

The Influence of Organizational Culture, Training, and Human Resource Development on Performance Evaluation and Energy Saving Behavior in the Engineering Department at Plaza Blok M

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ABSTRACT

This study aims to analyze the influence of Organizational Culture (X1) and Training and Human Resource Development (X2) on technicians' Energy-Saving Behavior (Y), with Performance Evaluation (Z) acting as a mediating variable. The research adopts a quantitative approach using a Likert-scale questionnaire administered to 51 respondents from the Engineering Department at Plaza Blok M. The results indicate that Training and Human Resource Development (X2) has a positive and significant effect on Energy-Saving Behavior (Y) with statistical values ($\beta = 0.495$; $t = 2.814$; $p < 0.05$). Meanwhile, Organizational Culture (X1) does not have a direct significant effect on Energy-Saving Behavior (Y) ($\beta = 0.109$; $p > 0.05$). Furthermore, Performance Evaluation (Z) significantly influences Energy-Saving Behavior (Y) ($\beta = 0.332$; $p < 0.05$). The coefficient of determination (R^2) shows that the independent variables explain 58.8% of the variance in Performance Evaluation (Z) and 68.2% of the variance in Energy-Saving Behavior (Y). The mediation test results reveal that Performance Evaluation (Z) does not mediate the relationship between Training and Human Resource Development (X2) and Energy-Saving Behavior (Y), as indicated by the insignificant mediation effect ($p > 0.05$). This study contributes to the development of knowledge by proposing an integrative model that links human resource management systems with employees' energy-saving behavior in commercial building operations.

Keywords:

Organizational Culture; HR Training and Development; Performance Evaluation; Energy-Saving Behavior; Management.

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INTRODUCTION

Climate change and sustainability challenges have increasingly driven the transformation of the property and commercial building sectors toward environmentally responsible and sustainable operational practices. According to data from the International Energy Agency (IEA, 2022), buildings account for approximately 30% of global energy consumption and contribute about 26% of total carbon emissions. In Indonesia, the situation is similarly significant, where commercial buildings consume up to 87% of electricity within the non-industrial sector (ESDM, 2020). These figures highlight the importance of implementing energy efficiency strategies as part of broader efforts to achieve decarbonization and the national Net Zero Emission target by 2060.

Within the Environmental, Social, and Governance (ESG) framework, the environmental dimension emphasizes energy efficiency and the reduction of carbon emissions, while the social dimension focuses on strengthening human resource competencies and employee engagement. Meanwhile, the governance dimension

highlights the importance of transparent leadership, accountable management systems, and effective monitoring mechanisms. In this context, organizational practices related to human resource management play a crucial role in supporting sustainable operational performance.

From a theoretical perspective, organizational culture plays a fundamental role in shaping employee values, attitudes, and behavioral norms within an organization. According to Schein's organizational culture theory, shared values and norms influence employees' work behavior and guide their actions in achieving organizational objectives. Empirical evidence supports this perspective. Research conducted by Hapsari, Madiistriyatno, and Eddy (2024) found that organizational culture and work discipline significantly influence employee performance, as indicated by t-test values of 3.556 and 5.779, which exceed the t-table value of 1.681. These findings suggest that a strong organizational culture can contribute to improved work behavior and performance outcomes.

In addition, Human Capital Theory explains that investments in training and human resource development can enhance employees' competencies, productivity, and overall organizational performance. Training programs provide employees with the knowledge and technical skills necessary to perform their duties more effectively. Supporting this perspective, research by Nurhana AN, Madiistriyatno, and Nurrochim (2024) revealed that training (coefficient 0.065) and competence (coefficient 0.033) have positive effects on employee performance. This evidence demonstrates that systematic investment in employee development contributes to improved organizational productivity.

In the specific context of energy-saving behavior among building technicians, behavioral theories also provide relevant explanatory frameworks. The Theory of Planned Behavior, proposed by Ajzen, explains that individual behavior is influenced by three main factors: attitudes toward behavior, subjective norms, and perceived behavioral control. In organizational settings, these behavioral determinants can be strengthened through training programs, energy awareness campaigns, and organizational support systems. When technicians possess adequate knowledge and positive attitudes toward energy efficiency, they are more likely to demonstrate environmentally responsible behaviors in their daily operational activities.

Several empirical studies have further confirmed the relationship between training, environmental awareness, and pro-environmental behavior. Santoso and Riyadi (2022) found that both the intensity and quality of training programs are positively associated with employees' pro-environmental behavior. Similarly, research conducted by Pratiwi (2021) and Azmi Al Bahij et al. (2020) demonstrated that energy awareness significantly influences conservation behavior, with a coefficient of determination (R^2) value of 0.605. These findings indicate that knowledge and awareness related to energy conservation play a critical role in shaping employees' environmentally responsible behavior.

Furthermore, performance management theory emphasizes that performance evaluation systems function as strategic tools to align individual behavior with organizational objectives. Through systematic performance assessment, organizations can ensure that employee performance is directed toward achieving operational efficiency and strategic goals. Empirical evidence from research conducted by Sigit P., Sukiman, Irawan R., and Madiistriyatno (2024) shows that

performance measurement has a significant influence on work quality, with a significance value of 0.016 and a coefficient of 0.213. This suggests that well-structured performance evaluation systems can encourage employees to demonstrate higher levels of responsibility and effectiveness in their work activities.

Based on the theoretical and empirical perspectives discussed above, there is a strong indication that organizational culture and training and human resource development play important roles in influencing technicians' performance evaluation and their energy-saving behavior in commercial building operations. In this regard, the Engineering Department at Plaza Blok M represents an important operational unit responsible for maintaining building systems and ensuring energy efficiency in daily building management activities.

The novelty of this study lies in the integration of organizational culture, training and human resource development, and performance evaluation variables within the context of commercial building operations, particularly in relation to energy-saving behavior. By examining these relationships, this research contributes to the development of an integrative human resource management model that supports sustainable building operations and the achievement of corporate ESG targets.

METHOD

This study was conducted in the Engineering Department of a commercial shopping center located in South Jakarta during the period of August to November 2025. The research employed a quantitative approach with an explanatory research design and a cross-sectional survey method. This design was selected to examine the causal relationships between organizational culture and human resource training and development on technicians' performance evaluation and energy-saving behavior.

The research population consisted of 75 technicians working in the Engineering Department. The sample size was determined using the Taro Yamane formula with a precision level of 10% and a confidence level of 90%, resulting in a minimum required sample of 43 respondents. The sampling technique applied was purposive sampling, with respondents selected based on specific criteria, namely technicians who were directly involved in the operation and maintenance of Mechanical, Electrical, and Plumbing (MEP) systems within the building.

Primary data were collected using a structured questionnaire based on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was distributed online using Google Forms to facilitate data collection. Secondary data were obtained from internal energy consumption reports, organizational policy documents, regulatory references, and relevant scientific literature.

The collected data were analyzed using SmartPLS version 4 through the Partial Least Squares–Structural Equation Modeling (PLS-SEM) technique. The analysis procedure included several stages, namely descriptive statistical analysis, measurement model evaluation (outer model), structural model evaluation (inner model), and hypothesis testing through bootstrapping procedures. The evaluation of the measurement model included tests of convergent validity, discriminant validity, and construct reliability using indicators such as outer loading, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha. Meanwhile, the structural model was evaluated using R^2 values and path coefficient significance to test the research hypotheses.

RESULTS AND DISCUSSION

This study applied the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach using SmartPLS version 4. The research model consisted of two exogenous variables, namely Organizational Culture (X1) and Training and Development (X2), one mediating variable, Performance Evaluation (Z), and one endogenous variable, Energy-Saving Behavior (Y). The analysis was conducted through two main stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model), followed by a bootstrapping procedure for hypothesis testing.

From the total population of 75 technicians, 51 questionnaires were successfully returned and considered valid for analysis. This number exceeded the minimum target sample of 43 respondents, thereby improving the statistical robustness of the study.

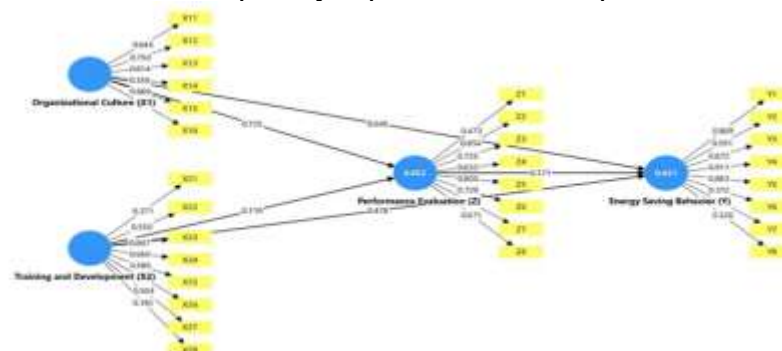
Descriptive statistical analysis indicated that all variables were categorized at a very high level, reflecting strong organizational support for energy efficiency practices. Organizational Culture recorded a mean score of 4.34, indicating that energy-saving values have been well internalized within the organization, particularly in the aspect of collective responsibility which achieved a score of 4.84. Training and Development obtained a mean value of 4.54, suggesting that training programs implemented by the organization are relevant and effective, especially in terms of applying training outcomes in operational practices (4.75). Performance Evaluation showed a mean score of 4.39, reflecting routine and objective evaluation processes accompanied by constructive feedback mechanisms (4.65). Meanwhile, Energy-Saving Behavior recorded a mean value of 4.45, indicating strong awareness and actual implementation of energy conservation practices, particularly in turning off unused equipment (4.78).

Overall, these descriptive findings suggest a strong synergy between organizational culture, employee training, performance evaluation systems, and technicians' energy-saving behavior.

1. Measurement Model Evaluation

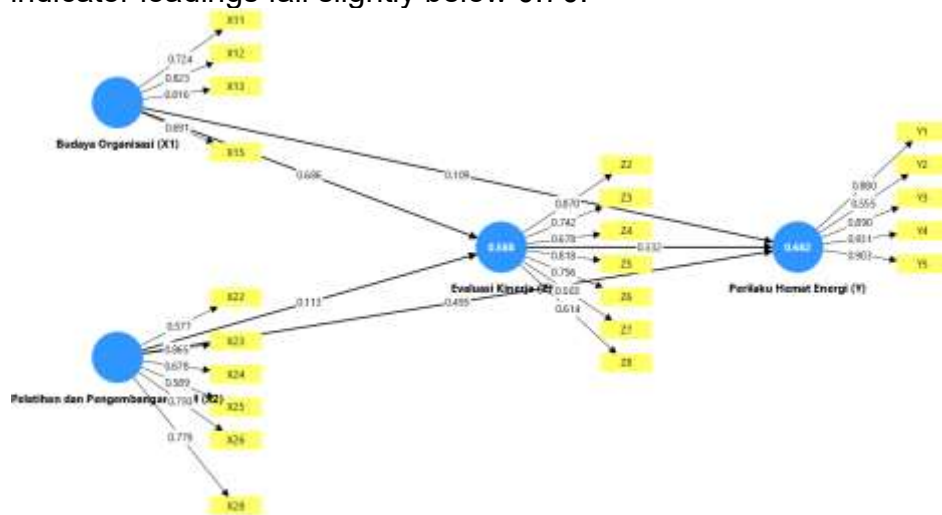
The evaluation of the measurement model confirmed that the research instrument met the criteria for convergent validity, discriminant validity, and reliability. These assessments were conducted using outer loading values, Average Variance Extracted (AVE), Composite Reliability, and Cronbach's Alpha.

The results of convergent validity testing indicate that most indicators achieved outer loading values greater than 0.50, with several indicators exceeding 0.70, suggesting that the indicators adequately represent their respective constructs



Within the Organizational Culture construct (X1), indicators X14 and X16 were removed because their loading values were below 0.50. However, the remaining indicators were retained since the Composite Reliability value exceeded 0.70. In the Training and Development construct (X2), indicators X21 and X27 were eliminated due to low loading values, while the remaining indicators met the validity requirements. For the Performance Evaluation construct (Z), indicator Z1 was removed because it did not meet the loading threshold. In the Energy-Saving Behavior construct (Y), indicators Y6, Y7, and Y8 were excluded due to very low loading values, while indicators Y1 to Y5 showed strong loading values and were retained.

Despite these eliminations, all constructs achieved Composite Reliability values greater than 0.70, indicating satisfactory internal consistency and reliability. According to Fornell and Larcker (1981) and Hair et al. (2014; 2019), constructs remain acceptable when the Composite Reliability exceeds the recommended threshold even if certain indicator loadings fall slightly below 0.70.



Although some indicator loadings were below 0.70, they were retained in the model because the Composite Reliability values exceeded 0.70. According to Fornell and Larcker (1981), constructs remain acceptable when the AVE value is slightly below 0.50 but Composite Reliability exceeds 0.60. Additionally, Hair et al. (2014) recommend that loading values of 0.50 can still be accepted in exploratory research or when measuring relatively new constructs.

Removing too many indicators could potentially reduce measurement depth, construct validity, reliability, and interpretative accuracy while also increasing the risk of bias. Therefore, a loading threshold of 0.50 was applied to maintain methodological rigor while minimizing the removal of measurement indicators.

2. Construct Reliability and Validity

Table 1. Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (rho_c)	AVE
Organizational Culture (X1)	0.764	0.849	0.586
Performance Evaluation (Z)	0.846	0.881	0.520
Training and Development (X2)	0.820	0.864	0.521
Energy Saving Behavior (Y)	0.894	0.923	0.711

The results of reliability and validity testing indicate that all constructs demonstrate satisfactory levels of reliability and validity. Cronbach's Alpha values for

all variables exceed 0.70, indicating strong internal consistency among the indicators measuring each construct. Similarly, the Composite Reliability values are all greater than 0.70, confirming that the measurement instrument is reliable.

In terms of convergent validity, all constructs have AVE values above 0.50, indicating that each construct explains more than 50% of the variance of its indicators. Among the constructs, Energy-Saving Behavior shows the highest AVE value (0.711), suggesting a particularly strong representation of its measurement indicators. These results confirm that the measurement model is valid and reliable for further structural model analysis.

3. Discriminant Validity

Table 2. Fornell–Larcker Discriminant Validity Test

	Organizational Culture (X1)	Performance Evaluation (Z)	Training and Development (X2)	Energy Saving Behavior (Y)
Organizational Culture (X1)	0.766			
Performance Evaluation (Z)	0.762	0.721		
Training and Development (X2)	0.671	0.574	0.722	
Energy Saving Behavior (Y)	0.693	0.698	0.758	0.843

The discriminant validity test using the Fornell–Larcker criterion indicates that the square root of the AVE values (shown on the diagonal) is greater than the correlations between constructs. This demonstrates that each construct shares more variance with its own indicators than with other constructs, confirming the discriminant validity of the measurement model.

4. Structural Model Evaluation

Table 3. Coefficient of Determination (R²)

Variable	R-square	R-square Adjusted
Performance Evaluation (Z)	0.588	0.571
Energy Saving Behavior (Y)	0.682	0.661

The coefficient of determination (R²) for Performance Evaluation (Z) is 0.588 (adjusted 0.571), indicating that Organizational Culture and Training and Development explain approximately 58.8% of the variance in Performance Evaluation. This represents a moderate explanatory power.

Meanwhile, the R² value for Energy-Saving Behavior (Y) is 0.682 (adjusted 0.661), meaning that 68.2% of the variance in Energy-Saving Behavior is explained by the predictor variables included in the model. This result indicates strong predictive capability of the model, particularly in explaining energy-saving behavior.

5. Hypothesis Testing

Table 4. Direct Effect Hypothesis Testing

Path	Coefficient (β)	T-Statistics	P-Value	Hypothesis
(X1) → (Z)	0.686	5.197	0.000	H1 Accepted
(X1) → (Y)	0.109	0.456	0.648	H2 Rejected
(X2) → (Z)	0.113	0.664	0.507	H3 Rejected
(X2) → (Y)	0.495	2.814	0.005	H4 Accepted
(Z) → (Y)	0.332	2.366	0.018	H5 Accepted

The hypothesis testing results reveal that Organizational Culture (X1) has a significant positive effect on Performance Evaluation (Z), with $\beta = 0.686$, $T = 5.197$, and $p < 0.001$. Therefore, H1 is accepted. However, Organizational Culture does not significantly influence Energy-Saving Behavior (Y) ($\beta = 0.109$; $p = 0.648$), leading to the rejection of H2.

Training and Development (X2) does not significantly affect Performance Evaluation (Z) ($\beta = 0.113$; $p = 0.507$), resulting in the rejection of H3. Nevertheless, Training and Development significantly influences Energy-Saving Behavior (Y) ($\beta = 0.495$; $p = 0.005$), thus supporting H4. Finally, Performance Evaluation (Z) significantly influences Energy-Saving Behavior (Y) ($\beta = 0.332$; $p = 0.018$), confirming H5.

Overall, Energy-Saving Behavior is primarily influenced by Training and Development and Performance Evaluation, while Organizational Culture influences it indirectly through Performance Evaluation.

6. Mediation Analysis

Table 5. Indirect Effect (Mediation) Testing

Path	Coefficient (β)	T-Statistics	P-Value	Hypothesis
(X1) \rightarrow (Z) \rightarrow (Y)	0.228	2.283	0.022	H6 Accepted
(X2) \rightarrow (Z) \rightarrow (Y)	0.038	0.525	0.600	H7 Rejected

The mediation test results indicate that Performance Evaluation (Z) significantly mediates the relationship between Organizational Culture (X1) and Energy-Saving Behavior (Y), with $\beta = 0.228$, $T = 2.283$, and $p = 0.022$. Therefore, H6 is accepted. This finding suggests that Organizational Culture indirectly influences Energy-Saving Behavior through Performance Evaluation mechanisms.

Conversely, Performance Evaluation does not mediate the relationship between Training and Development (X2) and Energy-Saving Behavior (Y) ($\beta = 0.038$; $p = 0.600$). Therefore, H7 is rejected.

Discussion

The findings of this study indicate that improving energy-saving behavior in commercial building operations requires alignment between organizational systems and individual competencies. Organizational culture was found to significantly influence performance evaluation and indirectly shape energy-saving behavior through this mechanism. This finding supports the argument of Hofstede (2001) and Bititci et al. (2006), who emphasize that cultural values become operationally effective when they are embedded within formal management systems.

Consistent with the perspectives of Simons (1995) and Luu (2021), the results indicate that organizational culture alone is insufficient to directly drive behavioral change unless it is translated into measurable performance indicators. In this context, integrating energy-efficiency indicators into performance appraisal systems becomes a critical mechanism for transforming sustainability values into concrete operational behavior among technicians.

On the other hand, training and development were found to directly influence energy-saving behavior but did not significantly affect performance evaluation, nor was this relationship mediated by it. This finding aligns with the arguments of Zhang et al. (2023) and Amrutha and Geetha (2021), who suggest that sustainability-oriented training programs can directly improve pro-environmental behavior through increased knowledge, awareness, and intrinsic motivation.

In technical operational environments, improvements in competence may directly translate into practical work behavior without necessarily requiring reinforcement through formal performance evaluation systems. However, the lack of integration between training outcomes and performance appraisal mechanisms may limit long-term behavioral reinforcement, as suggested by performance management literature.

Overall, the findings highlight the existence of two complementary pathways in promoting energy efficiency within organizational settings: structural reinforcement through performance evaluation systems and capability enhancement through targeted training programs. Sustainable organizational behavior is most effectively achieved when organizational culture, competency development, and performance management systems are strategically aligned.

CONCLUSION

This study concludes that organizational culture has a significant positive influence on performance evaluation but does not directly influence energy-saving behavior. Conversely, training and development do not significantly influence performance evaluation; however, they have a direct and significant effect on energy-saving behavior.

Performance evaluation positively and significantly influences energy-saving behavior and mediates the relationship between organizational culture and energy-saving behavior. However, performance evaluation does not mediate the relationship between training and development and energy-saving behavior.

Overall, the proposed model demonstrates strong explanatory power, explaining approximately 68.2% of the variance in energy-saving behavior. Theoretically, these findings confirm the role of performance evaluation as a managerial mechanism that connects organizational culture with individual behavioral outcomes. The results also highlight the contextual nature of training effectiveness in influencing employee behavior.

Practically, building management should integrate measurable energy-efficiency indicators into performance appraisal systems, strengthen operational and needs-based technical training programs, and cultivate an organizational culture that promotes sustainability and energy efficiency values.

Future research should consider incorporating additional variables such as transformational leadership, employee motivation, or organizational commitment. Longitudinal research designs are also recommended to capture behavioral changes over time. Additionally, testing the research model across different types of commercial buildings may improve the generalizability of the findings.

The novelty of this study lies in the integration of organizational culture, training and development, and performance evaluation within a single SEM-PLS structural model focusing on commercial building technicians. This study also addresses a research gap related to the mediating role of performance evaluation in translating competencies into actual energy-saving behavior.

Nevertheless, several limitations should be acknowledged. The relatively small sample size and the focus on a single organizational setting limit the generalizability of the findings. Furthermore, the use of self-reported data may introduce response bias, and the cross-sectional design limits causal inference.

Future studies are therefore encouraged to employ larger and more diverse samples, multi-organizational research settings, longitudinal designs, and objective energy performance data. Practically, organizations should ensure that sustainability-based performance evaluation systems are aligned with targeted technical training initiatives to achieve long-term improvements in energy efficiency.

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