The Effect of Leadership, Employee Engagement, and Work Environment on Employee Performance in the Manufacturing Industry

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ABSTRACT

Employee performance is a strategic determinant for the sustainability and competitiveness of the organization, especially in the manufacturing industry that faces pressure on efficiency and production accuracy. This study aims to analyze the influence of leadership, employee engagement, and work environment on employee performance, both partially and simultaneously. The study used a quantitative approach by collecting data through a structured questionnaire given to all 66 permanent employees as respondents, so this study used a total sampling technique. The collected data were analyzed using multiple linear regression to test the relationships between variables. The results of the study show that leadership, employee engagement, and work environment each have a significant partial effect on employee performance, and simultaneously, these three variables are proven to have a significant influence on improving employee performance. These findings confirm that organizational effectiveness is largely determined by the synergy between a supportive leadership style, high employee engagement, and a conducive work environment. This research makes a theoretical contribution in strengthening the understanding of the determinants of employee performance in the context of the manufacturing industry and provides practical implications for company management in formulating performance improvement strategies through strengthening leadership, optimizing engagement, and improving the work environment.

Keywords*: Employee Engagement, Employee Performance, Leadership, Work Environment.*

INTRODUCTION

Global economic shifts, supply chain disruptions, and rapid digital transformation have intensified competitive pressures on the manufacturing sector to maintain productivity while reducing operational costs (Mourtzis & Panopoulos, 2022). In this context, employee performance becomes a key source of competitive advantage, as manufacturing output largely depends on workforce capability and consistency (Roziq et al., 2021). In Indonesia, recent labor market dynamics also highlight challenges related to employment and productivity that manufacturing firms must address to remain competitive (Kurniadi et al., 2024). For manufacturing companies, maintaining production quality and timely delivery further emphasizes the importance of improving employee performance, making the examination of organizational factors influencing

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performance highly relevant for both managerial practice and human resource management research.

Leadership is a key organizational factor frequently highlighted in the literature for shaping employee behavior and performance. Studies by Bellibaş et al. (2021) show that transformational and instructional leadership are positively associated with individual and team performance. Leadership influences work goals, motivation, and perceptions of organizational support, which ultimately affect productivity on the production line (Andriansyah et al., 2024). In manufacturing settings, leadership that communicates clearly, responds to employee needs, and supports training tends to improve output and product quality. However, its impact may vary depending on organizational context and job characteristics, making company-specific research important to validate broader theoretical findings.

Employee engagement is a key construct linking working conditions to performance outcomes (Ahakwa et al., 2021). The Job Demands–Resources (JD-R) model explains that job and personal resources foster engagement, which subsequently improves performance (Bakker & De Vries, 2021). Empirical studies by Tran et al. (2025) show that higher engagement is associated with greater initiative, resilience to work stress, and better task performance. In manufacturing, engagement can also mediate the relationship between leadership and productivity, making it important to examine leadership, engagement, and performance simultaneously to better understand the psychological mechanisms behind employee performance.

The work environment, including physical aspects (facilities, ergonomics, noise, ventilation) and non-physical factors (organizational climate, interpersonal relationships, managerial support), has been shown to influence productivity and work commitment (Nuraena et al., 2024). Studies by Zhenjing et al. (2022) indicate that improvements in workplace conditions enhance concentration and reduce production errors, directly affecting manufacturing output. In plastic manufacturing, factors such as occupational safety, adequate equipment, and effective supervisor–employee relationships are particularly critical for operational performance (Muhammad et al., 2025). Therefore, the work environment is included as a key independent variable to assess its direct and interactive effects on employee performance.

Although the literature shows a link between leadership, engagement, work environment, and performance, some studies produce inconsistent findings. López-Cabarcos et al. (2022) report the absence of leadership influence on performance in a particular manufacturing context. Research by Tortorella et al., (2021) finding the limitations of the influence of employee engagement. While Ghasemi et al. (2025) report non-significant results for work environment variables. These differences in results indicate the existence of moderators or contextual conditions (sample size, nature of tasks, organizational culture) that have not been adequately explained. In addition, the most recent meta-analyses and JD-R studies recommend field research that tests simultaneous models with a full organizational sample (Mazzetti et al., 2023). In other words, there is an empirical gap between cross-study findings and contextual study results, especially in plastic manufacturing companies in Indonesia, which requires focused research using thorough sampling techniques to improve external validity.

This study aims to empirically examine the effects of leadership, employee engagement, and work environment on employee performance at PT. Plastindo Cemerlang Group (Sidoarjo). The theoretical contribution of this study is to enrich the literature on human resource and organizational management with contextual empirical evidence from the plastics manufacturing industry in Indonesia, and to test the relevance of the JD-R model and leadership theory in local contexts. The findings produced will provide guidance for the management to design leadership interventions, engagement enhancement programs, and work environment improvements that have an impact on productivity. These practical recommendations are expected to be applied in HR policies, leadership training programs, and measurable investments in work facilities. Thus, this

research has the potential to become a practical and academic reference for efforts to improve employee performance in the Indonesian manufacturing sector.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Leadership and Employee Performance

Leadership plays a strategic role in building the direction, motivation, and quality of work of individuals and groups within the organization. Abdulfatai (2021) defines leadership as the capacity to influence and direct subordinates towards the achievement of collective goals, while Irayani et al. (2025) view leadership as a dynamic process in shaping group behavior through direction and control. Effective leaders not only channel instruction, but also create an inspiring work atmosphere through constructive interpersonal communication (Al Marshoudi et al., 2023; Załoga, 2024). In perspective Lamprinou et al. (2021), leadership is not simply attached to the position, but is a contextual and situation-dependent influence mechanism.

Empirical research by Suryadi et al. (2024) indicates that transformational leadership plays a crucial role in enhancing employee motivation and performance by fostering a shared vision and empowering employees within the organization. Studies by Udin et al. (2023) show that this leadership style strengthens intrinsic motivation and encourages more productive work behavior. In addition, leaders contribute to improving employees' psychological energy through inspiration and empowerment, which supports greater engagement and commitment at work (Kim & Beehr, 2023). International findings further highlight that engaging leadership significantly strengthens employees' psychological resources and improves overall team effectiveness (Mazzetti & Schaufeli, 2022). Effective leadership becomes a critical factor in shaping productive work behavior, strengthening employee loyalty, and driving optimal organizational performance.

H1: Leadership has a significant effect on employee performance.

Employee Engagement and Employee Performance

Employee engagement refers to a positive psychological state in which employees demonstrate high levels of energy, strong dedication, and active involvement in their work. The concept proposed by Schaufeli (2021) explains that engaged employees tend to display strong focus, enthusiasm, and commitment toward their tasks. Similarly, Kim (2023) notes that engagement is reflected in employees' awareness of organizational objectives and their proactive behaviors in supporting performance achievement. In contemporary organizational settings, employee engagement has become a strategic factor for improving retention, encouraging creativity, and enhancing work quality. Empirical research by Setyawati et al. (2025) also identifies work engagement as a key predictor of task performance and organizational citizenship behavior, highlighting its important role in driving overall organizational effectiveness.

Recent research confirms that high employee engagement is positively correlated with productivity, mental health, and team effectiveness (Lu et al., 2022). Bowden et al. (2021) Identify four pillars of engagement that include capacity to engage, internal motivation, freedom to initiate, and strategic orientation. Meanwhile, Bakker and De Vries (2021) emphasizing the importance of job resources and personal resources that are able to increase resilience and encourage employees to contribute optimally. Riyanto et al. (2021) have shown that employee engagement consistently has a positive effect on performance. Thus, engagement is a key element that strengthens the relationship between individuals and organizations in the context of achieving strategic goals.

H2: Employee engagement has a significant effect on employee performance.

Work Environment and Employee Performance

The work environment encompasses the overall physical and non-physical conditions that surround employees and affect the way they perform tasks. Basalamah and As'ad (2021) explains that the quality of the work environment determines the comfort and smoothness of the task, while Surianto and Nurfahira (2024) Assess that physical work environments, such as lighting, noise, and layout, as well as social factors such as relationships between employees and the climate of the organization, contribute to a work atmosphere that can increase or decrease productivity. Noya (2024) grouping the work environment into facilities, non-physical atmospheres, and physical conditions that directly affect motivation and work effectiveness.

Recent studies by Farooq et al. (2024) indicate that a well-designed work environment plays a crucial role in improving employee performance. An ergonomic, safe, and collaboration-supportive workplace can enhance employees' concentration, reduce fatigue, and promote higher productivity. In manufacturing settings, appropriate workplace conditions are also associated with greater efficiency and accuracy in completing tasks (Naranjo et al., 2025). Furthermore, a supportive work environment helps minimize operational errors and accelerates the production process, which is particularly important in industries that require precision and consistent output (Alzoubi et al., 2022). These findings highlight that the work environment functions not merely as a supporting element but as a key structural factor that directly influences employees' effectiveness, work quality, and overall organizational performance.

H3: Work environment has a significant effect on employee performance.

Simultaneous Effect on Employee Performance

Employee performance is a key factor in determining organizational effectiveness, particularly in the manufacturing sector, which requires high efficiency, precision, and adaptability to global market changes (Sony & Mekoth, 2022). It refers to the level of work achievement that meets organizational standards and reflects the alignment between expected and actual results (Andreas, 2022; Nurlina, 2022). In modern organizations, performance is evaluated not only by task output but also by employees' creativity, initiative, and commitment to organizational goals. Research by Aidara et al. (2021) also identifies performance as a central indicator of long-term competitive advantage. Additionally, factors such as individual ability, job design, motivation, loyalty, and discipline influence work behavior and outcomes (Sitopu et al., 2021). Employee performance results from the interaction of individual competencies, organizational support, and a supportive work environment.

The interaction between leadership, employee engagement, and the work environment forms a synergistic relationship that collectively influences employee performance. The Job Demands–Resources (JD-R) model explains that leadership acts as a job resource capable of strengthening employees' personal resources, which subsequently enhances engagement and improves work outcomes (Abdurachman et al., 2023; Kurniawan et al., 2024). In addition, a supportive work environment provides resources that help reduce psychological strain and promote higher levels of engagement (Wang, 2024; Wahyu et al., 2025). Studies by Aiyub et al. (2021) indicate that these three variables, either individually or simultaneously, significantly affect employee performance. Therefore, integrating these variables within a single analytical framework is expected to clarify the mechanisms influencing employee performance and contribute to the advancement of human resource management theory.

H4: Leadership, employee engagement, and work environment have a simultaneous effect on employee performance.

According to Figure 1, this study examines the influence of leadership, employee engagement, and work environment on employee performance. Leadership provides

direction and motivation that can improve employees' work outcomes (H1). Employee engagement reflects employees' dedication and involvement, which contributes to higher productivity (H2). A supportive work environment also enhances comfort and focus, thereby improving performance (H3). Furthermore, these three variables are expected to interact and collectively influence employee performance, leading to the hypothesis that leadership, employee engagement, and work environment simultaneously have a significant effect on employee performance (H4).

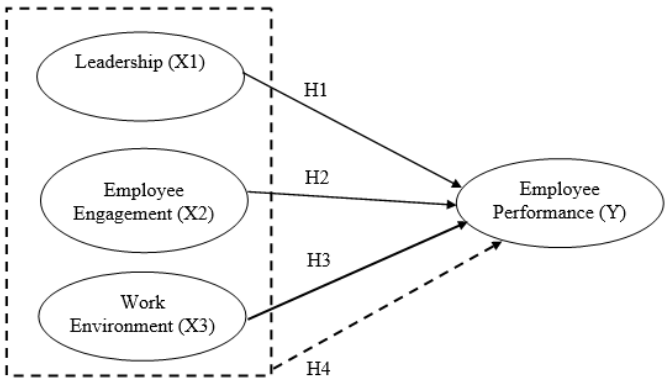

Figure 1. Conceptual Framework

RESEARCH METHODS

This study adopts a quantitative approach with an explanatory research design to analyze the causal relationships among leadership, employee engagement, work environment, and employee performance within a manufacturing organization. The quantitative method is selected because it produces objective, measurable, and generalizable findings. It also enables hypothesis testing through inferential statistical analysis, allowing systematic identification of relationships between variables. Explanatory research is appropriate for assessing both partial and simultaneous effects and for validating theoretical models developed in previous studies. Therefore, this design effectively explains employee performance as an outcome of the interaction among key organizational factors.

The population of this study consists of all 66 permanent employees of PT. Plastindo Cemerlang Group in Sidoarjo is directly involved in production and operational activities. Since the population is fewer than 100 individuals, total sampling is applied, meaning the entire population serves as the research sample. This technique enhances data accuracy, minimizes sampling bias, and strengthens internal generalization. Total sampling is also commonly used in studies of small to medium-sized organizations to ensure full representation of the units of analysis. Therefore, all 66 permanent employees who met the inclusion criteria were included as respondents in this study.

Data collection was carried out using a structured questionnaire with a 1–5 Likert scale. The research instrument comprises a leadership scale, an employee engagement scale based on the Utrecht Work Engagement Scale (UWES), a work environment scale, and an employee performance scale. Before use, the instrument was tested through content validity and constructed validity, tested using item–total correlation analysis and reliability using Cronbach's Alpha, with a minimum limit of ≥ 0.70 (Govindasamy et al., 2024). Data collection was carried out directly (offline) with all respondents by ensuring that the confidentiality and ethics of the research were maintained.

Multiple linear regression analysis was employed to examine both the individual and combined effects of leadership, employee engagement, and work environment on employee performance (Montgomery et al., 2021). This method aligns with the study's objective of analyzing causal relationships between the independent variables and the

dependent variable. The analytical procedure involved several stages, including classical assumption testing, followed by t-tests to assess partial effects and an F-test to evaluate the simultaneous effect of all variables. Data were processed using the IBM SPSS Statistics, a statistical program commonly applied in quantitative research. The analysis was conducted systematically to ensure the validity of the results and interpretations consistent with the theoretical framework. The statistical findings were interpreted comprehensively to address the research objectives and verify the proposed hypotheses.

RESULTS

In this study, the population consisted of all permanent employees working at PT. Plastindo Cemerlang Group in Sidoarjo. The total number of respondents was 66 employees. The sample was obtained using a total sampling technique, in which all employees who met the predetermined research criteria were included as respondents. When the population size is less than 100 individuals, the entire population may be used as the research sample to increase data accuracy and internal validity.

Table 1. Characteristics of Respondents

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	56	84.8
	Female	10	15.2
Age	20–30 years	20	30.3
	31–40 years	32	48.5
	> 40 years	14	21.2
Education Level	Senior High School	49	74.2
	Diploma/Bachelor	17	25.8
Total Respondents		66	100

According to Table 1, most respondents were male (84.8%), while female employees represented 15.2%. This distribution reflects the typical workforce composition in manufacturing industries, where operational positions are largely held by male workers. In terms of age, the largest proportion of respondents was in the 31–40 year group (48.5%), followed by employees aged 20–30 years (30.3%), and those above 40 years (21.2%), indicating that the workforce is predominantly within a productive and experienced age range.

Regarding education, the majority of respondents had completed senior high school or vocational education (74.2%), whereas 25.8% possessed a bachelor's degree. This pattern aligns with the common staffing structure of manufacturing companies, where many operational and technical roles are filled by individuals with secondary-level education. The demographic characteristics suggest that the respondents represent a productive and sufficiently educated workforce, which supports the reliability of the collected data.

Descriptive statistical analysis was performed to provide an initial overview of respondents' perceptions of leadership, employee engagement, work environment, and employee performance before conducting inferential testing. The analysis covered measures such as the mean, standard deviation, minimum value, and maximum value, along with a categorical interpretation of the results. Score categorization followed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with interpretation intervals of 1.00–1.80 (very low), 1.81–2.60 (low), 2.61–3.40 (moderate), 3.41–4.20 (high), and 4.21–5.00 (very high).

According to Table 2, all variables are categorized as high. Leadership achieved a mean score of 4.12, suggesting that employees view leadership practices as effective and supportive. Employee engagement recorded a mean of 4.08, indicating strong commitment and active involvement in work. The work environment obtained a mean value of 4.15, reflecting employees' perceptions of favorable physical and psychosocial workplace conditions that support productivity. Meanwhile, employee performance showed a mean score of 4.18, which signifies a high level of perceived performance.

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Std. Deviation	Minimum	Maximum	Category
Leadership	4.12	0.46	3.20	4.90	High
Employee Engagement	4.08	0.51	3.00	4.85	High
Work Environment	4.15	0.48	3.10	4.95	High
Employee Performance	4.18	0.44	3.30	4.90	High

The standard deviation values, ranging from 0.44 to 0.51, indicate moderate variation and relatively consistent responses among participants. The minimum and maximum scores also show adequate response diversity, confirming that the data are appropriate for regression analysis. Consistently high mean scores correspond with the strong coefficient of determination ($R^2 = 0.811$), suggesting that supportive leadership, strong employee engagement, and a positive work environment are closely associated with higher employee performance.

Table 3. Validity Test Results

Variable	Number of Items	Range of r-count	Cronbach Alpha
Leadership	8	0.52 – 0.78	0.88
Employee Engagement	9	0.48 – 0.81	0.91
Work Environment	7	0.45 – 0.76	0.85
Employee Performance	6	0.50 – 0.83	0.87

Table 3 presents the validity and reliability test results for all research variables. The validity test shows that all questionnaire items have r-count values above the minimum threshold of 0.30, indicating that each item is valid for measuring its respective variable. Leadership has r-count values ranging from 0.52–0.78, employee engagement ranges from 0.48–0.81, work environment ranges from 0.45–0.76, and employee performance ranges from 0.50–0.83. In terms of reliability, all variables demonstrate strong internal consistency, with Cronbach's Alpha values of 0.88 for leadership, 0.91 for employee engagement, 0.85 for work environment, and 0.87 for employee performance. Since all values exceed the recommended threshold of 0.70, the research instruments are considered both valid and reliable for further analysis.

Table 4. Classical Assumption Test Result

Variable	Normality Test	Multicollinearity Test		Heteroscedasticity Test
	Asymp. Sig (2-tailed)	Tolerance	VIF	Significance
Leadership	0.200	0.68	1.47	0.312
Employee Engagement		0.72	1.38	0.441
Work Environment		0.65	1.53	0.529

Based on Table 4, the normality test was conducted using the Kolmogorov-Smirnov test. Since the significance value is greater than 0.05, the residual data are normally distributed. The multicollinearity test was conducted by examining the Tolerance and Variance Inflation Factor (VIF) values. All tolerance values are above 0.10, and VIF values are below 10, indicating no multicollinearity problem. The heteroscedasticity test was conducted using the Glejser test. Since all significance values exceed 0.05, the model does not exhibit heteroscedasticity. Classical assumption tests confirmed that the regression model met the required assumptions, allowing the analysis to proceed with multiple linear regression. The regression model effectively explains the relationship between the independent variables and employee performance while providing an initial indication of the relative influence of each factor.

Table 5. Coefficients of Multiple Linear Regression

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t-statistics	Sig.
	B	Std. Error	Beta		
Constant	81.257	11.213	-	7.225	0.000
Leadership (X_1)	0.724	0.163	0.654	4.146	0.000
Employee Engagement (X_2)	0.646	0.159	0.487	3.026	0.000
Work Environment (X_3)	0.783	0.172	0.471	3.915	0.000

Based on the test results in Table 5, here is the regression equation result: $Y = 81.257 + 0.724X_1 + 0.646X_2 + 0.783X_3$. This equation indicates that all independent variables have positive coefficients, meaning that improvements in leadership, employee engagement, and work environment are associated with increases in employee performance. All three variables showed significance values smaller than 0.05. This identifies that each independent variable has a significant influence on employee performance. First, leadership has been shown to have a significant partial influence, which suggests that leadership style and effectiveness contribute directly to the achievement of individual performance. Second, employee engagement also has a significant influence, partially, indicating that employees' levels of engagement, enthusiasm, and dedication are closely related to their work performance. Third, the work environment has been shown to significantly affect performance, consistent with findings that its physical and psychosocial conditions can affect the quality and accuracy of task implementation. Based on these regression results, the regression equation can be expressed as follows.

Table 6. Coefficient Determination and F-Test

Test	Result
R-Square	0.811
F-statistics	27.197
Sig.	0.000

Table 6 results show that the regression model is statistically significant. An F-statistic of 27.20 with a significance level of 0.000 ($p < 0.05$) indicates that leadership, employee engagement, and work environment collectively exert a significant influence on employee performance. Thus, the regression model is considered suitable for explaining the variation in the dependent variable. The coefficient of determination (R^2) is 0.811, meaning that 81.1% of the variation in employee performance is explained by leadership, employee engagement, and work environment. The remaining 18.9% is attributed to other factors not included in this study.

DISCUSSION

The findings indicate that leadership has a significant partial effect on employee performance at PT. Plastindo Cemerlang Group, supporting contemporary leadership perspectives. Effective leadership fosters collaboration through transparent communication, participative decision-making, and competency development. This is consistent with the concept of engaging leadership, which emphasizes empowering and inspiring employees to enhance psychological energy and work engagement (Kim & Beehr, 2023). In addition, the results align with Udin et al. (2023), demonstrating that transformational leadership strengthens intrinsic motivation and productive work behavior. Conceptually, leadership improves performance by building trust, enhancing organizational support, and clarifying work objectives, making leadership quality a key driver of human resource performance.

Further analysis indicates that employee engagement significantly influences performance, highlighting the role of employees' emotional and cognitive attachment in

driving productivity. Highly engaged individuals demonstrate greater dedication, persistence, and proactive behavior in achieving organizational goals. These findings are consistent with the Job Demands–Resources (JD–R) model, which posits that engagement emerges from the availability of job resources and organizational support (Koroglu & Ozmen, 2022). Moreover, Setyawati et al. (2025) identify work engagement as a key predictor of task performance. Engagement may also act as a mediating mechanism linking organizational conditions to performance outcomes, underscoring the importance of sustained HR development, recognition systems, and effective communication.

The findings also demonstrate that the work environment significantly affects employee performance, encompassing both physical and psychosocial dimensions. Favorable working conditions, such as safety, comfort, and adequate facilities, enable employees to maintain focus and minimize fatigue during their tasks. This result is consistent with prior studies by Naranjo et al. (2025), indicating that an ergonomic workplace enhances efficiency and accuracy, particularly in manufacturing settings. Beyond physical aspects, non-physical elements such as positive relationships among colleagues and supportive supervision also contribute to higher motivation and job satisfaction. Conversely, an unfavorable work environment may undermine psychological well-being and reduce productivity, especially in roles that require high levels of precision. Therefore, organizations should continuously improve workplace conditions by evaluating facilities and fostering a constructive organizational culture.

The simultaneous test further reveals that leadership, employee engagement, and the work environment collectively exert a significant influence on employee performance. This indicates that the three variables do not operate in isolation but interact in a complementary manner to enhance performance outcomes. From a theoretical perspective, leadership offers direction, engagement provides psychological drive, and the work environment supplies the structural support needed for employees to perform effectively. This interaction aligns with the resource caravan concept within the Job Demands–Resources (JD–R) framework, which suggests that organizational resources reinforce one another and produce cumulative performance effects (Radu, 2023; Arifin et al., 2025). Consequently, improvements in one factor should be accompanied by the strengthening of others to achieve optimal results, highlighting the importance of a holistic management approach in improving employee performance in manufacturing organizations.

The findings are generally consistent with previous studies showing that leadership, employee engagement, and the work environment significantly influence employee performance. However, some studies report different results. For instance, Purwanto et al. (2021) found that leadership did not significantly affect performance. These differences may arise from contextual factors such as organizational culture, job characteristics, and organizational maturity. In manufacturing organizations with more hierarchical structures, leadership tends to have a stronger impact on performance. The results also contribute to management science by highlighting the integration of psychological, relational, and structural factors in shaping performance. Theoretically, the findings support the Job Demands–Resources (JD–R) model and extend its application to the manufacturing sector in Indonesia, while practically encouraging organizations to improve performance through strengthened leadership, supportive work environments, and a people-centered management approach.

CONCLUSION

The study was conducted at PT. Plastindo Cemerlang Group concludes that employee performance is significantly influenced by leadership, employee engagement, and the work environment. Partially, effective leadership, strong employee engagement, and a supportive work environment each contribute positively to improving performance. Simultaneously, these three factors collectively have a significant effect on employee performance, indicating that their integration is essential for achieving optimal

organizational outcomes. Therefore, organizations need to strengthen leadership quality, foster employee engagement, and create a conducive work environment as part of a comprehensive human resource strategy to enhance performance and maintain organizational competitiveness.

This study offers practical directions for improving performance in the manufacturing sector by strengthening leadership, enhancing employee engagement, and creating a supportive work environment. Strategies may include coaching-based leadership training, reward systems, career development opportunities, employee empowerment, improved facilities, and an inclusive work culture. However, several limitations should be noted. The use of survey methods may lead to perception bias, routine manufacturing work may influence respondents' evaluations, and the cross-sectional design limits the ability to observe changes over time. Future research is therefore recommended to apply longitudinal or mixed-method approaches to better understand the dynamics among these variables.

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