

The Effect of Green Human Resource Management on Green Innovation: The Mediating Role of Green Organizational Commitment in MSMEs in Samarinda City

Suyanto^{1*}, Dian Irma Aprianti², Eko Ravi Pratama³, Lailatul Maghfiroh⁴

^{1,2,3,4} Widya Gama Mahakam University, Faculty of Economics and Business,
Samarinda, Indonesia

*Corresponding Author E-mail: Suyanto@uwgm.ac.id

Abstract

This study examines the influence of *Green Human Resource Management* (GHRM)—comprising green recruitment, green training, and green knowledge sharing—on green innovation in *Micro, Small, and Medium Enterprises* (MSMEs) in Samarinda, with green organizational commitment (GOC) as a mediating variable. This topic is particularly important since MSMEs, although vital in developing economies, often overlook ecological aspects. The research adopts a quantitative descriptive design with a sample of 100 food and beverage MSME owners in Samarinda, drawn from a population of 16,825 using Slovin's formula. Data were analyzed using *Structural Equation Modeling-Partial Least Squares* (SEM-PLS) with WarpPLS 7.0. The results show that all three dimensions of GHRM significantly affect green innovation, with green knowledge sharing exerting the strongest impact, followed by green recruitment, while *green training* has a positive but weaker effect. Furthermore, GOC significantly mediates these relationships, with the strongest indirect effect found in the path from green knowledge sharing to green innovation. The overall model demonstrates strong feasibility and explanatory power ($R^2 = 0.941$ for green innovation). These findings indicate that HR practices aimed at environmental sustainability are most effective when supported by organizational commitment. Policy-wise, this research underscores the importance of embedding environmental awareness into recruitment, training, and knowledge-sharing processes at the MSME level. Practically, MSMEs are encouraged to institutionalize green values as part of their organizational culture to strengthen innovation and competitiveness. This study contributes originality by modeling how internal GHRM mechanisms influence innovation through organizational commitment, thereby extending previous theories and offering context-specific insights for MSMEs in Indonesia.

Keywords: Green Human Resource Management; Green Innovation; Organizational Commitment; MSMEs; Sustainability.

Abstrak

Penelitian ini mengkaji pengaruh *Green Human Resource Management* (GHRM)—yang mencakup *green recruitment*, *green training*, dan *green knowledge sharing*—terhadap *green innovation* pada *Usaha Mikro, Kecil, dan Menengah* (UMKM) di Kota Samarinda, dengan *green organizational commitment* (GOC) sebagai variabel mediasi. Topik ini penting karena meskipun UMKM berperan vital dalam perekonomian negara berkembang, aspek ekologis masih sering terabaikan. Penelitian ini menggunakan desain deskriptif kuantitatif dengan sampel 100 pemilik UMKM sektor makanan dan minuman di Samarinda, yang ditentukan menggunakan rumus Slovin dari populasi 16.825 unit usaha. Data dianalisis dengan *Structural Equation Modeling-Partial Least Squares* (SEM-PLS) melalui WarpPLS 7.0. Hasil penelitian menunjukkan bahwa ketiga dimensi GHRM berpengaruh signifikan terhadap inovasi hijau, dengan *green knowledge sharing* sebagai faktor paling dominan, disusul oleh *green recruitment*, sedangkan *green training* tetap berpengaruh positif namun lebih lemah. Selain itu, GOC terbukti memediasi secara signifikan hubungan tersebut, dengan pengaruh mediasi terkuat pada jalur dari *green knowledge sharing* menuju *green innovation*. Secara keseluruhan, model penelitian menunjukkan kelayakan dan daya jelaskan yang sangat tinggi ($R^2 = 0.941$ untuk inovasi hijau). Temuan ini mengindikasikan bahwa praktik HR berbasis lingkungan akan lebih efektif jika diperkuat oleh komitmen organisasi. Dari sisi kebijakan, penelitian ini menegaskan pentingnya integrasi kesadaran lingkungan dalam proses rekrutmen, pelatihan, dan berbagi

* Copyright (c) 2025 **Suyanto et al.**

This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/)

Received: June 13, 2025; Revised: August 20, 2025; Accepted: October 12, 2025

pengetahuan, khususnya pada level UMKM. Secara praktis, UMKM didorong untuk menginstitusionalisasikan nilai-nilai hijau dalam budaya organisasi guna memperkuat inovasi dan daya saing jangka panjang. Penelitian ini memberikan kontribusi orisinal dengan memodelkan mekanisme internal GHRM yang memengaruhi inovasi melalui komitmen organisasi, sehingga memperluas teori terdahulu sekaligus menawarkan wawasan kontekstual bagi UMKM di Indonesia.

Kata Kunci: *Green Human Resource Management*; Inovasi Hijau; Komitmen Organisasi; UMKM; Keberlanjutan.

INTRODUCTION

In recent years, environmental issues have become a major concern across multiple sectors, including business. The climate crisis, characterized by deforestation, pollution, and extreme weather events, demands a transformation toward more *sustainable* practices (Soden et al., 2020). In Indonesia, *Micro, Small, and Medium Enterprises (MSMEs)* play a vital role in the national economy, contributing more than 60% to the Gross Domestic Product (GDP) and employing over 97% of the workforce (Kementerian Koordinator Bidang Perekonomian Republik Indonesia, 2025). Despite their strategic role, most MSMEs have not integrated environmental responsibility into their core business strategies. This issue has become increasingly urgent given Indonesia's transition toward a green economy, as reflected in Presidential Instruction No. 13 of 2011 on Energy and Water Conservation and Indonesia's involvement in the World Bank's *Carbon Fund Program*. East Kalimantan even became the first province in Indonesia to receive carbon funding in 2022 due to its forest conservation initiatives. Samarinda, the provincial capital, hosts more than 16,825 MSMEs and holds strategic potential to drive green transformation at the local level (Hasyim, 2024; Prabawati, 2024). However, most MSMEs in the region still prioritize short-term economic performance while neglecting environmental issues that are crucial for long-term sustainability (Asadi et al., 2022).

Reports indicate that the adoption of green innovation among micro, small, and medium enterprises (MSMEs) remains limited but shows promising potential. A survey by Katadata (in Rosadi, 2021) revealed that only about 10% of MSMEs have genuinely integrated sustainability into their products. At the same time, interest in adopting environmentally friendly practices is remarkably high—95% of MSMEs expressed a willingness to implement green business initiatives, according to surveys reported by ANTARA News (2021) and Liputan6.com (2021). While Greenpeace focuses primarily on campaigns, education, and advocacy to encourage better environmental practices across various sectors, these findings emphasize the critical role of MSMEs themselves in driving sustainable transformation. Identifying the internal factors—particularly human resource management practices—that can enable such transitions is therefore essential to accelerate green innovation and achieve broader sustainability goals (GETI Media, 2025).

Research on *Green Human Resource Management (GHRM)* has been conducted in several directions. First, studies have confirmed that GHRM plays an important role in enhancing innovation and environmental performance, especially in large firms and multinational corporations (Jabbour & De Sousa Jabbour, 2016; Yong et al., 2019). Second, other studies emphasize GHRM's contribution to developing a green organizational culture and fostering pro-environmental employee behaviors through policies such as green recruitment, green training, and green reward systems (Cherian & Jacob, 2012; Watzlawick et al., 2011). Third, research has examined the relationship between GHRM and green innovation in global contexts, although most studies have focused on developed countries with relatively stable business ecosystems (Pinzone et al., 2019; Tang et al., 2018).

Nevertheless, these studies leave several gaps. First, the context of MSMEs in developing countries, including Indonesia, remains underexplored, even though this sector has distinct characteristics compared to large firms in terms of resources, organizational structure, and business orientation. Second, most previous studies only examined the direct impact of GHRM on green innovation without exploring the internal mechanisms that mediate this relationship. Third, mediating variables such as *Green Organizational Commitment (GOC)* and internal processes like green knowledge sharing have often been overlooked, despite their potential to strengthen the relationship between GHRM and green innovation (Ahmed et al., 2023; Shoaib et al., 2021; Yang & Li, 2023; Yunaningsih et al., 2024). These gaps provide the opportunity for this study to contribute.

Based on this background, this research aims to analyze the influence of *Green Human Resource Management* (green recruitment, green training, and green knowledge sharing) on *Green Innovation* among MSMEs in Samarinda City, with *Green Organizational Commitment* as a mediating variable. This study is expected to address the shortcomings in previous literature while offering theoretical contributions to the development of models linking GHRM and green innovation in the context of MSMEs in developing countries.

Specifically, the argument of this study is that GHRM does not directly drive green innovation but works through the strengthening of organizational commitment to environmental values. Green recruitment brings in talent with ecological awareness, green training equips them with relevant competencies, and green knowledge sharing facilitates creative collaboration. Together, these elements reinforce green organizational commitment, which becomes the main driver of green innovation in MSMEs. Therefore, the hypothesis proposed in this study is that *Green Organizational Commitment* mediates the influence of GHRM on *Green Innovation*.

RESEARCH METHODS

The unit of analysis in this study is individual owners of Micro, Small, and Medium Enterprises (MSMEs) operating in the food and beverage sector within Samarinda City, East Kalimantan, Indonesia. The study specifically focuses on how these MSME owners implement environmentally conscious human resource practices—such as green recruitment, green training, and green knowledge sharing—and how these practices affect their capacity for green innovation. These individuals were chosen as the unit of analysis because they act as both decision-makers and implementers of human resource and innovation strategies in small-scale business settings, making them critical agents in driving sustainability efforts.

This study adopts a quantitative descriptive research design, utilizing a hypothesis-testing approach to explain causal relationships between variables (Creswell, 2018). The use of a Structural Equation Modeling - Partial Least Squares (SEM-PLS) method was justified by the study's objective to simultaneously test multiple independent variables and their mediating effects on green innovation. Quantitative analysis was deemed appropriate to provide statistically significant findings that are generalizable across the MSME population in Samarinda. The decision to use WarpPLS 7.0 software was based on its ability to model latent variables with small sample sizes, handle complex path modeling, and evaluate mediation relationships effectively.

The study employed primary data as its main source of information, which was collected directly from MSME owners. These respondents represent the actors responsible for applying green practices in recruitment, employee development, and innovation. The sample was drawn from a population of 16,825 registered MSMEs in the food and beverage sector, as recorded by the Samarinda Trade and Industry Office in 2024. Using Slovin's formula with a 10% margin of error, a sample size of 100 MSME owners was

determined. This sample is considered adequate for PLS-based modeling and represents the diversity of small business contexts within the city.

Data were gathered using a structured questionnaire, distributed online via platforms such as WhatsApp and Instagram using a Google Form link. The questionnaire consisted of multiple Likert-scale items designed to measure constructs such as green recruitment, green training, green knowledge sharing, green organizational commitment, and green innovation. These items were adapted from validated instruments used in prior studies (Jabbour et al., 2013; Shoaib et al., 2021). The use of an online self-administered survey was selected due to its cost-effectiveness, accessibility, and ability to reach respondents across various areas of Samarinda during a limited data collection timeframe.

The collected data were analyzed using SEM-PLS with WarpPLS 7.0. This analysis consisted of two stages: evaluation of the outer model (measurement model) and the inner model (structural model). The outer model tested the reliability and validity of measurement instruments using convergent validity, discriminant validity, composite reliability, and Cronbach's alpha. The inner model evaluated the strength and significance of hypothesized relationships among variables using path coefficients and p-values. In addition, mediating effects of green organizational commitment were tested using indirect path analysis. Model fit was assessed using multiple indices including Average Path Coefficient (APC), Average R-squared (ARS), and Tenenhaus Goodness of Fit (GoF), ensuring that the model met the ideal statistical thresholds for predictive relevance and explanatory power.

The results of hypothesis testing are based on the path relationship in the structural model which will be assessed for significance. This significance value can be obtained using SEM analysis with WarpPLS 7.0. Hypothesis significance testing can be seen through the coefficient parameter test.

Testing for mediation effects is carried out when there are mediating or intervening variables in a study. Mediation occurs when exogenous and endogenous variables are interconnected through the role of connecting variables. According to Ghozali and Latan (2015), there are three steps to test the effect of mediating variables, that is:

- Test the effect of exogenous variables (X) on endogenous variables (Y).
- 1) Test the effect of exogenous variables (X) on the mediating variable (M).
- 2) Conducting simultaneous tests on the effects of exogenous variables (X) on endogenous variables (Y) through mediating variables (M).

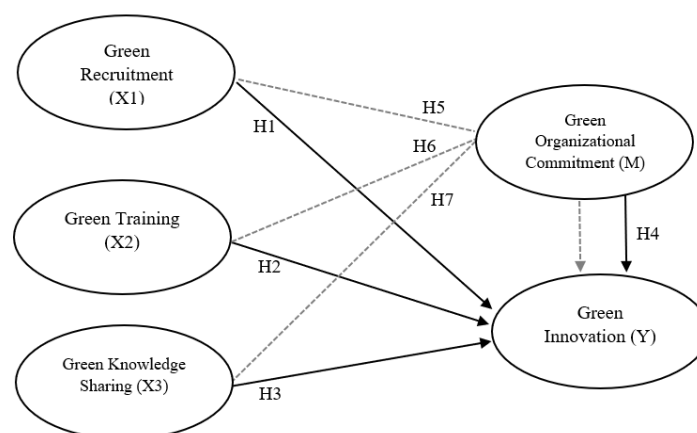


Figure 1. Conceptual Model

Source: Results of data processing in 2025

Analyze

1) Inferential Analyze of the measurement model (Outer Model)

The outer model refers to the evaluation of the reliability and validity of the research variables. Several indicators are used to assess the outer model, including Convergent Validity, Discriminant Validity, Composite Reliability, Cronbach's Alpha, and Average Variance Extracted (AVE). Based on the results of the SEM analysis, all variables were declared valid and reliable, as described below:

Tabel 1. Outer Model

Variabel	Indikator	Cross Loading	Average Variance Extracted (AVE)	Composite Reliability	Cronbach's Alpha
<i>Green Recruitment</i>	GR 1.1	0.824	0.769	0.952	0.939
	GR 1.2	0.823			
	GR 2.1	0.906			
	GR 2.2	0.867			
	GR 3.1	0.930			
	GR 3.2	0.907			
<i>Green Training</i>	GT 1.1	0.833	0.799	0.975	0.972
	GT 1.2	0.903			
	GT 2.1	0.904			
	GT 2.2	0.934			
	GT 3.1	0.890			
	GT 3.2	0.931			
	GT 4.1	0.926			
	GT 4.2	0.788			
	GT 5.1	0.921			
	GT 5.2	0.898			
<i>Green Knowledge Sharing</i>	GKS 1.1	0.894	0.812	0.972	0.967
	GKS 1.2	0.940			
	GKS 2.1	0.837			
	GKS 2.2	0.909			
	GKS 3.1	0.932			
	GKS 3.2	0.900			
	GKS 4.1	0.896			
	GKS 4.2	0.898			
<i>Green Organizational Commitment</i>	GOC 1.1	0.928	0.859	0.973	0.967
	GOC 1.2	0.897			
	GOC 2.1	0.959			

	GOC 2.2	0.951			
	GOC 3.1	0.957			
	GOC 3.2	0.866			
<i>Green Innovation</i>	GI 1.1	0.780	<i>0.831</i>	<i>0.986</i>	<i>0.984</i>
	GI 1.2	0.885			
	GI 2.1	0.898			
	GI 2.2	0.933			
	GI 3.1	0.887			
	GI 3.2	0.930			
	GI 4.1	0.946			
	GI 4.2	0.952			
	GI 5.1	0.78			
	GI 5.2	0.918			
	GI 6.1	0.927			
	GI 6.2	0.924			
	GI 7.1	0.955			
	GI 7.2	0.32			

Source: Results of data processing in 2025

Based on Table 2, the AVE, composite reliability, and Cronbach's alpha values have met the required standards as described above and therefore can be said to be valid.

Table 2. Goodness of Fit

No.	Model Fit & Quality indeces	fit criteria	Analysis Result	Interpretation Value
1	<i>Average path coefficient (APC)</i>	$p < 0.001$	0.314	<i>Positive</i>
2	<i>Average R-squared (ARS)</i>	$P < 0.001$	0.689	Meets Criteria
3	<i>Average adjusted R squared (AARS)</i>	$P < 0.001$	0.678	Good
4	<i>Average block VIF (AVIF)</i>	<i>Acceptable (≤ 5), ideally (≤ 3.3)</i>	2.179	Accepted
5	<i>Average full collinearity VIF (AFVIF)</i>	<i>Acceptable (≤ 5), ideally (≤ 3.3)</i>	2.810	Ideal
6	<i>Tenenhaus GoF (GoF)</i>	<i>Small ≥ 0.1, Medium ≥ 0.25, Large ≥ 0.36</i>	0.749	<i>Significant</i>
7	<i>Sympson's paradox ratio (SPR)</i>	<i>Acceptable (≥ 0.7), ideally = 1</i>	0.857	Ideal
8	<i>R-squared contribution ratio (RSCR)</i>	<i>Acceptable (≥ 0.9), ideally = 1</i>	0.946	Significant
9	<i>Statistical suppression ratio (SSR)</i>	<i>Acceptable (≥ 0.7)</i>	1.000	Ideal
10	<i>Nonlinear bivariate causality direction ratio (NLBCDR)</i>	<i>Acceptable (≥ 0.7)</i>	1.000	Significant

Source: Results of data processing in 2025

To test whether the research model meets the ideal criteria, the Goodness of Fit Model is used. Goodness of fit is defined as an index and measure of how well the relationship between latent variables is represented. A model is considered fit if the model covariance matrix is equal to the data covariance matrix. Overall, the results met all 10 criteria set, indicating that the model is fit (Kock, 2015).

2) Hypothesis Testing

After analyzing the inner and outer models, the next step is hypothesis testing by examining the direct and indirect (mediation) effects shown in Tables 7 and 8.

Table 3. Direct Impact

Variable Influence	Path Coefficient	P-Value	Significant
<i>Green Recruitment → Green Innovation</i>	0.341	<0.001	<i>Positively Significant</i>
<i>Green Training → Green Innovation</i>	0.170	0.039	<i>Positively Significant</i>
<i>Green Knowledge Sharing → Green innovation</i>	0.462	<0.001	<i>Positively Significant</i>
<i>Green Organizational Commitment → Green Innovation</i>	0.339	<0.001	<i>Positively Significant</i>

Source: Results of data processing in 2025

RESULTS AND DISCUSSION

The Direct Effects of GHRM on Green Innovation

The results of the analysis using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with WarpPLS 7.0 show that the three dimensions of Green Human Resource Management (GHRM)—namely green recruitment, green training, and green knowledge sharing—have a direct and significant effect on green innovation among food and beverage MSMEs in Samarinda City. This finding confirms the basic assumption that environmentally conscious human resource management practices can serve as a crucial catalyst in fostering sustainable innovation at the level of small and medium enterprises.

More specifically, green knowledge sharing emerged as the most dominant factor, with a path coefficient of 0.462 ($p < 0.001$). This result indicates that the more intensive the exchange of information, ideas, and experiences related to environmentally friendly practices among MSME owners and employees, the greater their capacity to generate green innovations. This knowledge-sharing mechanism enables collective learning and internal collaboration that accelerate the adoption of innovative practices, such as the use of eco-friendly materials, waste reduction, and the implementation of energy-efficient technologies.

Furthermore, green recruitment also demonstrated a strong positive effect, with a path coefficient of 0.341 ($p < 0.001$). This suggests that recruitment processes that consider candidates' environmental awareness and commitment significantly enhance the tendency of MSMEs to develop sustainable innovations. New talent with a green orientation provides fresh perspectives and strengthens the organization's value alignment with sustainability principles. This factor is particularly important in the context of MSMEs, where recruitment decisions tend to be more flexible, allowing the emphasis on green criteria to directly influence business strategies.

Meanwhile, green training produced a positive but relatively weaker effect compared to the other two variables, with a path coefficient of 0.170 ($p = 0.039$). This finding reinforces that green training remains relevant for strengthening innovation capacity, even though its impact is not as strong as recruitment or knowledge sharing. This can be explained by the limited resources of MSMEs, where formal training programs are often discontinuous and partial. Nonetheless, training still makes an important

contribution by improving employees' technical understanding and skills in supporting the implementation of environmentally sustainable innovations.

A summary of the direct effects of GHRM on green innovation is presented in Table 4 below:

Table 4. Direct Effects of GHRM on Green Innovation

Independent Variable	Dependent Variable	Path Coefficient	p-Value	Remarks
Green Recruitment	Green Innovation	0.341	< 0.001	Positive and Significant
Green Training	Green Innovation	0.170	0.039	Positive and Significant
Green Knowledge Sharing	Green Innovation	0.462	< 0.001	Positive and Significant (strongest)

Source: Data processed using WarpPLS 7.0, 2025

Overall, these results strengthen the perspective of the *Ability-Motivation-Opportunity (AMO)* theory that underpins this research. Green recruitment provides the ability by bringing in environmentally conscious talent; green training enhances the motivation by equipping them with relevant knowledge and skills; and green knowledge sharing creates the opportunity for innovative collaboration. Collectively, these three elements work simultaneously to strengthen the green innovation capacity of MSMEs.

Thus, this study not only confirms the significance of GHRM in promoting sustainable innovation but also highlights that, within the context of MSMEs, internal knowledge sharing becomes the most critical determinant of successful adoption of green innovation.

The Role of Green Organizational Commitment

The SEM-PLS analysis shows that *Green Organizational Commitment (GOC)* has a significant effect on green innovation, with a path coefficient of 0.339 ($p < 0.001$). This finding highlights that organizational commitment to environmental values is a key factor driving sustainable innovation in the MSME sector. In other words, the stronger the orientation and attachment of MSME owners and employees to environmental issues, the greater the likelihood that their organizations will engage in environmentally friendly innovative transformations.

Conceptually, *Green Organizational Commitment* can be understood as the internalization of sustainability values that serve not only a normative function but also a motivational foundation in business decision-making. This commitment functions as a stabilizer that ensures the continuity of green innovation efforts even when MSMEs face resource limitations or market pressures. For example, owners with a green orientation are more consistent in adopting energy-efficient technologies, using eco-friendly raw materials, or minimizing production waste, even when the costs of implementation are relatively higher than conventional practices.

From the perspective of the *Ability-Motivation-Opportunity (AMO)* theory, GOC plays an essential role as the element of motivation that bridges the influence of GHRM policies on green innovation. Green recruitment provides the ability by bringing in environmentally conscious talent; green training expands the opportunity by developing knowledge and skills; and green knowledge sharing enhances the opportunity for collaborative capability. However, without strong organizational commitment to environmental values, these three mechanisms are unlikely to be transformed into actual innovations.

Thus, GOC can be seen as both a psychological and normative driver that converts green human resource practices into sustainable innovative behavior.

The test of GOC's role in influencing green innovation is presented in Table 5 below:

Table 5. The Effect of Green Organizational Commitment on Green Innovation

Independent Variable	Dependent Variable	Path Coefficient	p-Value	Remarks
Green Organizational Commitment	Green Innovation	0.339	< 0.001	Positive and Significant

Source: Data processed using WarpPLS 7.0, 2025

In addition, the mediation test indicates that GOC not only acts as an independent variable but also mediates the relationship between GHRM dimensions (green recruitment, green training, and green knowledge sharing) and green innovation. This suggests that organizational commitment serves as a bridge that amplifies the influence of green HR practices on the realization of innovation. For instance, newly recruited employees with environmental orientations will not automatically produce green innovation unless the organization internalizes sustainability values and visions into its core commitment. Similarly, training and knowledge sharing only effectively drive innovation when employees collectively commit to environmental goals.

Therefore, *Green Organizational Commitment* can be regarded as both a psychological and institutional mechanism that strengthens the relationship between GHRM and green innovation. This finding aligns with the studies of Ahmed et al. (2023) and Shoaib et al. (2021), which emphasize the critical role of organizational commitment as a mediator between green HR practices and sustainable performance. In the context of MSMEs in Samarinda, the role of GOC becomes even more significant given the resource limitations and business scale, where the personal commitment of owners and employees largely determines the strategic direction of the enterprise.

The Mediation Effect of Green Organizational Commitment

The mediation analysis using *SEM-PLS* with WarpPLS 7.0 demonstrates that *Green Organizational Commitment (GOC)* plays a significant role as a mediating variable in the relationship between *Green Human Resource Management (GHRM)* practices and green innovation. In other words, organizational commitment to environmental values serves as an internal mechanism that translates green human resource policies into tangible sustainable innovations within MSME business practices.

In detail, the strongest mediating effect was observed in the path *green knowledge sharing* → *GOC* → *green innovation*, with an indirect path coefficient of 0.156 ($p < 0.001$). This result indicates that green knowledge sharing within the organization not only has a direct impact on innovation but also cultivates a collective commitment to environmental values, which in turn strengthens the organization's capacity for green innovation. In the MSME context, simple activities such as internal discussions, sharing environmentally friendly practices among business owners, or collaboratively implementing waste reduction ideas can foster a shared sense of ownership toward the organization's sustainability mission.

Additionally, the path *green recruitment* → *GOC* → *green innovation* produced a significant mediating effect with a coefficient of 0.115 ($p < 0.001$). This suggests that recruiting employees with an environmental orientation contributes not only through individual competencies but also by reinforcing

the organization's overall commitment to environmental issues. When newly recruited employees bring ecological awareness, these values are more likely to be internalized into the organizational culture, thereby driving consistent sustainable innovation.

Meanwhile, the path *green training* → *GOC* → *green innovation* generated a positive but relatively weaker mediating effect, with a coefficient of 0.057 ($p = 0.041$). Although the contribution is smaller compared to other dimensions, this finding highlights that green training plays a role in building organizational awareness by enhancing employees' knowledge and skills. In other words, training not only transfers technical competencies but also strengthens employees' psychological and normative commitment to the organization's sustainability goals.

A summary of the mediation test results is presented in Table 6 below:

Table 6. Mediation Effects of Green Organizational Commitment

Mediation Path	Path Coefficient	p-Value	Remarks
Green Recruitment → GOC → Green Innovation	0.115	< 0.001	Significant Mediation
Green Training → GOC → Green Innovation	0.057	0.041	Significant Mediation (weakest)
Green Knowledge Sharing → GOC → Green Innovation	0.156	< 0.001	Significant Mediation (strongest)

Source: Data processed using WarpPLS 7.0, 2025

These findings reinforce the argument that green organizational commitment is both a psychological and institutional mechanism crucial for linking green HR practices with sustainable innovation. Without strong organizational commitment, green recruitment, training, or knowledge-sharing policies would only produce partial outcomes. However, when environmental values are embedded in organizational commitment, these policies are transformed into collective behaviors that are consistent and innovation-oriented.

Therefore, the mediating role of GOC in this study provides an important theoretical contribution by affirming that the GHRM–green innovation relationship is not a simple linear connection but is significantly influenced by internal mechanisms of organizational commitment. Practically, this suggests that MSMEs must prioritize the cultivation of an organizational culture grounded in environmental commitment as a key strategy to drive sustainable innovation.

Discussion

This study analyzed the influence of *Green Human Resource Management (GHRM)*—comprising green recruitment, green training, and green knowledge sharing—on green innovation in MSMEs in Samarinda City, with *Green Organizational Commitment (GOC)* as a mediating variable. The results obtained through *SEM-PLS* demonstrate that all three dimensions of GHRM significantly affect green innovation, with green knowledge sharing identified as the most dominant factor. In addition, GOC was found to have a direct influence on green innovation while also mediating the relationship between GHRM and innovation. These findings confirm the critical importance of organizational commitment in bridging green HR policies so that they are effectively implemented in the form of sustainable innovation.

These results can be explained by the fact that environmentally oriented HR practices reinforce the three elements of the *Ability-Motivation-Opportunity (AMO)* framework. Green recruitment provides the ability by bringing in talent with ecological awareness. Green training enhances motivation by expanding employees' understanding and technical competencies. Meanwhile, green knowledge sharing creates opportunity for creative collaboration that strengthens the organization's capacity for innovation. However, these mechanisms cannot be transformed optimally without strong organizational commitment to sustainability values. In other words, GOC functions as an internal mechanism that unifies individual orientations into consistent collective behavior that drives green innovation.

The findings of this study are consistent with previous research demonstrating the effectiveness of GHRM in promoting environmental performance in large firms (Jabbour & De Sousa Jabbour, 2016; B. Yong, 2020). They also support the conclusions of Cherian and Jacob (2012) and Watzlawick et al., (2011), who emphasized GHRM's role in fostering a pro-environmental culture within organizations. However, this research differs by focusing on MSMEs in a developing-country context, which has rarely been explored in prior studies. Compared to studies conducted in developed economies (Pinzone et al., 2019), this study provides novel contributions by demonstrating that mediating variables such as GOC and internal mechanisms like knowledge sharing play an essential role in linking green HR practices with innovation. Thus, the novelty of this study lies in modeling the GHRM-green innovation relationship through GOC in the context of Indonesian MSMEs.

Historically, these findings reflect how the green economy transition has shifted from being dominated by large corporations to becoming increasingly relevant to MSMEs, which were previously perceived primarily as traditional economic actors. This indicates that sustainability has now become part of the local business development narrative. However, the transition toward a green economy in the MSME sector is not without challenges. Many MSMEs still struggle to operationalize green innovation effectively, often limiting their actions to basic measures such as recycling, even while acknowledging the importance of the green transition (Rodrigues & Franco, 2023). Other major barriers include financial and technical constraints, as the high costs of sustainable technologies and the lack of technical know-how hinder the adoption of green practices (Indiran et al., 2025). Regulatory and market pressures also intensify the burden on MSMEs, as compliance with environmental regulations often requires significant financial resources and complex administrative processes (Indiran et al., 2025). In Indonesia specifically, most MSMEs continue to face limited government support and incentives, which slows the adoption of green practices.

Nevertheless, there are significant opportunities accompanying this transition. Public policy support and clear regulatory frameworks can accelerate green transformation, as illustrated by the case of the United Kingdom, where the importance of a green financing roadmap for SMEs has been emphasized (Owen & Burnett, 2025). Moreover, digitalization has become an important factor that can increase resource efficiency, strengthen performance measurement systems, and drive the integration of sustainable value chains (Boeva, 2025; Queiroz et al., 2022). Circular economy practices are also increasingly relevant, particularly in industries under strong regulatory pressure, such as the polymer industry in Europe, which has begun adopting recycling and waste-reduction strategies (Vasileva et al., 2018). In addition, collaboration between MSMEs, research institutions, and policymakers provides critical support in creating an enabling environment for green innovation, as it enhances access to knowledge, technology, and financial resources (Fazlurrahman et al., 2024; Mankar et al., 2025).

Thus, from a historical perspective, the green economy transition within MSMEs represents a complex process: one that is full of challenges but also rich in strategic opportunities. The success of this

transition is determined by a combination of green competencies, behavioral intention, energy efficiency, and supportive regulations, along with cross-actor collaboration (Huy & Phuc, 2025; Jia et al., 2025; Wiratmadja et al., 2025).

From a social perspective, the findings of this study indicate that green HR practices can strengthen organizational solidarity based on environmental values. This underscores that green innovation is not merely about technology or capital, but also the result of social cooperation and the internalization of collective values within the organization. Several studies confirm that green organizational culture (GOC) in SMEs plays a crucial role in promoting environmental sustainability and business performance. For instance, green transformational leadership has been shown to contribute to building a green organizational culture that subsequently enhances employees' innovative behavior and environmental performance (Ismail, 2025; Siswanti & Muafi, 2022). Moreover, GHRM practices, when combined with the development of a green culture, can foster employees' pro-environmental behavior and strengthen their commitment to sustainability goals (Altassan, 2023; Din et al., 2025).

In addition to leadership and HRM, green knowledge sharing has also been proven to reinforce the influence of green organizational culture on green innovation. A study of agricultural SMEs in Morocco demonstrated that social collaboration and environmental knowledge sharing serve as key catalysts for the emergence of green innovation (Simmou et al., 2025). Similar findings were observed among SMEs in Malaysia, where sustainable knowledge management through green innovation enhanced overall organizational performance (Nasir et al., 2024). On the other hand, strategic orientations directed toward green practices, including the adoption of green manufacturing strategies, have also been shown to strengthen sustainable performance and the competitiveness of SMEs (Al-Hakimi et al., 2022; Yahya et al., 2021).

Thus, from a social dimension, it can be understood that green HR practices, when integrated with leadership, collective learning, and green business strategies, can build organizational solidarity based on environmental values. This not only generates improved performance but also strengthens the organization's social identity as an agent of change toward sustainable development.

From an ideological perspective, this study demonstrates that the short-term profit-based business paradigm has begun to shift toward the ideology of sustainability. SMEs are no longer perceived merely as economic units, but also as social agents that play an important role in the global environmental agenda. This aligns with the literature suggesting that sustainability-oriented SMEs are capable of leveraging green innovation to enter niche markets, reduce resource use, and enhance quality of life (Klewitz, 2017; Mukaromah et al., 2023). Both internal drivers such as individual values and organizational culture, and external drivers such as social networks and regulatory pressures, significantly shape SMEs' sustainability practices (Nie et al., 2025; Westman et al., 2019).

Although SMEs face barriers such as limited trained personnel, high costs, and inadequate data (Dixit & Priya, 2023; Gómez-Garza et al., 2024), they nonetheless demonstrate strong capacity as agents of regional development. Through collaboration with government, the private sector, and knowledge networks, SMEs can develop circular economy strategies and strengthen both exploratory and exploitative learning capabilities (Suchek & Franco, 2024). Furthermore, the integration of green strategies into business orientations has been proven not only to improve environmental performance but also to reinforce SMEs' competitiveness and long-term sustainability (Jamil et al., 2025).

Within a broader ideological dimension, the adoption of corporate social responsibility (CSR) practices also reinforces SMEs' position as social actors contributing to sustainable development. Although CSR in SMEs is often informal, it still generates positive impacts on environmental, social, and financial

performance (Mu et al., 2024; Wanze et al., 2025). This confirms that sustainability is no longer merely a business strategy but has become a new ideology that positions SMEs as key pillars in achieving global sustainable development goals.

This study functions to strengthen the GHRM literature by providing empirical evidence that green HR practices can enhance green innovation through organizational commitment, even within the SME sector, which has often been perceived as lacking the capacity for sustainable transformation.

However, these results also have limitations. For example, reliance on organizational commitment may pose challenges if owners or employees lack strong ecological awareness. Moreover, given financial and resource constraints, SMEs are vulnerable to neglecting green practices when facing short-term economic pressures. This finding aligns with studies highlighting the primary barriers SMEs face in adopting green practices. The most dominant barrier is financial, where limited capital and the high upfront costs of eco-friendly technologies prevent many SMEs from initiating sustainable practices (Chien et al., 2021; Indiran et al., 2025; Mashingaidze et al., 2024; Purwandani & Michaud, 2021; D. Wang et al., 2023).

Beyond financial barriers, technical challenges also play a significant role. The lack of technical expertise and limited research and development (R&D) capacity hinder SMEs from effectively adopting and maintaining green innovation (Chin et al., 2024; Karuppiah et al., 2020). From a regulatory perspective, many SMEs struggle to navigate the complexity of environmental regulations, which often require costly certifications and compliance processes, while government support and incentives remain limited (Durrani et al., 2024; Rajapakse et al., 2022).

Organizational barriers are also evident, particularly due to SMEs' relatively loose structures, limited human resources, and the absence of an internal culture oriented toward sustainability (Shahin et al., 2024; L. Wang, 2023). Social and market factors likewise play a role, as consumer perceptions and community skepticism can slow down the adoption of green practices (Mankar et al., 2024; Rizos et al., 2016).

Accordingly, the limitations identified in this study are consistent with the literature emphasizing that the adoption of green practices in SMEs is not only a matter of internal commitment but also strongly influenced by structural, technical, regulatory, and market challenges. To address these issues, financial support strategies, technical training, policy incentives, and the cultivation of a green organizational culture are essential for enabling SMEs to transform toward sustainable business practices.

Based on these reflections, an action plan is required that focuses on strengthening ecological commitment while alleviating financial and resource barriers. First, to address the weak ecological awareness of owners and employees, local governments in collaboration with educational institutions should provide continuous green training programs that instill environmental values while equipping practical skills. Second, to reduce vulnerabilities stemming from financial constraints, governments should provide green incentives such as subsidies, tax relief, or eco-friendly financing schemes that enable SMEs to invest in sustainable technologies and practices. Third, to overcome weak organizational structures and internal commitment, the establishment of local green knowledge-sharing communities should be facilitated. Through these communities, SMEs can exchange experiences, access technical information, and build collective solidarity in facing market pressures. With these measures, the limitations of organizational commitment and resource constraints can be minimized, thereby strengthening SMEs' resilience in transitioning toward sustainable business models.

CONCLUSION

This study concludes that *Green Human Resource Management (GHRM)* practices—comprising green recruitment, green training, and green knowledge sharing—have a significant influence on green innovation among food and beverage MSMEs in Samarinda City. Among the three dimensions of GHRM, green knowledge sharing was found to be the most dominant factor driving green innovation, followed by green recruitment and green training. In addition, *Green Organizational Commitment (GOC)* plays a critical role, functioning both as an independent variable that directly affects green innovation and as a mediating variable that bridges the relationship between GHRM practices and the achievement of sustainable innovation. Thus, this study affirms that green innovation in MSMEs is not only the result of HR policies implemented directly but also emerges through the internalization of values and organizational commitment to sustainability.

The main contribution of this research lies in providing new empirical evidence regarding the role of GOC as a mediating mechanism in the relationship between GHRM and green innovation, particularly in the context of MSMEs in developing countries. This study extends the application of the *Ability-Motivation-Opportunity (AMO)* theory by demonstrating that the abilities, motivations, and opportunities created through GHRM become effective drivers of innovation only when reinforced by organizational commitment to environmental sustainability. Beyond its theoretical contribution, this research also provides practical implications: MSMEs must institutionalize green values within their organizational culture, and policymakers should provide supportive regulations, financial incentives, and continuous training to accelerate the green transformation of the MSME sector.

Nevertheless, this study has several limitations. First, the relatively small sample size (100 MSMEs) requires cautious generalization of the findings. Second, the research focused on the food and beverage sector in a single city (Samarinda), which may limit the applicability of the results to other sectors or regions with different dynamics. Third, the reliance on self-report questionnaires as the primary research instrument introduces the possibility of response bias. Future studies are encouraged to employ larger samples across multiple sectors and regions, adopt longitudinal designs to capture changes in organizational commitment over time, and apply methodological triangulation—such as in-depth interviews or case studies—to enhance the validity of findings.

REFERENCES

- Ahmed, R. R., Akbar, W., Aijaz, M., Channar, Z. A., Ahmed, F., & Parmar, V. (2023). The role of green innovation on environmental and organizational performance: Moderation of human resource practices and management commitment. *Heliyon*, 9(1). <https://doi.org/10.1016/j.heliyon.2022.e12679>
- Al-Hakimi, M. A., Al-Swidi, A. K., Gelaidan, H. M., & Mohammed, A. (2022). The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis. *Journal of Cleaner Production*, 376, 134346. <https://doi.org/10.1016/j.jclepro.2022.134346>
- Altassan, M. A. (2023). Understanding the Role of Green Organization Culture and Innovation between Green HRM Practices and Environmental Performance of SMEs in Saudi Arabia. *Pakistan Journal of Life and Social Sciences (PJLSS)*, 21(2). <https://doi.org/10.57239/PJLSS-2023-21.2.0013>
- Asadi, A., Sularsih, H., Wibisono, S. H., & Mukoffi, A. (2022). Kebijakan insentif pajak UMKM di masa pandemi Covid-19. *E-Journal Perdagangan Industri Dan Moneter*, 10(2), 85–90.

- Boeva, V. (2025). The Integration of the Digital Economy and the Green Transition – Opportunities for Small and Medium-Sized Enterprises, Environment, Technology, Resources. *ENVIRONMENT. TECHNOLOGY. RESOURCES. Proceedings of the International Scientific and Practical Conference*, 1, 97–102. <https://doi.org/10.17770/etr2025vol1.8657>
- Cherian, J., & Jacob, J. (2012). Green marketing: A study of consumers' attitude towards environment friendly products. *Asian Social Science*, 8(12), 117.
- Chien, F., Pantamee, A. A., Hussain, M. S., Chupradit, S., Nawaz, M. A., & Mohsin, M. (2021). Nexus between financial innovation and bankruptcy: evidence from information, communication and technology (ict) sector. *The Singapore Economic Review*, 1–22.
- Chin, W. L., Tham, A., & Noorashid, N. (2024). Distribution of (In)Equality and Empowerment of Community-Based Tourism: The Case Study of Brunei Darussalam. *International Journal of Hospitality & Tourism Administration*, 25(5), 843–874. <https://doi.org/10.1080/15256480.2023.2175287>
- Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). Sage Publications.
- Din, M. ud, Ahmad, A., Samad, S., Lee, S., & Han, H. (2025). Sowing the seeds of sustainability: A sociological exploration of environmental sustainability within SME sector. *Climate Services*, 37, 100533. <https://doi.org/10.1016/j.cliser.2024.100533>
- Dixit, S. K., & Priya, S. S. (2023). Barriers to corporate social responsibility: an Indian SME perspective. *International Journal of Emerging Markets*, 18(9), 2438–2454. <https://doi.org/10.1108/IJOEM-02-2021-0294>
- Durrani, N., Raziq, A., Mahmood, T., & Khan, M. R. (2024). Barriers to adaptation of environmental sustainability in SMEs: A qualitative study. *PLOS ONE*, 19(5), e0298580. <https://doi.org/10.1371/journal.pone.0298580>
- Fazlurrahman, H., Ciptomulyono, U., & Irhamah. (2024). Volatility Technology and Environmental Sustainability to Improve Green Innovation in Small Medium Enterprises: A Bibliometric Analysis. *2024 12th International Conference on Cyber and IT Service Management (CITSM)*, 1–5. <https://doi.org/10.1109/CITSM64103.2024.10775960>
- GETI Media. (2025). Meningkatkan Daya Saing UMKM dengan Inovasi Ramah Lingkungan. *GETI Media*. <https://getimedia.id/2025/04/28/meningkatkan-daya-saing-umkm-dengan-inovasi-ramah-lingkungan/>
- Ghozali, I., & Latan, H. (2015). *Partial least squares konsep, teknik dan aplikasi menggunakan program smartpls 3.0 untuk penelitian empiris* (Vol. 4, Issue 1). Badan Penerbit UNDIP.
- Gómez-Garza, R., Güereca, L. P., Padilla-Rivera, A., & Ibarra, A. A. (2024). Barriers and enablers of life cycle assessment in small and medium enterprises: a systematic review. *Environment, Development and Sustainability*. <https://doi.org/10.1007/s10668-024-05622-1>
- Hasyim, I. (2024). Kalimantan Timur Jadi Penerima Pertama Dana Karbon FCPF di Asia Pasifik. *Tempo.Co*. <https://www.tempo.co/digital/kalimantan-timur-jadi-penerima-pertama-dana-karbon-fcpf-di-asia-pasifik-72826>
- Huy, P. Q., & Phuc, V. K. (2025). Changing times: does the critical success factors boosting green transition of SMEs remain unchanged? *Journal of Innovation and Entrepreneurship*, 14(1), 2. <https://doi.org/10.1186/s13731-024-00449-6>
- Indiran, L., Abdullah, M., Raj, J., & Hassan, M. S. (2025). The Challenges of Sustainability Practices among SMEs: Interview with CEOs in Malaysia. *IOP Conference Series: Earth and Environmental Science*, 1488(1), 012038. <https://doi.org/10.1088/1755-1315/1488/1/012038>
- Ismail, I. J. (2025). Transforming small business ventures for a greener tomorrow: the interplay between green transformational leadership, organizational green culture, and environmental sustainability. *Cogent Social Sciences*, 11(1). <https://doi.org/10.1080/23311886.2024.2441400>

- Jabbour, C. J. C., & De Sousa Jabbour, A. B. L. (2016). Green Human Resource Management and Green Supply Chain Management: Linking two emerging agendas. *Journal of Cleaner Production*, 112, 1824–1833. <https://doi.org/10.1016/j.jclepro.2015.01.052>
- Jabbour, C. J. C., Jabbour, A. B. L. de S., Foropon, C., & Gassmann, O. (2013). Green Human Resource Management: A Review and Future Directions. *Journal of Cleaner Production*, 57, 1–13.
- Jamil, K., Zhang, W., Anwar, A., & Mustafa, S. (2025). Driving SME Sustainability via the Influence of Green Capital, HRM, and Leadership. *Sustainability*, 17(13), 6076. <https://doi.org/10.3390/su17136076>
- Jia, H., Nurbanu, A., & Azimkhan, S. (2025). Role of Renewable Energy in the Green Transition of Small and Medium Sized Enterprises in Mongolia. *The Singapore Economic Review*, 1–16. <https://doi.org/10.1142/S0217590825490207>
- Karuppiah, K., Sankaranarayanan, B., Ali, S. M., Chowdhury, P., & Paul, S. K. (2020). An integrated approach to modeling the barriers in implementing green manufacturing practices in SMEs. *Journal of Cleaner Production*, 265, 121737. <https://doi.org/10.1016/j.jclepro.2020.121737>
- Kementerian Koordinator Bidang Perekonomian Republik Indonesia. (2025). Pemerintah Dorong UMKM Naik Kelas, Tingkatkan Kontribusi terhadap Ekspor Indonesia. *Kementerian Koordinator Bidang Perekonomian Republik Indonesia*. [https://www.ekon.go.id/publikasi/detail/6152/pemerintah-dorong-umkm-naik-kelas-tingkatkan-kontribusi-terhadap-ekspor-indonesia#:~:text=Peran UMKM sebagai tulang punggung,dari 64 juta unit usaha](https://www.ekon.go.id/publikasi/detail/6152/pemerintah-dorong-umkm-naik-kelas-tingkatkan-kontribusi-terhadap-ekspor-indonesia#:~:text=Peran%20UMKM%20sebagai%20tulang%20punggung,dari%2064%20juta%20unit%20usaha).
- Klewitz, J. (2017). Grazing, exploring and networking for sustainability-oriented innovations in learning-action networks: An SME perspective. *Innovation: The European Journal of Social Science Research*.
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration (Ijec)*, 11(4), 1–10.
- Liputan6.com, & Deny, S. (2021). Survei: 95 Persen UMKM Berminat Terapkan Usaha Ramah Lingkungan. *Liputan6.Com*. <https://www.liputan6.com/bisnis/read/4684640/survei-95-persen-umkm-berminat-terapkan-usaha-ramah-lingkungan#:~:text=Survei: 95 Persen UMKM Berminat,Ramah Lingkungan - Bisnis Liputan6.com>
- Mankar, V. A., Katare, V., Lodhi, L., & Kaushik, T. K. (2025). *A Study of Drivers and Barriers of Green Supply Chain Management Practices in the Context of Developing Framework for SMEs* (pp. 1–14). <https://doi.org/10.4018/979-8-3373-0045-0.ch001>
- Mankar, V. A., Vichoray, C., & Shukla, H. (2024). Sustainable supply chain management in SMEs: Analyzing drivers and barriers to green practices in Nagpur. *Nanotechnology Perceptions*.
- Mashingaidze, M., Bunu, S. V., Mashoko, D., Njanji, R., & Madyise, T. (2024). *Adoption of Green Practices in Small and Medium Enterprises in Developing Countries* (pp. 25–50). <https://doi.org/10.4018/979-8-3693-7046-9.ch002>
- Mu, Z., Li, Y., & Hussain, H. (2024). Sustainability Beyond Profits: Assessing the Impact of Corporate Social Responsibility on Strategic Business Performance in Hospitality Small and Medium Enterprises. *Sustainability*, 16(23), 10224. <https://doi.org/10.3390/su162310224>
- Mukaromah, H., Permana, C. T., & Astuti, W. (2023). Aiming towards creative city: how Surakarta City government applied the Sustainability-Oriented Innovation (SOI) as a strategy to empower local small and medium creative industries. *IOP Conference Series: Earth and Environmental Science*, 1186(1), 012018. <https://doi.org/10.1088/1755-1315/1186/1/012018>
- Nasir, A., Zakaria, N., Do, N., & Velasquez, S. (2024). The impact of knowledge management on sustainable performance with mediation effect of green innovation in Malaysian SMEs. *VINE Journal of Information and Knowledge Management Systems*. <https://doi.org/10.1108/VJIKMS-02-2024-0066>

- Nie, L., Lam, W., & Zhang, R. (2025). Sustainability of Small and Medium-Sized Enterprises in Hong Kong: Drivers and the Moderating Role of Social Network. *Corporate Social Responsibility and Environmental Management*, 32(4), 4726–4742. <https://doi.org/10.1002/csr.3207>
- Owen, R., & Burnett, A. (2025). Delivering Net Zero and Beyond: Addressing the Financing Challenges for UK Green SME Transition. In *Examining Net Zero: Creating Solutions for a Greener Society and Sustainable Economic Growth* (pp. 175–185). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-83608-574-420251017>
- Pinzone, M., Guerci, M., Lettieri, E., & Huisinigh, D. (2019). Effects of ‘green’training on pro-environmental behaviors and job satisfaction: Evidence from the Italian healthcare sector. *Journal of Cleaner Production*, 226, 221–232.
- Prabawati. (2024). Langkah Konkret Kalimantan Timur Dalam Mitigasi Emisi GRK Melalui Sektor Perkebunan. *Diskominfo Kaltim*. <https://portal.kaltimprov.go.id/detailberita/langkah-konkret-kalimantan-timur-dalam-mitigasi-emisi-grk-melalui-sektor-perkebunan>
- Purwandani, J. A., & Michaud, G. (2021). What are the drivers and barriers for green business practice adoption for SMEs? *Environment Systems and Decisions*, 41(4), 577–593. <https://doi.org/10.1007/s10669-021-09821-3>
- Queiroz, G. A., Alves Junior, P. N., & Costa Melo, I. (2022). Digitalization as an Enabler to SMEs Implementing Lean-Green? A Systematic Review through the Topic Modelling Approach. *Sustainability*, 14(21), 14089. <https://doi.org/10.3390/su142114089>
- Rahman, M. R. (2021). Survei: 95 persen UMKM berminat terapkan usaha ramah lingkungan. *Antara News*. <https://www.antaraneews.com/berita/2460041/survei-95-persen-umkm-berminat-terapkan-usaha-ramah-lingkungan#:~:text=Survei: 95 persen UMKM berminat terapkan usaha ramah lingkungan - ANTARA News>
- Rajapakse, R. M. D. A. P., Azam, S. M. F., & Khatibi, A. (2022). Towards Green Credentials of SMEs: Qualitative Insights on Barriers to Green Responsiveness from a Developing Economy. *International Journal of Applied Economics, Finance and Accounting*, 14(1), 15–24. <https://doi.org/10.33094/ijaefa.v14i1.635>
- Rizos, V., Behrens, A., Van der Gaast, W., Hofman, E., Ioannou, A., Kafyeke, T., Flamos, A., Rinaldi, R., Papadelis, S., Hirschnitz-Garbers, M., & Topi, C. (2016). Implementation of Circular Economy Business Models by Small and Medium-Sized Enterprises (SMEs): Barriers and Enablers. *Sustainability*, 8(11), 1212. <https://doi.org/10.3390/su8111212>
- Rodrigues, M., & Franco, M. (2023). Green Innovation in Small and Medium-Sized Enterprises (SMEs): A Qualitative Approach. *Sustainability*, 15(5), 4510. <https://doi.org/10.3390/su15054510>
- Rosadi, D. (2021). Survei UNDP: 95 Persen UMKM Berminat Terapkan Usaha Ramah Lingkungan. *Katadata.Co.Id*. <https://katadata.co.id/berita/industri/61681c66c21c2/survei-undp-95-persen-umkm-berminat-terapkan-usaha-ramah-lingkungan>
- Shahin, V., Alimohammadlou, M., & Abbasi, A. (2024). Identifying and prioritizing the barriers to green innovation in SMEs and the strategies to counteract the barriers: An interval-valued intuitionistic fuzzy approach. *Technological Forecasting and Social Change*, 204, 123408. <https://doi.org/10.1016/j.techfore.2024.123408>
- Shoaib, M., Abbas, Z., Yousaf, M., Zámečník, R., Ahmed, J., & Saqib, S. (2021). The role of GHRM practices towards organizational commitment: A mediation analysis of green human capital. *Cogent Business & Management*, 8(1), 1870798.
- Simmou, W., Shehadeh, M., Ed-Dafali, S., Hussainey, K., & Nandy, M. (2025). From Culture to Green Innovation: The Interplay of Social Capital, Entrepreneurial Leadership, and Green Knowledge Sharing in Moroccan Agricultural SMEs. *Business Strategy and the Environment*, 34(5), 6264–6282. <https://doi.org/10.1002/bse.4303>
- Siswanti, Y., & Muafi, M. (2022). Ethical Leadership Style in Moderating the Influence of Green Organizational Culture on Green Innovative Behavior: SMEs Cases. *International Journal of*

-
- Sustainable Development and Planning*, 17(4), 1153–1160. <https://doi.org/10.18280/ijstdp.170413>
- Soden, R., Hamel, P., Lallemand, D., & Pierce, J. (2020). The Disaster and Climate Change Artathon: Staging art/science collaborations in crisis informatics. *Proceedings of the 2020 ...* <https://doi.org/10.1145/3357236.3395461>
- Suchek, N., & Franco, M. (2024). Inter-organisational Cooperation Oriented Towards Sustainability Involving SMEs: a Systematic Literature Review. *Journal of the Knowledge Economy*, 15(1), 1952–1972. <https://doi.org/10.1007/s13132-023-01196-x>
- Tang, M., Walsh, G., Lerner, D., Fitza, M. A., & Li, Q. (2018). Green innovation, managerial concern and firm performance: An empirical study. *Business Strategy and the Environment*, 27(1), 39–51.
- Vasileva, E., Hristova-Pesheva, Y., & Ivanova, D. (2018). Green business management as a business opportunity for small and medium-size enterprises in polymer industry. *Journal of Chemical Technology and Metallurgy*.
- Wang, D., Si, R., & Fahad, S. (2023). Evaluating the small and medium sized enterprises motivating factors and influencing barriers about adoption of green practices. *Environment, Development and Sustainability*, 25(4), 3029–3041. <https://doi.org/10.1007/s10668-022-02166-0>
- Wang, L. (2023). Digital economy, entrepreneurship and energy efficiency. *Energy*, 269. <https://doi.org/10.1016/j.energy.2023.126801>
- Wanze, L., Embong, Z., Saleh, N. M., & Abdullah, M. (2025). Corporate social responsibility and SME sustainability: A systematic literature review. *Jurnal Pengurusan*.
- Watzlawick, P., Bavelas, J. B., & Jackson, D. D. (2011). *Pragmatics of human communication: A study of interactional patterns, pathologies and paradoxes*. WW Norton & Company.
- Westman, L., Luederitz, C., Kundurpi, A., Mercado, A. J., Weber, O., & Burch, S. L. (2019). Conceptualizing businesses as social actors: A framework for understanding sustainability actions in small- and medium-sized enterprises. *Business Strategy and the Environment*, 28(2), 388–402. <https://doi.org/10.1002/bse.2256>
- Wiratmadja, I. I., Achmad, F., & Rizana, A. F. (2025). *Green Strategy Implementation and Innovativeness in SMEs: A Pathway Towards Sustainable Development Goals* (pp. 305–314). https://doi.org/10.1007/978-981-96-5690-5_29
- Yahya, S., Jamil, S., & Farooq, M. (2021). The impact of green organizational and human resource factors on developing countries' small business firms tendency toward green innovation: A natural resource-based view approach. *Creativity and Innovation Management*, 30(4), 726–741. <https://doi.org/10.1111/caim.12469>
- Yang, M., & Li, Z. (2023). The influence of green human resource management on employees' green innovation behavior: The role of green organizational commitment and knowledge sharing. *Heliyon*, 9(11).
- Yong, B. (2020). An intelligent blockchain-based system for safe vaccine supply and supervision. *International Journal of Information Management*, 52. <https://doi.org/10.1016/j.ijinfomgt.2019.10.009>
- Yong, J. Y., Yusliza, M.-Y., Ramayah, T., & Fawehinmi, O. (2019). Nexus between green intellectual capital and green human resource management. *Journal of Cleaner Production*, 215, 364–374.
- Yunaningsih, A., Johan, A., & Rahmayanti, R. (2024). Fostering innovation through green HRM: The mediating role of organizational support and green commitment. *Asian Management and Business Review*, 4(2), 293–307.
-