

Green Human Resources Management and Its Prediction Green Organizational Citizenship Behaviours: Green Transformational Leadership as Moderator and Green Work Engagement as Mediator

Cong Hiep Duong¹, Dinh Long Do¹, Phuong Thao Nguyen¹

¹Thai Nguyen University of Economics and Business Administration, Thai Nguyen, Vietnam.

Abstract

Purpose: This study aims to explore the status and challenges of green human resources management in Vietnam's electronics industry. Furthermore, this research proposes a theoretical framework to fill the identified gaps and foster employees' green organizational citizenship behaviours.

Design/methodology/approach: Data were collected from employees (n=379) in the Vietnamese electronics industry using a self-administered questionnaire. We used partial least squares-structural equation modelling (PLS-SEM) as the primary statistical technique to examine the study's hypotheses.

Findings: The results suggest that green human resources management significantly predicted employees' green organizational citizenship behaviours. Furthermore, green transformational leadership acts as a moderator, and green work engagement acts as a mediator in the relationship between green human resources management and employees' green organizational citizenship behaviours.

Practical implications: The results provide valuable insights for Vietnamese electronics industry policymakers on how green human resources management may positively contribute to employees' green organizational citizenship behaviours.

Originality/value: This paper makes several contributions. First, it contributes to the general literature of green human resources management. Second, it expands the limited research on green human resources management within the Vietnamese context. Third, it identifies green transformational leadership as a moderating variable, and green work engagement as a mediating variable in the relationship between green human resources management and green organizational citizenship behaviours.

Keywords: Green Human Resources Management, Green Organizational Citizenship Behaviours, Green Transformational Leadership, Green Work Engagement, Vietnamese Electronics Industry.

Introduction

Environmental concerns, such as global warming, natural resource depletion, and pollution, have become increasingly pressing global issues. Human activities are identified as major contributors to these environmental problems. Organizations worldwide are increasingly adopting various environmental protection initiatives and developing green strategies (Longoni et al., 2018; Wu et al., 2018), signifying a growing attention to employees' activities and behaviors as a driving force behind environmental challenges (Al-Swidi et al., 2021). This shift emphasizes the need for businesses to take proactive environmental management measures to conserve natural resources and reduce environmental impacts (Jabbour et al., 2010). A pivotal organizational response to these environmental demands is the emergence of Green Human Resource Management (GHRM). GHRM activities that are specifically designed to enhance positive environmental outcomes (Gupta et al., 2025). It integrates environmental considerations into all HRM practices, including green recruitment and selection, green training and development, green performance management, and green rewards and incentives (Kaur & Gupta, 2024; Tang et al., 2018). The overarching aim of GHRM is to develop environmentally conscious employees (Pham et al., 2023) and foster the sustainable use of resources within enterprises (Tran, 2023). This focus on GHRM as a strategic mechanism for achieving sustainability has garnered significant scholarly attention (Aboramadan, 2022; Liu et al., 2021).

The effective implementation of GHRM necessitates focusing on employee green behavior, particularly Green Organizational Citizenship Behavior (GOCB). GOCB can include eco-civic engagements, and eco-helping behaviors (Mi et al., 2019) are crucial for the successful execution of environmental initiatives and overall organizational environmental performance (Alt & Spitzbeck, 2016). There has been a notable shift in academic attention from organizational-level green outcomes to understanding and shaping employee green behaviors in the workplace (Thomas & Albishri, 2024). GOCB can effectively supplement the defects and deficiencies of the formal environmental management system to promote an organization's green development (Boiral, 2009). Complementing GHRM's influence, Green Transformational Leadership (GTL) plays a vital role in fostering employee green behaviors. Leaders who exhibit GTL articulate a clear green vision, provide resources, and empower employees to engage in pro-environmental actions. GTL can also serve as a role model, advocating environmental protection concepts and shaping behaviors consistent with an environmental vision (Chen & Chang, 2013; Robertson & Barling, 2017). To further understand the mechanisms through which GHRM and GTL translate into GOCB, the

concept of Green Work Engagement (GWE) is critical. GWE serves as a motivational mechanism that influences performance outcomes. Employees with higher GWE contribute to the company through environmentally responsible behavior (Aboramadan et al., 2020). Despite its importance, studies investigating the factors affecting GWE, particularly the combined effect of GHRM and green leadership, remain limited (Aboramadan, 2022). While a direct link between GHRM and desirable outcomes is often assumed, a recognized void exists in understanding the underlying social and psychological processes that explain how GHRM practices translate into employee green behaviors (Pham et al., 2020). Research on GHRM and employees' green work-related outcomes remains in its early stages (Aboramadan, 2022), with no existing studies specifically focusing on the electronics industry. Prior research has often examined the roles of GHRM and green leadership separately (Al-Swidi et al., 2021). However, some findings suggest that the influence of GHRM and green leadership on employee green behaviors might not be direct but rather mediated by other organizational mechanisms, like green organizational culture (Aboramadan et al., 2020; Rehman et al., 2021). This indicates a need for studies that explore the interactive effects of GHRM and green leadership.

Much of the existing literature on GHRM is rooted in Western contexts or developed countries (Dumont et al., 2017; Hooi et al., 2022; Tandon et al., 2023). Empirical studies conducted in specific emerging markets such as Vietnam remain limited. The Vietnamese electronics industry, in particular, presents a critical area for further investigation. According to the General Statistics Office (GSO), Vietnam's electronics industry achieved remarkable growth in 2024, with export revenues reaching USD 126.5 billion, accounting for over one-third of the nation's total exports. Within this sector, exports of computers, electronics, and components rose by 26.6% to USD 72.56 billion, while phones and components contributed USD 53.9 billion (Daidoanket, 2025). Exploring this industry can offer valuable contextual insights into how GHRM, GTL, and GWE interact to influence GOCB in a rapidly developing Asian economy facing growing environmental concerns. At COP26 in 2021, the Prime Minister of Vietnam pledged to achieve net-zero emissions by 2050 (Vnexpress, 2024). Consequently, organizations across sectors, including electronics, are increasingly aligning with environmental regulations and are now under closer scrutiny by local authorities (Chinhphu.vn, 2024).

Accordingly, this study seeks to advance the existing literature by proposing and empirically examining a moderated mediation model in the context of the Vietnamese electronics industry. By applying and extending Ability-Motivation-Opportunity (AMO)

theory (Appelbaum, 2000) perspectives in this under-researched context, this research seeks to offer a more nuanced understanding of the determinants of employee green behavior and provide valuable insights for practitioners and policymakers in Vietnam. This study aims to answer the following research questions:

RQ1: How does GHRM predict GOCB?

RQ2: Does GWE mediate the relationship between GHRM and GOCB?

RQ3: How does GTL moderate the relationships among GHRM, GWE, and GOCB?

The remainder of this paper is organized as follows: Section 2 presents the literature review, outlining key theoretical frameworks and prior research relevant to the study. Section 3 details the research methodology. Section 4 reports the results of the data analysis, followed by a discussion of the key findings in Section 5. Finally, Section 6 offers concluding remarks and implications for future research.

Literature review

Theoretical background

This study adopts the AMO theory as a foundational framework to examine the intricate relationships among GHRM practices, GWE, GTL, and GOCB. The AMO theory has been extensively applied in prior research to explore the link between GHRM and environmental performance outcomes (Yu et al., 2020), suggesting that organizational effectiveness is maximized when HR practices are designed to enhance employee abilities, stimulate motivation, and create opportunities for contribution (Appelbaum, 2000). In the context of environmental sustainability, GHRM operationalizes the core principles of the AMO framework through targeted practices. Specifically, green recruitment and training initiatives are implemented to enhance employees' abilities by equipping them with the knowledge and skills necessary for environmentally responsible tasks. To foster motivation, GHRM encompasses green performance management and incentive systems that align individual goals with organizational environmental objectives. Additionally, green employee involvement initiatives create opportunities for staff to engage actively in environmental decision-making and management processes (Anwar et al., 2020; Awan et al., 2023; Esponda Perez et al., 2025; Sobaih et al., 2020). Within the AMO framework, GHRM practices collectively contribute to developing GOCB, voluntary, and discretionary behaviors that support the organization's environmental performance (Gupta et al., 2025; Pham et al., 2019). Moreover, the resources and support provided through GHRM practices are posited to foster GWE, characterized by employees' active, positive, and dedicated involvement in environmental initiatives (Ababneh, 2021; Haque et al., 2024).

GHRM and GOCB

GHRM is a contemporary management approach that integrates environmental consciousness into all HRM activities, such as recruitment, training, performance evaluation, and compensation, to foster positive environmental outcomes and achieve organizational sustainability goals (Jabbour et al., 2010; Jabbour & de Sousa Jabbour, 2016). A core aim of GHRM is to develop a "green workforce" that understands, values, and actively participates in environmentally friendly practices and initiatives (Anwar et al., 2020).

GOCB is defined as "individual and discretionary social behaviours that are not explicitly recognised by the formal reward system and that contribute to a more effective environmental management by organisations" (Boiral, 2009). These behaviors encompass voluntary employee actions beyond formal job responsibilities, such as proactively suggesting eco-friendly improvements, encouraging peers to adopt sustainable practices, or actively participating in environmental initiatives (Hooi et al., 2022). GOCB is widely recognized as a critical element in the effective implementation of environmental strategies and in enhancing an organization's overall environmental performance (Brick et al., 2017). According to the AMO theory, HRM practices improve organizational outcomes by developing employees' abilities, stimulating motivation, and creating opportunities for constructive behaviors (Muisyo et al., 2022). Within green management, GHRM practices are intentionally structured to strengthen these three dimensions, fostering employees' discretionary pro-environmental behaviors.

GHRM practices, particularly green recruitment and green training, are pivotal in enhancing employees' green abilities (Kim et al., 2015; Snape & Redman, 2010). Targeted green training programs equip employees with the knowledge, competencies, and environmental values needed to comprehend environmental issues, respond to environmental challenges, and actively contribute to environmental protection (Aragão & Jabbour, 2017; Pinzone et al., 2016). These initiatives foster "green competence" positively associated with a higher likelihood of employees exhibiting GOCB (Anwar et al., 2020). Among GHRM practices, green training is frequently identified as the most influential in promoting employees' voluntary pro-environmental behaviors (Pham et al., 2019). GHRM practices serve as key motivational mechanisms by encouraging employees to align their behaviors with organizational environmental goals. This alignment is primarily facilitated through green performance management systems and environmentally oriented reward structures (Anwar et al., 2020; Jackson et al., 2014). Both monetary incentives (e.g., bonuses) and non-monetary forms of recognition (e.g., public acknowledgment) for environmental

achievements have enhanced employees' commitment and willingness to engage in GOCB (Ahmed et al., 2024; Pham et al., 2019). Moreover, GHRM initiatives can cultivate employees' environmental passion by emphasizing the importance of environmental preservation and underscoring their contributions. This heightened emotional engagement with environmental issues fosters more substantial affective commitment and encourages more autonomous, self-driven pro-environmental behaviors (Ahmed et al., 2024; Vallerand et al., 2007). Additionally, GHRM practices create meaningful opportunities for employees to engage actively in environmental initiatives and decision-making processes (Govindarajulu & Daily, 2004; Muisyo et al., 2022). These opportunities include involving employees in environmental problem-solving, continuous quality improvement efforts related to environmental concerns, and participation in broader sustainability initiatives (Daily et al., 2012; Ofstad et al., 2017). Organizations enhance both their environmental awareness and problem-solving competencies by empowering employees to contribute ideas, engage in collaborative green projects, and make decisions on environmental matters (Daily et al., 2012; Ofstad et al., 2017). When employees are provided with such opportunities, they are more inclined to proactively engage in GOCB, as they perceive these actions as valuable contributions to collective benefits and acquire further personal and social resources (Ahmed et al., 2024).

A growing body of empirical research supports the positive relationship between GHRM practices and GOCB. For instance, a study conducted among hospitality employees in Pakistan found that GHRM significantly influenced GOCB, with environmental passion and emotional exhaustion mediating this relationship (Ahmed et al., 2024). A study conducted in Jammu, Jammu and Kashmir, India's manufacturing companies found that GHRM significantly influenced GOCB (Gupta et al., 2025). Similarly, research in Taiwanese manufacturing firms demonstrated that GHRM practices focusing on enhancing green abilities, motivation, and opportunities fostered the development of a green organizational culture, subsequently promoting collective GOCB (Muisyo et al., 2022). In the context of Vietnam's hotel industry, Pham et al. (2019) found that green training, green performance management, and green employee involvement, all grounded in the AMO framework, had direct and positive effects on GOCB. Additionally, studies have shown that GHRM significantly enhances employee green behavior (Aboramadan, 2022; Chaudhary, 2020) , with GOCB often mediating the relationship between GHRM and overall environmental performance (Anwar et al., 2020). Based on this empirical foundation, the following hypothesis is proposed:

H1. GHRM positively influences the GOCB among employees in the Vietnamese electronics industry.

GWE as a mediator

GWE is conceptualized as a positive, fulfilling, and work-related psychological state characterized by vigor, dedication, and absorption in tasks associated with green tasks (Aboramadan, 2022; Schaufeli et al., 2002). It reflects employees' enthusiasm for green initiatives, their commitment to environmental work, and the emotional energy they invest in sustainability-related work. This engagement manifests through feelings of inspiration, pride, intensity, and persistence when performing green tasks (Islam et al., 2021; Karatepe et al., 2022; Mughal et al., 2024; Raineri & Paillé, 2016), often resulting in heightened concentration, happiness, and deep involvement in the workplace (Buil et al., 2016).

The AMO theory offers a compelling framework for understanding how GHRM practices contribute to GWE (Ababneh, 2021; Chen, 2019). Organizations that proactively recruit individuals with environmental awareness and align candidate values with the organization's green mission are more likely to attract employees inclined toward environmental responsibility (Gobelna, 2019; Tang et al., 2018). Additionally, providing targeted green training enhances employees' knowledge and capabilities, enabling them to effectively identify and resolve environmental challenges. These developmental efforts not only increase employees' cognitive awareness of environmental issues but also strengthen their competencies in environmental management (Ababneh, 2021; Anwar et al., 2020). As a result, cultivating green abilities is expected to promote stronger emotional connection, enthusiasm, and positive attitudes toward environmental values, ultimately fostering higher levels of GWE (Ababneh, 2021). When organizational performance evaluations integrate environmental goals and explicitly recognize green behaviors, employees tend to perceive their roles as more meaningful. This perceived significance motivates them to exert greater discretionary effort toward achieving environmental objectives (Gobelna, 2019; Pinzone et al., 2016). Furthermore, implementing reward and incentive systems tied directly to sustainability-related achievements reinforces positive employee attitudes and strengthens their commitment to environmental initiatives, key drivers of GWE (Anwar et al., 2020; Ari et al., 2020; Jackson et al., 2011). These motivational mechanisms inspire employees to invest greater energy, enthusiasm, and dedication in their green work (Aboramadan, 2022; Tran, 2023). By establishing both formal and informal communication channels and involving employees in decision-making processes concerning environmental objectives, organizations cultivate a stronger psychological and emotional attachment to environmental

values (Gholami et al., 2016; Roscoe et al., 2019). This active participation and opportunities for collaboration and autonomy in green initiatives enhance employees' sense of ownership and engagement. As a result, employees experience increased levels of passion, enthusiasm, and energy in their environmental roles, reinforcing GWE (Haque et al., 2024).

Empirical studies across various contexts have consistently demonstrated the positive influence of GHRM practices on GWE. For instance, research conducted in hotels in Jordan and Saudi Arabia revealed that GHRM practices significantly enhance employee engagement in environmental initiatives. GWE partially mediates the relationship between GHRM and individual green behavior (Ababneh, 2021). Similarly, green inclusive leadership has positively impacted GWE in the hospitality sector (Abdou et al., 2023). In Saudi Arabian manufacturing SMEs, GHRM was shown to positively influence GWE, which partially mediated the link between GHRM and sustainable organizational performance (Alfadel et al., 2025). Furthermore, evidence from the Bangladeshi ready-made garment industry indicates that green competency-building practices directly enhance GWE, while green knowledge sharing mediates the relationship between GHRM practices and GWE (Haque et al., 2024).

Employees with high levels of GWE are more likely to demonstrate proactive and discretionary eco-friendly behaviors that extend beyond their formal job responsibilities (Buil et al., 2016; K, 2024; Thomas & Albishri, 2024). Their vigor, dedication, and absorption in green tasks translate into a heightened willingness to invest time, effort, and energy in promoting green practices within the organization (Abdou et al., 2023). Engaged employees tend to be more optimistic, confident, and sensitive to opportunities for environmental improvement, which increases the likelihood of engaging in GOGB (Bakker & Demerouti, 2008). Such voluntary behaviors are often viewed as part of a reciprocal exchange, wherein employees respond positively to the organizational support and resources provided. Empirical evidence confirms that engaged employees are more inclined to go the "extra mile" in their green behaviors (Gilal et al., 2019; Matta et al., 2015; Thomas & Albishri, 2024).

Empirical research has increasingly highlighted the mediating role of GWE in the relationship between GHRM and employee green behaviors. For instance, a study on higher education institutions in Palestine found that GWE significantly mediated the effect of GHRM on various forms of employee green behavior, including in-role, extra-role, and green innovative work behavior (Aboramadan, 2022). Similarly, research conducted in luxury hotels in Saudi Arabia revealed that GWE mediates the relationship between environmental corporate social responsibility and GOGB. This suggests that environmental corporate social responsibility enhances employees' discretionary green behaviors by engaging them in

meaningful green initiatives, which increases their energy and dedication toward green behavior (Thomas & Albishri, 2024). Accordingly, the following hypothesis was proposed:

H2. GWE mediates the relationship between GHRM and GOCB in the Vietnamese electronics industry.

GTL as a moderator

GTL represents an extension of the traditional transformational leadership paradigm, specifically oriented toward environmental sustainability objectives. GTL is “the behaviors of leaders who motivate followers to achieve environmental goals and inspire them to perform beyond expected levels of environmental performance” (Chen & Chang, 2013). The core aim of green transformational leaders is to provide inspiration, motivation, and a clear vision that aligns employees with organizational environmental goals, while simultaneously addressing their developmental needs (Chen & Chang, 2013; Dhar, 2015). A growing body of empirical evidence supports the significant positive influence of GTL on employees' GOCB, indicating that GTL fosters voluntary, proactive environmental actions in the workplace (Liu & Yu, 2023; Mi et al., 2019; Nandedkar & Brown, 2018; Öğretmenoğlu et al., 2022).

Empirical studies have highlighted the moderating role of GTL in enhancing the effectiveness of GHRM practices. Research conducted in Pakistan demonstrated that GTL significantly strengthens the positive relationship between GHRM practices and green perceived organizational support, suggesting that GTL amplifies how employees perceive and respond to GHRM initiatives, subsequently fostering green outcomes such as green creativity (Hameed et al., 2022). Another study in the same context found that GTL moderates the relationship between GHRM and green corporate social responsibility and significantly moderates the link between GHRM and environmental performance (Niazi et al., 2023). Although these studies focus on CSR and environmental performance rather than directly on GOCB, they underscore GTL's capacity to reinforce the influence of GHRM on a range of environmental outcomes within organizations. Furthermore, a study conducted in tour operators in Ho Chi Minh City, Vietnam, exploring GHRM practices and GOCB reveals that environmentally specific servant leadership moderates the positive relationship between GHRM practices and GOCB (Luu, 2019), implying that GTL can reinforce the messages and intentions embedded in GHRM practices. The argument is that when employees perceive strong GTL, they are more likely to fully embrace and internalize the green values promoted through GHRM, leading to a stronger manifestation of GOCB. Therefore, we hypothesize:

H3: GTL moderates the relationship between GHRM practices and GOCB

The theoretical framework is shown in Figure 1

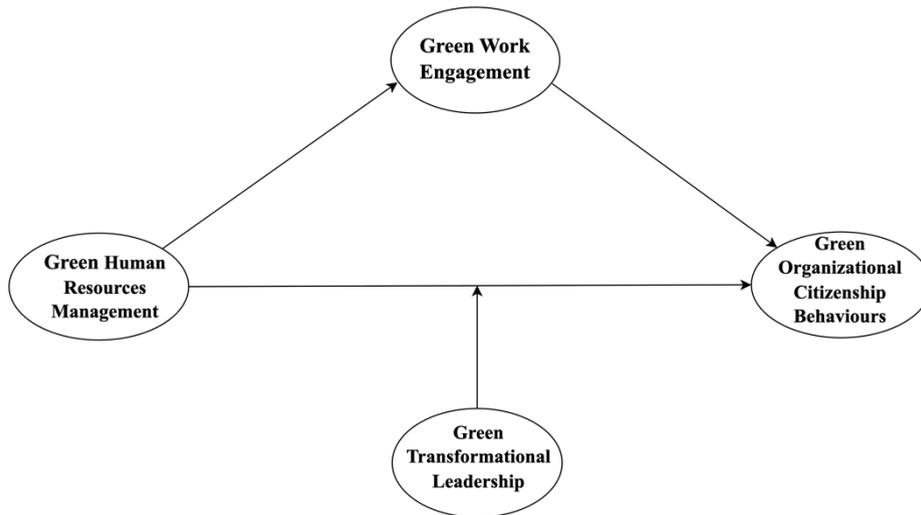


Fig. 1. Theoretical framework

Methodology

Research design and participants

A comprehensive data collection framework was implemented to support the objectives of this study. A hybrid sampling strategy was adopted, combining convenience and snowball sampling techniques. Data were collected from a diverse range of respondents working in the electronics industry in Northern Vietnam. The survey was administered via structured questionnaires using Google Forms, with the data collection period from May 2024 to March 2025. Participants were recruited through personal and professional networks, as well as through email invitations and social media outreach. Eligibility criteria required participants to be full-time employees, at least 18 years of age.

This study utilized a structured survey questionnaire to examine the factors influencing GOCB within the Vietnamese electronics industry. The questionnaire was organized into two main sections: the first gathered demographic information from participants, while the second focused on measuring the core constructs of the study. This systematic approach enabled the collection of a comprehensive dataset, thereby providing valuable insights into the key determinants of GOCB and environmentally responsible behaviors in Vietnam's electronics industry.

Ethical consideration

This study strictly adhered to established ethical guidelines. Written informed consent was obtained from all participants before data collection. All personal identifiers were removed to protect confidentiality and privacy, and the data were anonymized using unique identification codes. As participant contact is no longer

available, no follow-up communication was conducted. The study complied with the principles outlined in the Declaration of Helsinki and did not involve any participants under 18.

Measurements

The key constructs in this study include GHRM, GTL, GWE, and GOCB. Each construct was adopted from validated scales in prior research and adapted to fit the specific context of this study. GHRM was measured using a six-item scale developed by Dumont et al. (2017). GTL was assessed using six items derived from Chen and Chang (2013). GWE was evaluated based on a six-item scale from Schaufeli et al. (2006), while GOCB was measured using a six-item scale adapted from De Roeck and Farooq (2018). All items were rated using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Data analysis

In this study, descriptive statistical analysis was performed using SPSS 25.0. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed via SmartPLS 3.2.9 to assess the structural relationships among constructs. This method was chosen due to its predictive accuracy, strength, and suitability for advancing theoretical development (Hair et al., 2021). The analysis followed a two-step approach. First, the measurement model was evaluated through confirmatory factor analysis to assess convergent and discriminant validity. Second, the structural model was tested using bootstrapping procedures with 5,000 subsamples to determine the significance of the hypothesized relationships.

Results

Participants' characteristics

The study sample comprised 379 respondents from the Vietnamese electronic industry. In terms of age, the majority were between 18 and 27 years old (49.08%), followed by those aged 28–37 (31.13%), 38–47 (17.41%), and 47 or older (2.38%). Regarding gender, 64.12% of participants were female, while 35.88% were male. The marital status distribution was relatively balanced, with 52.51% married and 47.49% single. Details of respondents' characteristics were represented in Table 1.

Table 1 Respondents' characteristics (N = 379)

Characteristics	Categories	Frequency	Percentage (%)
Age	18-27	186	49.08
	28-37	118	31.13
	38-47	66	17.41
	47 or above	9	2.38
Gender	Male	136	35.88
	Female	243	64.12
Education level	High school or below	155	40.9
	University/College	204	53.82
	Master and above	20	5.28
Monthly income	< \$250	26	6.86
	\$251-\$400	151	39.84
	\$401-\$600	124	32.72
	> \$601	78	20.58
Marital status	Single	180	47.49
	Married	199	52.51
Experiences	Less than 02 years	102	26.91
	02-<05 years	142	37.47
	05-<10 years	118	31.13
	10-<15 years	17	4.49

Source(s): Author's work

Multicollinearity and Common Method Bias

This study rigorously assessed the potential for multicollinearity and common method bias (CMB). To evaluate multicollinearity, the variance inflation factor (VIF) was calculated. According to the criterion suggested by Hair et al. (2021), all VIF values in this study ranged from 1.518 to 2.133, indicating no significant multicollinearity issues within the model. To address concerns related to CMB, participants were assured that their responses would remain anonymous and confidential, thereby reducing evaluation apprehension and mitigating potential bias (Podsakoff et al., 2003). In addition, Harman's single-factor test was employed to assess CMB. The analysis revealed that the single factor accounted for 35.710% of the total variance, well below the 50% threshold recommended by Podsakoff et al. (2003),

indicating that CMB was not a serious concern in this study. Emphasizing methodological rigor, the research incorporated several procedural remedies before data collection to minimize the risk of CMB. These measures were designed to enhance the validity and reliability of the responses by mitigating potential sources of systematic bias.

Assessment of the measurement model

A rigorous assessment of the measurement model was conducted to ensure the reliability and validity of all constructs. Initial analyses included examining the outer loadings of the model’s indicators, where values above 0.5 are deemed acceptable (Sarstedt et al., 2022). The results indicated that all outer loadings for GHRM, GWE, GTL, and GOCB exceeded this threshold, supporting the inclusion of these indicators in the model.

Reliability was evaluated using Cronbach’s alpha, with all constructs demonstrating values greater than 0.8, indicating high internal consistency in accordance with DeVellis (2016). Additionally, construct validity was assessed using Composite Reliability (CR) and Average Variance Extracted (AVE). The minimum CR value observed was 0.865 (Bagozzi & Yi, 1988), and all AVE values exceeded the recommended threshold of 0.5 (Hair et al., 2021), thereby confirming both the internal consistency and convergent validity of the constructs. Detailed results of reliability and convergent validity are presented in Table 2.

Table 2 Result of validity and convergent validity

Construct	Items	Outer loading	VIF	Construct reliability and validity		
				Cronbach's Alpha	CR	AVE
GHRM	GHRM1	0.674	1.704	0.832	0.877	0.544
	GHRM2	0.739	1.969			
	GHRM3	0.752	1.796			
	GHRM4	0.750	1.903			
	GHRM5	0.765	2.133			
	GHRM6	0.741	1.851			
GTL	GTL1	0.718	1.639	0.813	0.865	0.517
	GTL2	0.695	1.648			
	GTL3	0.669	1.438			
	GTL4	0.771	1.783			
	GTL5	0.722	1.727			

Construct	Items	Outer loading	VIF	Construct reliability and validity		
				Cronbach's Alpha	CR	AVE
	GTL6	0.734	1.649			
GWE	GWE1	0.689	1.523	0.814	0.865	0.518
	GWE2	0.713	1.800			
	GWE3	0.685	1.741			
	GWE4	0.745	1.939			
	GWE5	0.774	2.130			
	GWE6	0.706	1.750			
GOCB	GOCB1	0.709	1.518	0.828	0.877	0.544
	GOCB2	0.716	1.598			
	GOCB3	0.704	1.680			
	GOCB4	0.774	1.962			
	GOCB5	0.719	1.831			
	GOCB6	0.773	1.951			

Source(s): Author's work

Discriminant Validity

To assess the distinctiveness of the constructs in this study, discriminant validity was evaluated using the Fornell–Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait–Monotrait (HTMT) ratio of correlations. As presented in Table 3, the square roots of the AVE for each construct were greater than the corresponding inter-construct correlations, thereby satisfying the Fornell–Larcker criterion and confirming discriminant validity (Hair et al., 2021). Additionally, the HTMT ratios for all construct pairings were below the threshold of 0.90, as recommended by Henseler et al. (2015), further reinforcing the discriminant validity of the measurement model (see Table 4). These results collectively support the robustness, reliability, and discriminant validity of the constructs employed in this research.

Table 3 Fornell-Larcker criterion

	GHRM	GOCB	GTLD	GWE
GHRM	0.737			
GOCB	0.511	0.733		
GTLD	0.550	0.662	0.719	
GWE	0.539	0.556	0.609	0.719

Source(s): Author's work

Table 4 Heterotrait-Monotrait (HTMT) ratio

	GHRM	GOCB	GTLD	GWE
GHRM				
GOCB	0.608			
GTLD	0.669	0.800		
GWE	0.652	0.664	0.738	

Source(s): Author's work

Assessment of the structural model

The structural model was assessed through a comprehensive approach that involved analyzing the magnitude and significance of path coefficients and evaluating the model's predictive relevance. The strength of the hypothesized relationships was determined by examining the path coefficients alongside their respective p-values to establish statistical significance. In line with the criteria suggested by Hair et al. (2021), all R^2 values exceeded the minimum threshold of 0.10, indicating acceptable explanatory power for the endogenous constructs. Additionally, predictive relevance was assessed using Q^2 values, all above zero (GOCB = 0.258; GWE = 0.214, respectively), confirming the model's capacity to predict key endogenous variables (Sarstedt et al., 2021). Collectively, these findings support the robustness and validity of the structural model and its effectiveness in offering meaningful insights into the relationships among the constructs under study.

Based on the PLS-SEM analysis with bootstrapping 5,000 resamples, the hypothesis testing results are summarized in Table 5 and illustrated in Figures 2 and 3. The findings show that GHRM has a significant positive effect on GOCB ($\beta = 0.146$, $p = 0.005$), supporting Hypothesis H1. Additionally, the mediation analysis confirms that GWE partially mediates the relationship between GHRM and GOCB ($\beta = 0.053$, $p = 0.009$), providing support for Hypothesis H2. However, the results also reveal a significant negative interaction effect between GHRM and GTL on GOCB ($\beta = -0.061$, $p = 0.046$), indicating support for

Hypothesis H3, suggesting that high levels of GTL weaken the positive effect of GHRM on GOCB

Table 5 Hypothesis testing

Hypotheses	Path coefficient (β)	Sample Mean	T-Statistics	P-Value	Conclusion
H1: GHRM -> GOCB	0.146	0.144	2.805	0.005	Supported
H2: GHRM -> GWE -> GOCB	0.053	0.054	2.610	0.009	Supported
H3: GHRM*GTL -> GOCB	-0.061	-0.061	1.994	0.046	Supported

Source(s): Author's work

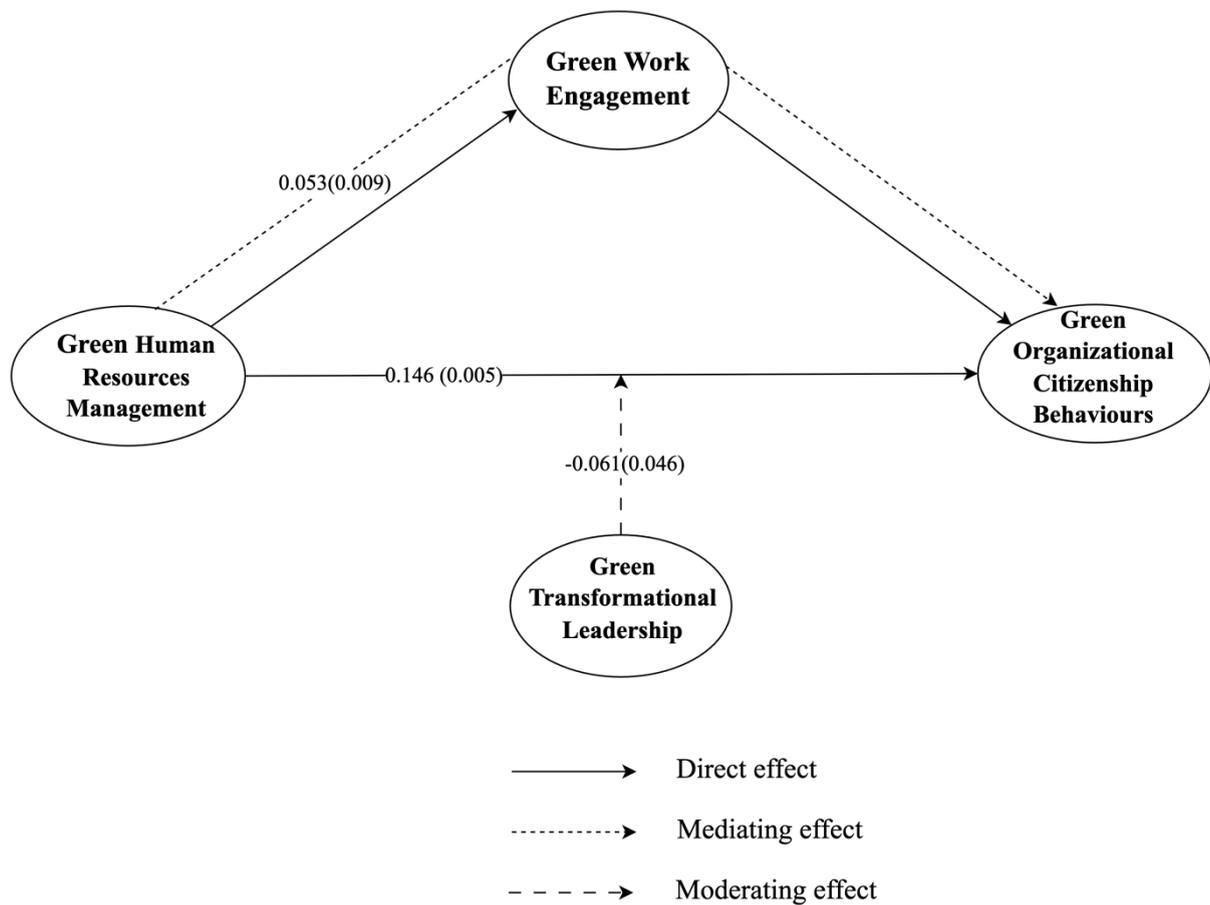


Fig. 2. PLS-SEM model result

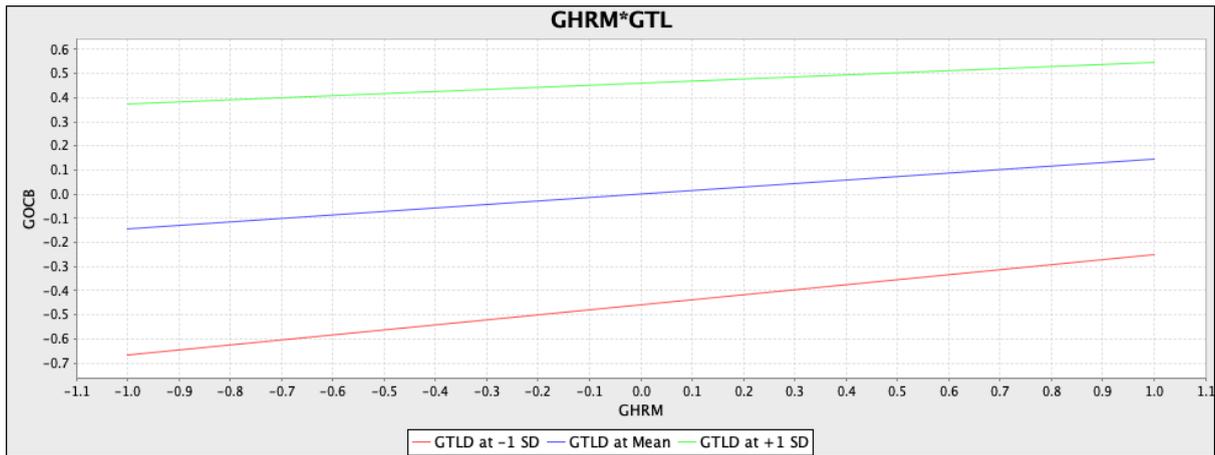


Fig. 3. The moderating effect of GTL on the relationship of GHRM to GOCB.

Discussions

This study aimed to investigate the direct and indirect influences of GHRM, GWE and GTL on GOCB, specifically exploring the mediating role of GWE and the moderating effect of GTL on the GHRM-GOCB relationship. The analysis reveals that the identified predictors account for approximately 43% of the variance in GWE, and 49.8% of the variance in GOCB, indicating a substantial explanatory capacity within the proposed model. The findings offer valuable insights into the dynamics of green employee behaviors within the Vietnamese electronics industry, contributing to the burgeoning literature on green management, particularly in emerging economies like Vietnam.

Firstly, our results indicate that GHRM significantly positively affected GOCB ($\beta = 0.146$, $p = 0.005$). This finding is consistent with a substantial body of prior research affirming the positive link between GHRM practices and employees' GOCB (Ahmed et al., 2024; Gupta et al., 2025; Hooi et al., 2022; Muisyo et al., 2022; Pham et al., 2019). This relationship can be understood mainly through the AMO (Hooi et al., 2022; Pham et al., 2019). AMO theory posits that GHRM practices enhance employees' green abilities through recruitment and training, motivate them via performance appraisal and incentives, and provide opportunities for involvement and knowledge sharing to engage in environmentally friendly behaviors that contribute to organizational performance (Marin-Garcia & Tomas, 2016; Pham et al., 2019). By aligning HR strategies with environmental goals, organizations foster an environment where employees are equipped and encouraged to go beyond their formal job requirements to support environmental sustainability (Altinay et al., 2019; Chen, 2019). Specifically, studies conducted in Vietnam's hotel industry have also confirmed the direct positive effect of GHRM practices on GOCB (Pham et al., 2019). However, the findings of this study is inconsistent with reserach reported by Al-Swidi et al. (2021), who

found that no significant impact of GHRM on GOCB in the public and private sectors in Qatar. This inconsistency highlights the need for more nuanced investigations to reconcile these divergent results and better understand the contextual factors that may influence the relationship between GHRM and GOCB.

Secondly, the mediation analysis revealed that GWE partially mediates the relationship between GHRM and GOCB ($\beta = 0.053$, $p = 0.009$). This significant finding suggests that GHRM influences GOCB not only through a direct pathway but also indirectly by fostering GWE. This mediating mechanism aligns with previous studies, which identify GWE as a critical intervening variable linking GHRM practices to sustainable performance (Alfadel et al., 2025). Supporting evidence from research conducted in Palestine also confirms GWE's mediating role between GHRM and various dimensions of employee green behavior (Aboramadan, 2022). These findings imply that GHRM initiatives enhance employees' motivation and psychological investment in environmentally focused work, which in turn drives their voluntary contributions to environmental sustainability. The partial mediation observed indicates that while GHRM exerts a direct influence on GOCB, a substantial portion of its effect operates through the psychological mechanism of engagement. This reinforces the applicability of the AMO theory in explaining how GHRM fosters engagement by enhancing employees' capabilities, motivation, and opportunities to participate in green behaviours (Ababneh, 2021).

Finally, and most notably, the study found a negative interaction effect between GHRM and GTL on GOCB ($\beta = -0.061$, $p = 0.046$), suggesting that high levels of GTL weaken the positive effect of GHRM on GOCB. This is a particularly intriguing and somewhat counter-intuitive finding. Hameed et al. (2022) suggest that GTL can strengthen the positive relationship between GHRM practices and green perceived organizational support, which in turn influences green creativity. The result in this study indicated that there is a positive and significant impact of GTL and GOCB in the Vietnamese electronics industry ($\beta = 0.458$, $p < 0.001$). The finding indicated that both GHRM and GTL show significant and positive effects on GOCB, supporting the well-established view that structured GHRM and GTL can independently foster GOCB. However, the interaction term (GHRM*GTL) yields a negative and significant effect on GOCB. This surprising result suggests that in the Vietnamese context, when both GHRM and GTL are implemented simultaneously and intensively, they may create unintended consequences that diminish employees' motivation to engage in GOCB. One explanation lies in the operational dynamics of the Vietnamese electronics industry. As key participants in global supply chains, companies within this sector

are under substantial pressure to comply with international environmental standards, such as ISO 14001 and ESG reporting requirements. In response, firms often adopt formal GHRM practices, such as green training programs, performance appraisals, and environmentally focused rewards, while simultaneously promoting green leadership to align with global expectations. However, when both GHRM initiatives and GTL are implemented intensively and concurrently, employees, particularly those in factory or production roles, may experience cognitive overload or perceive the initiatives as overly directive. Instead of feeling inspired and empowered, workers may view the green agenda as excessive or controlling. This perception could reduce their intrinsic motivation to engage voluntarily in environmentally responsible behaviors, potentially explaining the observed negative interaction effect between GHRM and GTL on GOCB. Moreover, the interaction between GTL and GHRM may generate cognitive dissonance among employees if these elements are not strategically aligned. In highly standardized and process-oriented settings such as electronics manufacturing, misaligned or inconsistent messaging between leadership behaviors and HR policies can create confusion, potentially undermining trust and diminishing employees' willingness to engage in extra-role environmental behaviors such as GOCB. These findings underscore the importance of coherence and synergy between green leadership and HR systems in Vietnamese electronics firms. Rather than operating as isolated initiatives, GTL and GHRM should be integrated to project a unified and consistent green vision. Leaders should act as interpreters and advocates of green HR policies, humanizing them and making them relatable, while HR systems should be designed to empower, rather than impose, green behaviors. It is especially critical that green policies be customized to the practical realities of factory-floor operations to prevent employee resistance or disengagement and to ensure authentic buy-in at all organizational levels.

Theoretical Implications

This study makes key theoretical contributions to the literature on GHRM and organizational behavior, particularly within the underexplored context of the Vietnamese electronics industry. This research addresses the research gaps on GHRM in Vietnam, an especially timely focus given the country's commitment to net-zero emissions by 2050 and the increasing monitoring of environmental regulations in all industries, including electronics (Chinhphu.vn, 2024). By examining the interrelations among GHRM, GTL, GWE, and GOCB, the study offers novel insights into how GHRM practices operate within a rapidly developing Asian economy.

This study adopts and extends the AMO theory as its foundational framework, empirically testing a moderated mediation model to deepen understanding of the drivers of employee green behaviour. GHRM is shown to align closely with the AMO components: enhancing green abilities through recruitment and training, boosting motivation via performance management and incentives, and providing opportunities for engagement (Appelbaum, 2000). This integration contributes to the promotion of GOCB and the cultivation of GWE. The results corroborate the partial mediating role of GWE in the relationship between GHRM and GOCB (Aboramadan, 2022), suggesting that GHRM practices affect GOCB both directly and indirectly. Specifically, GHRM enhances employees' enthusiasm, dedication, and psychological engagement with environmentally responsible tasks, thereby fostering GOCB. This mediating pathway reinforces and extends prior research that highlights GWE as a critical mechanism through which GHRM facilitates sustainable organizational outcomes (Alfadel et al., 2025; Thomas & Albishri, 2024).

A particularly notable and somewhat counterintuitive finding of this study is the significant negative interaction between GHRM and GTL on GOCB. While both GHRM and GTL individually exert positive effects on GOCB, their simultaneous and intensive implementation appears to diminish the positive impact of GHRM. This contradicts previous assumptions that GTL would amplify the effects of GHRM (Hameed et al., 2022). This unexpected outcome underscores the complexity of managing green initiatives, particularly in emerging economies. It suggests that in highly standardized, process-driven sectors like electronics manufacturing, an overly forceful combination of GHRM and GTL may result in cognitive overload or perceptions of excessive control, ultimately reducing employees' intrinsic motivation to engage in voluntary green behaviors. These findings point to the importance of context-sensitive application and call for further research to explore when and how GTL may either enhance or hinder the effectiveness of GHRM, especially in non-Western or operationally rigid environments.

Practical Implications

GHRM should be strategically leveraged to promote employees' GOCB. It is recommended that environmental concerns be thoroughly integrated into HR practices, including green recruitment, training, performance management, and reward systems, to nurture environmentally responsible behaviors. Organizations should focus on enhancing employees' green abilities through targeted training, stimulating motivation through performance incentives, and offering meaningful participation in environmental initiatives. Both monetary and non-monetary rewards are important to bolster employee commitment

and willingness to engage in GOCB. Additionally, fostering GWE is critical, given its mediating role between GHRM and GOCB. Organizations should actively engage employees, aligning personal values with the organization's environmental mission and providing autonomy and collaborative opportunities within green projects to enhance employee enthusiasm and dedication.

A key practical implication of this study is the need to carefully balance GHRM and GTL, as their simultaneous and intensive application may unintentionally hinder GOCB. While each independently promotes GOCB, uncoordinated implementation can lead to overlapping roles, mixed messages, or perceived pressure, undermining employees' voluntary engagement. Instead, organizations should adopt a complementary approach in which GTL supports and humanizes GHRM practices without overwhelming employees, and GHRM systems provide clear and empowering structures. Customizing green policies to fit the operational realities of the factory floor is essential to avoid resistance or disengagement and to foster genuine commitment across all organizational levels. In light of differing findings from other contexts (Al-Swidi et al., 2021; Hameed et al., 2022), firms in Vietnam's electronics industry should tailor their green management strategies to their unique cultural and operational conditions, rather than uncritically adopting Western or foreign models. This contextualized approach is critical for meeting international environmental standards while maintaining employee engagement and motivation.

Limitations and future research

This study offers key insights into the relationship between GHRM, GWE, GTL, and GOCB in Vietnam's electronics industry. However, several limitations suggest directions for future research. First, the use of hybrid sampling (convenience and snowball) limits the generalizability of findings. Future studies should adopt more robust methods, such as random or stratified sampling. The focus of this research is on the Vietnamese electronics industry, which is contextually rich, but it restricts applicability to other sectors or regions, highlighting the need for comparative research across industries and countries. Second, the cross-sectional design limits causal inference. In future research, longitudinal studies are needed to observe the long-term effects of GHRM and GTL on employee behaviors and motivation.

A particularly noteworthy finding was the unexpected negative interaction between GHRM and GTL, indicating that elevated levels of green leadership may diminish the positive impact of green HR practices. This highlights the need for future research to investigate the underlying mechanisms of this dynamic and identify conditions under which

the integration of GHRM and GTL can be optimized. The conditions under which GTL enhances or undermines GHRM, whether this effect is unique to standardized, process-heavy industries like electronics, and the balance between formal HR initiatives and leadership intensity to avoid cognitive overload or perceived over-control. Additionally, contextual discrepancies call for deeper exploration into how cultural, regulatory, and economic factors shape GHRM–GOCB dynamics. Qualitative methods (e.g., interviews, focus groups) would further illuminate how employees perceive overlapping green initiatives and whether they feel empowered or constrained.

Conclusion

This study contributes to the growing body of literature on GHRM by exploring how it predicts GOCB within the Vietnamese electronics industry. Grounded in the AMO framework, this research provides empirical evidence supporting the role of GHRM as a significant driver of employee green behaviors. The results reveal that GHRM positively influences GOCB both directly and indirectly through the mediating role of GWE, underscoring the importance of psychological engagement in translating HR initiatives into voluntary environmental actions. A novel finding of this study is the significant negative interaction between GHRM and GTL on GOCB. Contrary to previous assumptions that GTL would reinforce the effects of GHRM (Hameed et al., 2022), the data suggest that simultaneous, intensive implementation of both may lead to unintended consequences, such as employee cognitive overload or perceptions of excessive control, thereby diminishing intrinsic motivation for green behavior. This underscores the importance of careful integration and alignment of green leadership and HR strategies to ensure consistency, clarity, and empowerment in executing sustainability goals. Practically, they suggest that Vietnamese firms, particularly in structured and process-intensive sectors like electronics, should tailor green initiatives to organizational realities, balancing directive leadership with participatory and context-sensitive HR strategies. Finally, this study highlights the complexity of fostering voluntary environmental behaviors in emerging economies and emphasizes the need for integrated, culturally adaptive, and psychologically empowering approaches to green management.

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