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The influence of osh culture and osh climate on the performance of employees in construction projects at PT. X

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### Abstract

Efforts to prevent work accidents are needed to avoid losses that arise and to improve work safety performance in the workplace, therefore K3 is an effort to get a comfortable workplace and working atmosphere to support the achievement of the highest productivity. This study uses interviews and observations to understand the effect of OSH on employee performance with a saturated sample of 180 respondents and quantifies the survey results in the processing of modified regression analysis. The results of the study show that there is a positive relationship between K3 climate and the performance of Construction Project Employees at PT. X. That is, the better the OSH climate in the work environment, the higher the performance of construction project employees. Furthermore, researchers also found that OSH culture plays a role as a mediator in this relationship. In this context, a positive OHS Culture can have a profound effect on creating a safe, disciplined and safety-oriented work environment.

**Keywords:** Workplace accidents, Occupational safety and health (K3), Employee performance, Safety climate

### 1. Introduction

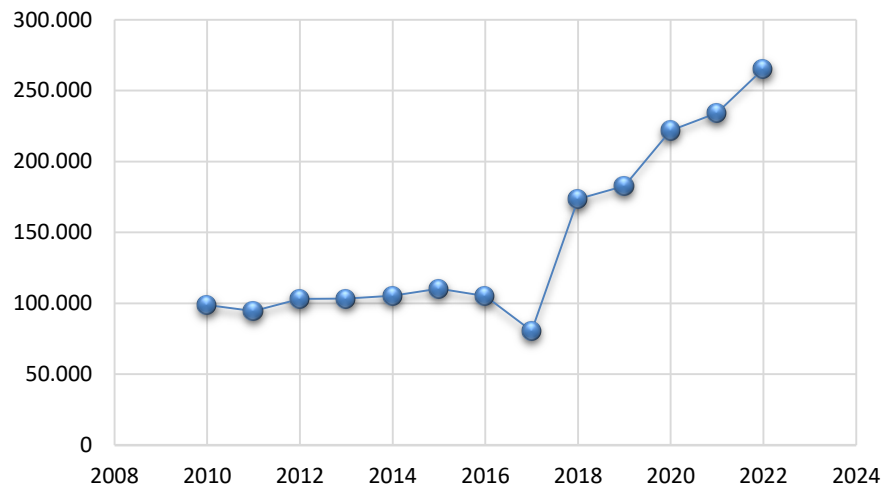
Good OSH implementation is an important factor in preventing losses and increasing social and economic benefits for workers, employers, government, society, the state and the nation as a whole. Efforts to prevent work accidents are needed to avoid losses that arise and to improve work safety performance in the workplace, therefore K3 is an effort to get a comfortable workplace and working atmosphere to support the achievement of the highest productivity.

Based on research by Salim et al. (2023), states that accidents from the construction industry sector have the largest percentage, namely 32% of total work accidents in Indonesia. Because the numbers continue to increase and the percentage is large, the topic of occupational safety and health needs to be the main concern. This is as stated in Alfiyah (2023) which states that the construction industry is a sector that has a fairly high risk of work accidents.

The construction sector in Indonesia is ranked first with the highest work accident rate. This relatively high risk of work accidents is associated with the unique characteristics of construction projects, different work locations, open and affected by the weather, limited implementation time and high physical endurance and the use of a large number of workers who are quite inexperienced and the implementation Weak occupational health and safety management systems in the construction sector ultimately place workers at high risk of experiencing work accidents.

Reporting from presentation materials related to Smart Safety by Ramli (2018) and additional data from BPJS related to National Level Work Accident Case Data contained in the number of claims at BPJS can be written as follows,

Figure 1  
*Number of Work Accidents in Indonesia (2010 – 2022 period)*



Source: BPJS Claim Data, 2022

According to audit data from the Ministry of Public Works and Public Housing, since August 2017, at least 12 construction accidents have occurred. That is, on average about two incidents a month (Mola, 2018). A total of 9 people died and 16 people suffered serious or minor injuries. This loss does not include material and immaterial losses, and does not include unrecorded accidents (Supriyadi, 2018). Maulia (2023) states that construction work accidents are caused by the implementation of "fast and furious" projects. In addition, the lack of discipline (behavior) of the workforce in complying with OSH, there is still weak commitment and supervision of OSH in the internal workplace, the implementation of OSH is not optimal, and the safety climate and OSH culture are still weak (Dhakiri, 2018). The level of negligence in human resources (HR) and non-compliance with standard operating procedures (SOP) is still high (Dirjen Bina Marga Kemen PUPR, 2018).

According to Reason (1997), the OSH program should start from the most basic stage, namely the formation of an OSH culture. Based on several studies, that OSH culture can be formed from top management commitment, OSH regulations and procedures, communication, employee competence, employee involvement, and work environment (Christina, 2012). The following is also research from Kalteh et al. (2019), entitled *The Relationship between Safety Culture and Safety Climate and Safety Performance: a systematic review* describes if in an effort to improve safety performance it is necessary to have a safety culture and safety climate which is indicated by a positive relationship between the two and the work safety performance of a company.

In a simple understanding, safety climate can be considered as a surface feature of safety culture (Flin, 2000) while safety culture is a product resulting from individuals, groups, attitudes, perceptions, and also behavior patterns that determine commitment and skills in managing safety organizations according to the International Atomic Energy Agency-IAEA (1991). The intensive results of previous research related to safety culture, safety climate and safety performance conducted by Asad et al. (2021) with the title "Synergetic Effect of Safety Culture and Safety Climate on Safety Performance in SMEs: Does Transformation Leadership Have a Moderating Role?" as an effort to analyze the role of transformational leadership in the relationship between safety culture, safety climate, and safety performance in small and medium companies,

Safety culture consists of several interrelated attributes or dimensions, including:

- 1) Psychology: This dimension involves the promotion of a non-punitive culture that focuses on identifying the root causes of mistakes and near misses, not blaming individuals.
- 2) Behavioral: This dimension involves promoting a learning culture that encourages reporting of errors and near misses, and the use of these reports to enhance patient safety.
- 3) Situational: This dimension involves promoting a reporting culture that encourages healthcare providers to report errors and near misses without fear of retribution.

Occupational safety is a very important thing in the world of work, therefore it is necessary to have some updated research related to work safety to be carried out, because it is expected to increase awareness of the importance of work safety. By conducting research, scientific evidence can be found showing how important work safety is for employees and the company. From these reasons, it can be concluded that research related to work safety is very important to increase awareness, program effectiveness, safety performance, employee productivity, and employee quality of life, especially if such research can observe direct objects in practice in companies that have a high level of safety risk. a fairly high level of work, such as a construction company.

PT. X is a construction company based in Jakarta, Indonesia, specializing in infrastructure construction projects such as dams, highways, bridges, ports, airports and other civil engineering. The company has an important role in infrastructure development in Indonesia and has been involved in several major projects in the country. With a strong commitment to safety, health and the environment (K3), PT. X upholds OHS standards in every aspect of the project, ensuring employee safety, compliance with OHS regulations, and environmental protection. With a strict quality management system and quality human resources and extensive experience in the construction industry, PT. X continues to make a significant contribution to infrastructure development in Indonesia.

Related to work safety PT. X Jakarta, Work accidents that befall construction project workers are relatively high. The high number of work accident cases that befall construction project workers shows that job protection for these unskilled workers is low. Although, some companies have implemented work safety systems for their employees, most of them still do not meet work safety standards. Furthermore, it is necessary to remind again about the importance of Occupational Safety and Health (K3).

Based on this, the purpose of this research is to, (1) identify and analyze the influence of the OSH climate on the performance of construction project employees at PT. X. (2) Identify and analyze the influence of K3 culture on the performance of construction project employees at PT. X. (3) Identify and analyze the mediating effect of OSH culture on the relationship between OSH climate and employee performance at PT. X.

## 2. Method

The proposition in this study is "The Influence of K3 Culture and K3 Climate on the Performance of Construction Project Employees of PT. X Persero". Based on the problems that have been formulated, in this study there are three variables that will be examined as follows: (1) Free Variables namely: K3 Climate (X1); (2) Mediation Variables namely: K3 Culture (Z); (3) Employee Performance Dependent Variable (Y2). Based on this, the research hypothesis is,

- 1) Hypothesis 1: K3 climate has a positive effect on the performance of construction project employees at PT. X (Persero).
- 2) Hypothesis 2: K3 culture has a positive effect on the performance of construction project employees at PT. X (Persero).
- 3) Hypothesis 3: OHS Culture can mediate the Effect of OHS Climate on the performance of construction project employees at PT. X (Persero).

The strategy used in this study is to use a quantitative approach, namely an associative research strategy used to determine the relationship between two or more variables. Where this

study aims to determine the effect of implementing K3 Climate (X) on the performance of project employees (Y) with K3 culture (Z) as mediation.

This study uses interviews and observations to understand the effect of OSH on the performance of employees. The results of the data during the interview and observation processes were then quantified as an attempt to treat the test in answering the problem formulation and the purpose of this research. The samples taken in this study used a saturated sample, a sampling technique in which all members of the population are used as samples. Based on this, the following is a description of the respondents who will be used as samples of this study,

Table 1

*Details of the study population*

Characteristics of Respondents	N	%
Age		
≤ 25 years	86	48%
26 – 35 years	55	31%
≥ 36 years	39	22%
Length of working		
≤ 18 months	92	51%
18 – 24 months	15	8%
≥ 24 months	73	41%
Last education		
Did not finish school	14	8%
SD	21	12%
JUNIOR HIGH SCHOOL	47	26%
SENIOR HIGH SCHOOL	18	10%
D3	28	16%
S1	36	20%
S2	14	8%
S3	2	1%
Position		
Field Wages (Honorary Worker)	100	56%
Project Head (Experts in the Field)	12	7%
Headquarter Permanent Employee	42	23%
Division Head at Headquarter	16	9%
Head of Department at Headquarter	8	4%
Directors	2	1%

In this study, the authors will manage data by providing an assessment of the instrument or questionnaire distributed to respondents using a Likert scale with a score of 1 to 4 on the grounds that to reduce bias, facilitate analysis, increase clarity and eliminate neutral options that will interpret undecided position.

The following are the units for forming variable assessments in this study which are based on the measurement method carried out by Ahmed Jalil Al-Bayati (2021).

Table 2  
*Research Questionnaire*

Factor Variables	Characteristics	code	Variable	
Safety Culture in the Construction business	Upper Management (UM)	UM 1	Upper management has strong safety values and is always used to guide decision making	
		UM 2	Upper management responds to all incidents in a positive way and uses them as learning opportunities.	
		UM 3	Upper management is willing to allocate time and funds when corrective safety action is required.	
		UM 4	Top level management complies with all safety requirements and procedures.	
		UM 5	Upper management regards safety as an integral part of the job, receiving the same amount of attention as any other aspect of the job.	
	Safety Coordinator (SC)	SC 1	Safety personnel regard safety as an integral part of the job, receiving the same amount of attention as any other aspect of the job	
		SC 2	Safety personnel clearly communicate safety regulations and expectations.	
		SC 3	Safety personnel are easily approachable and receive all necessary input from conditions in the field	
		SC 4	Safety personnel strive to improve overall site security	
		SC 5	Safety personnel communicate accident reports to workers to prevent similar future accidents.	
	Construction Safety Climate	Frontline Supervisors (FS)	FS 1	Supervisors encourage recording and reporting of all near misses.
			FS 2	Supervisors (supervisors) actively participate in reviewing safety procedures.
			FS 3	Supervisors (supervisors) are able to improvise and fix unsafe conditions quickly.
			FS 4	The supervisor (supervisor) is able to lead by example in terms of OSH procedures.
			FS 5	Supervisors always ensure that workers follow proper safety regulations.
Workers Involvement (WI)		WI 1	Workers feel comfortable reporting unfavorable field conditions.	
		WI 2	Workers know how/where to file incident reports.	
		WI 3	Workers follow all K3 policies and procedures	
		WI 4	Workers take actions and efforts to learn and apply the K3 concept	
		WI 5	Workers actively participate in carrying out OSH procedures.	
		WI 6	Workers believe that if they make a report regarding uncondusive field conditions, they will be handled quickly and conditions are safe for workers.	
Work Performance	Safety motivation	SM 1	I feel that it is beneficial to work to maintain or improve my personal safety	

	BC 2	I feel the need to always control the available K3
	BC 3	I believe it is important to reduce the risk of accidents and incidents in the workplace
Safety Behavior (Compliance and Participation)	SCO 1	I use all necessary safety equipment to do my job
	SCO 2	I use the correct safety procedures to carry out my work
	SCO 3	I ensure the highest level of safety when I do my job
	SP 1	I always inform and promote safety programs in the organization (company) where I work
	SP 2	I make extra efforts to improve workplace safety
	SP 3	I voluntarily perform tasks or activities that help improve workplace safety
Yield Quantity	QT 1	I am able to complete the work according to the set target
	QT 2	I work according to the procedures set by the company
Yield Quality	QL 1	My work does not get records from supervisors
	QL 2	I am disciplined at work
	QL 3	I comply with work procedures determined by the company
Punctuality	QL 4	I comply with the rules set by the company
	TM 1	I comply with the rules set by the company
	TM 2	I can work quickly and precisely
	TM 3	I am able to work effectively and efficiently

In an effort to strengthen the output of this study, an internationally validated questionnaire was also given, namely the NOSACQ-50 questionnaire which has proven to be a trusted tool for measuring work climate, valid in predicting safety motivation, perceived level of work safety, and the behavior of workers themselves. . The validity of NOCASQ-50 has been validated by various international organizations and companies through various levels of work safety climate. NOSACQ-50 is also very easy to use because it only consists of 50 questions and the questionnaire is available in Indonesian, therefore the NOCASQ-50 was chosen as the questionnaire instrument in this study.

### 3. Results and Discussion

This F test is used to test whether the overall regression model significantly affects the dependent variable. The overall F-test process involves a comparison between the variability explained by the model (R-square) and the variability that is not explained (residual sum of squares). If the calculated F value is greater than the critical F value at a certain significance level, then the null hypothesis is rejected, and it can be concluded that the overall regression model has statistical significance with a significance standard of <5%.

Table 3  
*F Test Results (Significance Test)*

Model	Sum of Squares	df	MeanSquare	F	Sig.
Regression	12058,013	3	4019,338	255,640	0.000b
residual	2767,187	176	15,723		
Total	14825,200	179			

a. Dependent Variable: K3\_TOTAL Performance

b. Predictors: (Constant), Climate\*Culture\_INTERACTION, OSH\_TOTAL Climate, OSH\_TOTAL Culture

Source: Research Processed Data

The results of the F test as an overall F-test, it can be concluded that the regression model that tests the influence of OSH culture as a moderator of the relationship between OSH climate and the performance of construction project employees at PT. X has high statistical significance. This means that the K3 climate variable and the K3 culture variable together have a significant effect on employee performance. These results provide strong evidence that OSH climate and OSH culture play an important role as a moderating factor in influencing employee performance in the company. The results of this significant F test provide valuable insights for the management of PT. X in increasing the effectiveness of the OHS program and improving the safety culture in the work environment to improve the performance of construction project employees

#### MRA Test (Modified Regression Analysis)

The results of this MRA are very important to provide richer and deeper insights for the management of PT. X in the development of policies and strategies related to occupational safety and health. By recognizing the important role of OSH culture as a moderator, companies can be more focused and effective in increasing awareness and application of OSH principles throughout the work environment. That way, it is expected to improve employee performance, minimize the risk of accidents, and create a safe and productive work environment for construction projects at PT. X.

Table 4

#### MRA test results

Model	Coefficients				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	std. Error	Betas		
1 (Constant)	-4,738	12,628		-0.375	0.708
Climate K3_TOTAL	0.470	0.097	0.880	1,562	0.046
K3_TOTAL Culture	0.626	0.169	1,072	3,704	0.000
Climate*Culture_INTE RACTION	-0.477	0.131	-0.806	-1.593	0.042

a. Dependent Variable: K3\_TOTAL Performance

Source: Research Processed Data

The value of the beta coefficient, obtained a value of 0.880 for the K3 climate variable and 1.072 for the value of the interaction between climate and K3 culture as the z variable. The value of -0.806 for variable z indicates that the moderating role of OSH culture on the relationship between OSH climate and employee performance is negative, indicating that OSH culture can strengthen the impact of OSH climate on construction project employee performance. Thus, the results of this MRA show that both the K3 climate variable and the OSH culture have a significant influence on the performance of construction project employees



at PT. X. In addition, the interaction between OSH climate and OSH culture acts as a moderator that strengthens the influence of OSH climate on employee performance. These results provide valuable insights for the management of PT.

So that the regression formulation of this study can be written as follows,  $\hat{y} = -4.738 + 0.880X_1 + 1.072X_2 - 0.806(X_1 * X_2) + 12.628$

The explanation of each component of the function of the formulation is as follows:

- $\hat{y}$  is the variable performance of construction project employees at PT. X which is the dependent variable in the study. The function of this formulation indicates that employee performance variables are influenced by other independent variables, namely  $X_1$  (K3 climate),  $X_2$  (K3 culture), and the interaction between  $X_1$  and  $X_2$ .
- $X_1$  is the climate variable K3 which is one of the independent variables. The formulation function shows that a one-unit change in the climate variable K3 ( $X_1$ ) is associated with a 0.880 change in employee performance (Y), when all other variables are held constant.
- $X_2$  is a K3 culture variable which is an independent variable. The formulation function shows that a one-unit change in the OSH culture variable ( $X_2$ ) is associated with a 1.072 change in employee performance (Y), when all other variables are held constant.
- The interaction between  $X_1$  and  $X_2$  is represented by ( $X_1 * X_2$ ). The function formulation shows that a change in the interaction between OSH climate ( $X_1$ ) and OSH culture ( $X_2$ ) is associated with a change of -0.806 in employee performance (Y), when all other variables are held constant.
- The constants (-4.738) and 12.628 are intercepts in the regression equation, which denote the value of Y when the values  $X_1$  and  $X_2$  are zero. The constant (-4.738) shows the value of employee performance in conditions when the K3 climate and K3 culture values are zero. Meanwhile, the value of 12.628 indicates additional value to employee performance that is not influenced by the OSH climate variable, OSH culture, or the interaction of both.

In this study, the function of the regression formulation is used to model the relationship between OSH climate variables, OSH cultural variables, and the performance of construction project employees at PT. X. The results of the analysis show that the K3 climate variable ( $X_1$ ) and the K3 culture variable ( $X_2$ ) have a significant influence on employee performance (Y). When the K3 climate variable ( $X_1$ ) and the K3 culture variable ( $X_2$ ) increase by one unit, the employee's performance in construction projects is expected to increase by 0.880 and 1.072, respectively.

The interaction between OSH climate and OSH culture ( $X_1 * X_2$ ) plays a role in influencing employee performance. When there is an interaction between OSH climate variables and OSH culture, the positive impact of OSH climate on employee performance is offset by the negative impact of OSH culture, so that employee performance can experience a change of -0.806. The constants in the formulation function show that when the values for OSH climate, OSH culture, and the interaction of the two are zero, employee performance has a value of -4.738. The results of this formulation function provide a deeper understanding of the factors that influence the performance of construction project employees at PT. X and provide valuable insights for company management in increasing the effectiveness of OSH programs and creating a safe and productive work environment.

## R2 Test (Determination Test)

The test of determination, which is often represented by the coefficient of determination (R-square), is a statistical measure that shows the percentage of variability of the dependent variable (in this case, employee performance) that can be explained by the independent variables in the regression model. R-square has a value between 0 and 1, and the higher the value, the better the regression model is in explaining variations in employee performance. The determination test plays a crucial role in measuring the validity and relevance of the regression

model, as well as assisting in understanding the extent to which OSH climate variables and OSH cultural variables can explain variations in the performance of construction project employees at PT. X, and the following are the results of the determination test (R<sup>2</sup>)

Table 6

*Determination Test Results*

R	R Square	Adjusted R Square	std. Error of the Estimate	Sig. FChange
0.902a	0.813	0.810	3.96518	0.000

Predictors: (Constant), Climate\*Culture\_INTERACTION, OSH\_TOTAL Climate, OSH\_TOTAL Culture

Source: Research Processed Data

The results of the determination test are used to measure the extent to which the performance variability of construction project employees at PT. X can be explained by K3 climate variables and K3 cultural variables as moderators. The results of the determination test show several important statistical values:

a) F Change Significance Value (0.000):

The significance value of F Change indicates that the regression model that examines the influence of OSH climate variables and OSH culture variables together on employee performance is statistically very significant. This very low value confirms that the overall regression model has a strong ability to explain variations in employee performance based on OSH climate and OSH culture.

b) R value (0.902):

The R value, also known as the correlation coefficient, shows how strong the linear relationship is between the independent variable (K3 climate and OSH culture) and the dependent variable (employee performance). The R value of 0.902 indicates a very strong relationship between these variables.

c) R Square Value (0.902):

The R Square value, also known as the coefficient of determination, measures the proportion of variability in employee performance that can be explained by the OSH climate variables and OSH culture variables in the regression model. In this study, the R Square value of 0.902 indicates that around 90.2% of employee performance variations can be explained by the K3 climate variable and the K3 culture variable.

d) Adjusted R Square Value (0.902):

Adjusted R Square value is an adjustment of the R Square value to take into account the number of independent variables in the regression model. The Adjusted R Square value of 0.902 indicates that the variability of employee performance which can be explained by the OSH climate variables and OSH cultural variables does not change much when considering the number of independent variables in the regression model.

The results of the K3 culture frequency analysis at PT. X 52% of respondents answered Strongly Agree that an OHS Culture in the company has been formed and has become a positive contribution to work with a sense of comfort, security and protection, followed by a selection statement Agree as many as 37% of respondents, and the remaining consisting of a total of 11% answered Disagree. Based on these results, it is expected that PT. X can improve work culture with OSH, so that in OSH performance it is hoped that in the following year all respondents will answer Agree and Strongly Agree that the OSH Culture applied will provide a sense of comfort, safety and protection.

## Discussion

### Effect of K3 Climate on Employee Performance PT. X (Persero)

Based positively influences on the results of statistical testing using modified regression analysis, it can be seen if the OSH climate has a positive influence on employee performance. This shows that hypothesis 1 can be accepted and states that in this study it is proven that the K3 climate, especially the implementation of K3 construction, has occurred at PT. X. Realizing that in the project environment it is very important to help reduce the number of work accidents in the project area more optimally. Companies engaged in the construction sector must implement the best possible K3 Management System to monitor the health and safety of employees in the work environment (Sianipar, 2021). Guidelines for Occupational Safety and Health (K3) need to be included in construction work contracts with a Zero Accident target. K3 construction also acts as a guideline for providing input related to planning, coordination processes, work environment arrangements, to how the project implementation process is (Gemely, 2018). The results of this study are in accordance with the results of research conducted by Susanti & Sugianto (2019) showing that the OSH climate has a significant effect on worker performance, then Amrita et al. (2022) which states that if there is a positive influence between the K3 climate that occurs in the project on employee performance. then Amrita et al. (2022) which states that if there is a positive influence between the K3 climate that occurs in the project on employee performance. then Amrita et al. (2022) which states that if there is a positive influence between the K3 climate that occurs in the project on employee performance.

### The Influence of Occupational Safety and Health Culture on Construction Project Employee Performance

K3 culture is proven from the results of the MRA statistical analysis, has a positive influence on employee performance, so it can be stated that if hypothesis 2. K3 culture has a positive effect on employee performance, it can be accepted that K3 culture has a positive impact on employee performance. It is very important to implement Occupational Safety and Health Management (K3) in all construction work to reduce the high risk of work accidents in the construction service industry. Research on safety risk factors in building construction projects in Indonesia over the past 10 years shows that Occupational Safety and Health (K3) guidelines should be integrated into construction work contracts with the aim of achieving Zero Accidents. The results of this study are in accordance with the research of Christina et al. (2022), Fajri (2017), which states that the K3 culture at PT. X also has a positive effect on the performance of construction project employees. Based on this, hypothesis 2 is accepted

### K3 Culture Mediates the Relationship between K3 Climate and Employee Performance in Construction Projects

The results of the Modified Regression Analysis show that the OHS Culture can in fact accelerate and encourage the influence of the OHS Climate creation in the work process, which certainly affects the Performance of Employees in PT. X, so the hypothesis in this study can be accepted. The results of the study show that there is a positive relationship between K3 climate and the performance of Construction Project Employees at PT. X. That is, the better the K3 climate in the work environment, the higher the performance of construction project employees.

Furthermore, researchers also found that K3 culture acts as a mediator in this relationship. In this context, a positive OHS Culture can profoundly affect creating a safe, disciplined and safety-oriented work environment. Employees will be more inclined to comply with safety procedures, adopt safe behavior, and work efficiently when the corporate culture supports good OSH implementation. This is in accordance with research conducted by Setiono (2018), Marom & Sinuharyo (2018), Pramudya (2018) which implicitly shows in several sections that there is a need for management awareness in fostering an OHS culture so that employee job satisfaction

occurs, which concluded with job satisfaction can mediate the relationship between K3 and employee performance.

### 3. Conclusion

The conclusions of this study are as follows: (1) Research conducted at PT. X indicates a positive relationship between K3 Climate (Occupational Health and Safety) and Construction Project Employee Performance. This confirms that the better the implementation of Occupational Safety and Health in the work environment, the higher the performance of construction project employees. (2) The results of the study show that there is a positive relationship between K3 Culture and Construction Project Employee Performance. That is, when PT. X implements a corporate culture that supports Occupational Safety and Health aspects well, employees tend to show better performance in the work environment of construction projects.

This research also proves that OSH Culture acts as a mediator (intermediary) in the relationship between OSH Climate and Employee Performance. A positive OSH culture is an important factor that strengthens the positive influence of OSH climate on employee performance. With a strong corporate culture in support of work safety and discipline, employees are more likely to adopt safe behavior and contribute to the overall construction project performance.

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