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The Influence of Green Human Resource Management and Green Innovation on Sustainable Economic Development Through MSME Performance

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Abstract: This study aims to analyze the effects of Green Human Resource Management (GHRM) and Green Innovation on Sustainable Economic Development through MSME Performance as a mediating variable. The study employed a quantitative approach with an explanatory research design involving 160 MSME respondents. Data were collected using a five-point Likert-scale questionnaire and analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The results show that GHRM does not have a significant effect on MSME Performance ($\beta = 0.104$; $p = 0.116$), whereas Green Innovation has a positive and significant effect on MSME Performance ($\beta = 0.613$; $p < 0.001$). GHRM has a positive and significant effect on Sustainable Economic Development ($\beta = 0.408$; $p < 0.001$), whereas Green Innovation does not have a significant effect ($\beta = 0.132$; $p = 0.214$). MSME Performance has a positive and significant effect on Sustainable Economic Development ($\beta = 0.212$; $p = 0.039$). MSME Performance also does not mediate the effects of GHRM ($\beta = 0.022$; $p = 0.288$) or Green Innovation ($\beta = 0.130$; $p = 0.054$) on Sustainable Economic Development. The R^2 value for MSME Performance is 45.3%, while the R^2 value for Sustainable Economic Development is 39.6%. These findings underscore the importance of Green Innovation in enhancing MSME Performance and highlight the direct role of GHRM in supporting Sustainable Economic Development.

Keywords: Green Human Resource Management, Green Innovation, MSME Performance, Sustainable Economic Development, PLS-SEM.

INTRODUCTION

Sustainable economic development requires a balance among economic growth, environmental preservation, and social well-being, thereby encouraging organizations to

integrate sustainability principles into their business strategies (Elkington, 2021; Goyal & Kumar, 2022). Micro, Small, and Medium Enterprises (MSMEs) play a significant role in this process, particularly in Indonesia (Putra & Sari, 2026; Tambunan, 2021). However, climate change, resource efficiency, and increasing market demands have encouraged MSMEs to adopt green business practices to strengthen their competitiveness (García-Granero et al., 2021; Khan & Qianli, 2022). Green Human Resource Management (GHRM) integrates environmental values into recruitment, training, performance appraisal, and reward systems (Renwick et al., 2021; Yong et al., 2020). GHRM enhances environmental awareness, Organizational Citizenship Behavior for the Environment (OCBE), innovation, and environmental performance (Kim et al., 2021; Nurdin & Yusuf, 2026), while also serving as a strategic organizational asset from the perspective of the Resource-Based View (Jabbour & de Sousa Jabbour, 2021; Ananda & Fitri, 2025).

Green Innovation has become an important factor in enhancing the competitiveness and sustainable performance of MSMEs through the development of products, processes, and managerial practices that reduce environmental impacts, such as improving energy efficiency, utilizing environmentally friendly materials, and reducing waste (Weng et al., 2021; Dangelico & Pujari, 2022). Green innovation contributes to both environmental and economic performance, although its effectiveness is influenced by technological capabilities, managerial commitment, organizational context, and internal readiness (Song & Yu, 2023; Anonim, 2022; Ananda & Fitri, 2025; Khan & Qianli, 2022).

In the Indonesian context, limitations in capital, technology, managerial competencies, and environmental literacy remain significant challenges to the implementation of GHRM and Green Innovation. ESG literacy, governance, financial record-keeping, regulatory requirements, and access to sustainable financing also influence the adoption of sustainability practices (Putra & Sari, 2026). Nevertheless, global supply chain requirements and growing consumer preferences for environmentally friendly products create opportunities for MSMEs to enhance their reputation and performance through green innovation (Goyal & Kumar, 2022; Ooi & Teh, 2021). Accordingly, MSME performance needs to be understood from a multidimensional perspective encompassing economic, environmental, and social dimensions.

Findings concerning the relationships among GHRM, Green Innovation, and organizational performance remain mixed. GHRM has been shown to enhance green innovation and environmental performance, while green innovation may function as a mediating mechanism when supported by strong environmental and managerial strategies (Ananda & Fitri, 2025; Kim et al., 2021; Saeed et al., 2022). Nurdin and Yusuf (2026) also demonstrated a positive effect of GHRM on innovation performance through OCBE. Therefore, this study examines the effects of GHRM and Green Innovation on Sustainable Economic Development through MSME Performance, drawing upon the Resource-Based View and Dynamic Capability Theory (Jabbour & de Sousa Jabbour, 2021; Teece, 2021). The findings are expected to enrich the existing literature and provide practical implications for the development of human resources and green innovation in MSMEs (Putra & Sari, 2026; Goyal & Kumar, 2022).

Literature Review

Green Human Resource Management

Green Human Resource Management (GHRM) is a strategic approach that integrates environmental considerations into human resource management (HRM) functions, including green recruitment, green training, green performance appraisal, green rewards, employee involvement, and environmentally oriented organizational culture. In MSMEs, GHRM is particularly important because limited resources make employee competencies and behaviors

strategic assets for organizational sustainability. (Syafri et al., 2021) found that GHRM has a positive effect on workplace green behavior and firm performance among Indonesian culinary SMEs. Astuti et al. (2023) demonstrated that GHRM contributes to sustainable organizational performance through green service innovation, while (Esthi and Setiawan, 2023) found positive effects on job satisfaction, employee performance, and organizational culture. (Aftab et al., 2023) demonstrated that GHRM enhances environmental performance through green innovation, environmental strategy, and pro-environmental behavior. The findings of (Aftab and Veneziani, 2024) and (Zhang et al., 2024) further strengthen the relationships between GHRM and pro-environmental behavior, environmental performance, green product innovation, and green process innovation.

Green Innovation

Green Innovation (GI) refers to innovations that integrate environmental considerations into products, processes, technologies, and organizational methods through the use of environmentally friendly materials, energy efficiency, waste reduction, and clean technologies. (Baeshen et al., 2021) positioned green innovation as an important mechanism for achieving sustainable business performance based on the Natural Resource-Based View (NRBV) and Triple Bottom Line (TBL). (Muangmee et al., 2021) emphasized the importance of green entrepreneurial orientation and green innovation for SMEs. (Syafri et al., 2021), (Rustiarini et al., 2022), (Suki et al., 2023), (Lestari and Sunyoto, 2023), and (Ji et al., 2024) demonstrated that green innovation contributes positively to firm performance, sustainability, financial performance, and SME competitiveness. Studies published in 2025 further reinforce the relationship between green innovation, R&D investment, and sustainable business performance.

MSME Performance

MSME performance reflects an enterprise's ability to achieve its objectives through both financial and non-financial indicators, including profitability, sales growth, productivity, efficiency, competitiveness, customer satisfaction, innovation, and sustainability. (Syafri et al., 2021) and (Rustiarini et al., 2022) demonstrated that green practices can improve MSME performance. Karnadji et al. (2023) linked green innovation with absorptive capacity, green supply chain management, organizational learning, market turbulence, and firm performance, while (Sisca and Wijaya, 2023) identified a relationship between green innovation and sustainable business performance among food and beverage MSMEs. (Ji et al., 2024) further strengthened this relationship.

Sustainable Economic Development

Sustainable economic development refers to the long-term viability of businesses through the balancing of economic, social, and environmental dimensions based on the principles of the Triple Bottom Line (TBL), namely profit, people, and planet. (Baeshen et al., 2021) and (Tjahjadi et al., 2021) emphasized this multidimensional scope, while Le (2022) demonstrated that green strategy, green corporate social responsibility, and green innovation can contribute to sustainable firm performance. (Suki et al., 2023), (Madrid-Guijarro and Duréndez, 2024), and (Li and Pan, 2026) further reinforce the importance of green innovation, management commitment, GHRM, and sustainability outcomes.

Hypothesis Development and Mediation

GHRM enhances organizational performance through employee competencies, motivation, efficiency, and environmentally responsible behaviors, as supported by (Syafri et

al.,2021) and (Esthi and Setiawan, 2023). Accordingly, H1: GHRM has a positive effect on MSME Performance.

Green innovation improves organizational performance through resource efficiency, waste reduction, improved product quality, differentiation, and enhanced competitiveness, as supported by (Syafri et al.,2021), (Rustiarini et al.,2022), (Sisca and Wijaya,2023), and (Ji et al.,2024). Therefore, H2: Green Innovation has a positive effect on MSME Performance.

GHRM also has the potential to enhance sustainable economic development through the development of competent and environmentally conscious human capital. (Aftab et al.,2023), (Makumbe, 2024), and (Hien, 2025) provide evidence supporting the relationship between GHRM and environmental, economic, and social performance. Therefore, H3: GHRM has a positive effect on Sustainable Economic Development.

Green innovation integrates economic and environmental objectives through product and process innovations that enhance value creation, efficiency, and competitiveness. (Baeshen et al.,2021) and (Rustiarini et al.,2022) support this relationship. Accordingly, H4: Green Innovation has a positive effect on Sustainable Economic Development.

Furthermore, MSME performance constitutes an important mechanism because high-performing enterprises possess greater capacity to survive, invest, improve productivity, create employment opportunities, and support environmentally responsible practices. Therefore, H5: MSME Performance has a positive effect on Sustainable Economic Development.

Novelty

The novelty of this study lies in positioning MSME Performance as a mediating variable in the relationship between GHRM and Green Innovation and Sustainable Economic Development. GHRM and Green Innovation are viewed not only as factors that directly influence sustainability but also as mechanisms that contribute to sustainability through improvements in employee competencies, productivity, efficiency, environmentally responsible behavior, and business performance. (Rustiarini et al.,2022), (Sisca and Wijaya,2023), (Aftab et al.,2023), (Zhang et al. ,2024), and (Li and Pan,2026) provide empirical support for these mechanisms. Accordingly, H6: MSME Performance mediates the effect of GHRM on Sustainable Economic Development, and H7: MSME Performance mediates the effect of Green Innovation on Sustainable Economic Development.

Research Gap

The literature from 2021 to 2026 indicates that the integration of GHRM, Green Innovation, MSME Performance, and Sustainable Economic Development remains relatively limited. Previous studies have more frequently employed green behavior, green culture, green intellectual capital, or green supply chain management as mediating variables, whereas MSME Performance has been comparatively less frequently examined as a mediator. Studies conducted in Indonesia, such as those by (Syafri et al.,2021), (Rustiarini et al.,2022), (Karnadji et al.,2023), and (Sisca and Wijaya ,2023), have generally examined these relationships separately or partially. This study extends the outcome beyond environmental performance toward Sustainable Economic Development, encompassing economic, social, and environmental dimensions. Furthermore, PLS-SEM using SmartPLS is employed to examine the relationships and mediation mechanisms within an integrated research model.

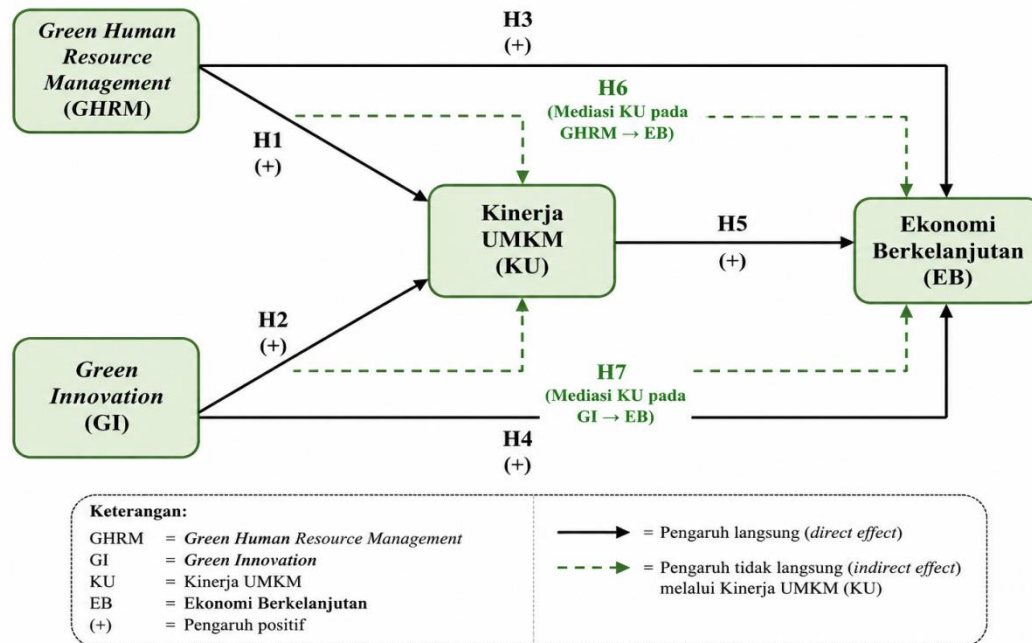


Figure: 1. Conceptual Framework

The proposed relationships are represented by the following hypotheses:

1. H1: GHRM → MSME Performance
2. H2: Green Innovation → MSME Performance
3. H3: GHRM → Sustainable Economic Development
4. H4: Green Innovation → Sustainable Economic Development
5. H5: MSME Performance → Sustainable Economic Development
6. H6: GHRM → MSME Performance → Sustainable Economic Development
7. H7: Green Innovation → MSME Performance → Sustainable Economic Development

METHODS

This study employed a quantitative approach with an explanatory research design to examine the effects of Green Human Resource Management (GHRM) and Green Innovation (GI) on Sustainable Economic Development (SED), with MSME Performance (MSMEP) serving as a mediating variable. Data were analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4.0.

The study population consisted of MSMEs engaged in human resource management, innovation, and business operations. The sample was selected using purposive sampling based on the following criteria: the MSME had been operating for at least two years; the respondent was the owner or manager; the respondent had sufficient knowledge of operational activities and human resource management; and the MSME had undertaken innovation-related activities. The study targeted 200 respondents. Primary data were collected through a five-point Likert-scale questionnaire, while secondary data were obtained from relevant academic literature.

Four reflective constructs were employed, namely GHRM, GI, MSME Performance, and Sustainable Economic Development. The measurement model was evaluated using outer loadings, Average Variance Extracted (AVE), Cronbach's Alpha, Composite Reliability, and the Heterotrait-Monotrait Ratio (HTMT). The structural model was assessed using the Variance Inflation Factor (VIF), coefficient of determination (R^2), effect size (f^2), and path coefficients. Hypothesis testing was conducted using bootstrapping with 10,000 subsamples at a 5% significance level and a 95% confidence interval. The mediating effects of GHRM

and GI on Sustainable Economic Development through MSME Performance were examined using specific indirect effects, with statistical significance determined based on a p-value < 0.05 and a confidence interval that did not include zero.

RESULTS AND DISCUSSION

The main findings of the structural model indicate that Green Innovation plays the strongest role in enhancing MSME Performance ($\beta = 0.613$). Green Innovation also has a positive direct effect on Sustainable Economic Development ($\beta = 0.262$). In contrast, GHRM does not have a significant effect on MSME Performance, although GHRM has a significant direct effect on Sustainable Economic Development ($\beta = 0.430$). Furthermore, MSME Performance has not been demonstrated to function as a significant mediator in either the relationship between GHRM and Sustainable Economic Development or the relationship between Green Innovation and Sustainable Economic Development.

Substantively, these findings indicate that, within the context of this study, Green Innovation is more effective as a mechanism for improving MSME Performance than GHRM. Meanwhile, the achievement of Sustainable Economic Development is influenced more strongly by the direct effects of GHRM and Green Innovation, together with the contribution of MSME Performance.

Table 1. Outer Loadings

Indicator	Sustainable Economic Development	GHRM	Green Innovation	MSME Performance
EB.5	1.000	–	–	–
GHRM.2	–	0.899	–	–
GHRM.5	–	0.881	–	–
GI.1	–	–	0.709	–
GI.2	–	–	0.810	–
GI.3	–	–	0.775	–
GI.4	–	–	0.801	–
GI.5	–	–	0.875	–
KU.1	–	–	–	0.724
KU.2	–	–	–	0.840
KU.3	–	–	–	0.688
KU.4	–	–	–	0.796

Green Human Resource Management, Green Innovation, and MSME Performance demonstrate relatively good convergent validity based on the outer loading and Average Variance Extracted (AVE) values calculated from the available data. All GHRM indicators exhibit high factor loadings, and all Green Innovation indicators have loadings above the recommended threshold of 0.70. Meanwhile, the MSME Performance construct has one indicator, namely KU.3, with a loading of 0.688, which is slightly below the 0.70 threshold but may still be considered acceptable for retention. The main issue concerns the Sustainable Economic Development construct, which uses only one indicator, namely EB.5, with a loading of 1.000.

Table 2. R-Square

Endogenous Construct	R-Square	Adjusted R-Square
Sustainable Economic Development	0.396	0.385
MSME Performance	0.453	0.446

Green Human Resource Management, Green Innovation, and MSME Performance demonstrate relatively good convergent validity based on the outer loading and Average Variance Extracted (AVE) values calculated from the available data. All GHRM indicators

exhibit high factor loadings, and all Green Innovation indicators have loadings above the recommended threshold of 0.70. Meanwhile, the MSME Performance construct has one indicator, namely KU.3, with a loading of 0.688, which is slightly below the 0.70 threshold but may still be considered acceptable for retention. The main issue concerns the Sustainable Economic Development construct, which uses only one indicator, namely EB.5, with a loading of 1.000.

The R-square value for MSME Performance of 0.453 indicates that Green Human Resource Management and Green Innovation jointly explain 45.3% of the variance in MSME Performance, while the remaining 54.7% is explained by other factors outside the research model. The adjusted R-square value of 0.446 indicates that, after accounting for the number of predictor variables, the model explains 44.6% of the variance in MSME Performance. Thus, the model demonstrates a moderate explanatory power for MSME Performance.

Based on the R-square assessment, MSME Performance has an R-square value of 0.453 and an adjusted R-square value of 0.446. These findings indicate that Green Human Resource Management and Green Innovation jointly explain 45.3% of the variance in MSME Performance. Meanwhile, Sustainable Economic Development has an R-square value of 0.396 and an adjusted R-square value of 0.385, indicating that GHRM, Green Innovation, and MSME Performance collectively explain 39.6% of the variance in Sustainable Economic Development. Therefore, the explanatory power of the model for both endogenous constructs is moderate, with slightly greater explanatory power for MSME Performance.

Table 3. Effect Size (f^2)

Predictor	Sustainable Economic Development	GHRM	Green Innovation	MSME Performance
Sustainable Economic Development	–	–	–	–
GHRM	0.196	–	–	–
Green Innovation	0.014	–	–	0.497
MSME Performance	0.041	–	–	–

Based on the effect size (f^2) assessment, Green Innovation has the largest contribution to MSME Performance, with an f^2 value of 0.497, which falls within the large effect category. This finding indicates that Green Innovation represents the most substantive variable in explaining changes in MSME Performance.

Furthermore, the effect of GHRM on Sustainable Economic Development has an f^2 value of 0.196, indicating a medium effect size. This result suggests that GHRM makes a meaningful contribution to Sustainable Economic Development. Meanwhile, the relationship between MSME Performance and Sustainable Economic Development has a small effect size, with an f^2 value of 0.041.

Green Innovation has an f^2 value of 0.014 for Sustainable Economic Development, indicating a very small effect size, although the relationship may still be statistically significant depending on the corresponding hypothesis-testing results. Overall, the effect size assessment demonstrates that Green Innovation is the most dominant factor in enhancing MSME Performance, whereas its direct contribution to Sustainable Economic Development is relatively limited.

Table 4. Discriminant Validity

Construct	Sustainable Economic Development	GHRM	Green Innovation	MSME Performance
Sustainable Economic Development	–	–	–	–
GHRM	0.658	–	–	–

Green Innovation	0.519	0.659	–	–
MSME Performance	0.528	0.557	0.792	–

Brief Interpretation

The discriminant validity results indicate that the relationships among the constructs are generally acceptable. The highest correlation is observed between Green Innovation and MSME Performance (0.792), followed by GHRM and Green Innovation (0.659), GHRM and Sustainable Economic Development (0.658), MSME Performance and GHRM (0.557), Green Innovation and Sustainable Economic Development (0.519), and MSME Performance and Sustainable Economic Development (0.528).

Overall, the correlation values indicate that the constructs demonstrate adequate distinctiveness from one another, suggesting that GHRM, Green Innovation, MSME Performance, and Sustainable Economic Development represent conceptually distinct constructs within the research model. This supports the adequacy of the measurement model in distinguishing the latent variables.

Table 5. Construct Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
GHRM	0.739	0.742	0.884	0.793
Green Innovation	0.854	0.860	0.896	0.633
MSME Performance	0.766	0.785	0.848	0.584

Brief Interpretation

The results in Table 4.5 indicate that the measurement model demonstrates adequate internal consistency and convergent validity. The Cronbach's Alpha values for all constructs range from 0.739 to 0.854, exceeding the commonly accepted threshold of 0.70, indicating satisfactory internal consistency.

The Composite Reliability (rho_a) values range from 0.742 to 0.860, while Composite Reliability (rho_c) values range from 0.848 to 0.896. All values exceed 0.70, confirming that the indicators consistently measure their respective constructs.

Furthermore, the AVE values for GHRM (0.793), Green Innovation (0.633), and MSME Performance (0.584) are all above the recommended minimum value of 0.50. This indicates that each construct explains more than 50% of the variance in its indicators. Therefore, GHRM, Green Innovation, and MSME Performance demonstrate satisfactory construct reliability and convergent validity, indicating that the measurement model is suitable for subsequent structural model analysis.

Table 6. Path Coefficients and P-Values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
GHRM → Sustainable Economic Development	0,408	0,417	0,109	3,744	0,000
GHRM → MSME Performance	0,104	0,113	0,066	1,570	0,116
Green Innovation → Sustainable Economic Development	0,132	0,119	0,106	1,242	0,214
Green Innovation → MSME Performance	0,613	0,613	0,058	10,542	0,000
MSME Performance → Sustainable Economic Development	0,212	0,216	0,103	2,063	0,039

Hypothesis Testing and Discussion

Hypothesis 1: Green Human Resource Management → MSME Performance

The hypothesis testing results indicate that Green Human Resource Management has a positive but statistically insignificant effect on MSME Performance. This is demonstrated by a path coefficient of 0.104, a T-statistic of 1.570, and a p-value of 0.116. Since the T-statistic is below 1.96 and the p-value exceeds 0.05, H1 is not supported. This finding indicates that the implementation of GHRM practices has not yet been able to directly and significantly improve MSME Performance.

Hypothesis 2: Green Innovation → MSME Performance

Green Innovation has a positive and statistically significant effect on MSME Performance, with a path coefficient of 0.613, a T-statistic of 10.542, and a p-value of 0.000. This result indicates that higher levels of Green Innovation implementation are associated with higher MSME Performance. Therefore, H2 is supported. Green Innovation represents the strongest predictor of MSME Performance in the proposed research model.

Hypothesis 3: Green Human Resource Management → Sustainable Economic Development

Green Human Resource Management has a positive and statistically significant effect on Sustainable Economic Development, as indicated by a path coefficient of 0.408, a T-statistic of 3.744, and a p-value of 0.000. Since the T-statistic exceeds 1.96 and the p-value is below 0.05, H3 is supported. This finding indicates that stronger implementation of GHRM practices is associated with higher levels of Sustainable Economic Development. It further demonstrates that an environmental orientation in human resource management can make a direct contribution to the sustainable economic development of MSMEs.

Hypothesis 4: Green Innovation → Sustainable Economic Development

Green Innovation has a positive but statistically insignificant effect on Sustainable Economic Development. This is reflected in a path coefficient of 0.132, a T-statistic of 1.242, and a p-value of 0.214. Because the T-statistic is below 1.96 and the p-value exceeds 0.05, H4 is not supported. This finding suggests that the implementation of green innovation among the MSMEs examined in this study has not yet translated into a statistically significant direct contribution to Sustainable Economic Development.

Hypothesis 5: MSME Performance → Sustainable Economic Development

MSME Performance has a positive and statistically significant effect on Sustainable Economic Development, with a path coefficient of 0.212, a T-statistic of 2.063, and a p-value of 0.039. Since the T-statistic exceeds 1.96 and the p-value is below 0.05, H5 is supported. This finding indicates that improvements in MSME Performance contribute positively to Sustainable Economic Development. Higher-performing MSMEs have greater capacity to maintain the continuity of their economic activities and contribute to sustainable economic development.

Table 7. Indirect Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
GHRM → MSME Performance → Sustainable Economic Development	0,022	0,025	0,021	1,062	0,288
Green Innovation → MSME Performance → Sustainable Economic Development	0,130	0,133	0,067	1,931	0,054

Hypothesis 6: GHRM → MSME Performance → Sustainable Economic Development

The indirect effect analysis indicates that MSME Performance does not mediate the effect of Green Human Resource Management on Sustainable Economic Development. The original sample value of 0.022, T-statistic of 1.062, and p-value of 0.288 indicate that the indirect effect is not statistically significant, as the T-statistic is below 1.96 and the p-value exceeds 0.05. Therefore, H6 is not supported. This finding indicates that GHRM practices have not yet been able to enhance Sustainable Economic Development through improvements in MSME Performance within the proposed research model.

Hypothesis 7: Green Innovation → MSME Performance → Sustainable Economic Development

The indirect effect analysis indicates that MSME Performance does not significantly mediate the effect of Green Innovation on Sustainable Economic Development at the 5% significance level. The original sample value is 0.130, with a T-statistic of 1.931 and a p-value of 0.054. Since the T-statistic is below 1.96 and the p-value is slightly above 0.05, H7 is not supported. Nevertheless, the p-value approaching the 0.05 threshold suggests a potential tendency toward a mediation relationship, although the evidence is not sufficiently strong to establish statistical support at the 5% significance level.

CONCLUSION AND RECOMMENDATIONS**Conclusion**

Based on the PLS-SEM analysis, this study demonstrates that Green Human Resource Management (GHRM) and Green Innovation play different roles in supporting MSME Performance and Sustainable Economic Development. GHRM has a positive but statistically insignificant effect on MSME Performance ($\beta = 0.104$; $p = 0.116$); therefore, H1 is not supported. In contrast, Green Innovation has a positive and statistically significant effect on MSME Performance ($\beta = 0.613$; $p < 0.001$), with the largest effect size ($f^2 = 0.497$); therefore, H2 is supported. This finding indicates that green innovation is the strongest factor contributing to MSME Performance within the proposed research model.

GHRM has a positive and statistically significant effect on Sustainable Economic Development ($\beta = 0.408$; $p < 0.001$); therefore, H3 is supported. Meanwhile, Green Innovation does not have a statistically significant direct effect on Sustainable Economic Development ($\beta = 0.132$; $p = 0.214$); therefore, H4 is not supported. MSME Performance has a positive and statistically significant effect on Sustainable Economic Development ($\beta = 0.212$; $p = 0.039$); therefore, H5 is supported. These findings suggest that the sustainable economic development of MSMEs is more strongly influenced by the quality of environmentally oriented human resource management and improvements in business performance than by the direct effect of green innovation.

The mediation analysis indicates that MSME Performance does not mediate the effect of GHRM on Sustainable Economic Development ($\beta = 0.022$; $p = 0.288$); therefore, H6 is not supported. MSME Performance also does not demonstrate a statistically significant mediating effect on the relationship between Green Innovation and Sustainable Economic Development at the 5% significance level ($\beta = 0.130$; $p = 0.054$); therefore, H7 is not supported. Nevertheless, the p-value close to 0.05 suggests a potential tendency toward a mediation relationship between Green Innovation and Sustainable Economic Development through MSME Performance, which warrants further investigation. Overall, the model explains 45.3% of the variance in MSME Performance and 39.6% of the variance in Sustainable Economic Development.

Recommendations

MSMEs are encouraged to prioritize Green Innovation through the development of environmentally friendly products, energy efficiency initiatives, waste reduction, and the adoption of clean technologies. At the same time, GHRM implementation should be strengthened through environmental training, reward systems, environmentally based performance appraisal, and greater employee involvement to optimize its contribution to business performance.

Government institutions and MSME-support organizations should expand access to green financing, technology training, innovation assistance, and environmental and ESG literacy programs. Such support is important to help MSMEs transform green practices into more tangible improvements in business performance and sustainable economic development.

Future research should employ broader samples, more comprehensive indicators of Sustainable Economic Development, and additional variables such as technological capability, managerial commitment, green organizational culture, or government support. Longitudinal research is also recommended to capture the long-term effects of GHRM and Green Innovation on MSME performance and sustainability outcomes.

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