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Factor Analysis Of Working Environment Factors, Worker Awareness, Top Management, Worker Communication, Regulations and Procedures(K3), And Availability of Signs (K3) to The Occupational Health And Safety (K3) Implementation At PT. Primary Mirasindo

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Abstract

This study aims to determine the analysis of work environment factors, worker awareness, work motivation, top management, worker communication, K3 rules and procedures, and the availability of K3 signs that significantly affect Occupational Health and Safety at PT. Mirasindo Perdana partially and simultaneously. The sample in this study used random sampling, so that the results obtained were 134 respondents from employees of PT. Mirasindo Perdana, the data collection technique used is through a questionnaire. This study uses factor analysis and multiple linear regression analysis with the help of computer software for SPSS version 20 statistics. work (X3), top management (X4), worker communication (X5), K3 rules and procedures (X6), and the availability of K3 signs (X7) have a positive and significant simultaneous effect on Occupational Health and Safety. while those that partially represent independent variables or other factors are top management (X4), K3 rules and procedures (X6), and the availability of K3 signs (X7). It can be seen that top management (X4), K3 regulations and procedures (X6), and the availability of K3 signs (X7) have a positive and significant impact on Occupational Health *and Safety at PT. Mirasindo Perdana.*

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Introduction

In the era of globalization, companies need Human Resources (HR) who have quality expertise, namely self-management or control, education, and intelligence. The aspect that determines the success of the company is to have an expert and qualified workforce, so as to increase the ability and creativity of work. Human Resources is one of the problems and reasons for every company to survive in the era of globalization (According to Hasibuan, 2014). One of the most important things in the management of Human Resources is Occupational Health and Safety (K3).

Occupational Health and Safety relates to work, work environment, work tools, machines, workplace and workers. Healthy environmental conditions and work tools that are still in good condition can help workers to carry out activities and activities safely and comfortably. Occupational Health and Safety (K3) is one of the important issues in increasing work productivity, to increase work efficiency and productivity the company needs to implement an Occupational Health and Safety (K3) system to support the achievement of company goals. One of them is PT. Mirasindo Perdana as a granite mining company, optimal employee performance is needed to increase productivity and maintain the survival of this company. To minimize work accidents, the company must make Occupational Health and Safety (K3) policies and regulations that can provide information to workers so that they can carry out their duties and responsibilities properly, for the Health and Safety of employees and the achievement of company goals.

In its operational activities, PT. Mirasindo Perdana also pays attention to the work of its employees. In this case the company is trying to reduce work accidents by providing personal protective equipment such as safety helmets, safety glasses, safety gloves, safety shoes, safety ear plugs, and body safety harnesses. Every employee is required to use personal protective equipment (PPE) that has been provided by the company. Discipline in work has not been fully implemented by employees and there are no regulations that are tightened by the company, with environmental conditions, tools, and machines used are still inadequate so that it can cause the risk of accidents. The following general description can be seen from the case data of employee work accidents at mining companies in Indonesia, including granite mines from 2017 to 2020:

Table 1 .1 Mining Company Work Accidents in Indonesia 2017-2020

year	Classification			Total
	minor	serious	Death	
2020	35	95	16	146
2019	27	106	24	157
2018	52	0	18	70
2017	61	0	10	73
total	177	201	68	446

Sumber: MODI, 2020

From Table 1.1, it can be seen data on minor, severe, and death work accidents in mining companies in Indonesia. In 2017 there were 63 minor work accidents, 0 serious accidents or no serious accidents, and 10 deaths occurred, in 2018 minor work accidents decreased by 52, serious accidents 0 or no serious accidents, and death increased by the number of 18, in 2019 minor work accidents decreased by 27, serious accidents increased by 106, and deaths increased by 24, in 2020 minor accidents increased by 35, serious accidents decreased by 94, and deaths decreased by 16. From the work accident data above, minor accidents from 2017-2020 with a total of 177, serious accidents from 2017-2020 with a total of 200, and deaths from 2017-2020 with a total of 68.

Based on the table above PT. Mirasindo Perdana as a company engaged in granite mining in carrying out its operations will not be separated from work accidents, ranging from light-risk accidents, serious-risk accidents and death. Mild-risk accidents are accidents that occur to employees in a relatively short recovery period until employees return to work, for example minor accidents that occur such as minor injuries that can still be handled with the first aid provided by the company. Accidents that are at serious risk are accidents that occur to employees during a relatively long recovery period until the employee returns to work, for example, serious accidents that occur such as broken bones, skin burns due to the equipment used is not suitable for use and cannot be handled by the company with facilities

that are not adequate. adequate. This must be handled by the hospital and can result in physical disability for the patient. This is not only detrimental to employees, but can also cause losses to the company such as damage to equipment, damage to the work environment, and other losses.

This research is slightly different from the previous research, namely the place of research at PT. Mirasindo Perdana and the concentration of the title of this research is the analysis of the factors that affect Occupational Health and Safety at PT. Mirasindo Perdana. This study uses the classical assumption test method, factor analysis, and multiple regression analysis. Based on the description above, the author is interested in researching the factors that affect Occupational Health and Safety, so the author takes the title "Analysis of Work Environment Factors, Worker Awareness, Top Management, Worker Communication, Regulations and Procedures (K3), and Availability of Signs- Signs (K3) That Significantly Affect Occupational Health and Safety (K3) At PT. Mirasindo Perdana".

Theoretical Review

According to Sri Rejeki (2016), occupational health is a physical, mental and social condition of a person who is not only free from disease and health problems but also demonstrates the ability to interact with his environment and work. A person's health status is determined by four factors, namely, environmental factors, behavior, health services and genetics. A person's Occupational Health affects the activities and activities carried out at work, with a healthy physical, mental and social condition able to increase work creativity and the achievement of company goals to obtain quality human resources in terms of skills, education, control and health.

According to Sri Rejeki (2016), Occupational Safety is safety related to work tools, machines, materials, and processing processes, environmental conditions and the conditions of the tools used affect work safety which have a positive or negative impact on the physical and mental conditions of workers. Work safety is one of the most prioritized in the company. To reduce the level of risky accidents and ensure work safety, the company provides facilities for personal protective equipment as a safety support tool.

Research methods

This research use method approach explanatory study (exsplanatory research) to explain the position of the variables in the meticulous and influence of one variable with another variable. This research is a research that explains the causal relationship (cause and effect) between research variables through hypothesis testing. The approach used in this study is a survey method, namely research that takes samples from one population using questionnaires or research conducted to obtain facts about the phenomena that exist in the object of research and seek actual and systematic information.

This study will examine the analysis of work environment factors, worker awareness, work motivation, top management, worker communication, K3 rules and procedures, and the availability of K3 signs that significantly affect Occupational Health and Safety at PT. Mirasindo Perdana .

Results

Validity Test Results

Validity test is used to see the accuracy of the instrument in carrying out its function as a measuring instrument. If the value of the instrument is valid, then the instrument can be used to measure. The requirements for an instrument to be declared valid are:

If the calculation of the probability value of Sig (p) <5% or the value of r count > r table , the data is declared valid (valid).

If the calculation of the probability value of Sig (p) > 5% or the value of r count < r table , the data is declared invalid (invalid).

Based on the Sig(p) value the results of the validity test of the research instrument using the product moment correlation coefficient are Valid for all indicator variable.

Reliability Test

Reliability test is used to determine the extent to which the measurement results remain consistent and stable over time. Testing the reliability of the instrument in this study using SPSS 20 software for windows. The reliability test in this study is said to be reliable if the Cronbach

Alpha value> 0.6 (trustworthy) can be seen as follows:

Table 4.5 Reliability Test

Reliability Statistics			
Instrumen	Cronbach'c Alpha	N of Items	Kesimpulan
X1 Working Env	0,603	8	Reliabel
X2 Worker Awareness	0,723	0	Reliabel
X3 Working Motivation	0,616	6	Reliabel
X4 Top Manajemen	0,705	8	Reliabel
X5 Communication	0,609	4	Reliabel
X6 HSE Regulation	0,673	7	Reliabel
X7 HSE Sign	0,668	7	Reliabel
Y HSE	0,719	13	Reliabel

Source: Data Processed SPSS 20, 2021

Factor Analysis Results

Multivariate analysis requires a simplification in the structure or dimensions of the data, so that the diversity of the data can be explained more simply. In the main variable analysis, from several main variables selected k main variables that have been able to explain the diversity of the data.

Table 4.17 Results of Factor Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,846	54,942	54,942	3,846	54,942	54,942
2	1,132	16,170	71,112	1,132	16,170	71,112
3	,997	14,236	85,348			
4	,799	11,411	96,759			
5	,181	2,592	99,351			
6	,036	,514	99,865			
7	,009	,135	100,000			

Extraction Method: Principal Component Analysis.

Source: Data Processed SPSS 20, 2021

In table 4.17 it can be seen that there are 2 independent variables that are most significant to the dependent variable (Occupational Health and Safety), with the percentage variance of each being 54.942% and 16.170%. happen. To support the statement above, it will be supported by the component transformation matrix in Table 4.18 and the rotated component matrix in Table 4.19.

Table 4.18 Component Transformation Matrix

Component Transformation Matrix

Component	1	2
1	,948	-,320
2	,320	,948

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Source: Data Processed SPSS 20, 2021

Based on table 4.18 it can be concluded that most of the data diversity of the 7 variables can be explained by two factors, with a value of 0.948.

Table 4.19 Component Matrix

Component Matrix

	Component	
	1	2
Lingkungan Kerja	-,765	,293
Kesadaran Pekerja	-,289	,683
Motivasi Kerja	-,275	,601
Top Manajemen	,923	,230
Komunikasi Pekerja	-,703	,162
Peraturan dan Prosedur K3	,947	,226
Tersedianya Rambu-Rambu K3	,926	,296

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

According to experts in the multivariate field, a loading factor value of 0.55 or more is considered significant. Based on table 4.19 shows the correlation value of each indicator to the factors formed are as follows: worker awareness factor 1 (-0.289) and factor 2 (0.683), work motivation factor 1 (-0.275) and factor 2 (0.601), top management factor 1 (0.923) and factor 2 (0.230), K3 rules and procedures factor 1 (0.947) and factor 2 (0.226), the availability of K3 signs factor 1 (0.926) and factor 2 (0.296).

The process of forming factors by their forming indicators can be seen from the results of the Rotated Component Matrix test . An indicator is declared to play a role as a forming factor intended by the highest loading factor value. The results showed that top management, K3 rules and procedures, and the availability of K3 signs had the highest loading factor value in forming

factor 1. Worker awareness, and work motivation, had the highest loading factor value in forming factor 2. It can be seen in table 4.20 following.

Table 4.20 Rotated Component Matrix

Rotated Component Matrix[a]

	Component	
	1	2
Lingkungan Kerja	-,631	,522
Kesadaran Pekerja	-,055	,740
Motivasi Kerja	-,068	,658
Top Manajemen	,949	-,077
Komunikasi Pekerja	-,614	,378
Peraturan dan Prosedur K3	,970	-,089
Tersedianya Rambu-Rambu K3	,972	-,016

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.
Source: Data Processed SPSS 20, 2021

Correlation Test

Correlation test was conducted to find out how strong the relationship was and to prove the hypothesis of a two-factor relationship. Based on the results of the analysis of the main components/variables described in table 4.17 and table 4.19.

Sugiono (2011) provides guidelines for providing interpretations of the correlation coefficient as follows.

Table 4.20 Guidelines for Providing Interpretation of Correlation Coefficients

Interval Koefisien	Tingkat Hubungan
0,00 – 0,199	Very Low
0,20 – 0,399	low
0,40 – 0,599	Moderate
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

Source: Taken From Quantitative Methods and SPSS written by Saloni Waruwu, Ferida Yuamita (2016)

From the results of calculations using SPSS 20, the product moment correlation coefficient is obtained between factor one and Occupational Health and Safety K3 (Y), factor two with Occupational Health and Safety (Y), and the relationship between factor one and factor two, as will be explained in the following table 4.21.

Table 4.21 Product Moment Correlation Test

Correlations

		Faktor 1	Faktor 2	Kesehatan dan Keselamatan Kerja K3
Faktor 1	Pearson Correlation	1	,000	0,847
	Sig. (2-tailed)		1,000	0,000
	N	134	134	134
Faktor 2	Pearson Correlation	0,000	1	0,425
	Sig. (2-tailed)	1,000		0,000
	N	134	134	134
Kesehatan dan Keselamatan Kerja K3	Pearson Correlation	0,847	0,425	1
	Sig. (2-tailed)	0,000	0,000	
	N	134	134	134

Sumber: Data Diolah SPSS 20, 2021

Based on the product moment correlation in table 4.21, the following results are obtained:

1. The correlation between Factor 1 and Occupational Health and Safety is 0.847, meaning that it has a very strong relationship.
2. The correlation between Factor 2 and Occupational Health and Safety is 0.425, meaning that it has a moderate relationship.
3. The correlation between Factor 1 and Factor 2 is 0.000, meaning that it has a very weak relationship.

From the results of the correlation test above, it can be concluded that factor 1, namely: top management, K3 rules and procedures, and the availability of K3 signs have a very strong relationship to Occupational Health and Safety

with a value of 0.847. The values of the Summary b and Scatterplot models of top management variables, K3 rules and procedures, and the availability of OHS signs are as follows:

Table 4.22 Table Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,864[a]	,747	,741	1,312

a. Predictors: (Constant), Tersedianya Rambu-Rambu K3, Top Manajemen, Peraturan dan Prosedur K3

b. Dependent Variable: Kesehatan dan Keselamatan Kerja K3

Source: Data Processed SPSS 20, 2021

Based on table 4.23 the results of SPSS 20 "Model Summary" above, it is known that the value of the coefficient of determination or R Square is 0.747. Based on the coefficient of determination (R Square) is 0.747 or equal to 74.7% which represents the relationship of the three independent variables of top management (X4), K3 rules and procedures (X5), and the availability of OHS signs (X7) to Occupational Health and Safety variable (Y). While the rest (25.3%) represents the relationship of the four independent variables of work environment (X1), worker awareness (X2), work motivation (X 3), and worker communication (X5) on Occupational Health and Safety K3 (Y). Furthermore, from the work environment variables (X1), worker awareness (X2), work motivation (X3), top management (X4), worker communication (X5), K3 regulations and procedures (X6) and the availability of signs and regulations. rambu K3(X 7) followed by multiple linear regression analysis test.

Analysis Regression

Regression analysis was conducted to determine the functional or causal relationship between two or more variables. Of the seven variables or seven independent factors which one most significantly affects the dependent variable Occupational Health and Safety K3 (Y). Then then do a regression analysis between the independent variable and the dependent variable.

Table 4.23 Multiple Regression Test

Independent Variable	Regression Coefficient	T count	Sig	Decision
Constant	2,911			
X1_Working Environment	0.220	0.861	0.392	Positive and Insignificant Influence
X2_Worker Awareness	-0.771	-1,349	0.182	Negative and Insignificant Effect
X3_Work Motivation	-0.059	-0.504	0.616	Negative and Insignificant Effect
X4_Top Management	0.454	4,936	0.000	Positive and significant influence
X5_Worker Communication	-0.149	-1,280	0.203	Negative and Insignificant Effect
X6_K3 Rules and Procedures	3,293	5,152	0.000	Positive and significant influence
X7_Availability of K3 Signs	0.903	2,382	0.000	Positive and significant influence
Dependent variable: Occupational Health and Safety K3				
F count = 94.716	Critical value : t table = 1.65704 F table = 2.08			

Source: Data Processed SPSS 20, 2021

Based on the test results in table 4.23, a regression equation model was developed, namely:

$$Y' = 2,911+0,220X_1+-,771X_2-,059X_3+ 0,454X_4 - ,149X_5+ 3,293X_6 + ,903X_7 + e$$

to further confirm the functional or causal relationship between work environment variables (X 1), worker awareness (X 2), work motivation (X 3), top management (X 4), worker communication (X 5), K3 regulations and procedures (X 6) and the availability of OHS signs (X7) on the OHS (Y) variable of Occupational Health and Safety, it is necessary to carry out the following tests:

Partial Hypothesis Test (t)

Hypothesis testing is used to test whether the independent variables in this study have a partial influence on the dependent variable. Based on the statistical results the hypothesis proposed in this study states that:

H1: Work environment factors have a positive effect on Occupational Health and Safety K3. This hypothesis is supported if the significance probability value shows a value <0.05. Based on table 4.24 it can be seen that the top management variable obtained t count of 0.861 with a significance of 0.392 (sig. < 0.05). The results of this study indicate that the significance number is much greater than 0.05, so the regression model cannot be used to predict the dependent variable, or in other words, the work environment variable has no significant effect on the Occupational Health and Safety variable.

H2: The worker awareness factor has a negative effect on Occupational Health and Safety K3. This hypothesis is supported if the significance probability value shows a value <0.05. Based on table 4.24, it can be seen that the worker awareness variable obtained t count of -1.349 with a significance of 0.182 (sig.<0.05). The results of this study indicate that the significance number is much greater than 0.05, so the regression model cannot be used to predict the dependent variable, or in other words, the worker awareness variable has no significant effect on the Occupational Health and Safety variable. Based on this analysis, it is concluded that hypothesis 2 proposed in this study is not accepted.

H3: Work motivation factors have a negative effect on Occupational Health and Safety K3. This hypothesis is supported if the significance probability value shows a value < 0.05. Based on table 4.24, it can be seen that the work motivation variable obtained t count of -0.504 with a significance of 0.616 (sig.<0.05). The results of this study indicate that the significance number is much greater than 0.05, so the regression model cannot be used to predict the dependent variable, or in other words, the work motivation variable has no significant effect on the Occupational Health and Safety variable. Based on this analysis, it is concluded that hypothesis 3 proposed in this study is not accepted.

H4: Top management factors have a positive effect on Occupational Health and Safety K3. This hypothesis is supported if the significance probability value shows a value <0.05. Based on table 4.24 it can be seen that the top management variable obtained t count of 4.936 with a significance of 0.000 (sig. < 0.05). The results of this study indicate that the significance number is much less than 0.05, so the regression model can be used to predict the dependent variable, or in other words, the top management variable has a significant effect on the Occupational Health and Safety variable. Based on this analysis, it is concluded that hypothesis 4 proposed in this study is accepted.

H5: Workers' communication factors have a negative effect on Occupational Health and Safety K3. This hypothesis is supported if the significance probability value shows a value <0.05. Based on table 4.24, it can be seen that the worker awareness variable obtained t count of -1.280 with a significance of 0.203 (sig. < 0.05). The results of this study indicate that the significance number is much greater than 0.05, so the regression model cannot be used to predict the dependent variable, or in other words, the worker communication variable has no significant effect on the Occupational Health and Safety variable. Based on this analysis, it is concluded that hypothesis 5 proposed in this study is not accepted.

H6: The factors of K3 regulations and procedures have a positive and significant impact on Occupational Health and Safety. This hypothesis is supported if the significance probability value shows a value < 0.05. Based on table 4.24, it can be seen that K3 rules and procedures obtained t count of 5.152 with a significance of 0.000 (sig. <0.05). The results of this study indicate that the significance number is much less than 0.05, so the regression model can be used to predict the dependent variable, or in other words, the OSH regulations and procedures have a significant effect on the OHS and Occupational Health and Safety variables. Based on this analysis, it is concluded that hypothesis 6 proposed in this study is accepted.

H7: The availability of K3 signs has a positive and significant effect on Occupational Health and Safety. This hypothesis is supported if the significance probability value shows a value < 0.05. Based on table 4.24, it can be seen that the variable availability of K3 signs obtained t count of 2.382 with a significance of 0.000 (sig. <0.05). The results of this study indicate that the significance number is much less than 0.05, so the regression model can be used to predict the dependent variable, or in other words, the variable availability of OHS signs has a significant effect on the OSH variable. Based on this analysis, it is concluded that hypothesis 7 proposed in this study is accepted.

Simultaneous Hypothesis Testing (f)

In this study, it is stated that the work environment, worker awareness, work motivation, top management, worker communication, K3 rules and procedures, and the availability of K3 signs have a simultaneous effect on Occupational Health and Safety. This hypothesis is supported if the probability value of 0.000 significance indicates a value <0.05 and cannot be supported otherwise. Based on table 4.24 it can be seen that the calculated f is 94,716 with a probability of 0.000 because the probability is much smaller than 0.05, it can be said that the work environment, worker awareness, work motivation, top management, worker communication, K3 rules and procedures, and the availability of signs K3 signs have a significant simultaneous effect on Occupational Health and Safety.

From the f-test, the calculated f value is 94,716 and f table is searched at = 5% with degrees of freedom (df) nk or 134-7 = 127 is 2.08, so the value of f count = 94.716 > f table = 2 .08 and a significance value of 0.000 (sig. <0.05). Based on the results of the analysis, the hypothesis 8 proposed in this study is accepted.

Conclusion

Based on the discussion of the previous chapters regarding the analysis of work environment factors (X1), worker awareness (X2), work motivation (X3), top management (X4), employee communication (X5), K3 regulations and procedures (X6), and availability K3 signs (X7) affect Occupational Health and Safety K3 (Y) at PT. Mirasindo Perdana, the conclusions in this study are:

1. Based on the results of the analysis with the factor analysis method of work environment variables (X 1), worker awareness (X 2), work motivation (X 3), top management (X 4), worker communication (X 5), K3 regulations and procedures (X 6), and the availability of K3 signs (X 7) is formed into two factors, namely factor 1: top management (X 4), K3 rules and procedures (X 6), and the availability of K3 signs (X 7) and factor 2 : work environment (X 1), worker awareness (X 2), work motivation (X 3), worker communication (X 5). From the results of the correlation test, there is a very strong relationship between factor 1: top management (X 4), K3 rules and procedures (X 6), and the availability of K3 signs (X 7) on Occupational Health and Safety K3 (Y).
2. Based on the results of the analysis using the partial factor analysis method, the most significant factors affecting Occupational Health and Safety (Y) are:
   - top management (X4) positive and significant effect on the Occupational Health and Safety (K3) at PT. Mirasindo Perdana.
   - K3 regulations and procedures (X 6) have a positive and significant effect on Occupational Health and Safety (K3) at PT. Mirasindo Perdana.
   - The availability of OHS signs (X 7) has a positive and significant effect on Occupational Health and Safety (K3) at PT.Mirasindo Perdana.

3. Based on the analysis of t test and F test result variable top manjemen (X 4), rules and procedures K3 (X 6), and the availability of signs K3 (X 7) positive and significant effect both partially and simultaneously to the variables of Health and Occupational Safety K3 (Y) at PT. First Mirasindo.

Suggestion

Based on the results of research that has been done, management should always provide motivation and encouragement to employees to always use Personal Protective Equipment (PPE), should develop HSE regulations and procedures for employees to apply in order to

increase productivity and Occupational Health and Safety at PT. Mirasindo Perdana, and also provide K3 signs in hazard-prone areas to avoid work accidents for the Health and Safety of K3 Employees at PT. Mirasindo Perdana.

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