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Modeling environmental performance: Green human resource management, leadership, commitment, innovation, and cultural moderation

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ABSTRACT

This study investigates the key drivers of environmental performance in micro, small, and medium enterprises in Surabaya, Indonesia, focusing on green human resource management, green transformational leadership, organizational commitment, and green innovation. The research also examines green organizational culture as a potential moderator influencing the relationships between these factors and environmental outcomes. Using a quantitative approach, data were collected from 188 respondents to micro, small, and medium enterprises and analyzed using partial least squares structural equation modeling. The results indicate that organizational commitment has the strongest impact on environmental performance, suggesting that employees who feel a deep connection to and sense of responsibility for their organization are more likely to adopt eco-friendly practices. Green innovation also plays a pivotal role by facilitating the development of sustainable products and processes that enhance resource efficiency. Additionally, both green human resource management and green transformational leadership contribute positively, supporting broader sustainability objectives. Interestingly, the analysis of moderation effects suggests that a highly structured green organizational culture may, in some cases, constrain the influence of green human resource management on environmental outcomes, indicating that overly rigid cultural expectations may not always align with the operational capacities of resource-limited micro, small, and medium enterprises. Overall, the findings emphasize the importance of designing sustainability initiatives that are both strategically ambitious and practically feasible for a small enterprise.

1. Introduction

In today's age of sustainability, environmental performance has shifted from being a peripheral concern to a central expectation for businesses, including micro, small, and medium

enterprises (MSMEs). As the backbone of economic growth, MSMEs increasingly face pressures to embrace eco-conscious practices that align with global sustainability agendas (Pandya et al., 2024). However, the path toward such practices is fraught with obstacles: limited awareness, scarce resources, and wavering commitment among business owners (Madrid-Guijarro & Duréndez, 2024), compounded by managerial capacities that often fall short in executing environmentally oriented strategies (Hristov et al., 2022).

Amid these mounting challenges, approaches such as environmentally focused transformational leadership, the cultivation of a green organizational culture, and the strategic deployment of green human resource management (GHRM) have emerged as key levers for organizational environmental accountability (Zhao et al., 2021; Alwali & Alwali, 2025). These mechanisms extend beyond enhancing ecological performance; they also spark innovation and nurture environmentally responsible behaviors across organizational hierarchies (Fosu et al., 2024; Awwad et al., 2026). Empirical evidence indicates that green leadership combined with a green culture can serve as a powerful engine for corporate sustainability, shaping employees' environmental mindsets and producing tangible ecological outcomes (Al-Swidi et al., 2021). This suggests that embedding sustainability in leadership and organizational norms should be more than a symbolic gesture; it must serve as a central driver of ongoing environmental improvement (Khammadee & Ninaroon, 2022; Altassan, 2023; Boeske, 2023).

Theoretically, this study is anchored in three perspectives: the resource-based view (RBV), ability–motivation–opportunity (AMO) theory, and institutional theory. RBV posits that internal resources such as GHRM practices, leadership competencies, and environmentally attuned organizational culture can yield enduring competitive advantages when they are valuable, rare, inimitable, and effectively managed (Barney, 1991; Hart, 1995). Such resources are particularly potent when they facilitate sustainable innovation and bolster environmental capabilities (Aftab et al., 2023). AMO theory complements this by emphasizing that employees' ecological skills, intrinsic motivation, and the opportunities provided through GHRM and leadership interventions jointly shape the likelihood of pro-environmental behavior and sustainable innovation (Appelbaum, 2000; Iftikar et al., 2022). Meanwhile, institutional theory highlights external pressures, including regulations, societal norms, and market expectations, that guide organizations toward environmentally responsible practices, ensuring legitimacy and stakeholder approval (DiMaggio & Powell, 1983; Tereshchenko et al., 2023). Taken together, these lenses illuminate why GHRM, green transformational leadership, organizational culture, employee commitment, and innovation are expected to intersect in shaping environmental performance, underscoring the dynamic interplay between internal capabilities and external demands (Shoaib et al., 2025).

For MSMEs, major barriers to implementing green strategies include a shortage of skilled labor and limited adoption of green technologies (Handayani et al., 2025; Purwanto et al., 2026). Research shows that GHRM practices become effective only when reinforced by strong managerial support and an organizational culture that encourages sustainable innovation (Al-Swidi et al., 2021). Similar patterns are evident in Surabaya, where MSMEs significantly contribute to the local economy, yet their environmentally friendly practices remain suboptimal due to low awareness and technological constraints (Tereshchenko et al., 2023; Purwanto et al., 2026). While most studies explore how isolated elements like green leadership or GHRM may enhance environmental performance (Niazi et al., 2023; Younis & Hussain, 2023), few examine the combined effects of GHRM, green transformational leadership, eco-conscious corporate culture, and green innovation on MSMEs. Research by Weber and Kassab (2024) underscores that true sustainability requires integrating green management with innovation, yet empirical evidence on small urban enterprises, particularly in resource-constrained developing cities like Surabaya, remains limited (Evinita et al., 2025; Utari, 2025; Hanoteau et al., 2026).

In Indonesia, Surabaya is a city with rapid MSME growth. However, low awareness of green innovation poses a serious challenge to maintaining business sustainability (Purwanto et al., 2024). The results of a study by Purwanto et al. (2024) show that environmentally based transformational leadership practices can trigger green innovation, thereby greatly enhancing an organization's environmental performance. In 2025, the Department of Cooperatives and MSMEs of East Java, Indonesia, reported that Surabaya has more than 385.054 MSMEs, which contribute significantly to the local economy. However, the Central Statistics Agency of Surabaya's report in 2023 shows that the majority of MSMEs in this city have not integrated sustainability practices into their operations, which indicates a gap between economic growth and environmental responsibility (Vásquez et al., 2021; Tereshchenko et al., 2023; Oluwatoyin & Mardikaningsih, 2024). Limitations in implementing sustainable measures, such as waste management and energy optimization, are fundamental obstacles to achieving sustainability (Hegab et al., 2023). This shows that although the potential for sustainability in the MSME sector is great, its implementation remains far from adequate. Compared with MSMEs in larger metropolitan areas such as Jakarta or Bandung, firms in Surabaya generally face stronger resource constraints, lower access to green technologies, and more informal management structures, which may limit the adoption of structured sustainability strategies

Implementing GHRM can serve as a strategic lever for MSMEs to address environmental challenges. Evidence from Fang et al. (2022), Elshaer et al. (2023), and Xie et al. (2023) indicates that GHRM not only encourages employees to adopt pro-environmental behaviors but also stimulates green innovation within small and medium-sized enterprises. However, the MSME sector often struggles with human resource constraints, including limited skill sets and insufficient training programs, which impede the effective deployment of GHRM initiatives (Kodua et al., 2022). This situation resonates with the context of MSMEs in Surabaya, where employee exposure to sustainability-focused training remains minimal. Alongside GHRM, environmentally oriented transformational leadership plays a pivotal role in promoting green behaviors across the workforce (Zhong & Hahn, 2026). However, there remains a gap in understanding how green leadership can be tailored to MSMEs, particularly in large urban centers facing intricate social and economic pressures, such as Surabaya.

The presence of a green organizational culture is equally critical in enhancing environmental performance, as it fosters collaboration between management and employees to cultivate environmentally conscious workplaces (Bashirun et al., 2025). When organizations embed environmental responsibility in their core values, members are more inclined to support sustainable practices collectively. Prior research corroborates this, demonstrating that a robust green organizational culture strengthens environmental initiatives and improves overall sustainability outcomes (Fang et al., 2022). Moreover, scholars have highlighted that such a culture can heighten employees' commitment to environmental stewardship and enhance the effectiveness of GHRM implementation (Singh et al., 2020).

Despite these benefits, awareness of the strategic importance of green organizational culture among MSMEs in Surabaya remains limited. Many business owners have yet to recognize the long-term advantages of a sustainability-oriented culture. While prior studies often assume that green organizational culture amplifies the impact of GHRM practices (Aggarwal & Agarwala, 2023; Ahmad et al., 2023; Legese et al., 2026), this assumption is seldom tested within MSMEs. In smaller organizations, the expectations for fostering an environmental culture may exceed the available resources or capacities, rendering formal green practices less effective or more difficult to implement (Singh et al., 2020; Crossley et al., 2021). Consequently, further investigation is warranted to understand how green organizational culture functions in MSMEs and to assess whether it consistently reinforces the application of environmental management practices in small-scale business settings.

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The role of green innovation cannot be ignored, as it enables organizations to strengthen their overall sustainability efforts by developing more environmentally friendly products, processes, and technologies. Green innovation improves operational efficiency and company competitiveness (Kumar & Gupta, 2026). However, most MSMEs in Surabaya still rely on conventional technologies that are less efficient and environmentally friendly, limiting their contribution to environmental performance. Another challenge is the low level of organizational commitment to sustainability. The organization's dedication to sustainability is essential to ensuring that diverse green efforts transcend mere ceremonial gestures and are integrated into a holistic business plan framework (Rasheed et al., 2025). Research by Karatepe et al. (2022) shows that strong organizational commitment can increase employee engagement in sustainability programs. Unfortunately, in Surabaya, most MSME players still view sustainability as an additional burden, failing to leverage it as an important strategy to strengthen business competitiveness.

Good environmental performance is becoming increasingly important for MSMEs to maintain business sustainability and to meet increasingly stringent market and regulatory demands (Ali et al., 2021). Additionally, consumers are increasingly concerned about how the items they purchase affect the environment, and businesses that cannot demonstrate their commitment to sustainability risk losing market share (Tereshchenko et al., 2023). The Indonesian government's efforts to support sustainability are manifested through regulatory policies that require companies, including MSMEs, to reduce their ecological footprint (Mardikaningsih & Arifin, 2021). This is done, among other things, by reducing carbon emissions and expanding the use of renewable energy sources.

Environmental performance at the organizational level reflects how effectively a company integrates environmentally responsible practices into its operations. It is widely regarded as a key indicator of an organization’s progress toward sustainability (Feng et al., 2024). Research has consistently shown that organizations demonstrating higher environmental performance are more likely to secure long-term sustainability, enhance operational efficiency, and gain competitive advantages (Singh et al., 2020). However, among MSMEs in Surabaya, environmental performance often receives limited attention. Many business owners remain focused primarily on short-term profits and financial survival rather than on strategies that promote sustainable long-term growth (Hegab et al., 2023).

In this context, the simultaneous integration of multiple organizational factors becomes essential for enhancing environmental performance in MSMEs. Key elements include GHRM, environmentally oriented transformational leadership, sustainability-driven organizational culture, green innovation, and employees’ commitment to environmental objectives. When these factors operate in concert, they can collectively reinforce the organization’s capacity to achieve meaningful environmental outcomes. Previous research, however, has largely examined these variables in isolation. For instance, Fang et al. (2022) focused on the influence of GHRM, Zhao et al. (2021) explored the link between green transformational leadership and green innovation, and Akhtar et al. (2024) emphasized the contribution of green innovation to environmental performance. Despite these insights, studies that integrate all of these components within a single cohesive framework, particularly in the context of MSMEs, remain scarce.

Despite extensive discussion in the literature, the interaction among these variables remains underexplored, particularly for MSMEs in Surabaya (Rumanti et al., 2026). At the same time, these enterprises face mounting pressures from environmental regulations and increasingly sustainability-conscious consumers. Consequently, MSMEs must adopt more integrated and comprehensive sustainability strategies (Shafaei et al., 2020). Implementing GHRM is a critical first step to ensure that human resource policies align with broader sustainability objectives (Fang et al., 2022). Similarly, green transformational leadership is

essential, as it can shape organizational values and guide the formation of a sustainability-focused culture (Srivastava et al., 2024). Furthermore, organizational commitment acts as a driver, motivating employees to engage in pro-environmental behaviors and supporting green innovation that promotes efficient resource use (Farrukh et al., 2022; Wei et al., 2023).

An organizational culture that is flexible and responsive to environmental challenges can enhance the effectiveness of GHRM in improving environmental performance. Research indicates that when a culture emphasizes ecological responsibility, the implementation of GHRM practices becomes more impactful (Fang et al., 2022; Khammadee & Ninaroon, 2022; Altassan, 2023). Such a culture not only facilitates the practical adoption of sustainable human resource initiatives but also reinforces the connection between these practices and tangible environmental outcomes. In other words, embedding sustainability values into everyday routines and shared behaviors enables GHRM programs to exert a stronger and more measurable influence (Gazi et al., 2024). Thus, cultivating a robust green organizational culture is a crucial strategy for maximizing the effectiveness of GHRM, especially in MSMEs.

This study adopts a comprehensive perspective by integrating multiple green management factors into a single analytical framework. It examines the interplay among GHRM, green transformational leadership, green organizational culture, organizational commitment, and green innovation. It assesses the moderating influence of green organizational culture on MSMEs operating in a developing urban environment. Unlike previous research, which has often concentrated on large corporations or treated these variables individually (Fang et al., 2022; Ahmed et al., 2024; Zihan & Makhbul, 2024), this study seeks to illuminate how these elements collectively shape environmental performance in Indonesian MSMEs, with particular attention to Surabaya, and whether green organizational culture amplifies or modifies these relationships (Zhao et al., 2021).

By exploring these interrelationships, the study aims to identify mechanisms for optimizing environmental performance in the sustainability era, offering actionable guidance for MSMEs to implement effective green transformations. Additionally, it investigates how GHRM mechanisms and environmentally conscious organizational culture can interact synergistically to enhance both environmental and organizational sustainability. Ultimately, the findings are intended to provide both practical and theoretical insights to reinforce sustainable practices within the MSME sector.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. Resource-Based View

This study employs multiple theoretical lenses to understand how organizational practices can enhance environmental performance, with the resource-based view (RBV) proposed by Barney (1991) serving as a primary framework. RBV posits that firms secure sustained competitive advantages when they control resources that are valuable, rare, difficult to imitate, and non-substitutable. In the realm of environmental management, such strategic resources may encompass GHRM practices, environmentally oriented leadership, a culture centered on sustainability, and capabilities to foster green innovation (Hart, 1995). From the RBV perspective, these internal resources are pivotal in enabling firms to respond effectively to environmental challenges while cultivating long-term competitive advantages (Barney, 1991; Aftab et al., 2023). Importantly, in the context of environmental strategy, these resources are not easily replicated by competitors. Thus, the success of green initiatives depends less on the mere adoption of standardized practices and more on how organizations skillfully orchestrate, combine, and deploy their unique capabilities (Hällerstrand et al., 2023). In other words, achieving strong environmental

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performance arises from leveraging distinctive organizational resources to drive sustainable innovation and promote environmentally responsible behaviors (Aftab et al., 2023).

2.1.2. Natural Resource-Based View

The resource-based view was further expanded through the concept of the natural resource-based view (NRBV) introduced by Hart (1995). This perspective argues that organizations' ability to manage and use natural resources strategically can generate long-term value not only in economic terms but also in environmental outcomes (Hart, 1995). Within the NRBV framework, several organizational capabilities become particularly critical, including pollution prevention initiatives, product stewardship practices, and the development of environmentally responsible technologies (Hart, 1995; Liu, 2025). Rather than treating environmental management as a peripheral obligation, these capabilities position sustainability as an integral component of strategic resource development. Organizations that cultivate such competencies can minimize ecological harm while improving operational efficiency and strengthening their competitive positioning in markets that increasingly prioritize sustainability. In this context, firms that effectively embed environmental responsibility into their strategic orientation often move beyond simple regulatory compliance. By internalizing environmental concerns into core organizational processes, they can reinforce corporate reputation and sustain competitive advantage over time (Song & Yang, 2026). Consequently, environmental capability should not be interpreted merely as a compliance mechanism, but rather as a strategic organizational asset that allows companies to translate ecological commitments into enduring economic and competitive benefits.

2.1.3. Ability–Motivation–Opportunity

The ability–motivation–opportunity (AMO) framework, proposed by Appelbaum (2000), suggests that employee performance is determined by three interconnected factors: employees' skills, their motivation to apply those skills, and the opportunities available to contribute effectively within the organization. Employees are most likely to perform successfully when all three elements are present (Appelbaum, 2000; Salvador-Gómez et al., 2023). In the context of environmental management, organizations can strengthen these factors through GHRM practices. For example, training programs focused on sustainability can enhance employees' knowledge and competencies, incentive systems tied to environmental goals can increase motivation, and opportunities to engage in eco-friendly initiatives allow employees to apply their skills in meaningful ways (Verma, 2026). When employees are equipped with environmental expertise, motivated to act, and given the chance to participate, they are more likely to demonstrate pro-environmental behaviors, supporting the organization's sustainability objectives and contributing to higher levels of environmental performance (Amrutha & Geetha, 2020; Waseem et al., 2025).

2.1.4. Institutional Theory

Institutional theory, as described by DiMaggio and Powell (1983), emphasizes the influence of external pressures on organizational decisions and behavior. Organizations often adopt similar structures and practices not merely from internal planning but also in response to coercive pressures from laws and regulations, normative pressures from professional or industry expectations, and mimetic

pressures arising from competition or market uncertainty (DiMaggio & Powell, 1983; Scott, 2008). In the context of environmental management, these external forces encourage organizations, including MSMEs, to implement sustainable practices in order to maintain legitimacy, comply with regulatory frameworks, and address growing stakeholder demands for eco-friendly operations (Tereshchenko et al., 2023). Prior research demonstrates that government regulations, industry norms, and market pressures significantly shape the adoption of green management practices and sustainability-oriented innovations (Xu et al., 2023; Orjuela-Ramirez et al., 2024; Pham et al., 2024; Albannai et al., 2026). Consequently, the effectiveness of environmentally focused strategies depends not only on a firm's internal capabilities but also on its ability to understand and respond to external institutional expectations (Scott, 2008; Akhtar et al., 2024). From this perspective, achieving strong sustainability performance involves harmonizing organizational resources and processes with external regulatory, social, and market requirements (Tereshchenko et al., 2023).

2.1.5. Green Human Resource Management

Green human resource management (GHRM) is an approach that integrates environmental concerns into the core design and implementation of human resource policies and organizational practices. Instead of treating sustainability as a secondary or separate issue, GHRM ensures that ecological considerations are embedded across key human resource activities, including recruitment, training and development, performance evaluation, and compensation systems, so that organizational operations consistently support environmental objectives (Molina-Azorin et al., 2021; Goel et al., 2022; Fang et al., 2022). In this approach, employees are viewed as central drivers of sustainability initiatives. The effectiveness of GHRM largely relies on staff awareness, capabilities, and engagement in environmentally responsible behaviors, highlighting the critical role of human capital in advancing organizational environmental goals (Bibi et al., 2026).

In practice, GHRM manifests through a set of interrelated mechanisms, including environmentally focused recruitment and selection procedures, sustainability-oriented training programs, green performance evaluation systems, and incentive structures that reward environmentally responsible behavior (Amrutha & Geetha, 2020; Singh et al., 2020). These practices aim to foster eco-conscious work behaviors, reduce negative environmental impacts from organizational operations, and support broader sustainable business goals. By integrating environmental values into human resource management, organizations can cultivate a workforce equipped to drive both environmental protection and sustainable innovation (Al-Swidi et al., 2021).

Empirical evidence further suggests that the consistent application of GHRM practices can foster employees' pro-environmental behaviour, reinforce a green-oriented organizational culture, and ultimately improve overall environmental performance (Fang et al., 2022). When employees receive adequate environmental training, appropriate incentives, and opportunities to participate in sustainability initiatives, they tend to engage more actively in environmental management activities and support the achievement of organizational sustainability targets (Amrutha & Geetha, 2020). Consequently, GHRM serves as an important mechanism for aligning human resource strategies with environmental sustainability objectives while strengthening an organization's capability to achieve superior environmental outcomes.

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2.1.6. Green Organizational Culture

Green organizational culture describes a pattern of collective values, shared assumptions, and behavioral norms within an organization that consistently emphasize environmental responsibility and sustainability-oriented practices (Sarwar et al., 2025). In organizations where such a culture is firmly established, environmental considerations become an inherent part of everyday routines, managerial decisions, and strategic directions, influencing how employees perceive and respond to ecological issues in their work environment (Imran & Jingzu, 2022). This cultural orientation reflects a joint commitment among organizational members to protect the environment and encourages individuals to incorporate ecological awareness into their professional responsibilities (Faezah et al., 2024). Prior studies indicate that a strong green-oriented culture can stimulate employees' pro-environmental behaviour and reinforce the implementation of sustainability programs within organizations (Khan & Terason, 2022).

When environmental values are continuously reinforced through communication, leadership examples, and organizational practices, employees tend to participate more actively in environmentally responsible activities. They are more supportive of green management initiatives (Imran & Jingzu, 2022). Moreover, such a culture can strengthen cooperation between management and employees in advancing sustainability agendas and environmental programs. Empirical evidence also suggests that organizations characterized by a well-developed green culture often achieve broader organizational benefits, including increased green innovation, improved environmental performance, and stronger sustainable competitive advantage (Al Doghan et al., 2022; Awwad et al., 2026; Legese et al., 2026).

When environmental values are deeply woven into an organization's culture, companies are better equipped to create eco-friendly products and processes while simultaneously fostering employees' dedication to sustainability initiatives. As such, a green organizational culture is a vital capability that facilitates the successful implementation of environmental management strategies and drives improvements in overall environmental performance.

2.1.7. Green Transformational Leadership

Green transformational leadership is a leadership approach in which leaders inspire, motivate, and guide employees to achieve environmental objectives while fostering eco-conscious behaviors throughout the organization (Novita et al., 2022). This style merges traditional transformational leadership principles with environmental management goals, emphasizing sustainability and ecological responsibility across all organizational activities (Wang et al., 2021). Leaders who adopt this approach actively communicate environmental values, encourage employee engagement in sustainability initiatives, and support innovative solutions that enhance environmental performance (Haider et al., 2026).

According to Alkandi (2025), green transformational leaders influence employees to internalize environmental values through role modeling, intellectual stimulation, and inspirational motivation tied to sustainability goals. By demonstrating pro-environmental behaviors themselves, leaders encourage employees to mirror these actions, thereby strengthening the organization's overall commitment to environmental stewardship (Omarova & Jo, 2022). Moreover, this leadership style fosters creativity and promotes the development of innovative approaches to address environmental challenges.

Research demonstrates that green transformational leadership has a notable influence on employees' environmental attitudes and behaviors. For instance, Alkandi (2025) reported that leaders who emphasize sustainability can foster employees' creativity in green initiatives and encourage their participation in environmental programs. Likewise, Soni (2023) found that leadership focused on ecological concerns positively shapes employees' pro-environmental actions. Moreover, green transformational leadership strengthens employees' dedication to sustainability goals and enhances the effectiveness of environmental management efforts (Wang et al., 2021).

Recent literature also highlights the broader organizational benefits of green transformational leadership, showing that it helps create a work climate where environmental responsibility is embedded in daily practices and overall organizational performance improves (Haider et al., 2026). Leaders who consistently promote sustainability values and model eco-conscious behaviors motivate employees to adopt green practices, engage in innovative environmental solutions, and support the achievement of organizational sustainability targets (Farrukh et al., 2022). In essence, green transformational leadership functions as a pivotal mechanism that converts strategic environmental objectives into concrete actions, reinforcing the organization's capacity for long-term environmental performance (Alqatan et al., 2025).

2.1.8. Organizational Commitment

Organizational commitment refers to the psychological bond that connects employees to their organization, reflected in feelings of attachment, loyalty, and a willingness to remain with the organization (Mirhadian et al., 2024). Through this bond, employees tend to identify themselves with organizational goals and are prepared to invest effort in supporting the organization's success. The concept was extensively elaborated by Meyer and Allen (1991), who explain that committed employees generally demonstrate stronger dedication, higher responsibility, and greater involvement in organizational activities, which ultimately contributes to organizational effectiveness (Meyer & Allen, 1991; Meyer et al., 2002; Aboutaleb et al., 2026).

Organizational commitment is typically understood through three interrelated dimensions: affective, continuance, and normative commitment. Affective commitment captures the emotional attachment employees feel toward their organization, continuance commitment reflects employees' assessment of the potential costs or losses associated with leaving, and normative commitment embodies a sense of moral or ethical obligation to remain with the organization (Meyer & Allen, 1991; Meyer et al., 2002). Collectively, these dimensions offer a holistic perspective on why employees choose to stay with an organization and continue contributing to its ongoing development.

Within the scope of sustainability and environmental management, organizational commitment is particularly relevant because it can encourage employees to support the organization's environmental initiatives. Employees who feel strongly attached to their organization tend to be more willing to participate in environmental programs, follow green management practices, and contribute to achieving sustainability objectives (Paillé et al., 2020; Murray & Holmes, 2021). Empirical evidence further indicates that organizational commitment can reinforce employees' pro-environmental behaviour and indirectly enhance environmental performance by motivating individuals to engage in sustainability-related activities

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(Odamtten et al., 2025). For this reason, organizational commitment is frequently regarded as a crucial organizational element that facilitates the successful implementation of environmental management and sustainability strategies.

2.1.9. Green Innovation

Green innovation involves creating and applying new ideas, technologies, products, or managerial practices that aim to minimize environmental impacts while promoting the sustainable use of natural resources (Le et al., 2024). It highlights the role of environmentally oriented solutions and creative approaches in helping organizations reduce pollution, reduce waste, improve energy efficiency, and achieve broader sustainability objectives (Chen et al., 2006). Implementing green innovation not only improves environmental outcomes but also enhances organizational competitiveness and supports long-term viability.

In practice, green innovation can take two primary forms: green product innovation and green process innovation (Khan et al., 2021). Green product innovation focuses on designing and producing products that are environmentally friendly across their entire life cycle, from manufacturing to consumption and disposal. In contrast, green process innovation targets improvements in operational and production processes to reduce resource consumption, minimize waste, and limit emissions (Abbas & Khan, 2023). Both types of innovation enable organizations to better comply with strict environmental regulations and meet growing societal expectations for sustainable business practices.

In recent years, green innovation has become a strategic approach for organizations aiming to align environmental responsibility with business performance (Le, 2022). Empirical evidence indicates that firms that embrace green innovation achieve better environmental outcomes, strengthen their corporate reputation, and gain competitive advantages in sustainability-conscious markets (Zameer et al., 2024). The success of green innovation initiatives is also influenced by internal organizational factors, such as supportive leadership, a sustainability-oriented culture, and GHRM practices that encourage eco-friendly employee behavior (Wang et al., 2022). Accordingly, green innovation serves as a key mechanism for translating sustainability strategies into concrete environmental improvements.

2.1.10. Environmental Performance

Environmental performance refers to an organization's ability to reduce its environmental impact through efficient resource use, pollution prevention, and environmentally responsible operational practices (Javed et al., 2026). It reflects the extent to which an organization successfully implements environmental management practices to minimize environmental damage and promote sustainability (Zhu & Sarkis, 2004). Environmental performance is often considered an important indicator of how well organizations integrate environmental concerns into their business strategies and operational activities.

In the realm of sustainable business, environmental performance is often gauged through a variety of measures, including reductions in waste and emissions, optimized energy consumption, more efficient use of natural resources, and adherence to environmental regulations (Majid et al., 2023). Organizations that excel in these areas typically integrate eco-friendly technologies, redesign production processes to improve sustainability, and actively involve employees in initiatives to improve environmental outcomes.

Research has highlighted that advancements in environmental performance extend beyond ecological benefits, also enhancing an organization's competitiveness and long-term viability (Zameer et al., 2021). Companies demonstrating strong environmental performance often enjoy higher operational efficiency, a stronger reputation, and greater stakeholder trust (Majid et al., 2023). Furthermore, internal organizational dynamics such as leadership approaches, the prevailing organizational culture, and human resource practices that promote pro-environmental behaviour play a crucial role in shaping environmental performance (Nisar et al., 2021; Omarova & Jo, 2022). Consequently, environmental performance emerges as a pivotal outcome, reflecting how organizational strategies and managerial interventions translate into sustainable development achievements (Chen et al., 2026).

2.2. Hypothesis Development

2.2.1. The Effect of Green Human Resource Management on Environmental Performance

GHRM represents a deliberate fusion of environmental stewardship with human resource practices, transforming ordinary workplace routines into eco-conscious actions (Yoo, 2024; Hawela et al., 2025). This approach goes beyond standard human resource processes by integrating sustainability at every stage, recruiting individuals with pro-environmental values, offering training rooted in sustainable practices, evaluating performance through an environmental lens, and rewarding behaviours that support the planet (Papademetriou et al., 2025). Unlike traditional GHRM, which often treats environmental responsibility as peripheral, GHRM weaves it into the fabric of daily work life, shaping employees not just as performers but as active stewards of ecological responsibility within the organization (Verma, 2026).

Green recruitment serves as an initial gateway through which organizations bring in individuals who are already attuned to environmental concerns and embrace pro-environmental values, effectively embedding a sustainability mindset from the start of their organizational journey (Rehman, 2025). Complementing this, green training programs expand employees' understanding of environmental challenges ranging from waste minimization and energy conservation to sustainable production techniques, thereby equipping them to actively contribute to environmental management efforts (Amrutha & Geetha, 2020). Alongside these initiatives, performance evaluation and compensation systems with an ecological focus assess and reward employees for environmentally responsible actions, reinforcing behaviours that advance organizational sustainability objectives (Majid et al., 2023). Together, these GHRM practices integrate environmental priorities into daily work routines and the broader organizational culture. By strategically shaping employees' skills, incentives, and behaviour, GHRM serves as a deliberate mechanism for aligning the workforce with sustainability goals and enhancing overall environmental performance (Legese et al., 2026).

From a theoretical standpoint, the RBV by Barney (1991) suggests that GHRM can cultivate human capital that is not only valuable but also difficult for competitors to replicate, thereby strengthening an organization's environmental edge. Employees equipped with green competencies and ecological awareness become strategic assets, driving sustainable advantage. Complementing this, NRBV by Hart (1995) highlights that environmentally oriented capabilities nurtured through human resource practices enable firms to curb pollution and advance sustainable development goals. The AMO framework by Appelbaum (2000) and San Román-Niaves et al. (2025) adds

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a behavioural dimension: by enhancing abilities through sustainability-focused training, boosting motivation through environmental incentives and performance feedback, and creating avenues for green initiatives, organizations can actively foster pro-environmental behaviour. Collectively, these mechanisms elevate organizational ecological performance, underscoring that the effectiveness of GHRM hinges on the firm's ability to empower and inspire its workforce to take on environmental responsibility (Legese et al., 2026).

Empirical research increasingly highlights the important role of GHRM in enhancing organizational environmental performance. For example, Fang et al. (2022) demonstrated that embedding environmental considerations into human resource processes encourages employees to participate actively in sustainability initiatives, thereby improving environmental outcomes. Likewise, Khammadee and Ninaroon (2022) showed that GHRM can substantially boost ecological efficiency in small and medium-sized enterprises. Additional studies by Altassan (2023), Ismail and Imran (2024), and Yousaf et al. (2025) confirm that human resource practices with a clear environmental orientation help organizations reduce their ecological footprint. Collectively, these findings indicate that GHRM goes beyond being a set of policies; it acts as a strategic tool to raise employee awareness, foster engagement, and drive measurable improvements in environmental performance.

In Surabaya, numerous MSMEs struggle to invest in advanced technologies due to limited resources. In this context, leveraging GHRM offers a practical, cost-effective way to enhance environmental performance (Bindeeba et al., 2025; Shahbaz & Malik, 2025). By cultivating employees' environmental awareness, building green skills, and fostering motivation toward sustainable practices, MSMEs can achieve meaningful gains in ecological efficiency and overall sustainability outcomes. **H_1: Green Human Resource Management Has a Positive Effect on Environmental Performance.**

2.2.2. The Impact of Green Transformational Leadership on Environmental Performance

In many MSMEs, employees' environmentally responsible actions often stem less from formal policies than from the influence and example set by their leaders (Mansour et al., 2022; Joseph, 2024). Green transformational leadership is a style in which sustainability is embedded in the organization's core, guiding strategic decisions and everyday practices alike. Leaders adopting this approach articulate a compelling environmental vision, stimulate creativity, encourage experimentation with eco-friendly solutions, and support individual initiatives aimed at sustainability (Alkandi, 2025). Unlike conventional transformational leadership, this approach explicitly integrates ecological considerations into organizational strategy, ensuring that each decision reflects environmental priorities.

Environmental performance captures the measurable outcomes of such organizational efforts, including waste reduction, energy efficiency, proper management of hazardous materials, and green product or process innovations (Awwad et al., 2026). In resource-constrained MSMEs, these outcomes depend heavily on employees' environmental awareness, skill sets, and motivation, as limited technological capabilities often limit large-scale interventions. Active participation in sustainability programs and the habitual application of green practices amplify these results, generating both operational efficiencies and reputational benefits (Nazir et al., 2024).

The influence of green transformational leadership on environmental performance can be interpreted through multiple theoretical lenses. From the

perspective of the NRBV, such leadership functions as a dynamic organizational capability, directing resources toward pollution prevention, eco-friendly innovation, and long-term ecological accountability (Hart, 1995). Meanwhile, the AMO framework highlights the behavioral mechanism: leaders enhance employees' environmental competencies via targeted training, stimulate motivation through green-oriented incentives, and provide opportunities for hands-on engagement in eco-initiatives (Appelbaum, 2000; Waseem et al., 2025). Institutional theory further underscores the leader's role in guiding the organization to respond to external pressures, regulatory requirements, industry norms, and stakeholder expectations, ensuring that sustainability initiatives align with broader environmental and social standards (DiMaggio & Powell, 1983). By combining strategic direction, workforce empowerment, and institutional alignment, green transformational leadership fosters behaviors that translate into measurable environmental improvements.

Empirical evidence supports this link. Studies have shown that leaders who prioritize sustainability stimulate organizational adoption of green practices, improving both environmental and operational outcomes (Faqera & Manaf, 2026; Ibrahim et al., 2026; Al-Dhobee et al., 2026). In the context of MSMEs in Surabaya, where financial and technological resources are limited, effective green leadership helps overcome these constraints by motivating employees, optimizing resource use, and promoting cost-effective sustainable practices. Leaders also play a central role in cultivating a culture of accountability and engagement, ensuring that environmental initiatives are consistently applied and internalized across the workforce. Consequently, green transformational leadership emerges as a crucial driver of environmental performance. **H_2: Green Transformational Leadership Has a Positive Effect on Environmental Performance.**

2.2.3. The Effect of Green Organizational Culture on Environmental Performance

A green organizational culture can be imagined as an invisible compass that guides every action, decision, and habit within an organization toward environmental responsibility. This culture is more than just official statements or attractive sustainability reports; it is a living system of shared values, beliefs, and norms that subtly but consistently influence employee behaviour and managerial strategies (Joly, 2026). In organizations with a strong green organizational culture, environmental awareness emerges in daily routines such as reducing waste without being told, finding ways to save energy, choosing suppliers that practise sustainability, and encouraging innovative green solutions so that ecological responsibility feels natural and becomes part of the job, rather than just a formal obligation. Thus, a green organizational culture serves as a foundation that affirms that every decision and action within the organization is aligned with the principles of sustainability (Subramanian & Suresh, 2023).

Organizational culture acts as an invisible framework that subtly guides employees' perceptions of priorities and shapes their behaviour (Aukhoon et al., 2024). When environmental values are deeply woven into an organization's identity, employees tend to go beyond their formal duties, taking voluntary actions that support sustainability. In this way, a green organizational culture operates not just as a guideline but as a social compass, steering individual choices toward ecological goals. Consequently, a strong green culture ensures that pro-environmental behaviour becomes instinctive, creating a shared sense of responsibility that permeates every level of the organization (Yan et al., 2026).

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From an RBV perspective, as Barney (1991) defines it, organizational culture can be seen as a rare, valuable, and non-replicable intangible asset. When environmental principles are woven into the fabric of daily routines and internalized by employees at all levels, a green organizational culture becomes a strategic lever that strengthens long-term competitive advantage. The NBRV by Hart (1995) complements this idea, highlighting that firms that embed sustainability in their processes and structures are better positioned to excel in environmental performance through proactive pollution control and sustainable initiatives. Essentially, a green organizational culture serves as a subtle yet pervasive framework that shapes everyday decisions and actions in alignment with ecological values, providing a resilient foundation for achieving sustained, consistent environmental outcomes (Alemu, 2025).

According to institutional theory, as articulated by DiMaggio and Powell (1983), green organizational culture often emerges in response to regulatory demands, industry standards, and public expectations. MSMEs often face increasing pressure from customers, suppliers, and local governments to operate in an environmentally responsible manner (Sawang et al., 2024). Over time, these external pressures are not merely complied with, but internalised and transformed into shared norms within the organization that guide every decision and action towards greater environmental friendliness. Thus, a green organizational culture serves as an adaptive mechanism, enabling organizations to translate external influences into consistent internal practices, making sustainability an integral part of the organization's identity and routine.

Empirical evidence increasingly highlights the significant role of green organizational culture in shaping environmental performance. Fang et al. (2022) indicate that such a culture amplifies the impact of GHRM practices on environmental outcomes, positioning it as a strategic cornerstone within the sustainability architecture. Khammadee and Ninaroon (2022) similarly emphasize that organizational policies and workplace practices oriented toward environmental responsibility lead to measurable improvements in ecological performance. Altassan (2023) further observes that, in MSMEs, green organizational culture exerts a direct positive influence on environmental outcomes, particularly when intertwined with GHRM and innovation efforts. Put differently, a culture that embeds ecological values does more than guide individual behaviors; it acts as an integrative force, aligning organizational systems, processes, and practices toward shared sustainability objectives, thereby enabling consistent and meaningful environmental gains.

In MSMEs in Surabaya, developing a green organizational culture often faces obstacles, mainly due to deeply rooted conventional work habits and limited environmental awareness. However, gradually integrating sustainability values into daily routines, leadership communication, and employee engagement initiatives can strengthen collective ecological commitment (Boeske, 2023; Ispiryan et al., 2024). When environmental values are continuously reinforced, MSMEs are better able to improve waste management efficiency, reduce emissions, and comply with environmental standards. Thus, instilling green values into organizational routines and behavioural norms is not merely a formality but a strategic mechanism that transforms collective behaviour into concrete actions that support sustainability. **H_3: Green Organizational Culture Has a Positive Effect on Environmental Performance.**

2.2.4. The Effect of Organizational Commitment on Environmental Performance

Organizational commitment is the psychological tether that connects employees to their organization, shaping both their intent to stay and their proactive engagement in achieving organizational objectives. Meyer and Allen's (1991) framework identifies three facets of commitment: Affective commitment, reflecting emotional attachment; continuance commitment, capturing the perceived costs of departure; and normative commitment, rooted in a sense of duty to remain contributing. When applied to sustainability, commitment transcends mere loyalty, manifesting as employees' genuine dedication to advancing environmental goals and championing green initiatives. Employees who exhibit strong organizational commitment are not only attentive to assigned responsibilities but also intrinsically motivated to pursue actions aligned with ecological values, positioning organizational commitment as a critical catalyst for sustaining consistent and meaningful environmental performance (Murray & Holmes, 2021).

A high level of organizational commitment encourages employees to go beyond their formal duties and actively contribute to organizational improvement efforts. When sustainability values are embedded in the organizational identity, committed employees tend to engage in environmentally friendly behaviour, reduce resource waste, and voluntarily support green initiatives. Thus, organizational commitment serves as an internal driver that translates sustainability policies into tangible results while shaping a work culture in which environmental responsibility becomes an intrinsic part of every employee's actions and decisions (Afsar et al., 2020; Hoxha et al., 2024).

From a behavioural perspective, and in line with AMO theory, organizational commitment strengthens the motivational factors that enable employees to consistently implement green practices. While GHRM develops employees' capabilities and provides opportunities for sustainable action (Iftikar et al., 2022), organizational commitment ensures that employees' intrinsic motivations align with environmental goals (Patwary et al., 2025). Furthermore, social exchange theory explains that when organizations demonstrate genuine concern for environmental responsibility and employee welfare, employees tend to reciprocate with stronger commitment and proactive environmental behaviour (Cropanzano & Mitchell, 2005; Blau, 2017). This theory suggests that positive organizational actions create a sense of obligation among employees, encouraging them to respond through supportive attitudes and behaviours that align with organizational goals. In the context of sustainability, when organizations invest in environmentally responsible practices and employee well-being, employees are more likely to develop stronger organizational commitment and engage in pro-environmental behaviours. Thus, organizational commitment not only serves as an emotional bond but also functions as an intrinsic motivator, making sustainability practices a natural part of employees' daily behaviour and enabling the achievement of continuous environmental performance outcomes.

Empirical evidence highlights the important role of organizational commitment in enhancing environmental performance (Ahmad et al., 2023; Yoo, 2024; Odamtten et al., 2025). According to Yoo (2024), implementing GHRM practices can strengthen employees' attachment and loyalty to the organization, thereby increasing their engagement in environmentally responsible behaviors. Within this framework, employees' commitment to sustainability serves as a mediating mechanism between GHRM practices and environmental outcomes, such that employees with strong commitment are more likely to internalize and act on environmental initiatives (Miah et al., 2026). Thus, organizational commitment goes beyond emotional attachment or

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intrinsic motivation; it functions as a catalyst that transforms environmental policies into tangible, enduring results.

In the context of MSMEs, organizational commitment is especially critical due to the limited presence of formal control systems and structured monitoring mechanisms. In such settings, voluntary cooperation and intrinsic motivation become key drivers of organizational outcomes, including environmental performance (Meyer et al., 2002; Odamtten et al., 2025). Employees' psychological attachment encourages them to actively support organizational goals and engage in discretionary behaviors beyond their formal job requirements. In sustainability-focused organizations, this commitment is particularly vital, as employees who identify with environmental values are more likely to adopt resource-efficient practices, participate in waste-reduction initiatives, and comply with environmental standards (Odamtten et al., 2025). This dynamic is especially relevant for MSMEs in Surabaya, where limited resources make internal motivation and employee-driven sustainability practices essential.

From the RBV perspective, organizational commitment can be considered an intangible strategic asset that is valuable, rare, and difficult to imitate, contributing to sustained competitive advantage (Barney, 1991; Aftab et al., 2023). A highly committed workforce enhances an organization's capacity to implement environmental strategies effectively and consistently, as employees are more willing to align their behaviors with sustainability objectives (Murray & Holmes, 2021). Furthermore, organizational commitment serves as a critical internal mechanism that bridges the gap between strategic intentions and actual employee behavior, ensuring that environmental policies are translated into concrete, continuous actions. Strengthening organizational commitment is therefore expected to foster consistent pro-environmental behavior and improve the effectiveness of green management practices. **H_4: Organizational Commitment Has a Positive Effect on Environmental Performance.**

2.2.5. The Effect of Green Innovation on Environmental Performance

Green innovation refers to the development and implementation of new or substantially improved products, processes, technologies, or management practices designed to reduce environmental impact while enhancing resource efficiency and overall organizational outcomes (Le et al., 2024). This concept encompasses a wide range of activities, such as eco-conscious product design, cleaner production techniques, energy-saving technologies, waste minimization strategies, and sustainable business models (Shahzad et al., 2022; Zhang et al., 2025). Beyond its technical dimension, green innovation operates as a strategic approach that embeds sustainability within organizational innovation, aligning ecological objectives with long-term business goals (Wang et al., 2022).

Green innovation is generally divided into two key categories: green product innovation and green process innovation. Green product innovation involves designing and developing products that minimize environmental harm throughout their life cycle, including the use of sustainable materials and environmentally friendly design principles (Ko, 2020). Green process innovation focuses on enhancing operational and production processes to lower emissions, reduce waste, and improve energy efficiency (Le et al., 2024). Together, these two dimensions work synergistically to reduce environmental footprints while generating sustainable value for organizations. Consequently, green innovation not only advances environmental

protection but also contributes to operational efficiency and long-term sustainability (Fang et al., 2022).

From the perspective of the NRBV, green innovation represents a strategic capability that enables organizations to achieve pollution prevention, product stewardship, and sustainable growth (Hart, 1995; Aftab et al., 2023). Firms that invest in environmentally oriented innovations develop resources and capabilities that are valuable, rare, and difficult for competitors to replicate, thereby securing sustained competitive advantage (Hart, 1995). In addition, from a dynamic capabilities standpoint, green innovation reflects an organization's ability to integrate, reconfigure, and renew internal and external resources to address environmental challenges and regulatory requirements (Teece et al., 1997; Abbas & Khan, 2023). This adaptive capability is particularly crucial for MSMEs, which must continually respond to evolving sustainability demands despite limited resources (Khabbaz et al., 2026).

Empirical studies consistently indicate that green innovation positively affects environmental performance. For example, Fang et al. (2022) demonstrated that implementing green innovation improves eco-efficiency and reduces environmental risks. Similarly, Khammadee and Ninaroon (2022) found that green innovation enables MSMEs to adopt more sustainable practices, thereby achieving better environmental outcomes. Other research also shows that green innovation supports waste reduction, energy efficiency, and compliance with environmental regulations, strengthening overall organizational sustainability (Altassan, 2023; Yousaf et al., 2025). Overall, these findings suggest that green innovation functions not only as a technological improvement but also as a strategic driver that translates sustainability initiatives into measurable environmental performance gains (Fang et al., 2022).

In the context of MSMEs, green innovation is often incremental rather than radical due to constraints on financial resources, access to technology, and innovation capabilities (Liang et al., 2025). However, even incremental innovations, such as adopting recycling systems, improving energy efficiency, implementing eco-friendly packaging, and optimizing resource use, can significantly enhance environmental performance (Awwad et al., 2026). These practical and cost-effective innovations allow MSMEs to reduce environmental impacts while maintaining operational efficiency and competitiveness. Therefore, green innovation, even at a modest scale, remains a critical strategic tool for achieving sustainability in resource-constrained organizations.

For MSMEs in Surabaya, green innovation provides a practical pathway to align economic objectives with environmental sustainability. By integrating environmentally friendly innovations into daily operations, MSMEs can reduce pollution, optimize resource use, and improve long-term business sustainability (Abbas & Khan, 2023). Moreover, green innovation serves as a strategic enabler, translating sustainability strategies into tangible outcomes and linking creativity, operational efficiency, and environmental responsibility (Fang et al., 2022). Consequently, the adoption of green innovation is expected to play a significant role in enhancing environmental performance in MSMEs. **H_5: Green Innovation Has a Positive Effect on Environmental Performance.**

2.2.6. The Moderating Role of Green Organizational Culture on the Relationship Between Green Human Resource Management and Environmental Performance

Green organizational culture is defined as a set of shared norms, values, and beliefs within an organization that encourage environmentally responsible behavior and support sustainability-focused practices (Ametorwo et al., 2026). When

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environmental principles are embedded in everyday routines, decision-making processes, and organizational norms, employees are more likely to adopt and maintain eco-friendly behaviors consistently (Imran & Jingzu, 2022). As such, a green culture not only influences employee attitudes but also strengthens the impact of environmental management practices, including GHRM.

GHRM involves human resource activities such as environmentally conscious recruitment, sustainability training programs, green performance assessments, and reward systems designed to encourage pro-environmental behavior (Papademetriou et al., 2025). However, the success of these initiatives depends heavily on the broader organizational environment. Without a supportive green culture, GHRM efforts may be perceived as symbolic or compliance-oriented, limiting their ability to bring about real behavioral change (Faeni et al., 2026). Hence, a green organizational culture is essential for ensuring that GHRM practices are internalized by employees and translated into concrete improvements in environmental performance.

Theoretically, the RBV frames green organizational culture as an intangible asset that is valuable, rare, and hard to replicate, thereby enhancing the effectiveness of other organizational capabilities, including GHRM (Barney, 1991; Hart, 1995). In addition, the AMO framework suggests that while GHRM builds employees' skills, motivation, and opportunities, a supportive organizational culture reinforces these factors by providing an environment conducive to eco-friendly actions (Appelbaum, 2000; Iftikar et al., 2022). Institutional theory also highlights the role of external pressures, such as regulatory demands and social expectations, in prompting organizations to embed sustainability values in their culture, thereby enhancing the legitimacy and consistency of GHRM practices (DiMaggio & Powell, 1983).

Empirical findings confirm the moderating influence of green organizational culture. Fang et al. (2022) report that a strong green culture strengthens the effect of GHRM on environmental performance by reinforcing employees' environmentally responsible behaviors. Similarly, Altassan (2023) shows that organizations with sustainability-oriented cultures are more successful at converting GHRM practices into measurable environmental outcomes. These results suggest that aligning formal human resource practices with informal cultural norms is key to achieving meaningful improvements in environmental performance.

In MSMEs, particularly those in Surabaya, limited resources can restrict the direct impact of GHRM. Nonetheless, when supported by a well-established green culture, employees are more likely to apply environmental knowledge and skills in their daily work consistently (Wang et al., 2022; Abbas & Khan, 2023). In this sense, a green organizational culture acts as an amplifying mechanism, enhancing GHRM's influence on environmental performance. **H_6: Green Organizational Culture Moderates the Relationship between Green Human Resource Management and Environmental Performance**.

2.3. Research Framework

The proposed conceptual framework positions environmental performance as the result of a dynamic interplay between strategic, behavioural, and innovation-driven factors within MSMEs. GHRM and green transformational leadership act as organizational levers, simultaneously developing employees' environmental competencies and inspiring proactive eco-friendly behaviours (Alkandi, 2025). Complementing these mechanisms, green organizational culture reflects collectively shared sustainability values that not only drive direct environmental improvements but also enhance the impact of GHRM practices (Legese et al., 2026). Additionally,

organizational commitment (Meyer & Allen, 1991) and green innovation (Chen et al., 2006) foster employees' psychological investment in sustainability goals and facilitate the adoption of eco-efficient products and processes. Viewed through the lenses of the RBV and NRBV, as articulated by Barney (1991) and Hart (1995), the framework illustrates how internal resources, cultural norms, and environmental capabilities converge to create a sustained ecological advantage. In essence, environmental performance does not emerge from isolated initiatives, but from the synergistic interaction of organizational strategies, cultural embeddedness, employee engagement, and innovative capacity. Based on the hypotheses outlined, the research model is depicted in Figure 1.

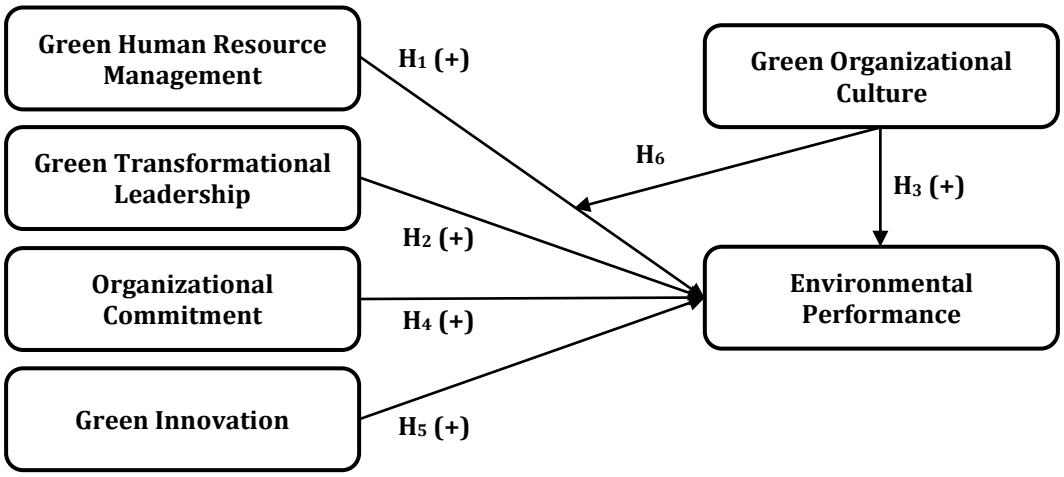

Figure 1. Research Framework

3. Research Methods

3.1. Population and Sampling Method

The population of this study comprises all MSMEs in Surabaya, East Java, Indonesia, totaling 385.054, according to data from the East Java Provincial Cooperative and MSME Office. A minimum sample size of 100 respondents was selected, in accordance with Roscoe's (1975) rule-of-thumb, suggesting that a sample size at least 10 times the number of variables is adequate for multivariate analysis. Considering the six constructs examined in this study, 100 respondents were considered sufficient to ensure statistical reliability.

This study collected data from 200 respondents, exceeding the minimum limit and thereby increasing the statistical power and reliability of the research results. Of the 200 questionnaires distributed, 188 were returned complete and valid and were therefore included in the final analysis. Sampling was conducted using stratified random sampling, as this method ensures that each stratum in the population has an equal chance of being represented, as recommended in research on MSMEs with heterogeneous geographical distribution (El-Kassar & Singh, 2019). The stratification mechanism was carried out through the following steps:

a. Division of areas: The city of Surabaya has 31 subdistricts and 154 villages.
b. From all villages, 200 business domicile targets in the village were randomly selected as the first stratum. This allowed one village to have more than one target respondent.
c. Respondent selection: From each selected village, MSMEs data were collected from the local MSMEs association or Cooperative Office. Respondents were selected based on their compliance with the criteria for implementing green initiatives in their

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businesses. Every MSME operator who met these criteria was included as a respondent.

d. Inclusion criteria: The selected respondents are MSME owners or managers who have been operating for at least 2 years. The business meets the criteria for a micro or small business as defined in Law No. 20 of 2008 concerning MSMEs. The business appears to be implementing green practices and has good environmental performance, as observed directly.

3.2. Data Collecting Method

This study employed a structured questionnaire with closed-ended items, measured on an eight-point Likert scale. Each research variable was assessed using carefully selected indicators derived from previously validated scales. Green human resource management (GHRM) was operationalized through four dimensions adapted from Renwick et al. (2013): green recruitment, sustainability-focused training, environmentally oriented performance management, and green reward systems. Green transformational leadership (GTL) was measured across four dimensions from Robertson and Barling (2013), including inspirational motivation, intellectual stimulation, role modeling, and individualized consideration. Green organizational culture (GOC) was operationalised using four indicators from Linnenluecke and Griffiths (2010): shared environmental values, active employee involvement, a focus on sustainability, and green communication practices. Organizational commitment (OC) was measured using three dimensions from Meyer and Allen (1991): affective, normative, and continuance commitment. Green innovation (GIN) was captured using three indicators from Chen et al. (2006), covering product, process, and organizational innovation. Finally, Environmental performance (EP) was evaluated with four metrics from Henri and Journeault (2010), including reductions in waste and emissions, improvements in energy efficiency, compliance with environmental regulations, and responsible management of natural resources. This comprehensive design ensured that each construct was measured with both precision and relevance, forming a solid foundation for subsequent structural analyses. All indicators were scored using the eight-point Likert scale.

3.3. Data Analysis Method

To explore the structural interconnections among the variables, the study employed partial least squares-structural equation modelling (PLS-SEM). The analysis unfolded in a series of steps, including multiple linear regression assessments, validity and reliability checks, and evaluation of conventional statistical assumptions. Data were processed using SmartPLS software, leveraging PLS-SEM for its ability to accommodate predictive research designs, handle complex inter-variable relationships, and operate without strict assumptions about data distribution. This methodological choice aligns with Hair et al. (2019), who highlight PLS-SEM's suitability for high-prediction models, and Henseler et al. (2015), who note the method's adaptability to the characteristics of social science data. By applying PLS-SEM in this structured and rigorous manner, the study not only captures the nuanced pathways between organizational practices, culture, leadership, innovation, and environmental performance but also ensures that the empirical findings reflect robust, interpretable, and practically meaningful insights for MSMEs navigating sustainability challenges.

Following data cleaning and coding, the study performed a comprehensive assessment of both the outer (measurement) and inner (structural) models. The outer model evaluation ensured that each indicator accurately captured its corresponding construct. Convergent validity was considered acceptable when factor loadings were 0.70

or higher and the average variance extracted (AVE) exceeded 0.50, in accordance with Hair et al. (2019). Construct reliability was further evaluated using Cronbach's alpha and composite reliability, with thresholds of 0.70 or above deemed satisfactory. By applying this rigorous, multi-step validation process, the study established that all constructs are both reliable and valid, providing a solid basis for analyzing structural relationships and generating credible insights into the determinants of environmental performance in MSME.

The final stage is bootstrapping, which is used to assess the significance of the model's path coefficients. The relationship between variables is considered significant if the t-statistic exceeds 1.96 at the 5% significance level and the p-value is below 0.05. This condition refers to the statistical testing procedure in PLS-SEM described by Henseler et al. (2015), which also emphasises that the confidence interval should not cross zero for the coefficient to be considered significant. With this approach, PLS-SEM can produce stable path estimates without requiring the assumption of a normal data distribution.

4. Results and Discussion

4.1. Characteristics of Respondent

Table 1 shows that most respondents operate in the food and beverage sector (42%), followed by services (17.6%) and information technology (15.4%). The majority of businesses employ 5 or fewer workers (54.3%), indicating that the sample predominantly comprises MSMEs. In terms of geographical distribution, Central Surabaya accounts for the largest share of respondents (30.9%), indicating relatively concentrated economic activity in this area. Regarding business maturity, most enterprises have been operating for more than five years (37.8%) or between two and five years (37.2%), suggesting relatively stable business establishments. The majority of business owners are between 41 and 50 years old (32.4%) and hold a bachelor's degree (45.7%), indicating a relatively educated entrepreneurial demographic. Additionally, work experience is fairly distributed, with 36.2% having 5–10 years of experience, reflecting adequate managerial exposure among respondents.

Table 1. Characteristics of Respondent

Characteristics	Category	Frequency	Percentage (%)
Type of Business	Food and Beverage	79	42.0
	Services	33	17.6
	Information Technology	29	15.4
	Fashion and Accessories	23	12.2
	Craft and Handicrafts	16	8.5
	Others	8	4.3
	Total	**188**	**100**
Number of Employees	≤ 5 employees	102	54.3
	6–10 employees	51	27.1
	> 10 employees	35	18.6
	Total	**188**	**100**
Business Location	Central Surabaya	58	30.9
	East Surabaya	46	24.5
	North Surabaya	29	15.4
	West Surabaya	28	14.9
	South Surabaya	27	14.3
	Total	**188**	**100**
Business Operating Period	> 5 years	71	37.8
	2–5 years	70	37.2
	< 2 years	47	25.0

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Characteristics	Category	Frequency	Percentage (%)
	Total	**188**	**100**
Owner's Age	41–50 years	61	32.4
	30–40 years	55	29.3
	< 30 years	39	20.7
	> 50 years	33	17.6
	Total	**188**	**100**
Owner's Education Level	Bachelor's Degree (S1)	86	45.7
	Diploma (D3)	33	17.6
	Master's Degree (S2)	32	17.0
	Senior High School	30	16.0
	Junior High School	4	2.1
	Elementary School	3	1.6
	Doctoral Degree (S3)	0	0.0
	Total	**188**	**100**
Work Experience	5–10 years	68	36.2
	< 5 years	63	33.5
	> 10 years	57	30.3
	Total	**188**	**100**

4.2. Validity Test

Table 2 presents the SmartPLS outer loading results for each measurement indicator. All indicator loadings exceed the recommended threshold of 0.7 (Hair et al., 2019), confirming satisfactory convergent validity. The data processed through SmartPLS, as presented in Table 2, demonstrate that the measurement model satisfies the requirements for convergent validity. Each indicator exhibits a factor loading exceeding 0.70, indicating that it reliably captures the essence of its respective construct. This strong alignment between indicators and constructs ensures that the model's measures are both precise and meaningful, providing a solid foundation for interpreting subsequent structural relationships and supporting credible conclusions regarding the determinants of environmental performance in MSMEs.

Table 2. Validity Test Result

Item	Environmental Performance	Green Human Management Resource	Green Innovation	Green Organizational Culture	Green Transformational Leadership	Organizational Commitment
EP1	0.871					
EP2	0.837					
EP3	0.825					
EP4	0.832					
EP5	0.783					
EP6	0.819					
EP7	0.815					
EP8	0.886					
GHRM1		0.831				
GHRM2		0.849				
GHRM3		0.862				
GHRM4		0.880				
GHRM5		0.817				
GHRM6		0.871				
GHRM7		0.896				
GHRM8		0.869				
GI1			0.901			
GI2			0.906			
GI3			0.894			
GI4			0.871			
GI5			0.873			
GI6			0.906			

Item	Environmental Performance	Green Human Management Resource	Green Innovation	Green Organizational Culture	Green Transformational Leadership	Organizational Commitment
GOC1				0.889		
GOC2				0.896		
GOC3				0.943		
GOC4				0.904		
GOC5				0.858		
GOC6				0.859		
GOC7				0.934		
GTL1					0.881	
GTL2					0.872	
GTL3					0.867	
GTL4					0.832	
GTL5					0.857	
GTL6					0.850	
GTL7					0.834	
GTL8					0.896	
OC1						0.892
OC2						0.863
OC3						0.857
OC4						0.794
OC5						0.808
OC6						0.890

4.3. Reliability Test

The validity of the instruments in the model can also be assessed using construct reliability and AVE. A construct is deemed reliable when its reliability value reaches at least 0.7, while AVE is considered acceptable when it exceeds 0.5. Together, these indicators ensure that each construct adequately captures and explains the variance of its underlying indicators. Table 3 provides the Composite Reliability and AVE values for each construct, illustrating that the measurement instruments meet the required standards for reliability and convergent validity.

Table 3. Reliability Test Result

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Environmental Performance	0.937	0.948	0.696
Green Human Resource Management	0.949	0.958	0.739
Green Innovation	0.949	0.959	0.795
Green Organizational Culture	0.960	0.967	0.806
Green Transformational Leadership	0.950	0.958	0.742
Organizational Commitment	0.925	0.940	0.725

As presented in Table 3, all constructs in the model exhibited strong reliability and validity. This is evidenced by Cronbach's alpha, rho_A, and composite reliability values, each exceeding the minimum benchmark of 0.6, while AVE values surpassed 0.5, meeting widely accepted standards for measurement validity. Specifically, Cronbach's alpha values ranged from 0.925 to 0.960, and composite reliability values ranged between 0.940 and 0.967. The AVE values, ranging from 0.696 to 0.806, also met the criteria for convergent validity. Collectively, these results demonstrate that the indicators for each construct possess high internal consistency and effectively capture the variance associated with

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their theoretical dimensions. By confirming the reliability and robustness of all measurement instruments, the study establishes a strong foundation for accurately interpreting structural relationships and deriving meaningful insights into the determinants of environmental performance in MSMEs.

4.4. Hypothesis Test

Hypothesis testing is based on the path coefficient values from the bootstrapping output, shown in Table 4. The structural model was examined using bootstrapping in SmartPLS to uncover how each factor shapes environmental performance. The analysis confirmed that all the proposed relationships were statistically significant at the 5% level. GHRM emerged as a positive contributor, nudging environmental performance upward, supporting the first hypothesis. Among all predictors, green transformational leadership emerged as the most powerful driver, underscoring the central role of leadership in shaping ecological outcomes. Green organizational culture also played its part, showing that shared green values help reinforce sustainable practices. Organizational commitment further strengthened environmental performance, while green innovation provided an additional boost, demonstrating that creativity and innovation in green practices can translate into measurable ecological gains. Together, these findings paint a dynamic picture of how leadership, culture, commitment, human resource practices, and innovation interact to drive sustainability in MSMEs.

The analysis of the moderating effect revealed that the interaction between green organizational culture and GHRM is statistically significant. Notably, the negative coefficient indicates that in organizations where a green culture is already deeply rooted, the incremental impact of additional GHRM practices on environmental performance tends to shrink. In other words, once sustainability values are firmly internalised, further human resource initiatives contribute only modest additional gains. This insight underscores the complex interplay between organizational culture and human resource practices, suggesting that while GHRM remains a vital driver, its effectiveness is influenced and sometimes tempered by the strength of the existing cultural context. It highlights the importance of designing sustainability strategies in MSMEs that are sensitive to the organization's cultural maturity and capacity.

Table 4. Hypothesis Test Result

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Green Human Resource Management → Environmental Performance	0.128	0.128	0.031	4.117	0.000
Green Transformational Leadership → Environmental Performance	0.730	0.728	0.032	22.852	0.000
Green Organizational Culture → Environmental Performance	0.066	0.067	0.032	2.055	0.040
Organizational Commitment → Environmental Performance	0.112	0.113	0.030	3.796	0.000
Green Innovation → Environmental Performance	0.221	0.221	0.029	7.624	0.000
Green Organizational Culture x Green Human Resource	-0.104	-0.105	0.031	3.333	0.001

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Management → Environmental Performance					

4.5. Discussion

4.5.1. The Effect of Green Human Resource Management on Environmental Performance

The results of this study reveal that GHRM significantly influences environmental performance. These findings echo earlier studies by Fang et al. (2022), Khammadee and Ninaroon (2022), Altassan (2023), Ismail and Imran (2024), and Yousaf et al. (2025), supporting the notion that environmentally focused human resource practices can meaningfully improve ecological outcomes. In the context of MSMEs in Surabaya, GHRM emerges as a key driver, illustrating that strategically aligning human resource management with sustainability objectives can effectively embed green practices into day-to-day organizational operations (Fang et al., 2022; Verma, 2026).

GHRM encompasses a range of human resource practices aimed at promoting organizational sustainability by raising employees' environmental awareness, providing training on eco-friendly procedures, and offering incentives for pro-environmental behavior (Ogiemwonyi et al., 2023; Zaman et al., 2025). Organizations that implement GHRM practices have enhanced environmental performance by improving resource efficiency and reducing negative impacts on ecosystems. Initiatives such as staff training on energy conservation and waste management serve as practical mechanisms for fostering a sustainability-oriented workplace. Renwick et al. (2013) note that human resource practices can strategically encourage pro-environmental behavior by providing rewards and incentives aligned with sustainability objectives.

The theoretical foundation for these effects can be explained by the AMO framework, in which GHRM enhances employees' abilities through training, strengthens their motivation through rewards, and creates opportunities for participation in green initiatives. Singh et al. (2020) further highlight that implementing GHRM in small and medium-sized enterprises, including MSMEs in Surabaya, can effectively address environmental challenges. Achieving meaningful sustainability outcomes requires organizations to leverage the full potential and capabilities of their workforce, ensuring that human resource strategies translate into tangible environmental improvements (Darmawan, 2024).

A focus on sustainability can be demonstrated by focusing on reducing carbon footprints through energy efficiency and waste management (Dinh et al., 2026). MSMEs can improve their reputation in the eyes of the public while increasing their competitiveness. These findings emphasize the importance of implementing GHRM policies in organizations. Through effective implementation, GHRM contributes to improving environmental performance and strengthening relationships with stakeholders who support sustainability (Afum et al., 2021). Environment-based GHRM should be a focus for MSMEs. GHRM is the basic framework for achieving organizational effectiveness (Mardikaningsih, 2024). Employee training on the value of eco-friendly workplace practices, such as reducing waste, improving operational efficiency, and maintaining standards in the work environment, is necessary to make GHRM a reality (Usman et al., 2023; Papademetriou et al., 2025). Such activities will also tangibly improve the quality of human resources.

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4.5.2. The Effect of Green Transformational Leadership on Environmental Performance

Green transformational leadership involves guiding and motivating employees to achieve environmental objectives by integrating sustainability into the organization's mission, strategy, and daily practices (Alkandi, 2025). The results of this study support prior research indicating that this leadership style positively influences environmental performance by raising employees' awareness, shaping their attitudes, and encouraging pro-environmental behaviors (Singh et al., 2020; Sobaih et al., 2022; Faqera & Manaf, 2026).

Theoretically, the NRBV frames green transformational leadership as a strategic capability that mobilizes organizational resources to support sustainability goals and strengthens environmentally focused competencies (Hart, 1995; Ibrahim et al., 2026). At the same time, institutional theory highlights that such leadership helps organizations address external pressures, including regulatory demands and stakeholder expectations, which enhances legitimacy and compliance (DiMaggio & Powell, 1983). By combining these perspectives, leaders serve as critical agents who embed sustainability into the organizational culture and translate strategic environmental plans into actionable practices that improve performance (Farrukh et al., 2022).

In MSMEs, where resources and formal structures are often limited, green transformational leadership plays a vital role in promoting simple but impactful environmental initiatives, such as reducing waste, conserving energy, and optimizing resource use (Sobaih et al., 2022; Nduneseokwu & Harder, 2023). By fostering employee engagement and demonstrating environmentally responsible behavior, leaders facilitate the adoption of sustainable practices that collectively enhance environmental outcomes. Consequently, green transformational leadership emerges as a key driver of environmental performance in resource-constrained business settings.

4.5.3. The Effect of Green Organizational Culture on Environmental Performance

The findings indicate that green organizational culture significantly influences the environmental performance of MSMEs in Surabaya, aligning with previous research (Imran et al., 2021; Fang et al., 2022; Aggarwal & Agarwala, 2023; Altassan, 2023). This type of culture reflects the shared values, norms, and practices that integrate sustainability into organizational routines and guide employees to adopt environmentally responsible behaviors. By embedding eco-friendly principles into daily operations, organizations encourage actions such as conserving energy, reducing waste, and using resources responsibly, collectively improving environmental outcomes (Altassan, 2023).

From a theoretical perspective, green organizational culture is strategically important. According to the RBV, an intangible asset is valuable, rare, and inimitable, thereby supporting sustained competitive advantage (Barney, 1991). At the same time, institutional theory suggests that regulatory requirements, industry standards, and societal expectations motivate organizations to internalize sustainability-oriented cultural values, enhancing legitimacy and credibility (DiMaggio & Powell, 1983). Empirical studies also indicate that a green culture fosters innovation in eco-friendly products and processes and reinforces employees' commitment to sustainability, both of which contribute to stronger environmental performance (Fang et al., 2022).

In the context of MSMEs, a green organizational culture is particularly vital given limited resources. By promoting shared commitment and environmentally

responsible practices, firms can achieve meaningful sustainability results even under resource constraints. Papademetriou et al. (2025) note that integrating sustainability into organizational routines leads to tangible environmental improvements, while Khammadee and Ninaroon (2022) emphasize that a supportive green culture enables MSMEs to implement effective, practical, eco-friendly measures. Furthermore, encouraging adaptive employee behavior is crucial to maintaining environmental initiatives in rapidly changing conditions (Warin & Darmawan, 2024). Overall, a robust green organizational culture acts as a key foundation for enhancing environmental performance and sustaining long-term competitiveness in MSMEs.

4.5.4. The Effect of Organizational Commitment on Environmental Performance

The analysis shows that organizational commitment plays a crucial role in shaping the environmental performance of MSMEs in Surabaya, consistent with earlier studies (Ahmad et al., 2023; Yoo, 2024; Odamtten et al., 2025). This commitment reflects employees' psychological attachment and loyalty to the organization, including its sustainability goals (Meyer et al., 2002; Rajhi & Aljuhmani, 2026). Employees who feel a strong connection to their organization are more inclined to adhere to environmental policies and actively participate in eco-friendly initiatives, such as energy-saving and waste-management initiatives (Memon et al., 2022). In MSMEs, this commitment often translates into practical measures, including the adoption of environmentally conscious production techniques and more efficient resource utilization, thereby contributing to improved environmental outcomes (Rehman et al., 2023).

From the perspective of the AMO framework, organizational commitment enhances employees' motivation and willingness to internalize environmental values, promoting consistent pro-environmental behaviors (Appelbaum, 2000). Employees in organizations with strong sustainability commitments are more likely to integrate eco-friendly practices into their daily work, ensuring that strategic environmental goals are effectively converted into operational actions. In this way, organizational commitment bridges the gap between formal policies and employees' actual behaviors, reinforcing the overall impact of sustainability initiatives.

These findings suggest that fostering organizational commitment is not only important for operational efficiency but also acts as a key mechanism for advancing environmental sustainability within MSMEs (Sendawula et al., 2021; Karatepe et al., 2022). By encouraging employee dedication and a shared sense of responsibility for sustainability, organizations can cultivate a culture that supports long-term, environmentally responsible practices. Strengthening organizational commitment is therefore vital to ensuring that eco-friendly strategies are effectively implemented and maintained in MSMEs (Kartini et al., 2025).

4.5.5. The Effect of Green Innovation on Environmental Performance

The findings of this study reveal that green innovation significantly contributes to the environmental performance of MSMEs in Surabaya. Green innovation involves developing and applying products, processes, and technologies that reduce environmental harm while promoting more efficient resource use (Awwad et al., 2026). By integrating environmentally oriented innovations into organizational practices, MSMEs can improve operational efficiency and achieve measurable sustainability outcomes, in line with prior studies (Fang et al., 2022; Khammadee & Ninaroon, 2022; Altassan, 2023; Yousaf et al., 2025). Moreover, the effectiveness of green innovation is enhanced when employees are actively engaged in its

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implementation and when management provides consistent guidance and support. Such involvement fosters a culture of innovation and ensures that eco-friendly practices are systematically applied across operations (Fang et al., 2022). From a strategic standpoint, green innovation functions as both a tool for environmental compliance and a driver of organizational competitiveness. MSMEs that adopt practical, cost-effective green solutions such as energy-efficient processes, sustainable production methods, and resource optimization can reduce their ecological footprint while supporting long-term business sustainability. These findings underscore the importance of fostering innovation-focused practices as a key mechanism for improving environmental outcomes in small and medium-sized enterprises.

From the perspective of the NRBV, green innovation can be understood as a strategic organizational capability that enables firms to achieve both environmental improvements and economic value creation (Hart, 1995; Ma et al., 2025). For MSMEs, adopting practical, affordable green solutions is particularly important because these enterprises often face limited financial resources and technological infrastructure. Implementing initiatives such as energy-efficient equipment, environmentally friendly production techniques, and more effective use of raw materials can help MSMEs reduce environmental impacts while improving operational efficiency (Khammadee & Ninaroon, 2022; Altassan, 2023). The successful application of such innovations largely depends on the firm's technological readiness and its capacity to integrate new environmentally oriented practices into existing operations.

Within the MSME sector in Surabaya, partnerships with external stakeholders such as universities, research institutions, and industry associations can play a crucial role in supporting the adoption of green innovation. These collaborations provide access to knowledge, technological expertise, and cost-effective solutions that may otherwise be difficult for small businesses to obtain (Mubarak et al., 2021; Pangarso et al., 2022). Through these cooperative efforts, MSMEs can gradually implement incremental improvements that enhance resource efficiency and minimize environmental damage (Yousaf et al., 2025). Consequently, green innovation should be viewed not only as a means of meeting environmental regulations but also as a strategic pathway to strengthen environmental performance and support sustainable business development in the long term.

4.5.6. Green Organizational Culture Moderates the Relationship between Green Human Resource Management and Environmental Performance

The results indicate that green organizational culture significantly moderates the relationship between GHRM and environmental performance, supporting the sixth hypothesis. Interestingly, the effect is negative, suggesting that in MSMEs where the green culture is particularly strong, the positive influence of GHRM on environmental performance becomes less pronounced. This counterintuitive finding can be interpreted through institutional theory and the AMO framework. Excessive cultural emphasis on environmental norms may create additional pressure on employees, while limited resources in smaller firms constrain their capacity to fully implement formal GHRM initiatives (DiMaggio & Powell, 1983; Appelbaum, 2000). As a result, rather than amplifying the benefits of GHRM, an overly dominant green culture can reduce its overall effectiveness. In practical terms, this suggests that while fostering sustainability-oriented cultural values is important, organizations must balance cultural expectations with operational realities. MSMEs may achieve better environmental outcomes when green culture and human resource practices are aligned without overburdening employees or exceeding resource capacities.

This finding contrasts with the dominant view that a green organizational culture strengthens GHRM outcomes (Aggarwal & Agarwala, 2023). One possible explanation lies in the concept of motivation crowding out, in which excessive external pressure reduces intrinsic motivation. Papademetriou et al. (2025) argue that when sustainability norms are perceived as obligatory, employees may view GHRM practices as redundant, thereby reducing their effectiveness. In addition, role overload theory suggests that excessive environmental expectations can lead to employee fatigue and psychological strain, ultimately weakening performance outcomes. This condition is particularly relevant in MSMEs in Surabaya, where limited resources and workforce capacity increase the risk of overload.

Furthermore, empirical evidence supports the possibility of negative moderation effects. Asikhia et al. (2022) finds that organizational culture can weaken the relationship between human resource practices and performance when there is a mismatch between cultural expectations and organizational capabilities. Similarly, recent studies highlight that while GHRM generally improves environmental performance, its effectiveness is highly contingent on contextual factors, including organizational culture (Aggarwal & Agarwala, 2023; Ahmad et al., 2023). These findings suggest that an excessively strong or misaligned green culture may undermine the intended benefits of GHRM.

In the context of MSMEs in Surabaya, this result highlights the importance of balancing cultural development with organizational capacity. When green cultural values outpace the organization's capacity to support them through training, evaluation systems, and incentives, the impact of GHRM diminishes (Shahzad et al., 2023). Therefore, organizations need to align green culture with HRM capabilities to avoid overburdening employees and ensure optimal environmental performance (Gazi et al., 2024). Collaboration between government, MSMEs associations, and other stakeholders is also essential to support capacity building, provide access to green technologies, and strengthen the implementation of sustainable practices (Aggarwal & Agarwala, 2023; Ahmad et al., 2023).

5. Conclusion

This study investigates the influence of GHRM, green transformational leadership, green organizational culture, organizational commitment, and green innovation on the environmental performance of MSMEs in Surabaya, East Java, Indonesia. The results reveal that organizational commitment and green innovation emerge as the most influential drivers, highlighting the importance of employees' intrinsic motivation, a strategic sustainability vision, and the capacity for innovative solutions in promoting environmentally responsible practices, particularly in resource-constrained enterprises. Additionally, green organizational culture, GHRM practices, and green transformational leadership demonstrate positive effects, underscoring how behavioral, cultural, and leadership mechanisms collectively reinforce sustainability initiatives across organizational processes. Collectively, these findings emphasize that embedding environmental responsibility into both human and organizational systems is essential for enhancing environmental performance and fostering long-term sustainable development in MSMEs.

A key and original insight from this study is that a green organizational culture can dampen the impact of GHRM on environmental performance. This indicates that when environmentally oriented cultural values dominate. However, the organization lacks the capacity to implement structured human resource practices effectively, and the expected benefits of GHRM may be compromised rather than amplified. The finding underscores the need to align cultural development with managerial and operational readiness, particularly in

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MSMEs, where resources, formal systems, and technical capabilities are constrained. From a theoretical standpoint, this challenges the conventional view of organizational culture as an automatic enhancer, revealing that excessive cultural emphasis can lead to behavioural overload or role saturation, thereby diminishing the incremental effectiveness of formal human resource initiatives.

From a practical standpoint, these findings indicate that enhancing environmental performance in MSMEs should begin by fostering strong organizational commitment and promoting easily adoptable green innovations. Efforts to embed green culture and human resource practices should proceed gradually and be carefully aligned with the organization's existing capabilities. Meanwhile, green transformational leadership remains a crucial driver, especially in small enterprises, where owners and managers have a direct hand in shaping employee behaviours and guiding the organization's overall direction.

This study is subject to several important limitations. First, its cross-sectional design provides only a single snapshot in time, making it challenging to capture how behaviours, organizational culture, and environmental performance unfold and interact over time. Second, the use of self-reported measures may introduce social desirability effects or perceptual biases, potentially shaping participants' responses. Finally, the study focuses exclusively on MSMEs in Surabaya, so the findings may not readily translate to other regions, industry sectors, or larger organizational settings, limiting the results' broader applicability.

Future studies could gain valuable insights by employing longitudinal designs, which would allow researchers to observe how green practices and organizational culture evolve and how these changes impact environmental performance. Investigating additional moderating or mediating factors, such as the rigor of environmental regulations, competitive market pressures, or the organization's digital capabilities, may also reveal the conditions that amplify or constrain the effectiveness of green management. Expanding the scope to include diverse regions and a wider array of enterprise types could further strengthen the generalisability of findings, providing a richer, more nuanced picture of how sustainable business transformations unfold in emerging economies.

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