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Knowledge, Attitude, and Supervision Correlation Analysis in Improving Work Safety Using The Pearson Method at A Tin Ore Refining Company in The Jelitik Industrial Area of Bangka Regency

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ABSTRACT

Occupational safety is a crucial aspect, especially in the mining sector, which has a high risk of accidents due to various factors. These factors include knowledge, attitude, and supervision. Although PT Pemurnian Oreh Timah in the Jelitik Industrial Estate recorded a few incidents of work accidents that occurred in the last 1 year, the risk of work accidents still exists. This study aims to analyze the level of close relationship between independent variables, namely knowledge and attitude, knowledge and supervision, and attitude with supervision in the Engineering Department of PT Pemurnian Oreh Timah in the Jelitik Industrial Estate, Bangka Regency. Pearson's correlation test method was used to analyze questionnaire data from 68 workers in the company's engineering department. The results showed that there was a weak relationship (r = 0.311) between knowledge and attitude, as well as a moderate relationship (r = 0.502) between knowledge and supervision. A moderate relationship (r = 0.484) was also found between attitude and supervision. These findings show that these factors are interrelated, where it is hoped that effective supervision can increase workers' knowledge and attitudes towards occupational safety.

Introduction

Occupational safety is a crucial aspect in every industry, especially in the mining sector, which has a high risk of accidents. Work accidents affect not only workers but also companies and society at large. Mondy and Noe (2005) define occupational safety as an effort to protect employees from injuries caused by work-related accidents. Based on Law No. 1 of (1970), work accidents are unexpected and unplanned events that can cause chaos in a process and result in loss of property, property, and people. Based on research by Bird and German (1990), work accidents are defined as unexpected events that result in losses to people, property, and the environment. The International Labour Organization (1998) identified factors that contribute to work accidents, including worker

factors, management factors, and work environment factors. Workers' knowledge and attitudes play an important role in preventing work accidents.

Notoatmodjo (2013) explained that knowledge is obtained through the five senses and is influenced by internal factors such as education, interests, experience, and age, as well as external factors such as economy, environment, and culture. Winardim (2020) defines attitude as a mental state that is studied and organized based on experience, which affects a person's reaction to others, objects, and situations. Zuchdi (2022) added that attitudes are influenced by personal experiences, culture, important people, mass media, educational and religious institutions, as well as emotional factors. Effective supervision is key to ensuring that work is carried out in accordance with safety plans and standards. Sarwono (1991) emphasized the importance of inspection, checking, matching, inspection, and control activities in supervision.

The Jelitik Industrial Estate in Bangka Regency is one of the industrial estates that has a high potential for work accidents. This area has abundant tin sand content and is the location for several companies engaged in mining, processing, and refining tin ore, including PT Pemurnian Oreh Timah. Although the company has recorded a few incidents of work accidents in the past 1 year, potential risks still exist. This study aims to analyze the close correlation between knowledge and attitude, knowledge and supervision, and attitude with supervision in the Engineering Department of PT Pemurnian Ore Timah in the Jelitik Industrial Estate, Bangka Regency. By examining these factors in depth, it is hoped that the results of the research can make a significant contribution to the development of more effective accident prevention strategies, as well as improve the implementation of safety practices in accordance with industry standards. In addition, the results of this study can enrich the occupational safety literature and provide practical guidance for companies in an effort to minimize risks and promote a safe work environment.

Method

This research uses a quantitative approach with a correlational descriptive design, conducted in the Engineering Department of Tin Ore Refining Company in the Jelitik Industrial Estate, Bangka Regency. The research sample consisted of 68 engineering department workers who were selected by purposive sampling. Data was collected through observation in the form of in-depth interviews with the Head of K3 and the company's summit, as well as a questionnaire consisting of 15 questions for each variable (knowledge, attitude and supervision). Instruments and classical assumption tests have tested the questionnaire data. The test of the instrument in the form of validity and reliability uses the Eviews 10 program, with a table value of 0.2387 and an Alpha Cronbach value of > 0.05, where if the result is > table, the data is declared valid and reliable. After that, a data normality test and a heteroskedasticity test were carried out. The data normality test in the Eviews 10 program using the Jarque-Bera method is seen with the condition that if the probability value > 0.05, the data is normally distributed. Meanwhile, the heteroskedasticity test uses the scatterplot graph method and the White

method resulting from the output of the Eviews 10 program (Friera et al., 2024). After that, the data was analyzed using the Pearson Product Moment Correlation Test (r) to test the level of the close relationship between the stated variables and the correlation coefficient (r). Correlation analysis (r), according to Sugiyono (2015), only measures the strength of the relationship between variables without having an impact on the causal relationship. However, correlation analysis can show the direction of the relationship, i.e., positive or negative relationship. The characteristics of the correlation coefficient of r are: 1) If the correlation value (r) is above 0.05, there is a relationship between variables; 2) Perfect/very strong relationship when r = +1 (indicates a positive direction) or r = -1 (indicates a negative direction), 3) The relationship between variables is weak/slight when r is close to 0. The interpretation of the degree of correlation tightness (r) is shown in Table 1.

Table 1 Guidelines for the Degree of Correlation Coefficient Relationship

Correlation Value	Relationship Level
0,00 – 0,20	Very Weak
0,20 – 0,40	Weak
0,40 – 0,60	Medium
0,60 – 0,80	Strong
0,80 – 1,00	Very Strong

Source : Sugiyono (2018)

Results and Discussion

An instrument first tested the questionnaire data in the form of a validity and reliability test using the Eviews program to measure the validity or validity of a question and check the consistency of the measuring tool from each questionnaire with the provision that if the results > the table, the variable was declared valid and reliable with a table of 0.2387. The validity test results are presented in Table 2, and the reliability test results are presented in Table 3. Table 2 shows that the results in each question item in each variable are greater than the table, so all questions in the questionnaire from each variable are declared valid.

Table 2 Validity Test Results

Question No.	R_{hasil}			R_{table}	Information
	Validity of Knowledge	Attitude Validity	Validity of Supervision		
1	0,2948	0,39428	0,285351	0,2387	Valid
2	0,3355	0,28142	0,25031		
3	0,308	0,30981	0,264446		
4	0,24	0,54373	0,357268		
5	0,2827	0,37443	0,353945		
6	0,2732	0,43715	0,371693		
7	0,2827	0,25571	0,295686		
8	0,308	0,35761	0,306511		
9	0,308	0,44268	0,37246		
10	0,2472	0,28899	0,30308		
11	0,3355	0,26278	0,331634		
12	0,293	0,27017	0,283143		

13	0,3626	0,31172	0,386074
14	0,2809	0,3182	0,280156
15	0,3643	0,27548	0,374446

Source: processed data, 2024

Table 3 shows the reliability coefficient (Alpha) for the three variables of the study: knowledge (0.2618), attitude (0.3986), and supervision (0.2884), where all the values of the Alpha coefficients of the three variables are more than the table, which means that the three variables can be trusted to be used as a data collection tool or to measure a predetermined object, in this case, to measure the degree of correlation between independent variables. Although these values are relatively low, all three variables are still categorized as "Reliable," indicating that the measurement instrument has sufficient consistency in assessing these variables. Attitude values show better consistency than knowledge and supervision.

Table 3 Reliability Test Results,

No.	Variable	Reliability Coefficient (Alpha)	Information
1	Knowledge	0,2618	Reliable
2	Attitude	0,3986	Reliable
3	Supervision	0,2884	Reliable

Source: processed data, 2024

After the data was declared valid and reliable, a classical assumption test in the form of a normality test and a heteroskedasticity test was carried out using the Eviews program to produce valid parameter values. The Jarque-Bera method was used in the Eviews program to perform a normality test. The normality test aims to test whether the regression model of the distributed variable is normal or not, with the provision that if the probability value > 0.05, the data is normally distributed. The data results showed that the probability value of the knowledge variable was 0.139390, the attitude variable was 0.117604, and the supervision variable was 0.131498, where all the Jarque-Bera probability values > 0.05, meaning that all variables were normally distributed. The data results are presented in Table 4.

Table 4. Results of the Jarque-Bera Normality Test

Jarque-Bera Test			
	Knowledge	**Attitude**	**Supervision**
Probability	0.139390	0.117604	0.131498
a. Test distribution is Normal.			

Source: processed data, 2024

The heteroskedasticity test aims to test whether, in the regression model, there is an inequality of variance from residual from one observation to another. A good regression model is that heteroskedasticity does not occur. The scatterplot graph method and the White method generated from the output of the Eviews program can be used to detect the presence or absence of heteroskedasticity. In the scatterplot method, if the image shows that the dots are randomly spread and scattered both above and below the number 0 on the Y axis, then it can be concluded that there is no heteroskedasticity. In the White

method, if the probability value of the model shown in Obs*R-squared > 0.05, then it can be concluded that there is no heterokedastition. The results of the heterokedastition test of the scatterplot method are shown in Figures 1 – 3, and the table of heterokedasticity test results of the White method is shown in Table 5. The test results showed that there was no heteroskedasticity in both methods.

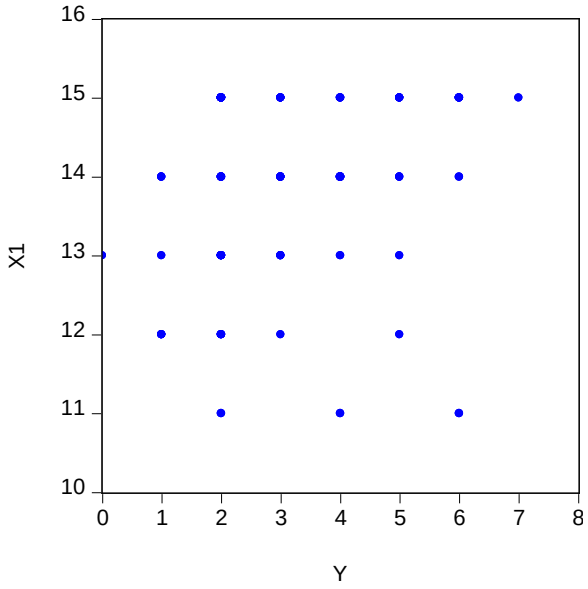

Figure 1. Results of Heteroskedasticity Test of Knowledge Variable Scatterplot Method

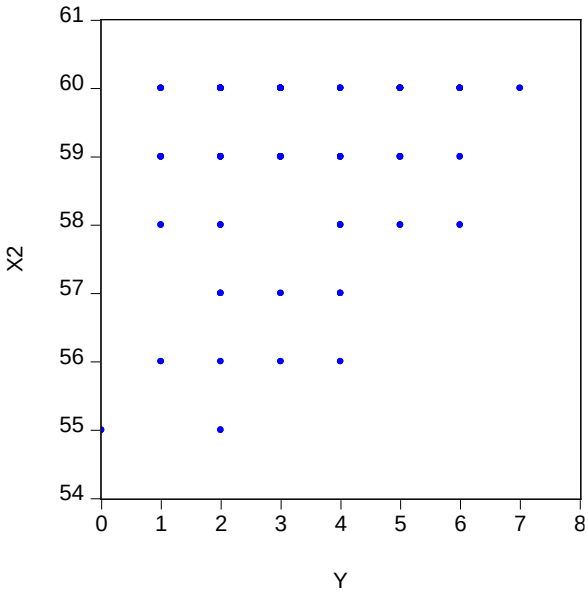

Figure 2. Results of the Heteroskedasticity Test of the Scatterplot Method of Attitude Variables

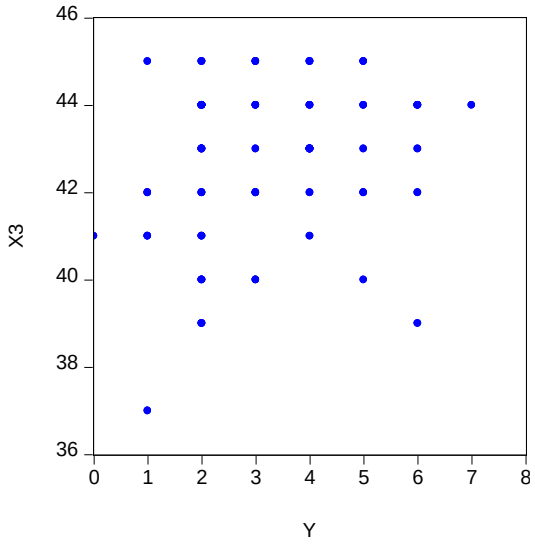

Figure 3. Results of Heteroskedasticity Test of Surveillance Variable Scatterplot Method

Table 5 shows the results of heteroscedasticity analysis using the White method on the Eviews program for all three variables, showing that there is no heteroscedasticity problem in the research data. For the knowledge variable, the Obs*R-squared value of 0.0586 with a probability greater than 0.05 indicates that the data does not experience heteroskedasticity. The attitude variable also produced an Obs*R-squared value of 0.5580 with a probability above 0.05, indicating that the data on this variable did not show heteroskedasticity. Finally, for the monitoring variable, the Obs*R-squared value of 0.9685, which is greater than 0.05, indicates that the data also did not experience heteroskedasticity. Thus, all variables in this study meet the assumption of homoskemasiness or do not experience heteroskedasticity.

Table 5. Results of the White Method Heteroskedasticity Test,

a. Knowledge

Heteroskedasticity Test: White

F-statistic	2.957865	Prob. F(2,65)	0.0590
Obs*R-squared	5.672502	Prob. Chi-Square(2)	0.0586
Scaled explained SS	3.786962	Prob. Chi-Square(2)	0.1505

Source: processed data, 2024

b. Attitude

Heteroskedasticity Test: White

F-statistic	0.567366	Prob. F(2,65)	0.5698
Obs*R-squared	1.166735	Prob. Chi-Square(2)	0.5580
Scaled explained SS	0.628904	Prob. Chi-Square(2)	0.7302

Source: processed data, 2024

c. Supervision

Heteroskedasticity Test: White			
F-statistic	0.044451	Prob. F(2,65)	0.9566
Obs*R-squared	0.092879	Prob. Chi-Square(2)	0.9546
Scaled explained SS	0.064063	Prob. Chi-Square(2)	0.9685

Source: processed data, 2024

After the data was declared valid, reliable, and normal, and no heteroskedasticity occurred, the Pearson correlation test was carried out. Data analysis was carried out using the Pearson Product Moment Correlation Test to test the relationship between independent variables, namely knowledge and attitude, knowledge and supervision, and attitude with supervision, in the engineering department of a tin ore refining company. The results of the analysis are presented in Table 6.

Table 6. Results of Analysis of Relationships Between Independent Variables

Variable Relationship	Correlation Value	Correlation Description	Relationship Level
Knowledge – Attitude	0.311946	Related	Weak
Knowledge – Supervision	0.502067	Related	Medium
Attitude – Supervision	0.484784	Related	Medium

Source: processed data, 2024

In Table 7 above, the results of Pearson's correlation analysis show that there is a correlation between the independent variable and the varying degree of closeness in the Engineering Department of PT Pemurnian Oreh Timah in the Jelitik Industrial Estate, where the correlation between knowledge and attitude (r = 0.311) and the moderate correlation between knowledge and supervision (r = 0.502), as well as attitude and supervision (r = 0.484). These findings suggest that knowledge and attitudes are important factors in improving occupational safety, although the relationship between knowledge and attitudes is relatively weak. The moderate relationship between knowledge and supervision, as well as attitude and supervision, shows that effective supervision can improve workers' knowledge and attitudes toward occupational safety. Knowledge is influenced by internal factors such as education, interests, experience, and age (Notoatmodjo, 2012), as well as external factors such as economy, environment, and culture. Attitude, as a determinant of behavior, is influenced by personal experiences, culture, important people, mass media, educational and religious institutions, as well as emotional factors (Arifuddin et al., 2023; Zuchdi, 1995). Effective supervision, as the process of monitoring employees' work activities to ensure that the company remains on track towards achieving its goals and making corrections if necessary (Mone et al., 2018; Siagian, 2003), can help in increasing workers' knowledge and attitudes towards occupational safety, as well as encouraging them to implement correct occupational safety practices.

Conclusion

Based on the findings and analysis, this study demonstrates a relationship between knowledge, attitudes, and supervision in the context of occupational safety. While the correlation between knowledge and attitude is weak, the moderate correlations between knowledge and supervision, as well as between attitude and supervision, highlight the pivotal role of effective supervision in enhancing workplace safety. These results suggest that targeted interventions focusing on supervision can significantly improve workers' knowledge and attitudes towards safety. For example, implementing regular training sessions guided by supervisors can strengthen workers' understanding of safety protocols. Additionally, fostering a culture of continuous feedback and monitoring ensures adherence to safety measures, thereby reducing accident risks. To improve occupational safety in the mining sector, it is essential to integrate these findings into comprehensive safety management practices. This includes creating tailored supervision strategies that align with workers' educational and cultural backgrounds, deploying advanced monitoring technologies to enhance supervision, and establishing policies that encourage proactive safety behavior.

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