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ANALYZING THE IMPACT OF EMPLOYEE COMPETENCE, ORGANIZATIONAL CLIMATE, AND PHYSICAL WORK ENVIRONMENT ON WORKER PRODUCTIVITY IN PALM OIL MANUFACTURING

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ABSTRACT

This study examines the influence of employee competence, organisational climate, and work environment on work performance at PT Perkebunan Nusantara IV Pasir Mandoge Palm Oil Factory. A quantitative method with an associative design was employed, involving 120 employees selected from a population of 172 using the Slovin formula with a 5% margin of error. Data were collected through five-point Likert scale questionnaires and analysed using multiple linear regression with standard classical assumption tests in IBM SPSS Statistics. The results indicate that employee competence, organisational climate, and work environment each have positive and significant partial effects on work performance, with t-values of 2.276, 3.213, and 3.787, respectively, all exceeding the critical value of 1.980. Simultaneously, these three variables significantly affect work performance, as shown by an F-statistic of 9.934, greater than the critical value of 2.68. The coefficient of determination (R-square) of 0.204 shows that 20.4% of the variation in work performance is explained by these variables, while 79.6% is attributed to other factors. The findings highlight that the work environment has the strongest association with work performance, underscoring the importance of supportive organisational conditions to enhance employee productivity and engagement.

Introduction

As technology continues to evolve, human resources play a crucial role in organizations. This means implementing the organisation's goals, objectives, vision, and mission. Humans always play an organisational role in every organisational activity because humans are the plane, and the realisation of any organisational activity cannot be achieved without the active role of employees, even if the company's tools are very sophisticated. Therefore, the success of a company depends not only on its technology but also on its human resources, so the company needs potential human resources (Irawati, 2020)(Yulianto & Madiistriyatno, 2023)(Rosya et al., 2024).

In the era of globalisation, competition between companies will intensify, and one key to success is the need for high-quality Human Resources (HR). Therefore, companies

will be required to be more selective in selecting Human Resources capable of demonstrating exemplary Performance. The capacity to utilise knowledge is contingent upon particular motivations. Individuals will take action if they are incentivised. Consequently, a vital management responsibility in augmenting knowledge-based value creation is to cultivate suitable motivation, enabling people to develop, share, and apply information in alignment with organisational objectives (Ma'ruvah et al., 2024)(Agustian et al., 2023)(Sadikin et al., 2023).

Competency models demonstrate knowledge, skills, and abilities to help identify talent gaps. The key to achieving competitive advantage is an organisation's employees' ability to leverage its cutting-edge technology and superior fixed capital resources to enter the market. Determining whether the workforce has the capabilities needed for success is very difficult. Therefore, many organisations have developed competency models to identify the knowledge, skills, and attributes necessary for successful job performance, aligned with their strategy and integrated with their Human Resources strategy. In the organizational environment, each company has its own way of identifying factors that support its success and progress. The organisational environment encompasses various factors: (1) employee relations; (2) ambient noise levels; (3) work restrictions; (4) illumination; (5) air circulation. security (Campion et al., 2020)(Horváthová et al., 2019)(Gangani et al., 2006).

The work environment encompasses the social and physical aspects of a corporation that affect employees in performing their responsibilities. Humans will perpetually endeavour to acclimatise to diverse environmental situations. Each individual will experience diverse situations in the workplace. An effective work environment fosters security and empowers people to achieve peak performance. When employees appreciate their work environment, they will feel comfortable in their job, execute their responsibilities, and utilise their time efficiently. An insufficient work environment might diminish employee performance (Muslih & Damanik, 2022)(Boose et al., 2017)(Irianingtyas et al., 2022).

Communication between employees is crucial, not just a comfortable environment. It is a crucial factor for success at work. It is not just for personal success, but also for the company or organization. Good communication leads to more precise, more consistent, and more focused team performance. Therefore, communication needs to be thoroughly studied for the success of individuals, teams, and the company (Sutaguna et al., 2023)(Okunade, 2025)(Jerab, 2024).

Certain specialists characterise the work environment in the following manner: As stated by (Tangkudung et al., 2017), the work environment encompasses all factors around an employee that can affect their performance of assigned duties, such as the availability of air conditioning and sufficient lighting. As stated by (Zhenjing et al., 2022), the work environment encompasses the factors and circumstances within a corporation that constitute the workplace for employees. The work environment encompasses all factors surrounding employees that can affect their job happiness and, consequently, their performance outcomes. Job assessment or appraisal is essential. Performance evaluation, or work achievement, refers to the method by which businesses evaluate employee performance.

This activity can improve personnel decisions and provide employees with feedback on their work performance. Organisational leaders who recognise specific achievements

will benefit significantly from their employees' Performance. Employee performance is the result of an employee's work over a specific period, measured against predetermined or mutually agreed standards, targets, or criteria. Of course, in this case, the assessment still takes into account various factors that influence work performance. The performance of employees is essential for the attainment of organisational objectives. Work performance refers to an individual's efficacy in executing assigned duties, contingent upon skills, experience, diligence, and time management (Safitri & Krisnandi, 2025)(Suprapto & Maharani, 2021)(Siraj & Hágen, 2023).

Low employee performance can be seen in various ways, including employees' inability to perform assigned tasks. Therefore, leaders need to seek out potential employees who will later deliver strong Performance. According to (Angriani & Eliyana, 2020), to achieve optimal employee work performance, organisations must create conditions that foster employee discipline in their work and enable employees to develop and improve their abilities and skills.

Based on pre-research conducted are always treated well to create good Performance and achieve company goals. Of course, many factors influence employee performance. The Climate provided is a form of company loyalty to employees that improves employee performance. However, some employees lack understanding of changing situations, which makes them less comfortable with the company's current Climate. Then the work environment is less conducive due to high temperatures, so employees tend to dislike it, resulting in suboptimal work and inefficient time use. There are still employees who lack sufficient competence, as evidenced by their ability to perform tasks and fulfil responsibilities.

Based on the background of the problem above, the author is interested in researching "Analysing the Impact of Employee Competence, Organisational Climate, and Physical Work Environment on Worker Productivity in Palm Oil Manufacturing"

Method

This study uses a quantitative method with an associative design to analyse the influence of competence, organisational Climate, and work environment on employee performance. This approach was chosen because the study aims to test the relationship and the magnitude of the independent variables' influence on the dependent variable through inferential statistical analysis.

Population and sample

The study population comprised all 172 employees of PT Perkebunan Nusantara IV Pasir Mandoge Palm Oil Factory. The sample size was calculated using the Slovin formula with a 5% margin of error, resulting in 120 respondents chosen using chance sampling.

Validity and Reliability Test

The feasibility of the questionnaire items was tested using the item-total correlation (Corrected Item-Total Correlation) by comparing the values at a significance level of 5%. The degree of freedom was set to df = n − k = 120 − 4 = 116. All items in the employee competency variables (X1.1–X1.10), organisational Climate (X2.1–X2.10), work environment (X3.1–X3.8), and work performance (Y1–Y12) had values greater than 0.181,

indicating they were valid and suitable for use as research instruments.$r_{hitung} r_{tabel} r_{tabel} = 0{,}181 r_{hitung}$

The reliability of the instrument was measured using the Cronbach's Alpha coefficient for each variable. The Cronbach's Alpha values were 0.708 for employee competence (X1), 0.810 for organisational Climate (X2), 0.775 for work environment (X3), and 0.674 for work performance (Y). With the reference limit, all variables were deemed reliable; X1 and X3 had good reliability, X2 was perfect, and Y was in the sufficient reliability category, so the entire questionnaire was considered consistent and could be used in further analysis.$\alpha \geq 0{,}6$

Variables and operationalisation

This study involves three independent variables and one dependent variable. The independent variables include: (1) employee competence (X1), (2) organisational climate (X2), and (3) work environment (X3), while the dependent variable is employee work performance (Y).

The variables are operationalised as measurable indicators using a five-point Likert scale. Employee competence is measured through motives, traits, and self-concept; organisational Climate is measured through structure, responsibility, appreciation, warmth, and organisational identity and loyalty; the work environment is measured through lighting, air quality, and cleanliness; and work performance is measured through work quality, punctuality, initiative, ability, and communication.

Data types and sources

The data used are quantitative, in the form of questionnaire scores given to respondents. The data sources consist of primary data collected directly from employees through questionnaire distribution, as well as secondary data in the form of company documents, such as a brief history and organisational structure.

Data collection technique

The primary data collection technique was a closed-ended questionnaire with a Likert scale of 1–5, ranging from "strongly disagree" to "strongly agree." The questionnaires were distributed directly to the sample of respondents and collected after completion by the employees.

Data analysis techniques

The data analysis was performed in multiple phases. Initially, descriptive statistics were performed to characterise the respondents and delineate the distributions of responses for each variable. Subsequently, instrument testing was performed, encompassing validity and reliability assessments. An item was deemed valid if its item-total correlation exceeded the specified r value, and reliable if Cronbach's Alpha satisfied the predetermined reliability standards. Before hypothesis testing, classical assumption tests were performed, encompassing assessments for normality, multicollinearity, and heteroscedasticity. Normality assessments were performed utilising a histogram, a normal probability plot, and the Kolmogorov–Smirnov test. Multicollinearity was assessed by tolerance and Variance Inflation Factor (VIF) metrics. Heteroscedasticity assessments were performed

via the Glejser test at a 5% significance threshold. Hypothesis testing was performed using multiple linear regression in IBM SPSS Statistics. The employed regression model was

$$,Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where
Y: is work performance,
X1: employee competency,
X2: Organisational Climate,
X3:work environment.

The partial influence of each independent variable was assessed using the t-test, while the simultaneous influence was evaluated with the F-test at a significance level of 5%. The coefficient of determination was employed to measure the model's capacity to elucidate variations in work performance.R squared

Results and Discussion

1. Respondent Characteristics

The respondents in this study were 120 employees. The authors described the respondents based on gender, age, and length of service.

Table 1. Respondent Characteristics Based on Gender, Age and Length of Service

Characteristics	Frequency	Percent
Gender		
Man	114	95.0
Woman	6	5.0
Age		
25-30 Years	2	1.7
31-40 Years	14	11.7
41-50 Years	70	58.3
> 51 Years	34	28.3
Years of service		
5-15 Years	22	18.3
16-25 Years	54	45.0
26-35 Years	44	36.7
Total	120	100.0

The examination of gender-based factors revealed that 114 respondents were male (95%) and 6 were female (5%). The data indicate that the majority of employees are male.

According to Table 1, the analysis of respondent characteristics by age revealed that there were 2 individuals (1.7%) aged 25-30 years, 14 individuals (11.7%) aged 31-40 years, 70 individuals (58.3%) aged 41-50 years, and 34 individuals (28.3%) aged over 51 years. The results indicate that the predominant age group of employees is between 41 and 50 years old.

The study's findings regarding respondent characteristics based on tenure indicated that 22 employees (18.3%) had 5-15 years of service, 54 (45%) had 16-25 years, and 44 (36.7%) had 26-35 years. The results indicate that most employees have tenures ranging from 16 to 25 years.

2. Multicollinearity Test

As stated by Ghozali (2018, p. 107), the multicollinearity test is designed to ascertain whether there exists a link among independent variables within the regression model. Multicollinearity can be identified by analysing tolerance and Variance Inflation Factor (VIF) values. The fundamental factors for decision-making with multicollinearity testing are as follows:

1. A tolerance value around 1 and a VIF value below 10 indicate the absence of multicollinearity issues.
2. Multicollinearity arises when the tolerance value deviates significantly from 1 and the VIF exceeds 10.

The outcomes of the multicollinearity assessment, indicating that the test model did not identify instances of multicollinearity, are presented in Table 2 below:

Table 2. Multicollinearity Test Results

Coefficientsa

Model		t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	2,723	0.007		
	Employee Competence	2,276	0.025	0.980	1,020
	Organizational Climate	3,213	0.002	0.985	1,015
	Work environment	3,787	0,000	0.993	1,007

a. Dependent Variable: Work Performance

Source: Processed Results of SPSS Version 24

The table above shows that tolerance is close to 1 and that the VIF is <10. Therefore, there is no correlation or relationship between the independent variables. Therefore, the independent variables (Employee Competence, Organisational Climate, and Work Environment) can be used to predict Job Performance.

3. Multiple Linear Regression Analysis

Multiple linear regression analysis is used to assess the strength and direction of the relationship between two or more independent variables. Multiple linear regression model testing is necessary for hypothesis testing based on parameter estimates and for forecasting.

Table 3. Multiple Linear Regression Results

Coefficientsa

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta
1	(Constant)	15,438	5,670	
	Employee Competence	0.188	0.083	0.190
	Organizational Climate	0.311	0.097	0.268
	Work environment	0.347	0.092	0.315

a. Dependent Variable: Work Performance

Source: Processed Results of SPSS Version 24

Based on the results of processing the questionnaire data above, it can be seen that the structural equations from the regression results above are as follows:

$$Y = 15.438 + 0.188X1 + 0.311X2 + 0.347X3 + e$$

The following is an interpretation of the results of the Equation above:

1. Constant Value (α) = 15.438
   The Work Performance variable, if not influenced by any variables, will remain at 15.438.

2. Regression Coefficient (β1) = 0.188
   The regression coefficient for Employee Competence (X1) is 0.188, indicating that a 1-unit increase in the Organisational Climate variable will increase Performance by 0.188 units, assuming other variables are constant.

3. Regression Coefficient (β2) = 0.311
   The regression coefficient value of the Work Environment (X2) has a positive sign of 0.311, meaning that an increase of 1 unit in the Work Environment variable (X2) will increase Performance by 0.311 units, assuming that other variables are constant.

4. Regression Coefficient (β3) = 0.347
   The regression coefficient for Work Environment (X3) is 0.347, indicating that a 1-unit increase in Work Environment (X3) will increase Performance by 0.347 units, assuming the other variables are constant.

From these results, the Work Environment variable shows the strongest relationship with Work Performance.

4. Partial Significance Test (t-Test)

Partial significance test with a submission level of α = 5% degrees of freedom. Decision-making criteria are as follows:

1. If tcount < ttable and Sig. > 0.05, the variables Employee Competence, Organisational Climate, and Work Environment do not have a partial influence on Work Performance.
2. If tcount > ttable and Sig. < 0.05, there is a partial influence of the variables Employee te and Work Environment on Work Per

Organisationalesting w, whether the hypothesis partially influences this study is accepted or not, a hypothesis test or "t" test is required. The test results indicate that the t table value obtained is t (df = n - (k-1)) = 120 - 3 = 117; the t table value at alpha (0.05) is 1.980.

Table 4. Results of Partial Hypothesis Test (t-Test)

Coefficientsa

Model		t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	2,723	0.007		
	Employee Competence	2,276	0.025	0.980	1,020
	Organizational Climate	3,213	0.002	0.985	1,015
	Work environment	3,787	0,000	0.993	1,007

a. Dependent Variable: Work Performance

Source: Processed Results of SPSS Version 24

According to Table 4 above, the following interpretations can be made:

1. t-value. The computed value for Employee Competence is (2.276) > ttable (1.980) or Sigsig-t (0.025) < alpha (0.05). The results indicate that Employee Competence positively and significantly affects Work Performance, thereby validating the alternative hypothesis.
2. t-value. The computed value for Organisational Climate is (3.213), exceeding the t-table value of (1.980) and the significance level (sig-t) of (0.002), which is less than alpha (0.05). The data indicate that Organisational Climate positively and significantly affects Work Performance, thereby validating the alternative hypothesis.
3. T-value. The computed value for the Work Environment is (3.787), which exceeds ttable (1.980) and has a significance level (sig-t) of (0.000), hence falling below alpha (0.05). The data indicate that Work Motivation positively and significantly affects Work Performance, thereby validating the alternative hypothesis.

5. Test the Coefficient of Determination (R2)

Test the coefficient of determination by observing the R-Square Value. The R-Square Value indicates how much of the variation in the dependent variable (Work Performance) is explained by the independent variables (Employee Competence, Organisational Climate, and Work Environment).

Table 5. Results of the Determination Coefficient Test

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	,452a	0.204	0.184	4,356

a. Predictors: (Constant), Employee Competence, Organisational Climate, Work Environment
b. Dependent Variable: Work Performance

Source: Processed Results of SPSS Version 24

Table 5 above shows an R-Square value of 0.204. This means that variations in Employee Competence, Organisational Climate, and Work Environment account for 20.4% of the variation in Job Performance. Therefore, it can be concluded that the contribution of

Employee Competence, Organisational Climate, and Work Environment to influencing Job Performance is 20.4%. In comparison, 79.6% is contributed by other variables not included in this study, such as Compensation, Salary, and others.

Discussion

The regression analysis yielded an Employee Competence coefficient of 0.188, with a partial t-test statistic of 2.276, beyond the critical threshold of 1.980, and a significance level of 0.025, which is less than the alpha of 0.05. Employee Competence exerts a favourable and significant impact on Work Performance. The results correspond with the predominantly favourable feedback from employees: proficient employees yield high-quality work and facilitate the alignment of work behaviour with corporate values.

The regression analysis yielded an Organisational Climate coefficient of 0.311, with a partial t-test value of 3.213, exceeding the t-table value of 1.980, and a significance level of 0.002, which is less than the alpha of 0.05. The organisational climate exerts a favourable and significant impact on work performance. The results correspond with the predominantly favourable feedback from employees: An effective organisational climate fosters a conducive work environment, hence enhancing employee performance as they experience comfort and satisfaction. A favourable organisational climate facilitates effective operations.

The regression analysis indicates a coefficient for the Work Environment of 0.347, with a t-statistic of 3.787, beyond the critical value of 1.980, and a significance level of 0.000, which is less than the alpha threshold of 0.05. The Work Environment exerts a favourable and substantial impact on Work Performance. These results correspond with the job Environment experienced by employees, since it can cultivate job excitement, thereby enhancing productivity. Simultaneously, collaborating with motivated individuals yields the advantage of executing tasks effectively.

This study employs simultaneous hypothesis testing to investigate the impact of Employee Competence, Organisational Climate, and Work Environment on Work Performance. The findings demonstrate that the F statistic (9.934) exceeds the F table value (2.68), and the significance level (0.000) is less than alpha (0.05). The impact of Employee Competence, Organisational Climate, and Work Environment on Work Performance is represented by an R-Square value of 0.204 (20.4%). The company must persist in implementing these three factors to enhance work performance, as organisations with Employee Competence, a positive Organisational Climate, and an optimal Work Environment can cultivate employee satisfaction, leading to superior work outcomes and heightened enthusiasm.

Conclusion

This study examines the influence of employee competence, organisational climate, and work environment on work performance at PT Perkebunan Nusantara IV Pasir Mandoge Palm Oil Factory. The results indicate that employee competence, organisational climate, and work environment each have positive and significant partial effects on work performance, with t-values of 2.276, 3.213, and 3.787, respectively, all exceeding the critical value of 1.980. Simultaneously, these three variables significantly affect work performance, as shown by an F-statistic of 9.934, greater than the critical value of 2.68. The coefficient of determination (R-square) of 0.204 shows that 20.4% of the variation in work performance is explained by these variables, while 79.6% is attributed to other factors outside the model. The findings confirm that the work environment has the strongest association with work performance, underscoring the importance of strengthening physical and social working conditions, together with continuous competence development and a supportive organisational climate, to enhance employee productivity.

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