



The Influence of Occupational Safety and Health on Employee Performance with Work Discipline as a Mediating Variable at PT Vale Indonesia Tbk

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Abstract

This study aims to analyze the effect of occupational safety and health on employee performance with work discipline as a mediating variable at the nickel mining company PT Vale Indonesia Tbk in Sorowako, South Sulawesi. This study uses a quantitative approach with the Structural Equation Modeling (SEM) method with Partial Least Squares (PLS) version 4.0. The population in this study was 2,823 employees of PT Vale Indonesia Tbk in Sorowako, South Sulawesi. The sampling technique used probability sampling with random sampling technique with a sample size of 96 employees working on-site or in the field. The data collection method in this study used a questionnaire measured by a Likert scale. The results showed that occupational safety and health positively and significantly affected employee performance. In addition, work discipline was proven to significantly mediate the relationship between occupational safety and health and employee performance. The implications of this study are to emphasize the importance of implementing good OHS and high work discipline in improving employee performance, as well as providing recommendations for company management to continue strengthening OHS policies and work discipline to achieve optimal performance.

Keywords : Occupational safety and health, work discipline, employee performance.

1. Introduction

Human resource management in an organization requires a systematic, planned, and efficient approach to increase the effectiveness and productivity of the workforce. One of the fundamental aspects of human resource management is the occupational safety and health (K3) system, which protects workers from the risk of accidents and occupational diseases (Qurbani & Selviyana, 2018). Work accidents can be caused by two main factors, namely human factors and environmental factors. Human factors refer to unsafe actions taken while working, such as violating safety procedures or lacking worker skills. Meanwhile, ecological factors include hazardous working conditions, such as the use of improper equipment, risky workplace conditions, and inadequate lighting. Both of these factors require serious attention from management to minimize the risk of accidents, especially for field workers with a higher risk level than indoor workers (Bhastary & Suwardi, 2018). Therefore, a vigilant attitude is needed when carrying out a job (Lubis et al., 2022).

Based on PT Vale Indonesia Tbk's 2023 sustainability report, implementing the occupational safety and health system shows increased employee compliance. This is reflected in the work accident data, which has decreased significantly in the last three years, with the number of serious accidents decreasing from 7 cases in 2022 to 3 cases in 2023. However, despite the increase in compliance, there were still three incidents of moderate severity work accidents experienced by contractor employees during shutdown, maintenance, and equipment preparation activities outside the work area. This situation shows that although there have been improvements in the implementation of OHS, gaps still need to be fixed to achieve an optimal level of work safety. Therefore, this study aims to understand further how OHS implementation can affect employee performance and the role of work discipline as a mediating variable in this relationship.

Employee performance is a factor that significantly determines the sustainability and success of a company (Ludwikowska, 2023), especially in the mining industry, which has high work risks. PT Vale Indonesia Tbk has evaluated its operational performance, which includes statistical calculations of the severity of work accidents (Severity Rate) and the frequency of work accidents (Frequency Rate). This method provides an objective picture of the effectiveness of implementing the K3 system in the work environment and its impact on employee productivity. In addition, the realization of nickel production in matte during 2023 reached 70,728 tons, an increase of 18% compared to the previous year. This increase reflects the effectiveness of the maintenance strategy implemented by the company but also shows inconsistencies in several production periods that need to be further examined (PT Vale Indonesia Tbk, 2023).

This research is essential considering that occupational safety and health not only impacts the welfare of workers but also contributes to the organization's overall performance. In a safe and healthy work environment, employees can work more effectively, reduce absenteeism due to accidents, and increase overall productivity. In addition, employee work discipline also plays a vital role as a mediating factor in improving the relationship between occupational safety and health and performance. This study will explore how work discipline can strengthen the positive effects of implementing an OHS system on employee productivity, resulting in recommendations that companies can adopt to improve workforce performance more optimally.

Based on the explanation above, this study aims to analyze the effect of occupational safety and health on employee performance with work discipline as a mediating variable at PT Vale Indonesia Tbk. This study is expected to provide academic contributions in human resource management and occupational safety, as well as recommendations that can be applied in the mining industry to improve the

effectiveness of K3 implementation. The results of this study are also expected to be a reference for other companies in similar industrial sectors to optimize occupational safety and health systems to improve employee performance and create a safer and more productive work environment.

2. Research Method

This study uses a quantitative approach and is then analyzed using the statistical methods obtained and interpreted. This study investigates the effect of occupational safety and health on employee performance at PT Vale Indonesia Tbk, with work discipline as a mediating variable. Data were collected through questionnaires distributed to respondents, namely PT Vale Indonesia employees who work directly on-site or in the field, with a total population of 2,823. Samples were taken from as many as 96 people using the Slovin formula with a sampling technique, namely random sampling (Sugiyono, 2018). This study's variables consist of independent, dependent, and mediating variables. The independent variable in this study is occupational safety and health. The dependent variables are employee performance and work discipline as mediating variables.

Data analysis was conducted using descriptive study to describe the characteristics of the research variables, including the mean value and standard deviation. In addition, to test the hypothesis using the Structural Equation Modeling (SEM) method with Partial Least Squares (PLS) version 4.0 (Hair et al., 2019). Regarding the influence of K3 on employee performance with work discipline as a mediating variable. Before testing the hypothesis, a research instrument test was performed, including validity and reliability tests. Validity tests were conducted through several tests, namely convergent validity, discriminant validity, and average variance extracted (AVE) (Hair et al., 2019).

3. Results and Discussion

Table 1 Characteristics of PT Vale Indonesia Tbk Employees

Respondent Characteristics	Adverb	Amount	Percentage
Gender	Male	67	66,67%
	Female	32	33,33%
	Total	96	100%
Age	21-29 years old	12	12,50%
	30-39 years old	58	60,42%
	40-49 years old	26	27,08%

	Total	96	100%
	<i>Process Plant</i>	27	28,13%
	<i>OPG (Operational Planning and Geotech)</i>	3	3,13%
	<i>EPC (Engineering Planning and Capital)</i>	4	4,17%
	<i>EPM (Environment and Permit Management)</i>	3	3,13%
Department	<i>HSOR (Health, Safety and Operational Risk)</i>	14	14,58%
	<i>Mines</i>	28	29,17%
	<i>EGS (Exploration, Geoscience and Study)</i>	12	12,50%
	<i>Energy and Logistic</i>	5	5,21%
	Total	96	100%
	1-7 years	26	27,08%
	8-15 years	31	32,29%
Employee Tenure	16-23 years	39	40,63%
	Total	96	100%

Source: Primary data (2024)

Table 1 shows the respondents' profiles, which consist of four characteristics: gender, age, department/type of work, and length of service. Based on gender, male respondents accounted for 66.67%, and female respondents accounted for 33.33% of the respondents who filled out the survey in this study. The respondent group aged 30-39 years was dominated by 60.42%, aged 40-49 years by 27.08%, and followed by the age group 21-29 years by 12.50%. For respondents based on department, the majority were filled by the mines department 29.17% and the process plant 28.14%. Several other departments such as OPG (Operational and Geotech) by 3.14%, EPC (Engineering and Capital) at 4.17%, EPM (Environment and Permit Management) at 3.13%, HSOR (Health, Safety, and Operational) at 14.58%, EGS (Exploration, Geoscience and Study) by 12.50%, and from the Energy and Logistic department by 5.21%. For the length of service status, it is known that 1-7 years is 27.08%, 8-15 years is 32.29%, and 16-23 years is 40.63%.

3.1. Validity Testing

Validity testing in this study was carried out through several tests, including:

3.1.1 Convergent Validity

Table 2 Convergent Validity Test Results

Variable	Loading	AVE	Adverb
Occupational Health and Safety (X)		0.695	Valid
X1.1.1	0.797		Valid
X1.1.2	0.774		Valid
X1.2.1	0.793		Valid
X1.2.2	0.843		Valid
X1.2.3	0.820		Valid
X1.3.1	0.888		Valid
X1.3.2	0.895		Valid
X1.4.1	0.768		Valid
X1.4.2	0.911		Valid
Work Discipline (Z)		0.701	Valid
Z1.1.1	0.861		Valid
Z1.1.2	0.816		Valid
Z1.2.1	0.917		Valid
Z1.2.2	0.916		Valid
Z1.3.1	0.840		Valid
Z1.3.2	0.903		Valid
Z1.4.2	0.926		Valid
Z1.5.1	0.901		Valid
Z1.5.2	0.857		Valid
Employee performance (Y)		0.725	Valid
Y1.1	0.886		Valid
Y1.2.1	0.772		Valid
Y1.2.2	0.895		Valid
Y1.3.1	0.903		Valid
Y1.3.2	0.841		Valid
Y1.4.1	0.817		Valid
Y1.4.2	0.838		Valid

Source: Primary data (2024)

Based on Table 2, it shows that all items in each indicator have an outer loading value > 0.70 . The first analysis shows that one indicator was found to be invalid in the convergent validity evaluation because it had a loading factor value < 0.70 , namely Z1.4.1, so it had to be removed from the analysis. After removing the invalid indicators, it was found that all indicators had a leading factor value > 0.70 , and it can be concluded that the indicator has met the convergent validity test standards and is declared valid.

3.1.2 Discriminant Validity

Table 3 Results of Discriminant Validity Testing

	Occupational Health and Safety	Work Discipline	Employee performance
X1.1.1	0.797	0.828	0.787
X1.1.2	0.774	0.802	0.757
X1.2.1	0.793	0.772	0.741
X1.2.2	0.843	0.414	0.474
X1.2.3	0.820	0.469	0.473
X1.3.1	0.888	0.512	0.474
X1.3.2	0.895	0.487	0.503
X1.4.1	0.768	0.368	0.421
X1.4.2	0.911	0.533	0.512
Y1.1	0.685	0.820	0.886
Y1.2.1	0.433	0.659	0.772
Y1.2.2	0.619	0.766	0.895
Y1.3.1	0.638	0.863	0.903
Y1.3.2	0.776	0.787	0.841
Y1.4.1	0.523	0.836	0.817
Y1.4.2	0.678	0.743	0.838
Z1.1.1	0.639	0.860	0.906
Z1.1.2	0.791	0.815	0.798
Z1.2.1	0.685	0.917	0.822
Z1.2.2	0.678	0.917	0.797
Z1.3.1	0.560	0.841	0.762
Z1.3.2	0.584	0.903	0.830
Z1.4.2	0.681	0.927	0.796
Z1.5.1	0.571	0.901	0.825
Z1.5.2	0.734	0.856	0.779

Source: Primary data (2024)

Based on the discriminant validity test results using the cross-loading value in Table 3, each indicator correlates more highly and is collected in each of its constructs compared to other constructs, so all indicators are said to have good discriminant validity.

3.2 Reliability Testing

Table 4 Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Adverb
Occupational Safety and Health	0.947	0.963	Reliabel
Work Discipline	0.937	0.965	Reliabel

Employee performance	0.936	0.940	Reliabel
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Source: Primary data (2024)

Table 4 shows that all constructs have Cronbach's alpha and composite reliability values above 0.70. The results of the reliability test show that Cronbach's alpha values for all variables are between 0.936 and 0.964, all above the minimum threshold ($\alpha > 0.70$). These results are supported by the composite reliability values for all variables between 0.940 and 0.965, all above 0.7 (CR > 0.70). Thus, it can be concluded that all variables meet the reliability requirements and are declared reliable for further testing.

3.3 Hypothesis Testing

3.3.1 Direct Influence Between Constructs

Table 5 Results of Testing the Influence Between Constructs (Hypothesis Test)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T statistics (O/STDEV)	P Values
K3 -> Employee performance	0.735	0.741	0.040	18.573	0.000

Source: Prime data (2024)

Occupational Safety and Health (K3) with employee performance obtained an estimated coefficient value of 0.735 and p-values of 0.000; it can be concluded that there is a significant influence between occupational safety and health (X) and employee performance (Y). A positive coefficient indicates that the better the occupational safety and health, the higher the employee performance. This result can be interpreted as occupational safety and health directly affecting employee performance at PT Vale Indonesia Tbk in Sorowako, South Sulawesi. Thus, the first hypothesis (H1), "H1: Occupational Safety and Health have a positive and significant effect on employee performance at PT Vale Indonesia Tbk in Sorowako, South Sulawesi, " is proven and accepted.

3.3.2 Indirect Influence Between Constructs

Table 6 Indirect Influence

Variable Influence Pattern	Indirect Effects			
	Coefficient	T Count	P Values	Adverb
K3 -> Work Discipline -> Employee Performance	0.640	9.456	0.000	Significant

Source: Primary data (2024)

The indirect effects test above shows that the coefficient of indirect influence of occupational safety and health (X) on employee performance (Y) through work discipline (Z) is 0.640, with an estimated coefficient value and p-values of 0.000. It can

be concluded that there is a significant influence between occupational safety and health (X) and employee performance (Y) through work discipline (Z). Thus, work discipline is a variable that mediates the influence between occupational safety and health and employee performance. This result also supports the second hypothesis (H2), namely "H2: Work discipline as a mediator has a positive and significant effect on occupational safety and health on employee performance at PT Vale Indonesia Tbk in Sorowako, South Sulawesi", proven and accepted.

3.4 Bootstrapping Results

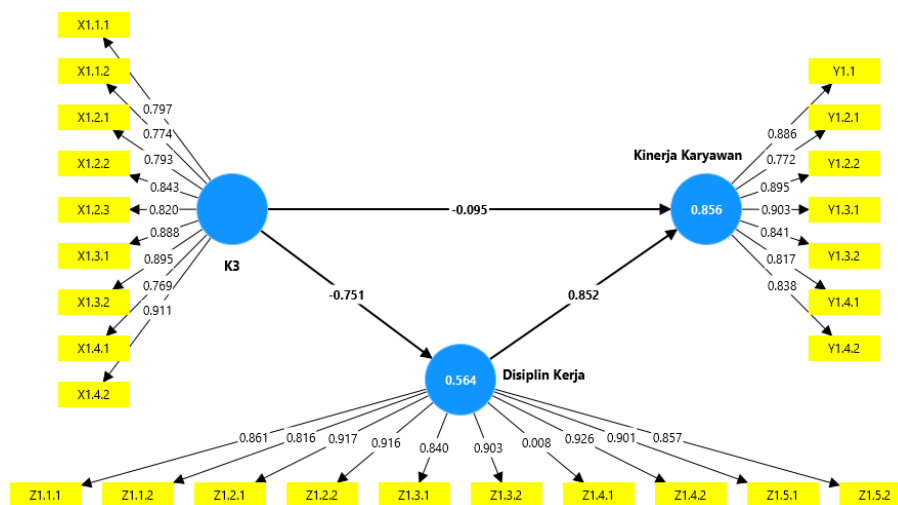


Figure 1. Bootstrapping

3.5 Discussion

3.5.1 The Influence of Occupational Safety and Health on Employee Performance

The results of the PLS test prove that occupational safety and health have a positive and significant effect on employee performance at PT Vale Indonesia Tbk (H1 is accepted). This can be seen in the path coefficient of occupational safety and health on employee performance of 0.735 ($p = 0.000$), which indicates a positive effect. Occupational safety and health of PT Vale Indonesia Tbk employees in Sorowako, South Sulawesi, can improve employee performance. The positive impact of K3 on employee performance shows that the better the occupational safety and health, the higher the employee performance.

The results of this study are the results of a descriptive assessment, which found that most PT Vale Indonesia Tbk Sorowako South Sulawesi employees have given high scores on the occupational safety and health variable instrument (after being reversed). Implementing suitable K3 and K3 procedures supports the high assessment related to this occupational safety and health instrument. Mining accidents at light, medium, and high levels at PT Vale are low, and mining accidents that cause serious injuries cause death. Many victims at PT Vale Indonesia Tbk are low.

This study proves that occupational safety and health directly affect employee performance. The results of this study support previous research (Veritia et al., 2024; Yunanto et al., 2024). Likewise, the research conducted by Lari (2024); Putri & Fu'ad (2023); Muhdi et al., (2021) companies must implement K3 activities to improve employee performance so that employees will feel cared for. K3 has an essential relationship with employee performance apart from employee productivity, which ultimately affects employee performance (Indra et al., 2020; Jayaputra & Sriathi, 2020). Law of the Republic of Indonesia No. 13 of 2013 concerning Manpower also states that occupational safety and health (K3) efforts are carried out to realize optimal performance. However, this is in contrast to research conducted by Kaharudin et al., (2022) if occupational safety and health do not affect employee performance, K3 must be implemented in the company with the help of mediating variables. Therefore, the study strengthens previous research that the better the occupational safety and health implementation, the higher the employee performance.

3.5.2 Indirect Effect of Occupational Safety and Health on Employee Performance Mediated by Work Discipline

The results of this study indicate that the coefficient of indirect influence of occupational safety and health on employee performance through work discipline is 0.640 with a p-value of 0.000. This suggests that work discipline mediates the impact of occupational safety and health on employee performance.

Reviewed from descriptive data shows that most employees have given high scores on occupational safety and health instruments, high assessments on work discipline, and very high assessments on employee performance. These results indicate that work discipline is a variable that mediates the relationship between occupational safety and health and employee performance.

The results of this study support previous research (Kaharudin et al., 2022). The better the employee's work discipline, the higher the work performance they can achieve (Amir & Ridwan, 2022), Without good employee work discipline, it is difficult for a company organization to achieve optimal results. So, discipline is the key to a company's success in achieving its goals. In contrast to research conducted by Putra et al., (2023); Putri & Fu'ad, (2023) work discipline factors do not significantly improve occupational safety and health on employee performance.

4. Conclusion

Based on the results of data analysis, it can be concluded that occupational safety and health (K3) has a significant positive effect on employee performance at PT Vale Indonesia Tbk Sorowako South Sulawesi. This shows that the higher the occupational safety and health, the better the performance. In addition, work discipline has also been shown to play an essential role as a mediating variable between occupational safety and health and employee performance, which means that work discipline has

a positive impact on improving the quality of employee performance. This finding confirms that when employees have high work discipline, occupational safety and health increase, affecting employee performance.

Based on the conclusion, several implications can be applied. First, to improve K3, routine training should be conducted, including emergency simulations and K3 procedures that are by national and international standards, compliance with K3 protocols, and inspections in the mining work area. Second, to improve employee performance, there needs to be ongoing training relevant to the mining industry's needs; technical, managerial, and soft skills must be improved, and employees must be encouraged to participate in mentoring and coaching programs. Third, although work discipline is a positive mediation, the results of the study indicate the need to develop an internal monitoring system that ensures that every step of the work is checked by colleagues or supervisors to prevent errors and educate employees about the negative impacts of work errors, both in terms of safety, product quality, and financial losses, so that they are more aware of the importance of working carefully and carefully.

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