The Impact of Green Human Resource Management on the Environmental Performance of SMEs: The Moderate Role of Environmental Strategy

OANH H. NGUYEN, NAM D. NGUYEN

Abstract: *This study aims to analyze the impact of green human resource management on the environmental performance of small and medium-sized enterprises and to examine the moderating role of environmental strategy. Data were collected from 342 employees and managers working at small and medium-sized enterprises in Vietnam. The study used quantitative analysis methods, including Cronbach's alpha testing, exploratory factor analysis, correlation analysis, moderated multiple regression, and bootstrapping using the PROCESS macro. The results show that green human resource management practices, including green recruitment and selection, green training and development, green performance management, green pay and reward systems, and green employee involvement, positively impact environmental performance. Additionally, green innovation and environmentally friendly behavior also contribute to improving the environmental performance of enterprises. Green performance management, green recruitment and selection, and green innovation are the three factors with the most significant influence. Moreover, the environmental strategy has a positive moderating impact, strengthening the relationship between green factors and environmental performance. The results of the study contribute to the empirical evidence on green human resource management in the context of small and medium-sized enterprises in Vietnam and suggest that they need to implement green practices within a clear and consistent environmental strategy.*

Keywords: Environmental performance, Environmental strategy, Green human resource management, Emerging economies, Vietnam.

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Introduction

In the context of climate change, resource degradation, and increasing pressure from stakeholders, environmental performance has become an important criterion for assessing the sustainable development capacity of enterprises (Dinh et al., 2025). Enterprises are now evaluated not only on their financial results but also on their ability to reduce emissions, use resources efficiently, comply with environmental standards, and develop environmentally friendly operating processes (Thai et al., 2025). This motivates enterprises to integrate environmental objectives into management functions, in which human resource management plays a particularly important role because workers are the direct actors in implementing, maintaining, and translating environmental policies into specific behaviors within the organization (Saptaria et al., 2022).

Green human resource management (GHRM) has emerged as an important approach for aligning human resource management activities with the enterprise's environmental goals. It is a system of human resource (HR) practices designed to increase workers' awareness, capacity, motivation, and participation in environmental protection activities (Vasilev et al., 2024). These practices typically include green recruitment and selection, green training and development, green performance management, green compensation and reward systems, and green employee engagement. According to Renwick et al. (2013), green human resource management helps integrate environmental governance into human governance policies and practices within organizations. Tang et al. (2018) also emphasized that green human resource management practices can create a foundation for enterprises to develop green competencies and promote positive environmental outcomes.

Although the topic of green human resource management has received increasing attention, previous studies have mainly examined the direct impact of green human resource management on environmental performance (Phan & Nguyen, 2024; Phan et al., 2023; Paillé et al., 2020), while not fully explaining the intermediate mechanisms through which green HR practices translate into environmental outcomes. Additionally, green HR policies do not automatically create environmental efficiencies unless they are translated into specific employee behaviors or innovations in products, processes, and technologies (Barney et al., 2021). Therefore, exploring the impact of green innovation and environmentally friendly behavior is necessary to comprehensively explain the ways in which enterprises achieve environmental outcomes. Moreover, the moderating role of environmental strategy has not been adequately addressed in studies on green human resource management.

More importantly, in developing countries such as Vietnam, enterprises face growing pressure from legal regulations, customer requirements, supply chain standards, and commitments to sustainable development. However, the implementation of environmental governance within enterprises is uneven. Many enterprises have addressed environmental issues primarily through technical compliance, while not fully leveraging the role of human resource management in building green capacity, green behavior, and green innovation. This creates a practical need to identify green human resource management factors that can drive

environmental performance, while clarifying the supporting role of environmental strategy in this process.

By integrating the Ability-Motivation-Opportunity (AMO) theory with the perspective of environmental strategy, the research is expected to contribute to the expansion of the theory of green human resource management and, at the same time, provide practical implications for managers seeking to improve environmental performance through HR policies and sustainable development strategies.

Literature Review

Underlying Theory

The analysis framework is built on the integration of the Ability-Motivation-Opportunity (AMO) theory, the Natural-Resource-Based View (NRBV), and Strategic Fit Theory.

The AMO theory was primarily developed by Appelbaum et al. (2000), who argue that employee performance depends on three basic conditions: ability, motivation, and opportunities for participation. According to this theory, workers can produce better organizational results when they are competent enough to do the job, motivated to act, and have the opportunity to engage in meaningful activities. In the context of green human resource management, AMO theory provides a solid foundation for explaining the role of green HR practices. Specifically, green recruitment and selection help enterprises attract employees with awareness and values that align with environmental goals. Green training and development improve knowledge, skills, and capacity to handle environmental issues. Green performance management and green pay and rewards motivate employees to engage with environmental goals. Meanwhile, green employee involvement provides opportunities for workers to contribute ideas, participate in green initiatives, and implement environmentally friendly behaviors in their daily work.

From this perspective, green human resource management is not merely a collection of individual HR policies but a management system that helps build green capacity, green motivation, and green participation opportunities for employees. When these conditions are met, employees are more likely to demonstrate pro-environmental behavior, such as saving energy, reducing waste, adhering to environmental procedures, using resources efficiently, and proactively proposing green improvements. Therefore, AMO theory provides a basis for explaining the relationship between green human resource management and employees' environmentally friendly behavior, and shows that employee behavior is an important mechanism for translating green HR policies into environmental performance.

Additionally, the study uses the Natural-Resource-Based View to explain the role of green innovation and environmental performance. This view builds on the resource-based view, emphasizing that the competitive advantage of enterprises comes not only from internal resources in general but also from the ability to manage environmental issues and develop competencies associated with sustainable development. According to Hart (1995), enterprises

can achieve a sustainable competitive advantage through competencies such as pollution prevention, product management, and sustainability. In this context, green innovation is an important organizational competency, reflecting enterprises' ability to improve products, processes, technologies, and operating methods to minimize environmental impacts.

According to NRBV, green human resource management practices can help enterprises build green innovation capacity by providing environmentally knowledgeable human resources, encouraging green creative thinking, and fostering an organizational environment conducive to innovation. When employees are trained, encouraged, and given opportunities to participate in environmental activities, they can contribute to improving production processes, reducing material use, saving energy, limiting emissions, and developing environmentally friendly products or services. Therefore, green innovation serves as an organizational mechanism that helps enterprises translate green human resources into concrete environmental outcomes.

Furthermore, strategic fit theory is used to explain the role of environmental strategy in the research model. This theory holds that organizational effectiveness depends on the alignment among the enterprise's strategy, structure, resources, and functional activities. In this study, the environmental strategy reflects the extent to which the enterprise integrates environmental objectives into its business strategy, management commitment, resource allocation, and long-term competitive orientation. When enterprises have a clear environmental strategy, green human resource management practices, green innovation, and environmental friendly behaviors will be more clearly oriented, implemented more consistently, and more closely linked to the organization's sustainable development goals.

According to a strategic alignment approach, green human resource management can be highly effective only when it is placed within a clear environmental strategic direction. If the enterprise's environmental strategy is still lackluster, lacks management commitment, or lacks supporting resources, green HR practices may remain at the formal level, be fragmented, and be difficult to create substantive changes in environmental performance. Conversely, when the environmental strategy is clearly established, enterprises can create consistency among environmental goals, HR policies, green innovation, and employee behavior. Therefore, the environmental strategy is expected to play a moderate role, enhancing the impact of green factors on environmental performance. Figure 1 shows the research model as follows:

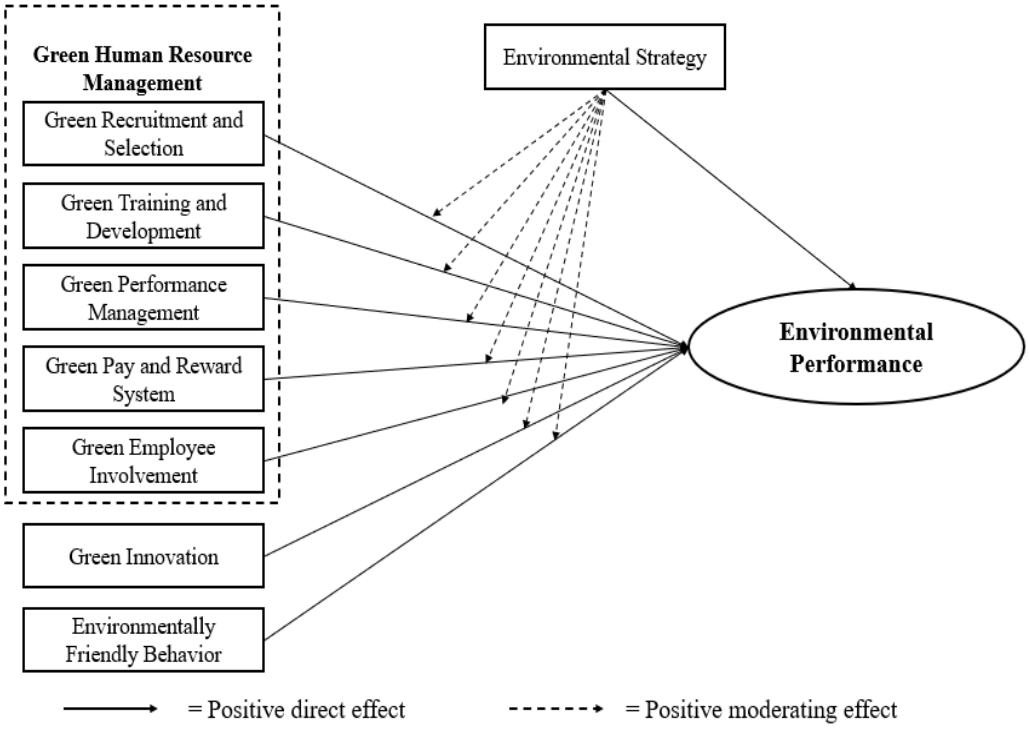

Figure 1. Analytical framework

2.2. Hypothesis development

Green human resource management is a set of organizational policies and processes that encourage environmentally friendly practices in human resource management and utilization, while ensuring harmony of interests between individual employees and the enterprise's development goals (Faisal, 2023). According to Tang et al. (2018), green human resource management encompasses HR practices that primarily support environmental governance, including green recruitment, green training, green performance management, green remuneration, and green employee engagement, which are considered important components of the green HR system. Environmental performance reflects the extent to which a business achieves positive environmental outcomes, such as reducing emissions, reducing waste, saving energy, using resources efficiently, and improving compliance with environmental requirements (Sharaf-Addin, 2024).

Green recruitment and selection refers to the integration of environmental criteria into the process of attracting, screening, and selecting personnel (Karmoker et al., 2021). Saeed et al. (2019) examined the impact of green human resource management practices, including green recruitment and selection, on employees' environmentally friendly behavior. The results show that these practices have a positive effect on environmental behavior within the organization. When enterprises select employees with environmental awareness and positive attitudes toward the environment, activities to reduce waste, save energy, and comply with

green processes will be carried out more effectively. Based on the above arguments, the research hypothesis is proposed as follows:

$H1_a$: Green recruitment and selection will be positively associated with environmental performance.

Green training and development is the process of equipping employees with the knowledge, skills, and competencies necessary to carry out environmentally friendly activities at work (Hasan & Hassain, 2026). Numerous studies have shown that green training is an important component that helps translate environmental policy into specific employee behavior. Saeed et al. (2019) show that green human resource management practices have a positive impact on employees' pro-environmental behavior. Additionally, Nguyen et al. (2024) demonstrates that green human resource management, grounded in the ability-motivation-opportunity framework, influences employees' pro-environmental behavior in hospital settings. When employees are adequately trained in environmental practices, they can perform their work in ways that save resources, reduce environmental errors, and improve green operational performance. Therefore, green training and development are expected to have a positive impact on environmental performance. Based on the above arguments, the research hypothesis is proposed as follows:

$H1_b$: Green training and development will be positively associated with environmental performance.

Green performance management integrates environmental criteria into the processes of setting goals, tracking, evaluating, and providing feedback on employee performance (Faisal, 2023). When environmental criteria are included in the performance review system, employees are more likely to comply with green processes, reduce waste, propose environmental protection initiatives, and improve resource use. Tang et al. (2018) emphasized that green performance management is an important component of the green human resource management scale, reflecting the extent to which enterprises formalize environmental goals within the HR system. Additionally, Aftab et al. (2023) show that green human resource management is linked to environmental performance through factors such as green innovation, environmental strategies, and pro-environmental behaviors. Therefore, when enterprises evaluate employees based on environmental criteria, environmental performance is likely to improve. Based on the above arguments, the research hypothesis is proposed as follows:

$H1_c$: Green performance management will be positively associated with environmental performance.

A green compensation and reward system uses material or non-material remuneration mechanisms to recognize and encourage employees' contributions to environmental goals (Odhiambo et al., 2023). The green compensation system creates incentives for employees to maintain and increase environmentally friendly behaviors. When environmental contributions are recognized, employees notice that enterprises value green goals, which in turn tends to make them more proactive in saving resources, reducing waste, and participating in environmental

protection activities. Saeed et al. (2019) included green rewards and remuneration in the green human resource management practice group and demonstrated that these practices positively impact employees' pro-environmental behavior. Since employees' environmental behavior is an important foundation for improving environmental outcomes, a green compensation and reward system is expected to have a positive impact on environmental performance. Based on the above arguments, the research hypothesis is proposed as follows:

$H1_d$: Green pay and reward system will be positively associated with environmental performance.

Green employee involvement reflects the extent to which employees are encouraged to participate in environmental activities, decisions, and initiatives within the enterprise (Aziza et al., 2023). Green involvement is important because environmental performance depends not only on strategy or technology but also on workers' substantive participation in daily activities. When employees are given the opportunity to participate, they tend to develop a stronger sense of responsibility and commitment to the organization's environmental goals. Tang et al. (2018) identify green employee involvement as an important component of green human resource management. Recent evidence also shows that green human resource management can promote pro-environmental behavior among employees, thereby contributing to improved environmental outcomes (Nguyen et al., 2024). Based on the above arguments, the research hypothesis is proposed as follows:

$H1_e$: Green employee involvement will be positively associated with environmental performance.

Green innovation is the process by which an enterprise develops or improves products, processes, technologies, and management methods to minimize negative impacts on the environment (Wang et al., 2021). Singh et al. (2020), using data from small and medium-sized enterprises (SMEs) in the manufacturing sector, have shown that green innovation positively predicts environmental performance; at the same time, green human resource management has an indirect impact on environmental performance through green innovation. Aftab et al. (2023) also affirmed that green innovation is an important mechanism in the relationship between green human resource management and environmental performance. When enterprises innovate in a green direction, production and business activities will reduce resource consumption, limit emissions, and reduce environmental costs. Based on the above arguments, the research hypothesis is proposed as follows:

H2: Green innovation will be positively associated with environmental performance.

Environmentally friendly behavior refers to employees' actions to minimize negative impacts on the environment during the work process (Khan et al., 2024). Eco-friendly behavior is important because corporate environmental goals can only become practical results when translated into concrete actions by workers. Saeed et al. (2019) show that green human resource management has a positive impact on employees' pro-environmental behavior. When employees proactively implement eco-friendly behaviors, enterprises have the potential to

reduce waste, improve environmental compliance, and improve resource performance. Therefore, eco-friendly behavior is expected to have a positive impact on environmental performance. Based on the above arguments, the research hypothesis is proposed as follows:

H3: Environmentally friendly behavior will be positively associated with environmental performance.

According to Martín-de Castro et al. (2023), environmental strategy is the proactive integration of environmental protection into a business's strategic process through stakeholder engagement and environmental management activities, in response to the climate emergency. It minimizes environmental risks, improves the performance of environmental operations, and at the same time strengthens the competitive advantage of enterprises. As a high-level management tool, it orients all activities of the organization toward sustainable development. Baloch et al. (2022) argue that a favorable organizational environment, combined with proactive strategies to promote the adoption of environmentally friendly technology, not only improves environmental outcomes but also enhances the economic performance of enterprises. Conversely, an ineffective management culture can make the environmental strategy reactive or responsive, heightening sensitivity to environmental risks, increasing the risk of environmental incidents, and damaging the reputation and brand image of the business (Rehman et al., 2021). Pollution prevention, product management according to the life cycle, and the pursuit of sustainable development are considered important pillars of environmental strategy, helping enterprises form and maintain a competitive advantage in the long term (Chen et al., 2016). Kraus et al. (2020) indicates that environmental strategy has a direct impact on environmental performance, which serves as an important bridge in the relationship between corporate social responsibility and environmental performance. Additionally, green innovation in organizations tends to be promoted more strongly when enterprises pursue a proactive environmental strategy, whereas reactive environmental strategies can undermine the positive impact of green innovation on environmental performance (Rehman et al., 2021). Furthermore, recent studies have emphasized the moderate role of environmental strategy in the relationship between green innovation and environmental performance. Mustafa et al. (2022) provide empirical evidence that environmental strategies have a positive and significant impact on this relationship. The impact of green innovation on environmental performance will be stronger in enterprises that pursue a proactive environmental strategy than in those with a reactive environmental strategy. Based on the above arguments, the research hypothesis is proposed as follows:

H4: Environmental strategy will be positively associated with environmental performance.

$H4_a$: Environmental strategy positively moderates the relationship between green recruitment and selection and environmental performance.

$H4_b$: Environmental strategy positively moderates the relationship between green training and development and environmental performance.

$H4_c$: Environmental strategy positively moderates the relationship between green performance management and environmental performance.

$H4_d$: Environmental strategy positively moderates the relationship between green pay and reward system and environmental performance.

$H4_e$: Environmental strategy positively moderates the relationship between green employee involvement and environmental performance.

$H4_f$: Environmental strategy positively moderates the relationship between green innovation and environmental performance.

$H4_g$: Environmental strategy positively moderates the relationship between environmentally friendly behavior and environmental performance.

Methodology

Measurement scales

The scales are adapted from relevant prior studies. Aspects of green human resource management are drawn from the studies of Dumont et al. (2017), Kim et al. (2019), and Ojo et al. (2022). The green innovation scale is based on the studies of Singh et al. (2020) and Sobaih et al. (2020). The environmentally friendly behavior scale is adapted from Kim et al. (2019) and Ojo et al. (2022). The environmental strategy scale is adapted from Chen et al. (2015) and Cater et al. (2018). Finally, the environmental performance scale is adapted from the studies of Sobaih et al. (2020) and Aggarwal and Aggarwala (2023).

Before conducting the formal survey, the authors held a group discussion with several managers from small and medium-sized enterprises and consulted with experts in human resource management and environmental governance. The purpose of this step was to assess the relevance, clarity, and reflectivity of the observed variables with respect to the research constructs, including green human resource governance, environmental strategy, and corporate environmental performance. The results of the discussion and consultation indicated that the preliminary scales received strong consensus. However, some observed variables needed to be adjusted in wording to better align with the characteristics of governance, resources, and the level of implementation of green activities in Vietnam's small and medium-sized enterprises, while ensuring specificity, ease of understanding, and minimizing the possibility of confusion for respondents. After these corrections, the formal questionnaire was based on a 5-level Likert scale, with level 1 indicating “strongly disagreed” and level 5 indicating “strongly agreed”.

Data collection

According to Hair et al. (2010), the recommended sample size for exploratory factor analysis (EFA) is at least 5 observations per variable and preferably 10. Therefore, the authors used a convenient sampling method with an optimal sample size of 350 to ensure the reliability and stability of the analysis results. However, to limit the influence of invalid response questionnaires, the authors issued 380 survey questionnaires.

The survey form will be sent online via email as a Google Forms link to employees and managers at a number of small and medium-sized enterprises in Vietnam from March to August 2025. After the data are checked and cleaned, answer sheets that lack information or do not complete the survey content are removed. The final result is 342 valid questionnaires. Demographic information on respondents is presented in Table 1 below:

Table 1. Sample characteristics

Items		N	Ratio (%)
Gender	Male	180	52.63
	Female	162	47.37
Income	5 - 10 millions VND	82	23.98
	10 - 15 millions VND	148	43.27
	Over 15 millions VND	112	32.75
Education	College	54	15.79
	Undergraduate	193	56.43
	Postgraduate	95	27.78
Seniority	From 3 to 5 years	86	25.15
	From 5 to 10 years	143	41.81
	Over 10 years	113	33.04

Data analysis

The data were analyzed using SPSS 26 with statistical tests such as descriptive statistics, Cronbach's alpha, exploratory factor analysis (EFA), Pearson correlation analysis, and moderated multiple regression (MMR) to evaluate the direct and moderating relationships between constructs in the research model. Additionally, the authors used the Bootstrap technique in the Hayes Process Macro to demonstrate moderating relationships.

Results and Discussion

Results

Table 2 presents a descriptive analysis showing that green employee involvement is rated highest (Mean = 4.02), while the green pay and reward system has the lowest mean (Mean = 3.74). This result indicates that Vietnam's small and medium-sized enterprises have focused on encouraging employee participation in green activities, but the remuneration mechanism tied to environmental goals remains incomplete.

Additionally, environmental performance (Mean = 4.15) and environmental strategy (Mean = 4.07) have relatively high means, indicating that Vietnam's small and medium-sized enterprises are aware of and oriented toward improving environmental outcomes. The standard deviation ranged from 0.57 to 0.76, indicating that the degree of dispersion was not large and that respondents' assessments were relatively stable.

Table 2. Descriptive statistics

Scales	Sign	Mean	S.D
Green recruitment and selection	GRS	3.78	0.71
Green training and development	GTD	3.92	0.65
Green performance management	GPM	3.85	0.68
Green pay and reward system	GPRS	3.74	0.76

Green employee involvement	GEI	4.02	0.60
Green innovation	GI	3.88	0.64
Environmentally friendly behavior	EFB	3.95	0.58
Environmental strategy	ES	4.07	0.57
Environmental performance	EP	4.15	0.67

The reliability analysis of the scales showed that all scales had Cronbach's Alpha coefficients ranging from 0.789 to 0.835, exceeding the acceptance threshold of 0.7 and indicating good reliability. In addition, the Corrected Item-Total Correlation for the observed variables was greater than 0.3, indicating that the observed variables are consistent with the overall scale. Cronbach's alpha if item deleted also did not indicate the need to remove any observed variables from the model (see Table 3).

Table 3. The result of reliability

Items	Cronbach's Alpha	Corrected Item – Total Correlation	Cronbach's Alpha if Item Deleted
Green recruitment and selection			
GRS1	0.826	0.627	0.819
GRS2		0.645	0.805
GRS3		0.609	0.782
GRS4		0.575	0.767
GRS5		0.632	0.743
Green training and development			
GTD1	0.803	0.551	0.794
GTD2		0.538	0.778
GTD3		0.542	0.761
GTD4		0.517	0.756
Green performance management			
GPM1	0.817	0.682	0.802
GPM2		0.675	0.796
GPM3		0.643	0.771
GPM4		0.651	0.757
Green pay and reward system			
GPRS1	0.831	0.619	0.827
GPRS2		0.578	0.793
GPRS3		0.550	0.772
GPRS4		0.584	0.760
Green employee involvement			
GEI1	0.795	0.634	0.788
GEI2		0.607	0.765
GEI3		0.612	0.749
Green innovation			
GI1	0.809	0.619	0.770
GI2		0.583	0.768

Items	Cronbach's Alpha	Corrected Item – Total Correlation	Cronbach's Alpha if Item Deleted
GI3		0.524	0.753
GI4		0.575	0.741
Environmentally friendly behavior			
EFB1	0.828	0.635	0.816
EFB2		0.587	0.795
EFB3		0.562	0.781
EFB4		0.533	0.767
Environmental strategy			
ES1	0.789	0.637	0.775
ES2		0.524	0.760
ES3		0.516	0.743
ES4		0.583	0.739
Environmental performance			
EP1	0.835	0.638	0.822
EP2		0.612	0.801
EP3		0.649	0.795

The EFA results for the independent scales showed that the KMO coefficient was 0.782, which was greater than the threshold of 0.5, indicating that the data were suitable for factor analysis. Bartlett's test had a Sig. = 0.000 < 0.05, indicating that the observed variables were correlated with each other overall and were eligible for EFA. The EFA extracted 7 factors with Eigenvalue = 1.135 > 1, and the total variance extracted reached 74.162%, indicating that these 7 factors explained most of the variability in the data. The factor loadings were all greater than 0.5, ranging from about 0.732 to 0.837, indicating that the observed variables showed good convergent validity on their respective factors. Thus, the independent scales meet the requirements for convergent values and factor structures and are eligible for further inclusion in subsequent analyses.

The EFA results for the environmental performance and environmental strategy scales show that the KMO coefficients for the two scales are 0.781 and 0.763, respectively, both greater than the threshold of 0.5, indicating that the data are suitable for EFA. Bartlett's Test has a Sig. value of 0.000 < 0.05, indicating that the observed variables are correlated with each other and meet the conditions for factor analysis.

For the environmental performance scale, factor loadings ranged from 0.779 to 0.814, the total variance was 71.353%, and the Eigenvalue was 1.492. For the environmental strategy scale, factor loadings ranged from 0.738 to 0.801, the total extraction variance was 72.835%, and the Eigenvalue was 1.376. Thus, the scales are satisfactory in terms of convergent values and are eligible for inclusion in further analyses.

The results in Table 4 show that environmental performance (EP) is positively correlated with and statistically significant for all independent and moderate variables at p <

0.01. Among these, the strongest correlation was between EP and environmentally friendly behavior (EFB), with a coefficient of r = 0.751, followed by green employee involvement (GEI) with r = 0.736, green training and development (GTD) with r = 0.705, and green innovation (GI) with r = 0.698.

Table 4. Correlation Analysis

	P	RS	TD	PM	PRS	EI	I	FB	S
P									
RS	.612**								
TD	.705**	.201**							
PM	.677**	.268*	.328**						
PRS	.649**	.384**	.199**	.323**					
EI	.736**	.276*	.257*	.219*	.194**				
I	.698**	.311**	.241**	.205**	.247*	.236*			
FB	.751**	.195*	.206**	.231**	.228*	.215**	.253**		
S	.654**	.257**	.184**	.276*	.193**	.284**	.215*	.179*	

**p < 0.05 và **p < 0.01*

EP = Environmental performance, GRS = Green recruitment and selection, GTD = Green training and development, GPM = Green performance management, GPRS = Green pay and reward system, GEI = Green employee involvement, GI = Green innovation, EFB = Environmentally friendly behavior, ES = Environmental strategy

The results in Table 5 show that the explanatory power of the model increases across the three regression models. In model 1, the R^2 is 0.637 and the Adjusted R^2 is 0.629, suggesting that the initial independent variables explain about 62.9% of the variation in environmental performance.

In model 2, the R^2 increases to 0.706, and the Adjusted R^2 is 0.691, reflecting improved interpretability when additional variables are included in the analysis. By model 3, the R^2 reaches 0.783, and the Adjusted R^2 is 0.774, indicating that the final model explains about 77.4% of the variation in environmental performance. This is a fairly high level of explanation, showing that the research model is well matched to the data (see Table 5).

Additionally, the Durbin-Watson coefficient ranges from 1.684 to 1.786, which is within an acceptable range, suggesting that the model shows no serious signs of residual

autocorrelation. Thus, the regression model provides a good fit and is suitable for further consideration of the variables' impact.

Table 5. Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	0.652[a]	0.637	0.629	0.281	1.684
2	0.738[a]	0.706	0.691	0.312	1.739
3	0.796[a]	0.783	0.774	0.357	1.786

The analysis results in Table 6 show that, in Model 1, independent variables including GRS, GTD, GPM, GPRS, GEI, GI, and EFB all have a positive and statistically significant impact on environmental performance at $p < 0.01$. Among these, the green pay and reward system (GPRS) had the strongest impact with $\beta = 0.273$, followed by environmentally friendly behavior (EFB) with $\beta = 0.254$ and green employee involvement (GEI) with $\beta = 0.242$.

In Model 2, when the environmental strategy (ES) moderating variable is added, the results show that ES has a positive and statistically significant impact on environmental performance, with $\beta = 0.204$, $p < 0.01$. This indicates that environmental strategy is an important factor in improving the environmental performance of enterprises.

In Model 3, all interaction terms between the environmental strategy and the independent variables have positive Beta coefficients and are statistically significant. Specifically, the interactions of cES.GRS, cES.GTD, cES.GPM, cES.GPRS, cES.GEI, cES.GI, and cES.EFB all have a positive impact on environmental performance. Among these, the interaction between environmental strategy and green innovation (cES.GI) had the strongest impact ($\beta = 0.194$; $p < 0.05$), followed by the interaction between environmental strategy and green training and development (cES.GTD) with $\beta = 0.172$; $p < 0.01$, and the interaction between environmental strategy and environmentally friendly behavior (cES.EFB) with $\beta = 0.158$; $p < 0.01$. This result confirms that environmental strategy plays a positive, moderate role, strengthening the relationship between green human resource management practices, green innovation, environmentally friendly behaviors, and environmental performance.

Additionally, the VIF coefficients in all three models were below 2, indicating that the model did not exhibit serious multicollinearity (Hair et al., 2010). Thus, the hypotheses regarding direct and moderate effects in the model are supported.

Table 6. The result of moderated multiple regression

	Model 1		Model 2		Model 3	
	Beta	VIF	Beta	VIF	Beta	VIF
GRS	0.238**	1.349	0.217**	1.682	0.329**	1.643
GTD	0.215**	1.456	0.239**	1.719	0.285**	1.712
GPM	0.209**	1.617	0.196**	1.545	0.358**	1.598
GPRS	0.273**	1.531	0.241**	1.611	0.204**	1.665

	Model 1		Model 2		Model 3	
	Beta	VIF	Beta	VIF	Beta	VIF
GEI	0.242**	1.582	0.285**	1.724	0.267**	1.471
GI	0.226**	1.303	0.263**	1.573	0.301**	1.553
EFB	0.254**	1.675	0.278**	1.696	0.242**	1.629
ES			0.204**	1.705	0.216**	1.707
cES.GRS					0.113**	1.493
cES.GTD					0.172**	1.687
cES.GPM					0.108*	1.594
cES.GPRS					0.131**	1.756
cES.GEI					0.125**	1.688
cES.GI					0.194*	1.710
cES.EFB					0.158**	1.595

*p < 0.05 and **p < 0.01

a. Dependent Variable: EP

EP = Environmental performance, GRS = Green recruitment and selection, GTD = Green training and development, GPM = Green performance management, GPRS = Green pay and reward system, GEI = Green employee involvement, GI = Green innovation, EFB = Environmentally friendly behavior, ES = Environmental strategy

Using the regression coefficients, the regression equation is constructed as follows:

EP = 0.358*GPM + 0.329*GRS + 0.301*GI + 0.285*GTD + 0.267*GEI + 0.242*EFB + 0.216*ES + 0.204*GPRS + 0.194*cES.GI + 0.172*cES.GTD + 0.158*cES.EFB + 0.131*cES.GPRS + 0.125*cES.GEI + 0.113*cES.GRS + 0.108*cES.GPM

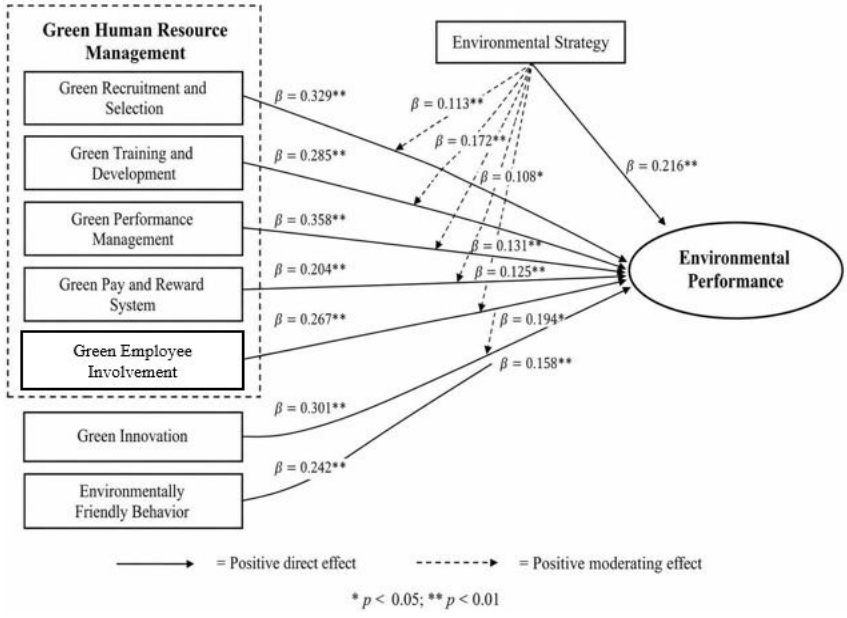

Figure 2. Research results model

Furthermore, to clarify the moderate role of the environmental strategy, the study continues to conduct additional testing using the Bootstrap technique through the PROCESS Macro.

Table 7. Moderate test results on PROCESS Macro

Int_1		coeff	se	t	p	Lower	Upper
Mode	cES.GRS	0.113	0.036	3,14	0.002	0.041	0.186
	cES.GTD	0.172	0.042	4,10	0.000	0.089	0.254
	cES.GPM	0.108	0.034	3,18	0.001	0.041	0.175
	cES.GPRS	0.131	0.039	3,36	0.001	0.055	0.207
	cES.GEI	0.125	0.037	3,38	0.001	0.052	0.198
	cES.GI	0.194	0.045	4,31	0.000	0.106	0.282
	cES.EFB	0.158	0.041	3,85	0.000	0.077	0.239

Note: GRS = Green recruitment and selection, GTD = Green training and development, GPM = Green performance management, GPRS = Green pay and reward system, GEI = Green employee involvement, GI = Green innovation, EFB = Environmentally friendly behavior, ES = Environmental strategy

The results in Table 7 show that all interacting variables have positive, statistically significant impact coefficients ($p < 0.05$). At the same time, the Bootstrap confidence intervals for the interacting variables did not include 0, indicating that the throttling effects were significant. Thus, the PROCESS Macro results continue to affirm that the environmental strategy plays a positive, moderate role, enhancing the impact of green factors on the environmental performance of enterprises.

Discussion

The results show that green human resource management practices, green innovation, and environmentally friendly behaviors all have a positive impact on the environmental performance of small and medium-sized enterprises. This confirms that environmental performance depends not only on technology, production processes, or the level of moderate compliance, but is also significantly influenced by how enterprises manage, develop, and shape workers' behavior. This result aligns with the AMO theoretical foundation, whereby green human resource management practices help improve employees' capacity, motivation, and opportunities to participate in environmental activities, thereby contributing to better environmental outcomes for enterprises. At the same time, this finding is consistent with studies by Renwick et al. (2013), Tang et al. (2018), Paillé et al. (2020), Kim et al. (2019), Ojo et al. (2022), and Aggarwal and Agarwala (2023), in which the authors argue that green human resource management is an important tool for helping enterprises promote green behavior and improve environmental performance.

Among green human resource management practices, green performance management has the strongest positive relationship with environmental performance. These results indicate that when environmental criteria are integrated into the system of goal setting, monitoring, evaluation, and feedback on work results, employees tend to be more aware of environmental

responsibility at work. This helps environmental goals move beyond generic slogans and become specific criteria associated with work performance. This result is consistent with Tang et al. (2018) and Faisal (2023), as these studies highlight the role of green performance management in formalizing environmental goals within HR systems. In the context of small and medium-sized enterprises, this finding is particularly significant because they are often resource-limited, so establishing clear evaluation criteria can be an effective governance tool to guide employee environmental behavior.

Green recruitment and selection also have a significant positive impact on environmental performance. This shows that selecting personnel with awareness, attitudes, and values aligned with sustainable development can create an important foundation for implementing environmental activities within the enterprise. This finding is consistent with Saeed et al. (2019), Dumont et al. (2017), and Ojo et al. (2022), which have shown that green recruitment helps form a workforce that is more likely to receive and implement environmental policies effectively. For small and medium-sized enterprises, green recruitment can serve as an important "starting point," because if employees are environmentally aware from the beginning, enterprises will reduce the cost of retraining and increase the ability to spread green culture within the organization.

The results also show that green innovation positively affects environmental performance. This implies that enterprises that improve their products, processes, technologies, and operating methods in a green direction will be able to reduce resource consumption, limit emissions, and improve resource performance. This finding aligns with a natural-resource-based view, in which green innovation is an important organizational competency that helps enterprises transform intrinsic resources into environmental advantages. This result is also consistent with Singh et al. (2020), Sobaih et al. (2020), Wang et al. (2021), Aftab et al. (2023), and Niazi et al. (2023), all of which confirmed that green innovation is an important mechanism for promoting environmental performance. In the context of small and medium-sized enterprises in Vietnam, this finding shows that green innovation activities are not necessarily associated with large technology investments, but can start with small improvements in processes, such as saving raw materials, reducing waste, and optimizing operations.

Green recruitment and selection, green employee involvement, environmentally friendly behavior, and a green pay and reward system also positively impact environmental performance. This result shows that enterprises seeking to improve environmental outcomes need to incorporate multiple green human resource management practices simultaneously. Green training equips employees with the knowledge and skills to perform their jobs in an environmentally friendly way; green involvement creates opportunities for employees to contribute initiatives and participate in environmental activities; environmentally friendly behavior translates environmental goals into concrete actions in daily work; and a green reward system provides incentives to maintain these behaviors. This finding is consistent with Saeed et al. (2019), Fawehinmi et al. (2020), Nguyen et al. (2024), and Kim et al. (2019), as these studies all highlight the role of green employee behavior in improving environmental outcomes.

Another notable finding is that environmental strategy not only directly affects environmental performance but also positively regulates all relationships in the model. This shows that green factors are more effective only when aligned with a clear environmental strategy. When enterprises have a proactive environmental strategy, recruitment, training, evaluation, remuneration, innovation, and green behavior incentives will be implemented more consistently, with clearer goals and supported by more appropriate resources. This finding is consistent with the strategic fit theory and aligns with studies by Chen et al. (2015), Čater et al. (2018), Kraus et al. (2020), Rehman et al. (2021), Mustafa et al. (2022), and Martín-de Castro et al. (2023), which suggest that environmental strategy is the foundation that helps enterprises navigate, coordinate, and enhance the performance of environmental activities.

The strongest moderate effect of environmental strategy is evident in the relationship between green innovation and environmental performance. This shows that green innovation yields more pronounced environmental outcomes when enterprises maintain a proactive and consistent environmental strategy. In other words, without strategic guidance, green innovation can become fragmented, under-resourced, or short-term. Conversely, when embedded in a clear environmental strategy, green innovation initiatives can be prioritized, implemented in concert, and produce a more substantive environmental impact. This finding reinforces the arguments of Rehman et al. (2021) and Mustafa et al. (2022) regarding the role of environmental strategy in enhancing the impact of green innovation on environmental performance.

Implications

Theoretical implications

The research results contribute to the flow of research on green human resource management and environmental performance. First, the study affirms that green human resource management is an important organizational mechanism for helping small and medium-sized enterprises improve environmental performance. Green practices such as green recruitment, green training and development, green performance management, green pay and reward systems, and green employee engagement all have a positive impact on environmental performance, showing that environmental outcomes do not depend solely on technology or the level of moderate compliance, but are also influenced by how enterprises govern, encourage, and mobilize workers to participate in environmental goals.

This result also contributes to expanding the application of the ability-motivation-opportunities (AMO) theory in the context of small and medium-sized enterprises in the developing economy. Accordingly, green human resource management practices are considered a tool to help improve green capacity, create green motivation, and expand green involvement opportunities for employees. When workers are equipped with environmental knowledge, incentivized through appropriate evaluation and remuneration systems, and given the opportunity to participate in green initiatives, they are more likely to contribute actively to improving the enterprise's environmental performance.

Another theoretical contribution of the study is clarifying the role of green innovation and environmentally friendly behavior in explaining environmental performance. The results

show that environmental performance is driven not only by formal green HR policies but also by the company's innovation capacity and employees' environmentally friendly behavior in daily work. This reinforces the natural-resource-based view, which holds that enterprises can improve environmental outcomes by developing green competencies such as process improvement, resource saving, waste reduction, and the adoption of cleaner technologies.

The study also adds evidence to the theory of strategic suitability by demonstrating the moderate role of environmental strategy. The results show that environmental strategy not only has a direct impact on environmental performance but also enhances the effects of green human resource management, green innovation, and environmentally friendly behavior on environmental performance. This implies that green practices will produce stronger results when placed in a clear strategic direction, with leadership commitment, and supported by the right resources.

Practical implications

The results of the study help small and medium-sized enterprises clearly identify factors that have an important impact on environmental performance, thereby prioritizing resources for activities with the most significant impact, such as green performance management, green recruitment and selection, and green innovation.

For green performance management, enterprises should set specific environmental assessment targets for each department and job location, such as energy savings, waste reduction rates, environmental process compliance, and the number of proposed green initiatives. These indicators should be integrated into the periodic performance review system and linked to decisions on rewards, promotions, and resource allocation.

Additionally, green recruitment and selection need to be redesigned with a green orientation to support the enterprise's environmental goals. Criteria for environmental awareness, attitude toward sustainable development, and adaptability to green processes should be integrated into job descriptions, recruitment criteria, and interview content. This approach helps enterprises attract valuable personnel aligned with the green development orientation, thereby creating a favorable foundation for the formation of an environmental culture in the organization.

Finally, enterprises need to view green innovation as a core competency to improve environmental performance, rather than merely a complementary activity. In the context of limited resources, small and medium-sized enterprises can start with practical, incremental improvements such as conserving raw materials, optimizing production processes, reusing waste, digitizing management processes, using energy-saving equipment, and improving products in an environmentally friendly direction. At the same time, enterprises should establish mechanisms to encourage employees to propose green initiatives and strengthen cooperation with suppliers, technology partners, or industry associations to enhance green innovation capacity.

Conclusion

The study clarified the impact of green human resource management on the environmental performance of small and medium-sized enterprises and examined the moderating role of environmental strategy. Results from 342 valid surveys showed that green human resource management practices, green innovation, and environmentally friendly behavior all have a positive impact on environmental performance. Among these, green performance management, green recruitment and selection, and green innovation are the three most significant factors. Additionally, environmental strategy not only has a direct impact but also enhances the impact of green factors on environmental performance.

The findings provide empirical evidence on the role of green human resource management in small and medium-sized enterprises in Vietnam and suggest that enterprises need to implement green practices within a clear and consistent environmental strategy. However, the study still has some limitations, including the use of a convenience sample selection method, cross-sectional survey data, and scales that are primarily based on respondents' perceptions. Follow-up studies can expand the sample range, use longitudinal data, and add intermediate variables such as green culture, green commitment, or green innovation capacity to further clarify the mechanism of impact.

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