

The Impact Of Occupational Safety Training On Employee Performance With Safety Culture As A Mediation Variable

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Abstract

This study examines the impact of Safety training on employee performance, with safety culture as a mediating variable at Pertamina Hulu Energi (PHE) Jambi Merang. The objectives of the research are to determine: (1) the direct effect of Safety training on employee performance, (2) the impact of safety culture on employee performance, and (3) the mediating effect of safety culture on the relationship between Safety training and employee performance. The research object consists of employees of PHE Jambi Merang, a company in the oil and gas sector with a high risk of workplace accidents. The population includes 70 employees, all of whom were selected as research participants using a total sampling technique. The analysis tool used in this study is Structural Equation Modeling (SEM), processed through SmartPLS software, to assess the relationship between Safety training, safety culture, and employee performance. The results are expected to provide valuable insights into improving the effectiveness of safety training programs and enhancing employee performance through strengthening the safety culture.

Keywords: Safety Training, Employee Performance, Safety Culture, Oil and Gas

INTRODUCTION

Occupational safety is one of the strategic issues in human resource management, especially in the oil and gas industry which is known to have high risks. Occupational safety is not only a moral obligation of the company to employees, but also a preventive measure to prevent losses that can occur due to work accidents. In this context, occupational safety training is an important element that not only equips employees with technical skills, but also builds awareness and proactive behavior to create a safe work environment.

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According to Heinrich (1931), workplace accidents are caused by a series of factors such as habits, individual errors, unsafe actions, and unsafe conditions. This theory, known as the Domino Theory, emphasizes the importance of intervention at each stage to prevent workplace accidents. In addition, Bird and Germain (1980s) stated that a systematic approach to root cause analysis of incidents can help organizations create a safer work environment.

However, occupational safety training alone is not enough without being supported by a strong safety culture. Reason (2000) asserts that safety culture includes five sub-cultures, namely communication, learning, reporting, fairness, and flexibility. These elements create a work environment that supports consistent safety behavior. Thus, effective occupational safety training must be integrated with efforts to build a safety culture in the company.

Literature review shows that occupational safety training has a significant influence in reducing the number of work accidents and increasing employee productivity. Hämäläinen et al. (2018) reported that every year, more than 2.78 million deaths due to work accidents and diseases occur globally, with the majority being caused by unsafe acts. However, the relationship between occupational safety training, safety culture, and employee performance is still rarely studied holistically, especially in the oil and gas sector.

Most previous studies have focused only on the direct relationship between occupational safety training and employee performance. Ramadhany & Pristya (2018) found that unsafe acts contributed 34.43% to the causes of workplace accidents. However, not many have highlighted the role of safety culture as a mediating variable in this relationship.

This study offers a new approach by exploring safety culture as a mediating variable between occupational safety training and employee performance. This integration is expected to provide a more comprehensive picture of how safety training can be optimized to improve employee performance.

This study provides practical and theoretical contributions. Practically, the results of this study can be a guideline for companies in designing more effective occupational safety training programs. Theoretically, this study enriches the literature on the relationship between safety training, safety culture, and employee performance.

Occupational safety training is the focus of this study. As a company operating in the oil and gas sector, of course the company faces a high risk of work accidents. Therefore, this study aims to examine how occupational safety training, integrated with safety culture, can contribute to improving employee performance. With this approach, this study is expected to provide real benefits for human resource management in the oil and gas industry, both in the short and long term. From the description, the hypotheses that can be formulated are:

H1: Occupational safety training has a positive and significant impact on safety culture.

H2: Occupational safety training has a positive and significant impact on employee performance.

H3: Safety culture has a positive and significant impact on employee performance.

H4: Safety culture positively and significantly mediates the effect of occupational safety training on employee performance.

METHODS

This study uses a quantitative approach with an explanatory research method. The purpose of this study is to explain the causal relationship between occupational safety training and employee performance, as well as the role of safety culture as a mediating variable. A quantitative approach is used to test the hypothesis that has been formulated statistically using data collected through a questionnaire. This data is then analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM). The population in this study were all employees in the Pertamina Hulu Energi (PHE) Jambi Merang environment.

The sampling technique used was non-probability sampling with a purposive sampling method, namely selecting respondents who were considered to have knowledge and experience related to occupational safety training, safety culture, and work performance. The study was conducted at the Pertamina Hulu Energi (PHE) Jambi Merang company, which is a subsidiary of PT Pertamina (Persero) engaged in oil and gas exploration and production. Data were collected through a closed questionnaire measured using a Likert scale. This instrument has been tested for validity and reliability through preliminary tests. Data analysis was carried out with the help of SmartPLS statistical software, which is suitable for models with mediating variables and small to medium samples. This model is also suitable for testing complex relationships between latent variables.

RESULTS AND DISCUSSION

Descriptive Analysis of Variables

Based on the data collected, the answers from the respondents have been summarized and then analyzed to determine the descriptive of each variable. The variables used in this study are: Work Safety Training (X), Safety Culture (Z), and Employee Performance (Y). Measurement of these variables is based on the following criteria:

Table 1 Descriptive Analysis of Variables

Variabel	Rentang Penilaian	Klasifikasi
Pelatihan Keselamatan Kerja (X)	70 – 125	Sangat Rendah
	126 – 181	Rendah
	182 – 237	Sedang
	238 – 293	Tinggi
	294 – 350	Sangat Tinggi
Kinerja Karyawan (Y)	70 – 125	Sangat Rendah
	126 – 181	Rendah
	182 – 237	Sedang
	238 – 293	Tinggi
	294 – 350	Sangat Tinggi
Budaya Keselamatan (Z)	70 – 125	Sangat Rendah
	126 – 181	Rendah
	182 – 237	Sedang
	238 – 293	Tinggi
	294 – 350	Sangat Tinggi

Source: Primary Data, 2025

Outer Model Evaluation

The measurement model, also known as the outer model, explains the relationship between a set of indicators and a latent variable, and shows how the indicators represent the variable being measured. (Hair et al., 2022). Convergent validity is the factor loading value on the latent variable with its indicators. The expected value is > 0.7.

Table 2 Outer Loading Score

Variable	Indicator	Perception	information
Pelatihan Keselamatan Kerja (X)	PK1	0.723	Valid
	PK2	0.798	Valid
	PK3	0.812	Valid
	PK4	0.782	Valid
	PK5	0.743	Valid

	PK6	0.732	Valid
	PK7	0.748	Valid
	PK8	0.808	Valid
	PK9	0.776	Valid
	PK10	0.744	Valid
	PK11	0.829	Valid
	PK12	0.737	Valid
Budaya Keselamatan (Z)	BK1	0.847	Valid
	BK2	0.759	Valid
	BK3	0.746	Valid
	BK4	0.855	Valid
	BK5	0.802	Valid
	BK6	0.762	Valid
	BK7	0.836	Valid
	BK8	0.849	Valid
	BK9	0.764	Valid
	BK10	0.791	Valid
	BK11	0.800	Valid
	BK12	0.829	Valid
	BK13	0.735	Valid
	BK14	0.775	Valid
	BK15	0.794	Valid
	BK16	0.782	Valid
	BK17	0.753	Valid
	BK18	0.760	Valid
Kinerja Karyawan (Y)	KK1	0.779	Valid
	KK2	0.753	Valid
	KK3	0.823	Valid
	KK4	0.863	Valid
	KK5	0.879	Valid
	KK6	0.840	Valid
	KK7	0.837	Valid
	KK8	0.870	Valid
	KK9	0.781	Valid
	KK10	0.785	Valid
	KK11	0.763	Valid
	KK12	0.832	Valid

	KK13	0.750	Valid
	KK14	0.739	Valid
	KK15	0.767	Valid

Source: Primary Data, 2025

Based on the results of data processing using PLS shown in Table 2, it is known that all indicators in this study have an outer loading value above 0.70. The loading factor value exceeding 0.70 indicates that the indicators in the variable have met the Convergent Validity criteria in adequate and good categories, so that this study can be continued to the next stage of validity testing.

Next, Discriminant validity is the cross loading value of the factor that is useful for whether the construct has adequate discriminant. The method is to compare the value of the intended construct must be greater than the value of the other construct.

Table 3 Cross Loading Score

Indicator	Pelatihan Keselamatan Kerja	Kinerja Karyawan	Budaya Keselamatan
PK1	0.723	0.456	0.272
PK2	0.798	0.595	0.211
PK3	0.812	0.457	0.209
PK4	0.782	0.445	0.237
PK5	0.743	0.455	0.263
PK6	0.732	0.377	0.236
PK7	0.748	0.344	0.234
PK8	0.808	0.332	0.142
PK9	0.776	0.323	0.204
PK10	0.744	0.323	0.279
PK11	0.829	0.555	0.196
PK12	0.737	0.502	0.323
BK1	0.215	-0.078	0.847
BK2	0.336	0.046	0.759
BK3	0.181	-0.116	0.746
BK4	0.217	-0.04	0.855
BK5	0.213	0.02	0.802
BK6	0.241	-0.046	0.762
BK7	0.253	-0.001	0.836
BK8	0.222	-0.06	0.849

BK9	0.138	-0.107	0.764
BK10	0.43	0.078	0.791
BK11	0.126	-0.057	0.8
BK12	0.185	0.01	0.829
BK13	0.078	0.029	0.735
BK14	0.171	0.06	0.775
BK15	0.235	0.016	0.794
BK16	0.219	0.031	0.782
BK17	0.267	0.069	0.753
BK18	0.184	-0.011	0.76
KK1	0.453	0.779	-0.02
KK2	0.393	0.753	0.014
KK3	0.516	0.823	0.04
KK4	0.469	0.863	0.018
KK5	0.45	0.879	-0.025
KK6	0.471	0.84	0.051
KK7	0.435	0.837	-0.042
KK8	0.523	0.87	0.011
KK9	0.4	0.781	-0.084
KK10	0.433	0.785	0.008
KK11	0.441	0.763	0.043
KK12	0.454	0.832	0.002
KK13	0.417	0.75	-0.069
KK14	0.511	0.739	0.015
KK15	0.553	0.767	0.027

Source: Primary Data, 2025

Based on the data in Table 3, the results of the discriminant validity test using the cross loading method show that each indicator of the variables of Occupational Safety Training (X), Safety Culture (Z), and Employee Performance (Y) has a higher loading factor value compared to the indicators in other variables. All cross loading values for each construct are above 0.7, which indicates that each indicator is declared valid and has met the requirements of the discriminant validity test.

Then, Composite reliability reliability is a measurement if the reliability value is > 0.7 then the construct value has a high reliability value. Average Variance Extracted (AVE) is the average variance of at least 0.5, and Cronbach alpha is a calculation to prove the results of composite reliability where the minimum value is 0.6

Table 4 Reliability Score

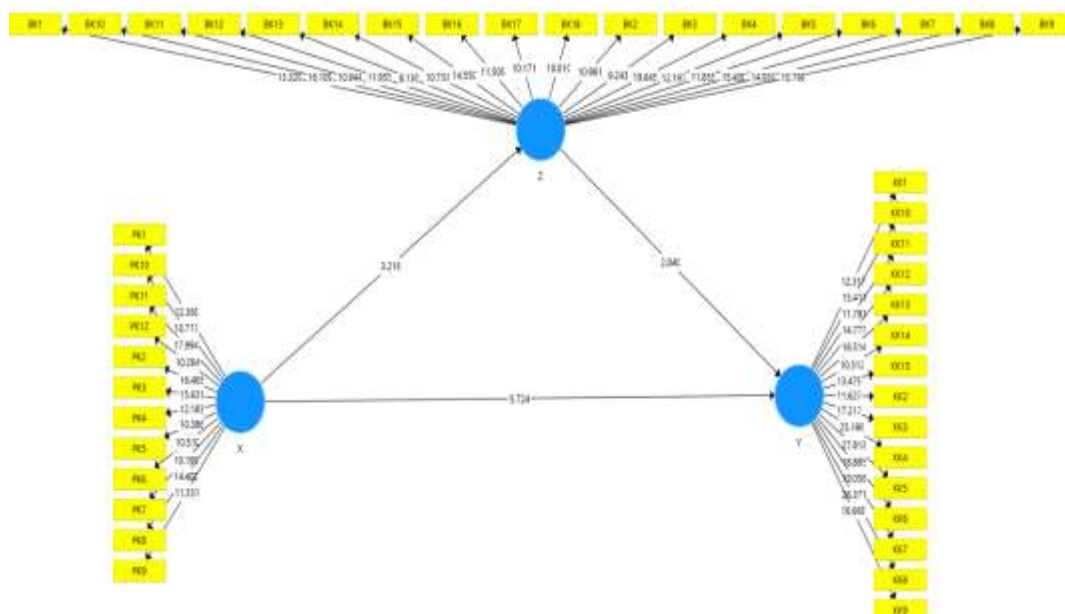
	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Pelatihan Keselamatan Kerja (X)	0.938	0.943	0.593
Kinerja Karyawan (Y)	0.961	0.962	0.649
Budaya Keselamatan (Z)	0.965	0.986	0.627

Source: Primary Data, 2025

Reliability testing is carried out using Cronbach's Alpha which must have a value above 0.60, while Composite Reliability must be more than 0.70 and Average Variance Extracted (AVE) exceeds 0.50. By fulfilling these provisions, it can be concluded that all tested variables are valid and reliable, so they are worthy to be continued to the structural model testing stage. Based on table 4, thus, according to the provisions, it can be concluded that the tested variables have met the validity and reliability criteria, so they are worthy to be used in further structural model testing.

Inner Model Evaluation

In this model analysis, the aim is to test the relationship between latent constructs.



Picture 1 Inner Model Test Results

R – Square (R²)

R² is the coefficient of determination in the endogenous construct. According to Chin (1998) explains "the criteria for the R square value limits in three classifications, namely 0.67 as Strong, 0.33 as moderate and 0.19 as weak.

Table 5 R Square (R²) Score

	<i>R Square</i>	<i>R Square Adjusted</i>
Budaya Keselamatan (Z)	0,095	0,081
Kinerja Karyawan (Y)	0,368	0,350

Source: Primary Data, 2025

The R² results in Table 5 show that the R² value of safety culture is 0.095. This value indicates that the work safety training variable has an effect on the safety culture variable by 0.9%. While the R² of employee performance is 0.368, indicating that the work safety training and safety culture variables have an effect on the employee performance variable by 36.8%.

Predictive Relevance (Q²)

Q² or known as Stone-Geisser's. This test is conducted to determine the predictive capability of how good the resulting value is. A Q-square value greater than 0 (zero) indicates that the model has a predictive relevance value, while if the Q-square value is less than 0 (zero), it indicates that the model has less predictive relevance.

Obtained by the formula:

$$Q^2 = 1 - (1 - R^2)$$

$$Q^2 = 1 - (1 - 0.0952)$$

$$Q^2 = 1 - (1 - 0.009025)$$

$$Q^2 = 1 - 0.990975$$

$$Q^2 = 0.009025$$

The results of the first Q-Square calculation, namely for the safety culture variable (Z), are 0.009025 (>0) or 0.90%. This means that the model in this study is suitable for explaining the dependent variable.

$$Q^2 = 1 - (1 - R^2)$$

$$Q^2 = 1 - (1 - 0.3682)$$

$$Q^2 = 1 - (1 - 0.135424)$$

$$Q2 = 1 - 0.864576$$

$$Q2 = 0.135424$$

The second result of the Q-Square calculation, namely for the employee performance variable (Y), is 0.135424 (>0) or 13.54%. This means that the model in this study is feasible in explaining the dependent variable.

Bootstrapping (Hypothesis Testing)

According to Abdillah and Jogiyanto (2015) the results of hypothesis testing can be seen in the inner model test, namely through the T-statistic which can show the level of significance in testing the hypothesis. With the criteria for accepting the hypothesis, namely the T-statistic value must be greater than the t-table > 1.96 for hypothesis testing at alpha 5% or it can also be seen by looking at the p-value < 0.05 which can show that the variable is significant. thus this shows that there is an influence on the latent variable on other latent variables.

Table 6 Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
X -> Y	0.638	0.645	0.111	5.724	0.000
X -> Z	0.307	0.335	0.096	3.216	0.002
Z -> Y	-0.196	-0.205	0.096	2.040	0.045

Source: Primary Data, 2025

DISCUSSION

The Impact of Occupational Safety Training on Employee Performance

The results of the hypothesis test show that Occupational Safety Training (X) has a positive and significant effect on Employee Performance (Y), with a path coefficient value of 0.638, a t-statistic value of 5.724 > 1.96, and a p-value of 0.000 < 0.05. This shows that the better the training provided by the company in terms of occupational safety, the higher the performance shown by the employees. Occupational safety training has a strategic role in preparing employees to understand the potential risks in the workplace, while providing skills to avoid or minimize the impact of these risks. This training covers various topics such as the use of personal protective equipment (PPE), understanding safe work procedures, emergency handling, and situational simulations that form alertness. Through intensive and structured training, employees not only work more safely, but also more confident and productive in completing tasks.

These results are supported by research by Maulana & Siregar (2022) which found that safety training contributes greatly to increasing productivity and operational efficiency in the oil and gas sector. This is because proper training not only reduces work accidents but also accelerates the adaptation process to changes in technology and new work procedures. A similar study by Fadhillah & Wahyuni (2021) also showed that safety training has a significant correlation with performance indicators such as work effectiveness, responsibility, and quality of task completion. Based on data analysis conducted by H. Artajaya (2020), there is an influence between the Independent Variable, namely the Job Training Variable (X1), which has a significant positive effect on the Dependent Variable, namely Employee Performance (Y) at PT. Sparta Prima. Then the results of research by Fikri Ibnu Maulana (2022) show that occupational safety and health (K3) have a partial effect on employee performance at PT Utama Telaga Baru Tanjungpinang. And in a study by Iqrok Muttaqin (2021) based on the results of the hypothesis test conducted, it was shown that the variables of training and occupational safety and health had a positive and significant effect partially and simultaneously on performance (Y) with a large influence of 61.7% of the performance variable can be explained by the two independent variables. While the remaining 38.3% is explained by other variables not examined in this study. In addition, safety training also increases employee intrinsic motivation through feelings of security and security, which in the long term has an impact on loyalty and job satisfaction. So it can be concluded that the positive effect of safety training on employee performance in this study is in line with various previous studies and shows the urgency to continue developing relevant and adaptive training systems.

The Impact of Occupational Safety Training on Safety Culture

The second hypothesis test shows that Occupational Safety Training also has a positive and significant influence on Safety Culture, with a path coefficient of 0.307, a t-statistic value of 3.216, and a p-value of 0.002. This means that occupational safety training not only functions to improve technical knowledge, but also forms a mindset, attitude, and shared values that are oriented towards safety. Training acts as a medium for internalizing a safe work culture. Through formal and informal learning processes in training, safety values such as personal responsibility, compliance with procedures, and concern for coworkers gradually become part of the organizational culture. Training is also an effective means of communication in conveying the company's safety vision.

Research by Putri & Gunawan (2020) shows that organizations that consistently hold occupational safety training will have higher levels of compliance and safety awareness among their members. This creates a strong safety culture, where safety is not only

considered an obligation, but as a collective value that is upheld together. Then the research findings by Dona Silviani et al (2022) show that OHS training has a significant partial effect on occupational safety culture. In research by Diky Nur Alamsyah et al (2024) Radiation protection training, which is one of the OHS training, is one of the effective means to improve and foster radiation safety culture in hospital facilities. Research by Akhmad Yani (2024) shows that occupational safety training has an effect on improving safety culture. Meanwhile, in research by Rahmat Ariya et al (2025) safety training did not show a significant relationship with occupational safety culture ($p = 0.112$). Thus, it can be concluded that occupational safety training in general contributes significantly to forming and strengthening a safety culture, which in turn will become an important foundation for achieving sustainable organizational performance.

The Influence of Safety Culture on Employee Performance

The test results show that safety culture has a significant influence on employee performance, although the direction of the relationship is negative (coefficient -0.196, t-statistic 2.040, p-value 0.045). These results indicate a significant correlation, but the negative direction needs to be analyzed in depth. Most likely, this negative result is caused by the perception of pressure felt by employees from the implementation of a safety culture that is too strict. In the context of the oil and gas industry such as PHE Jambi Merang, the implementation of a very rigid safety system, accompanied by strict supervision, can cause work stress, excessive fear of mistakes, or even inhibit work flexibility. This indicates that safety culture must be implemented with a balanced approach, namely prioritizing discipline but still providing space for employees to feel comfortable and empowered.

A study by Hasibuan et al. (2022) supports this by stating that excessive implementation of safety culture without a good communication strategy can reduce work enthusiasm and cause employee resistance. The results of a study by Wilis Rianawati (2020) show that work safety culture has a significant effect on employee performance. Research conducted by Reza Muafiq et al (2020) also has a significant effect on employee performance. Then in a study by Yasinta Sekar Prasasti et al (2024) showed that safety culture and work environment have a significant effect on employee performance. And in a study by I Putu Dedy Kastama Hardy et al (2020), the results of this study show that there is a significant relationship between patient safety culture and employee performance at Wangaya Hospital. Therefore, it is important for organizations to adjust the implementation of safety culture to the social and psychological context of employees, and prioritize a humanistic approach.

The Mediating Role of Safety Culture between Occupational Safety Training and Employee Performance

The mediation effect test shows that safety culture acts as a significant intervening variable in the relationship between occupational safety training and employee performance. The indirect path coefficient value of -0.060, t-statistic 2.066, and p-value 0.043, indicates a significant mediation effect even though the direction is negative.

This confirms that occupational safety training not only has a direct effect on performance, but also indirectly through the formation of a safety culture. However, as discussed, the safety culture that is formed needs to be monitored so that it does not lead to psychological stress. If this culture is implemented in an inclusive, supportive, and involving employee participation manner, the resulting mediation effect will be more positive.

This finding is supported by Halim & Widodo (2023) who stated that the effect of training on performance through safety culture will be optimal if the culture created truly reflects the values of togetherness, mutual care, and commitment to common welfare. In a study by Widyanty (2021) it also showed that safety culture has a significant effect on employee performance, one of which is when it is applied in relation to occupational safety training. Then in the research of Santoso et al (2022) showed a positive and significant influence of occupational safety training through safety culture on worker performance. In a study by Naji et al (2022) evaluating the mediating role of safety culture on employee performance in occupational safety training, the results showed a significant partial influence. And research by Peranginangin (2021) the results stated that safety culture mediates occupational safety training has a significant influence on employee performance. Organizations need to encourage a culture of safety that lives and grows from active participation, not just top-down rules.

CONCLUSION AND SUGGESTIONS

Based on the results of the study conducted at PHE Jambi Merang, it can be concluded that in general, occupational safety training, safety culture, and employee performance are at a fairly good level. This study revealed that occupational safety training has a positive and significant effect on employee performance and safety culture. These findings indicate that well-designed safety training can improve employee competence, awareness, and motivation to work safely and productively, and contribute to forming a strong safety culture in the work environment.

However, safety culture showed a significant but negative effect on employee performance. This indicates that the implementation of a safety culture that is too strict or repressive can cause psychological stress that has a negative impact on work flexibility and

productivity. Therefore, the approach to strengthening safety culture needs to be carried out in a balanced manner, by considering the psychosocial conditions of employees.

Furthermore, safety culture has been proven to be successful in mediating the effect of occupational safety training on employee performance. This shows that effective safety training can form a safety-oriented work culture, which ultimately contributes to improved performance. However, the implementation of safety culture needs to be developed through a participatory and communicative approach for optimal results. In addition, the results of the study also provide an overview of areas that need to be improved, such as more interactive training methods, employee involvement in safety program evaluations, and integration of occupational safety into the performance appraisal system. To improve the effectiveness of safety training and strengthen a safety culture that supports performance, organizations are advised to improve the quality of training materials and methods, provide soft skills training and coaching, and create a reward system that supports safe and productive work behavior. For further researchers, it is recommended to expand the scope of the study, both in terms of location and methodological approach. The use of a mixed-method approach can provide a more comprehensive understanding of employees' subjective perceptions and experiences related to safety training and culture. In addition, researchers can consider additional variables such as leadership, organizational climate, or work stress to obtain a more holistic picture of the factors that influence employee performance in the context of occupational safety.

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