 36 items of questions were valid based on the value of Pearson Product Moment of ≥ 0.72. This indicated that the questions in this questionnaire could represent the object of this study. The reliability test showed Cronbach's Alpha value of 0.98. These results showed that the questions in this research questionnaire were able to deliver relatively consistent results when repeatedly tested. It could be concluded that the questions in this questionnaire were valid and reliable for the use in safety work studies in SMEs furniture industries.

Keywords
Safety Climate, Reliability and Validity

1.   Introduction
Safety climate was an important concept in risk occupational management and an indicator of safety culture (Tharaldsen et al., 2008). Various definitions of safety climate makes no consensus on the most appropriate definition of safety climate. One of the definitions of the safety climate by Neal and Griffin (2002) was the perception of safety-related policies, procedures, and practices. This was consistent with many studies showing that safety climate can anticipate safety-related outcomes for workers (Yule et al., 2007). That way, research on safety climate would be able to provide positive input for industries in order to avoid work accident.

Different concepts of safety climate allowed the development of safety climate models that have the validity. It could make a safety climate assessment based on the characteristics of the research location (Milijic et al., 2013). Safety climate was an important requirement in the industry, furniture industry was no exception. Even regulations in the furniture industry in the country as well as in various countries required the existence of safety climate. But not all business actors in the furniture industry paid attention to the correct safety climate. For that we needed a research about safety climate in furniture industry. This study was a pilot project adopted from safety climate

research in India (Vinodkumar and Bhasi, 2009) and Malaysia (Ching and Rohani, 2016) using the same approach but in the chemical industry. The reason for the adoption of the study was because of the similarity of developing countries that were heading for a transition period so that the measurement parameters are considered the same. This research was interesting to be reviewed because the object of this research was the furniture industry on the scale of SMEs. Furniture industry on the scale of SMEs is chosen because not many who have licenses SMK3 (Occupational Health and Safety Management System) or OHSAS 18001 (Occupational Health and Safety Assessment Series) such as large companies so needed to know how the existing safety climate in the furniture industry on the scale of SMEs.

In the study, it was needed kind of an instrument to measure what needs to be known, as well as in this safety climate research. The research on safety climate was based on the main measurement instruments with questionnaires (Guldenmund, 2000). Measurement instruments in the form of questionnaire was used to measure the variables so as to explain the concept of safety climate in the furniture industry clearly. In recent years different developments had occurred with more than 40 safety climate measurements (Arghami et al., 2014). Therefore, an analysis was needed to measure the questionnaire that was able to represent the safety climate accurately and consistently. Measurement of this questionnaire was done by analysis of validity and reliability. Validity in the measurement of research instruments was able to reveal the extent to which a measuring instrument measures what it wanted to measure. Similarly, reliability indicated the extent to which a measurement result was relatively consistent when the measurement was repeated (Watson and Petrie, 2010). A questionnaire with high validity and reliability demonstrated the ability in measurement with valid and consistent results. Therefore the purpose of this study was to measure the validity and reliability of the questionnaire on the relation of safety climate factors and their personal attributes in the small and medium enterprise (SMEs) furniture industries.

2.   Methodology

D The data used in this research were primary data taken from SME furniture industry center in Central Java province. SMEs which inside the scope of the research's location were Jepara, Surakarta, Sukoharjo and Sragen. Respondents were wood workers who worked on SMEs furniture industry center as many as 100 people. This study emphasized the research instrument to test the validity and reliability. Validity and reliability tests were the basic elements in the evaluation of research instrument measurements (Tavakol and Dennick, 2011). In this research, instrument testing was done by questionnaire about safety climate research. This safety climate instrument was adopted from the development of Indian research (Vanodkumar and Bhasi, 2009) which later developed by Malaysian research (Ching and Rohani, 2016). The safety climate instrument consists of 8 variables with 36 question items. The eight safety climate variables were management commitment and actions for safety, worker's attitudes toward safety, worker's knowledge and compliance to safety, workers' participation and commitment to safety, safeness of work environment, emergency preparedness in the organization, priority for safety over production and risk justification.

A total of 100 respondents of wood workers from 15 SMEs of the furniture industry were interviewed using a questionnaire. Researchers interviewed respondents during lunch or coffee break. Measurement of variables in the study asked respondents to answer the questions posed with the choice of answers using Likert scale. The Likert scale exposed respondent to some questions and then was asked to provide answers as provided in the questionnaire. Likert scale measurement in the questionnaire was done by choosing strongly agree to the number 5 and strongly disagree for the number 1. The actual Likert scale used the question with 5 alternative response those were very agree, agree, do not know, disagree and strongly disagree (Boone and Boone, 2012)

Validity testing on the instrument of this study indicated whether the research questionnaire was valid or not. A measuring instrument was valid if it could measuring what was desired. In other words, capable of obtaining the exact data of the variables studied. The results were valid if there was similarity between the data collected with the actual data occurred on the object under study (Oppenheim, 2000). While for testing the reliability of research instruments indicated that the questionnaire for reliable research (relatively consistent) or not. According to Pruzan (2016) a reliable questionnaire was a questionnaire which, if tried repeatedly to the same moment, produces the same data. Reliability test in this research was done by Cronbach's Alpha technique and validity test was done by Product Moment technique using SPSS 23 software aid. According to Trihendradi (2013) Cronbach's Alpha value greater than 0.60 was stated reliable, so the questionnaire was reliable to be used.

3.   Results and Discussion
3.2.   Validity Test

The first stage in this study was to test the validity of research instruments. The validity test had been done to find out how far the questions asked by the researcher could represent the object being observed. The result of validity analysis calculation on the instrument of safety climate in SMEs furniture industry center were obtained as follows:

Table 1. Result validity test of safety climate instrument at SME's furniture

No	Dimensions	Instruments	Pearson Correlation Coefficient	Results
1	Management commitment and actions for safety	Safety is given high priority by the management.	0.772	Valid
2		My company gives comprehensive training to the employees in workplace health and safety issues.	0.765	Valid
3		Management always welcomes opinion from employees before making final decisions by operating open door policy on safety issues.	0.783	Valid
4		The safety rules and procedures followed in my company are sufficient to prevent incidents occurring.	0.784	Valid
5		Safety rules and procedures are strictly followed by the management.	0.801	Valid
6		New recruits are trained adequately to learn safety rules and procedures.	0.785	Valid
7		In my company, employees are rewarded for reporting safety hazards (thanked, cash or other rewards, recognition in newsletter etc.).	0.821	Valid
8		Corrective action is always taken when the management is told about unsafe practices including near miss accidents.	0.793	Valid
9		Safety issues are given high priority in training program.	0.783	Valid
10		My supervisors and managers always try to enforce safe working procedures.	0.748	Valid
11		Management promotes employees's involvement in safety related matters.	0.781	Valid
12		Management encourages the workers to attend safety training programmed	0.785	Valid
13		In my company, safety week celebrations and other safety promotional activities arranged by the management are very effective in creating safety awareness among workers	0.773	Valid
14		Safety training given to me is adequate to enable me to assess hazards in work areas.	0.794	Valid
15		There is open communication about safety issues in this work place	0.724	Valid
16		Preventive maintenance works are carried out regularly in work place.	0.769	Valid
17		My company provides sufficient safety equipment for workers.	0.776	Valid
18	Worker's attitudes toward Safety	I feel that it is important to maintain safety at all times.	0.727	Valid
19		I carry out my work in a safe manner.	0.757	Valid
20		I feel that it is necessary to carry out my work in a safe manner.	0.754	Valid
21		I feel that it is important to encourage others to use safe practices and safety program.	0.734	Valid
22	Worker's knowledge and compliance to safety	I know how to perform my job in a safe manner using safety equipment and standard work procedure.	0.726	Valid
23		I know how to maintain or improve workplace health and safety.	0.751	Valid
24		I know how to reduce the risk of accidents and incidents in the workplace.	0.764	Valid
25		I know what are the hazards associated with my job and necessary precautions to be taken while doing my job.	0.763	Valid
26	Workers' participation & commitment to safety	I follow safety regulations to get the job done.	0.797	Valid
27		I put extra effort to improve safety of workplace.	0.798	Valid
28		I voluntarily carry out tasks or activities that help improve workplace safety.	0.796	Valid
29	Safeness of work	Employees are exposed to risky situations in my workplace.	0.859	Valid

| 30 | environment | In my workplace, the chances of being involved in an accident are quite high. | 0.753 | Valid |

Table 2. Result validity test of safety climate instrument at SME's furniture (continued)

No	Dimensions	Instruments	Pearson Correlation Coefficient	Results
31	Emergency preparedness in the organization	I am adequately trained to respond to emergency situation in my workplace.	0.769	Valid
32		I know what to do and whom to report if a potential hazard is noticed in my work place.	0.785	Valid
33	Priority for safety over production	I believe that safety can be compromised for increasing production.	0.753	Valid
34		I feel that management is willing to compromise on safety for increasing production.	0.756	Valid
35	Risk Justification	Due to over familiarity with the job, occasionally I deviate from correct and safe work procedures	0.790	Valid
36		It isn't always practical to follow all safety rules and procedures while doing a job	0.775	Valid

Based on the calculation of validity test, the overall value of items in the research instrument on the safety climate had a coefficient of product moment correlation above the value of r table of 0.2324. Coefficient value was quite high. This was in accordance with the statement Salmiaty and Handayani (2015) that if the value of product moment correlation coefficient was higher than r table then the instrument was said to be valid. This validity test used significance level of 0.01. The test results of validity of this safety climate indicated that all question items in questionnaire were valid.

This safety climate questionnaire consisted of 36 items of questions with 8 variables. The highest product moment correlation coefficient value was the equality variable in the work environment of 0.859. This value indicated that the variables in work environment had the highest level of validity among other variables. While the value of the lowest product moment correlation coefficient was the commitment and management measures on safety of 0.724. This indicated that the variable of commitment and management action on safety had the lowest value among other variables. Overall, of the 36 items of questionnaire question of safety climate in the furniture industry UMKM expressed valid. Thus the safety climate research instrument was valid and could be used as an accurate research instrument.

3.2. Reliability Test

The reliability test on the safety climate instrument was done after testing the validity. Reliability test was done to know the consistency or stability of the measurement result of an instrument if the instrument would be reused as a measuring instrument of an object. Here was the result of reliability analysis test instrument safety climate:

Table 3. . Result validity test of safety climate instrument at SME's furniture (continued)

Cronbach's Alpha	N of Items
.980	36

The result of reliability instrument test of safety climate at SMEs furniture industry center in this research was equal to 0.98. The reliability test results were included in very high category. The reliability value indicate that all questions in the questionnaire of this study were reliable or consistent. A consistent questionnaire could be defined as a questionnaire that had results that tend not to change when used repeatedly on an object..

Cronbach Alpha instrument of climate climate in SMEs furniture industry center had a value above 0.6. These values indicated that the safety climate instrument consisting of 8 variables with 36 items of questions reliable or consistent. This was supported by Hullin et.al., (2001), the most common rule in reliability with Cronbach Alpha was 0.6-0.7, indicating acceptable reliability levels and 0.8 or more indicating excellent levels of reliability. Thus the instrument of safety climate research was declared reliable and could be used as the next research instrument.

4. Conclusion

Instrument was a tool used to collect data in a study. The data collected could show the quality of a study. A good research was a valid and reliable or consistent study. Therefore it took validity and reliability testing on research instruments to obtain valid and reliable data. The result of research of safety climate instrument at SMEs furniture industry center showed that the validity value of 36 questions with 8 variables were above r table. It could be interpreted that the instrument of safety climate in SMEs furniture industry center was valid. Similarly, the reliability of safety climate instrument test resuled on SMEs furniture industry center including high category. The result of the high reliability test showed that the instrument of safety climate research at SMEs was reliable to furniture industry center. This meant that the instrument of this study could be used repeatedly by producing the same results, accurate and could be used in further research.

References

Arghami, S., Parkestani, H.N., and Alimohammadi, I., Reliability and validity of safety climate questionnaire, *Journal of Research in Health Sciences,* vol. 14, no. 2, pp. 140-145, 2014.

Boone, H.N. And Boone, D.A., Analyzing likert data, *Journal of Extension*, vol. 50, no. 2, 2012.

Ching, T.S., and Rohani, J.M., Exploratory study on safety climate in Malaysia chemical industry. Research Universiti Teknologi Malaysia (Unpublished), Malaysia 2016.

Guldenmund, F.W., The nature of safety culture: a review of theory and research, *Safety Science,* vol. 34*,* pp. 215-257, 2000.

Hulin, C., Cudeck, R., and Netemeyer, R., Can a reliability coefficient be too high, *Journal of Customer Psychology,* vol. 10, pp. 55-56, 2001.

Milijic, N., Mihajlovic, I., Strbac, N., and Zivkovic, Z., Developing a questionnaire for measuring safety climate in the workplace in Serbia, *International Journal of Occupational Safety and Ergonomics,* vol. 19, no. 4, pp.3-17, 2013.

Neal, A., and Griffin, M.A., Safety climate and safety behaviour, *Australian Journal of Management,* vol. 27, pp. 67-75, 2002.

Oppenheim, A. N., *Quetionnere design interviewing and attitude measurement*, 2nd Edition, Bloomsbury Academic, London, 2000.

Pruzan, P., *Research Methodology: The Aims, Practice and Ethnics of Science*, Springer International Switzerland, 2016.

Salmiaty, S., and Handayani, D., Analysis of the relation between organizational commitment to work motivation and job satisfaction of the regional development planning agency's employee Makassar city, *Journal of Management Research and Analysis, vol.* 2, no. 3, pp. 219-226. 2015

Tavakol, M., and Dennick, R., Making sense of cronbach's alpha. *International Journal of Medical Education*, vol. 2, pp. 53-55, 2011.

Tharaldsen, J.E., Olsen, E., and Rundmo, T., A longitudinal study of safety climate on the Norwegian continental shelf. *Safety Science*, vol. 46, no. 3, pp. 427-439, 2008.

Trihendradi, C., *Langkah Mudah Menguasai SPSS 21*, Penerbit Andi, Yogyakarta, 2013.

Vinodkumar, M.N., and Bhasi, M., Safety climate factors and its relationship with accidents and personal attributes in the chemical industry, *Safety Science*, vol. 47 no. 5, pp. 659-667, 2009.

Watson, P.F., and Petrie, A. Method agreement analysis: A review of correct methodology. *Theriogenology*, vol. 73, pp.1167-1179, 2010.

Yule, S., Flin, R., and Murdy, A. The role of management and safety climate in preventing risk-taking at work. *International Journal of Risk Assessment and Management*, vol. 7, no. 2, pp. 137-151, 2007.

Biographies

Alfian Destha Joanda is a postgraduate student of Industrial Engineering Programme at the faculty of Sebelas Maret. He received his bachelor degree in Industrial Engineering from Sebelas maret University in 2015. His research interests in occupational health and safety.

Dr. Bambang Suhardi is a lecturer of the Industrial Engineering Programme at the faculty of Engineering Sebelas Maret University. He is a member of Perhimpunan Ergonomi Indonesia (PEI), Persatuan Insinyur Indonesia (PII) dan Masyarakat Standarisasi Indonesia (MASTAN). He holds a bachelor of industrial and management engineering

from Universitas Pasundan. His master degree of industiral engineering from Institut Teknologi Sepuluh November. He holds doctoral degree of environmental engineering from Universitas Gadjah Mada.

Dr. Jafri Mohd Rohani is the Coordinator of the Industrial Engineering Programme at the Department of Materials, Industrial and Manufacturing Engineering, Faculty of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Johor. Currently, he is the President of Society Cost and Quality Engineers (SCQE). He is a Member of the American Society for Quality (ASQ), Human Factor Society of Malaysia and registered with Board of Engineers, Malaysia (BEM). He has published more than 30 articles in index and non index journals and presents more than 50 conference papers locally and internationally. He holds B. Sc (Industrial Engineering), B. Sc (Mathematical Statistics) from New Mexico State University, USA and holds a M. Sc. (Industrial and Systems Engineering) from the Ohio University, USA. He holds Ph.D in Statistical Process Control at the Universiti Teknologi Malaysia, Skudai, Johor.