Driving Business Leadership Through Voluntary Workplace Green Behavior: Evidence from Green Human Resource Management, Green Satisfaction, and Green Supportive Climate

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Driving Business Leadership Through Voluntary Workplace Green Behavior: Evidence from Green Human Resource Management, Green Satisfaction, and Green Supportive Climate

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Abstract: *The increasing emphasis on environmental sustainability has become a critical issue within the context of business leadership, as organizational leaders are required to integrate environmental responsibility into strategic and operational decision-making. This study aims to investigate the organizational determinants that influence employees' voluntary engagement in environmentally responsible behavior in the workplace. The research was conducted through a survey administered in 2023 in Indonesia, specifically in the travel and tourism industry of North Sumatra, involving 160 employees from various travel companies, an industry selected due to its high environmental impact and strategic role in sustainable development. The data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS software to examine the relationships among the studied constructs. The findings demonstrate that organizational sustainability-oriented practices, employees' positive environmental-related attitudes, and a supportive organizational climate significantly enhance voluntary workplace green behavior. The results further indicate that internal organizational mechanisms play a crucial role in shaping employees' discretionary pro-environmental actions beyond formal job requirements. Empirical evidence from the model confirms the robustness of these relationships, explaining a substantial proportion of variance in voluntary green behavior. These findings contribute to the literature by clarifying how organizational systems and employee perceptions interact to foster sustainable behavior. From a practical standpoint, this study offers important insights for business leadership in designing strategic initiatives that strengthen environmental sustainability by fostering supportive climates and encouraging voluntary employee participation in green practices, thereby opening pathways for more effective leadership-driven sustainability strategies in the future.*

Keywords: business leadership, green human resource management, green satisfaction, green supporting climate, voluntary workplace green behavior.
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INTRODUCTION

The modern era, characterized by rapid industrial and technological advancements, has had a profound impact on global environmental conditions (Widianarko et al., 2025; Esen et al., 2024). Increased industrial activity, urbanization, and the consumption of natural resources have led to various environmental problems, including global warming, air and water pollution, and biodiversity loss (Mughal et al., 2023). The need for effective environmental management has never been greater than it is today, due to the reduced environmental carrying capacity for an increasing number of people who require development (Buffa et al., 2018; Ramesh et al., 2019). The transformation toward sustainable development has become a crucial objective for many industrial sectors worldwide, including the tourism sector. The World Tourism Organization (UNWTO) emphasizes that sustainability in the tourism sector encompasses not only environmental protection but also the balance of social and economic aspects (UNWTO, 2016).

In fact, the tourism sector generates approximately 8 percent of the world's total carbon emissions, primarily through the transportation and operational activities of tourism businesses (Tian et al., 2020; Rubel et al., 2021). In terms of its contribution to tourism, North Sumatra Province, one of Indonesia's major tourist growth centers, has experienced very rapid growth in the travel and hospitality industries (Nababan et al., 2023; Indajang et al., 2024). However, these developments have not always led to the adoption of green practices in the workplace. One of the biggest obstacles is the employee's lack of knowledge and commitment to sustainability. Therefore, there is a strong indication that current organizational management does not effectively promote voluntary workplace green behaviors (VWGB); therefore, it will likely indicate gaps and limitations in implementing green human resource management (GHRM), green job satisfaction, and green climate support.

In the contemporary era of sustainability-oriented transformation, business leadership faces increasing pressure to move beyond symbolic environmental commitments toward the effective internalization of sustainability values within everyday organizational practices (Fawehinmi et al., 2020; Yang et al., 2023). Leaders are now expected not only to formulate environmentally responsible strategies but also to ensure that such strategies are translated into voluntary and consistent behaviors among employees at all organizational levels (Amrutha & Geetha, 2021; Kim et al., 2019). This challenge is particularly salient in service-based industries such as tourism, where operational activities are highly dependent on environmental resources and where employee behavior directly shapes organizational environmental performance and public legitimacy.

From a leadership perspective, fostering voluntary workplace green behavior reflects an organization's capacity to align managerial systems, employee motivation, and organizational culture with sustainability objectives. Such alignment requires leaders to integrate sustainability into human resource management systems, shape positive employee perceptions of organizational environmental commitment, and cultivate a work climate that actively supports pro-environmental initiatives (Alsetoohy et al., 2022; Zhang et al., 2021). These leadership challenges are further intensified in small and medium-sized enterprises, which dominate the tourism sector in many developing regions, including North Sumatra, and often operate under resource constraints and limited formal sustainability infrastructures. Consequently, understanding how leadership-driven organizational mechanisms can encourage employees' voluntary engagement in green behavior becomes a critical issue for advancing sustainable business practices (Yang et al., 2023; Ahmad et al., 2023).

The lack of research in this area is due to the limited prior studies that have examined the relationship between green human resource management (GHRM) (Zhao & Huang, 2022; Kuo et al., 2022), green satisfaction (Amrutha & Geetha, 2021; Abdou et al., 2022), and green climate support (Huo et al., 2022; Alsetoohy et al., 2022) on voluntary green behavior in the travel and tourism industry, particularly in the developing region of North Sumatra. There are no studies that have tested a model examining how the three factors contribute to voluntary green behavior within a sustainable framework. Additionally, there is a lack of prior research examining how employees' views on environmental values (green satisfaction) directly contribute to voluntary green behavior in the tourism sector.

The purpose of this study is to address these gaps by providing a new empirical model for examining the impact of the three factors – *GHRM*, *green satisfaction*, and *green climate support* – on *voluntary green behavior* in the travel and tourism industry in North Sumatra. The researchers expect their model to make theoretical contributions, strengthen the concept of voluntary green behavior in the workplace, and provide insight to organizations on how to effectively manage their human resources sustainably.

Methodologically, this study employs a quantitative approach using partial least squares-based structural equation modeling (PLS-SEM), which enables the complex and simultaneous testing of relationships between variables. By involving various travel companies from major cities in North Sumatra, this study not only produces theoretical mapping but also has high practical relevance for the development of organizational and local government policies. In terms of theoretical contributions, this study expands the

scope of the GHRM model in the tourism context while also bridging the realms of human resource management and environmentally based organizational behavior. On the practical side, the results of this study provide a basis for the tourism travel industry to develop sustainability-based employee recruitment, training, and development policies, as well as create a work environment conducive to promoting green behavior change. With this approach, this study aims to help develop more adaptive, pro-environmental, and competitive tourism human resources. This aligns with the 2030 Sustainable Development Goals (SDGs), points 8 (decent work and economic growth) and 12 (responsible production and consumption).

The primary objective of this study is to analyze and model the impact of GHRM, green satisfaction, and the green supporting climate on VWGB, thereby supporting the sustainable practices of the travel and tourism industry in North Sumatra. The results of this study will contribute to the existing literature on green HRM and sustainable organizational behavior. Meanwhile, this study can serve as a reference for formulating evidence-based policy strategies to enhance the active role of employees in supporting green initiatives within the tourism sector.

LITERATURE REVIEW

Theoretical Framework

The theoretical framework proposed in this study aims to explain the relationship between green human resource management (GHRM), green satisfaction, and a green support climate in relation to voluntary green workplace behavior (VWGB). This is crucial for supporting sustainable practices in the North Sumatra tourism industry. The primary basis of this framework is the theory of planned behavior (TPB) framework introduced by Ajzen (2002).

According to the theory of planned behavior (TPB), an individual's actions are guided by three constructs – their attitudes toward the behavior, their beliefs about others' perceptions of whether they should perform the behavior (subjective norms), and their beliefs about how much influence they have over performing the behavior (perceived behavioral control). Green human resource management (GHRM) is an integrated system of policies and procedures in the area of HR that helps organizations implement sustainability values.

These policies and procedures serve as examples of green HRM, encompassing green recruitment, green training, and performance evaluations that assess employees based on ecological considerations (Khai et al., 2023; Rahman et al., 2024).

Additionally, employee green satisfaction and support for the environment are two important psychological factors that enhance employees' intrinsic motivation to engage in voluntary green behaviors. Employee green satisfaction relates to the degree to which employees believe that the organization is committed to protecting the environment (Amrutha & Geetha, 2021; Kim et al., 2019).

According to cognitive motivation theory, when employees are cognitively motivated to protect the environment, it leads to greater participation in ecological behaviors. Employee green support for the climate represents employees' perception of the level of support from their peers and organization as a whole regarding green behavior (Cui et al., 2020; Das et al., 2019). As such, employee support for the climate provides a subjective norm that influences employees' willingness to engage in green behaviors as specified in the theory of planned behavior.

Green Human Resource Management (GHRM) and Voluntary Workplace Green Behavior (VWGB)

Recent literature is showing increasing evidence that companies can strategically use green human resource management (GHRM) practices to encourage employees to take part in green behavior at work voluntarily, or what this article refers to as voluntary workplace green behavior (VWGB) (Ahmad et al., 2023; Ying et al., 2020). Several studies suggest that when companies implement environmentally friendly HR policies, including green recruitment, green training, green performance evaluations, and green incentives, they are associated with positive correlations in voluntary workplace green behavior (Haldorai et al., 2022; Pinzone et al., 2019).

More recent studies suggest that the relationship is not always direct; for example, a study by Rubel et al. (2021) demonstrated that the influence of GHRM on VWGB is mediated by green motivation and environmental beliefs. In a similar vein, a systematic review by Ahmad et al. (2023) confirmed that the trend in GHRM research from 2010 to 2023 has transitioned from focusing solely on HR practices to encompassing the broader implications of environmental behavior and performance in organizations.

Regarding VWGB, recent literature suggests that HR policies do not solely determine VWGB but are also significantly influenced by employees' psychological and social context, specifically the green

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psychological climate, green organizational identity, and social norms within the organization (Fawehinmi et al., 2020; Zhu et al., 2021). Green human resource management (GHRM) has emerged as a key strategy for organizations to integrate sustainability into their human resource management practices. Research indicates that green identity and environmental commitment play a significant mediating role. As an example, Yang et al. (2023) found that environmental belief and green organizational identity mediate the effects of GHRM on VWGB. Thus, there is a need for a holistic model that incorporates both the structural pathway (AMO) and the psychological-identity pathway.

Although a significant amount of research has been conducted on GHRM, some critical gaps remain. First, many of these studies have a cross-sectional design; therefore, they do not capture the dynamic nature of VWGB over time. Many researchers have emphasized the importance of implementing GHRM practices to influence employees' attitudes and behaviors toward the environment.

Studies like Anwar et al. (2020), Ahuman et al. (2024), Fawehinmi et al. (2020), and Rubel et al. (2023), conducted in various sectors, found a positive relationship between GHRM practices and employees' willingness to engage in environmentally friendly behaviors in the workplace. Additionally, GHRM practices such as continued training and development, environmentally friendly recruitment and selection, and performance management systems that emphasize sustainability goals have been identified as influential in promoting voluntary workplace green behavior (Fawehinmi et al., 2020; Yang et al., 2023).

Therefore, the literature suggests that GHRM has considerable potential to promote VWGB; however, the effectiveness of GHRM is contingent upon the presence of mediating variables, such as green motivation, environmental identity, and organizational contextual variables. Therefore, based on the results of many previous studies, the following hypotheses were formed:

H1: *Green human resource management influences voluntary workplace green behavior.*

Green Satisfaction and Voluntary Workplace Green Behavior (VWGB)

Green satisfaction can be defined as the level of satisfaction or job satisfaction resulting from an environmentally friendly work environment (Chen et al., 2015; Çavuşoğlu et al., 2021). This concept arose from the need to consider environmental aspects in assessing employee job satisfaction (Hashish et al., 2022; Aseanty et al., 2022).

The development of literature on employee green behavior shows that green satisfaction is increasingly viewed as an affective determinant that plays a crucial role in encouraging voluntary workplace green behavior (VWGB). In its early development phase, research focused mainly on the consumer context, positioning green satisfaction as an evaluative response to the quality and environmental performance of a product or service (Kim et al., 2019; Amrutha & Geetha, 2021).

These findings then resonated in the organizational context, where satisfaction with a company's green initiatives was seen as capable of increasing employee voluntary behavior, such as energy savings, waste reduction, and promoting environmental awareness. For example, research by Pinzone et al. (2019) found that green training increased satisfaction and, in turn, encouraged pro-environmental behavior in the healthcare sector. Meanwhile, Abdou et al. (2022) confirmed that green satisfaction increased customer citizenship behavior in eco-friendly hotels through social exchange mechanisms.

Other empirical findings from the service and tourism sectors further confirm the relevance of green satisfaction to voluntary pro-environmental behavior. For example, Hashish et al. (2022) demonstrated that green satisfaction is a significant predictor of green behavioral intentions in eco-friendly hotels.

Furthermore, several studies have shown a positive relationship between employees' perceived green satisfaction and their participation in voluntary workplace green behavior (Zhang et al., 2022; Yang et al., 2023). Employees who are satisfied with environmental practices in the workplace are more likely to engage in green behavior (Abdou et al., 2023; Cai et al., 2020).

However, further research is needed to understand the mechanisms underlying this relationship and to explore mediating or moderating factors that may influence it. Thus, the literature concludes that green satisfaction is an important affective mechanism that potentially explains how green organizational policies and climates can translate into green behavior. Therefore, based on several previous research findings, the following hypothesis is developed:

H2: *Green satisfaction influences voluntary workplace green behavior.*

Green Supporting Climate and Voluntary Workplace Green Behavior (VWGB)

A green supportive climate refers to a work environment where environmentally friendly practices and policies are supported and reinforced by the organization (Xiao et al., 2020; Tran Ngo et al., 2021). This

concept encompasses aspects such as pro-environmental communication, employee participation in environmental decision-making, and incentives for green behavior (Rubel et al., 2021; Das et al., 2019). Zientara and Zamojska's (2018) research in the hospitality industry demonstrated that a green organizational climate plays a significant role in encouraging employees' pro-environmental behavior, even when individual factors such as biospheric values, are not dominant.

These findings are consistent with Xiao et al. (2020), which demonstrated that a green organizational climate enhances VWGB through perceived insider status, indicating that organizational support serves not only as a structural resource but also as a social identification signal. On the other hand, Alsetoohy et al. (2022) demonstrated that a green supportive climate strengthens the impact of humble leadership on VWGB and green performance, confirming that green leadership requires a supportive climate to produce significant behavioral change.

Several studies have demonstrated that a green, supportive climate in the workplace can influence the level of employee participation in voluntary workplace green behaviors (Zientara & Zamojska, 2018; L. Yang et al., 2023). When an organization demonstrates commitment and support for environmental sustainability, employees tend to be more motivated to adopt green behavior in the workplace (Alsetoohy et al., 2022; Kennard, 2020), and the presence of facilities and incentives that support green practices can all increase employee motivation to behave in an environmentally friendly manner (Zhang et al., 2021; Zientara & Zamojska, 2018). More recent empirical studies also show that a green supportive climate often interacts with other variables to produce VWGB, rather than working alone.

Amrutha and Geetha (2021) found that green organizational training can only increase VWGB when a green supportive climate is firmly established in the workplace, which then increases green satisfaction as an affective mechanism. This study suggests that GHRM, without a supportive climate, is insufficient to produce voluntary green behavior.

In line with this, Rubel et al. (2021) showed that perceptions of a green work climate strengthen the relationship between GHRM practices and supervisors' pro-environmental behavior. A comparison of these two studies illustrates that a green-supportive climate acts as a bridge variable connecting structural policies with individual and group behavior and opens up space for integrative research on multi-actor interactions within organizations.

Therefore, based on several previous research findings, the following hypothesis can be developed:

H3: *Green supporting climate influences voluntary workplace green behavior.*

METHODOLOGY

Research Design

This study employs a library and field research design with a causal associative approach, aiming to investigate the relationship between several uncertain variables. According to Creswell (2014), mentioning a causal design helps analyze how one variable affects another.

It is also valuable for experimental research where the independent variable is treated in a controlled manner by the researcher to observe its direct impact on the dependent variable. The research location will focus on areas that are centers of the tourism travel industry in North Sumatra, including cities such as Medan, Pematangsiantar, and Simalungun Regency. Data collection was conducted through an online survey of employees working in various tourism and travel companies in the area.

Sample and Data Collection

The population of this study consists of all employees working in various tourism and travel companies in North Sumatra. This study will focus on variations in the type of work and experience levels of employees, including managers, administrative staff, tour guides, and customer service personnel. The research sample will be selected by purposive sampling, taking into account the representation of various tourism travel companies operating in the area.

The expected number of samples will include employees from various job levels and departments within the company so that the research results can reflect diverse perspectives and experiences. According to Sarstedt et al. (2020), if the population size is unknown, the sample size can be determined from 5 to 10 times the number of indicators used in a single construct.

This study utilizes 16 indicators from four existing variable dimensions, resulting in a total of 160 research samples, which comprise 16 x 10 employees working in various tourism and travel companies in North Sumatra (Table 1).

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Table 1. Description of Research Respondents

Category	Detail	Amount	Percentage (%)
Gender	Men	124	77.5
	Woman	36	22.5
Age (years)	< 25	18	11.25
	26–35	42	26.25
	36–45	60	37.5
	46–55	30	18.75
	> 55	10	6.25
Level of education	Senior High School	96	60
	Diploma	24	15
	Bachelor	28	17.5
	Masters	12	7.5
Length of Service (years)	< 1	25	15.63
	1–5	45	28.12
	6–10	70	43.75
	> 10	20	12.5
Position	Operational Staff	39	24.37
	Administrative Staff	30	18.75
	Tour guide	11	6.88
	Supervisor	10	6.25
	Manager	12	7.5
	Employee	58	36.25

Source: data processing results (2025).

This study included 160 participants with diverse demographic characteristics. In terms of gender, the majority of respondents were male, comprising 124 people (77.5%), while the female respondents numbered 36 (22.5%). This composition indicates that the male group made the dominant contribution to the study. From an age perspective, the majority of respondents were in the 36- to 45-year-old range, with a total of 60 people (37.5%).

Meanwhile, the 26- to 35-year-old age group was also significant, with a total of 42 people (26.25%). On the other hand, the number of respondents under 25 years old reached 18 people (11.25%).

For people between 46 and 55 years old, there were 30 people (18.75%), while for the age group above 55 years old, there were 10 people (6.25%). This distribution indicates that the majority of respondents were in the productive age category with quite good work experience.

The respondents' educational level revealed that 96 people, or approximately 60%, had a high school education, making them the largest group. Twenty-four people, or 15%, held a diploma, while 28 people (17.5%) held bachelor's degrees, and 12 people (7.5%) held master's degrees. This difference in educational level indicates the diversity of academic backgrounds among the respondents. Based on length of service, the largest group of respondents was those with 6–10 years of work experience, with a total of 70 people (43.75%).

Meanwhile, 45 people (28.12%) had worked for 1–5 years, and 25 people (15.63%) had less than one year of experience. Twenty respondents, equivalent to 12.5%, had worked for more than 10 years. This data indicates that the majority of respondents had significant work experience.

In terms of job title or position, the employee group was the largest category, with a total of 58 people, or approximately 36.25%.

Operational staff positions comprise 39 people, representing 24.37% of the total respondents. Additionally, there are 30 people (18.75%) in administrative positions. Tour guides comprise 11 people (6.88%), supervisors comprise 10 people (6.25%), and managers comprise 12 people (7.5%). This position distribution demonstrates representation across the organizational structure.

Measurement Instruments

Table 2 presents a detailed summary of the operational definitions of the research variables used in this investigation, together with their corresponding measurement codes, indicators, and relevant literature references. Each construct is methodically operationalized according to established theoretical and empirical underpinnings to guarantee conceptual clarity, content validity, and alignment with previous research. Table 2 delineates the translation of abstract concepts, including *green human resource management*, *green satisfaction*, *green supporting climate*, and *voluntary workplace green behavior*, into quantifiable indicators, thus providing a methodological foundation for subsequent empirical analysis and hypothesis testing.

Table 2. Operational Definitions of Research Variables

Variables	Code	Item	Source
Green Human Resource Management (GHRM)	GHRM1	Green Recruitment and Selection	Fawehinmi et al. (2020); Rubel et al. (2021)
	GHRM2	Green Training and Development	
	GHRM3	Green Performance Management	
	GHRM4	Green compensation and reward	
Green Satisfaction	GS1	Satisfaction with Environmental Practices	Chen et al. (2015); Abdou et al. (2022)
	GS2	Congruence of Individual and Organizational Environmental Values	
	GS3	Participation in Sustainable Initiatives	
	GS4	Satisfaction with Communication and Transparency	
Green Supporting Climate	GSC1	Pro-Environmental Communication	Amrutha and Geetha, (2021); Xiao et al. (2020)
	GSC2	Green Recognition and Awards	
	GSC3	Pro-Environmental Organizational Culture	
	GSC4	Green Facilities and Infrastructure	
Voluntary Workplace Green Behavior(VWGB)	VWGB1	Energy Savings	Kim et al. (2019); Tran Ngo et al. (2021)
	VWGB2	Waste Reduction	
	VWGB3	Environmentally Friendly Transportation	
	VWGB4	Promotion of Environmental Awareness	

Source: constructed by the authors using prior research (2025).

In this research, the operational definition outlines how specific measures were used to quantify each variable. The *GHRM* variable includes practices of hiring, recruiting, and selecting employees who are aware of the organization's environmental efforts; training and developing skills for employees to have better sustainable competencies; a system of evaluating employee performance that assesses how much they contribute to the organization's green practices; and compensation systems that reward employees for their environmentally responsible actions.

Green satisfaction encompasses how satisfied individuals are with their organization's environmental practices, the degree of alignment between individual and organizational environmental values, an individual's involvement in sustainability programs at work, and the transparency of the organization's environmental policy communication.

Green supporting climate encompasses communication that promotes environmentally responsible behaviors, recognizing employees for their contributions to environmental issues, creating an organizational environment that fosters environmentally responsible behaviors, and providing employees with physical facilities and equipment that facilitate environmentally responsible actions.

Voluntary workplace green behavior (VWGB) is measured using voluntary behaviors that include reducing energy usage, minimizing waste, utilizing environmentally friendly modes of transportation to get to and from work, and promoting environmental awareness within the organization.

Conceptual Framework

Green human resource management (GHRM) has been viewed as a strategic system that embeds sustainable development principles into recruitment and selection, training, appraisal, reward, and compensation systems, while simultaneously aligning them with the organization's environmental objectives. Previous research, adopting an international perspective, has demonstrated a significant positive correlation between GHRM and environmental conduct (Ren et al., 2018; Yong et al., 2020; Kim et al., 2019).

While some research indicates that this relationship is typically indirect, via psychological characteristics such as employees' environmental values and perceptions of fairness (Zhai et al., 2019; Pham et al., 2020), others report a direct relationship between GHRM and employees' environmentally friendly actions (Piwowar-Sulej, 2021; 2019). Research on green job satisfaction indicates that employees who experience high levels of satisfaction with their organizations' environmental policies are likely to engage in sustainability-related activities (Andersson et al., 2021; Luu, 2019), although variability in outcomes exists based on the level of organizational commitment to environmental policies and cultural orientation toward environmental policies (Dumont et al., 2017; Paillé & Meija-Morelos, 2019).

The present study contributes to theory by simultaneously integrating GHRM, green job satisfaction, and a green supportive climate as determinants of voluntary green workplace behavior (VWGB). In doing so, it extends our current understanding by considering green job satisfaction as an emotional reaction to the quality of environmental policies and a green, supportive climate as a structural condition that enhances employees' internalization of sustainability values. In addition, the inclusion of both of these constructs

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addresses a gap in prior research that typically separates structural and psychological factors. Overall, the conceptual framework for this study views GHRM as an antecedent to green job satisfaction and a green supportive climate and subsequently as an antecedent to VWGB.

This logical sequence of variables provides a solid theoretical basis for developing hypotheses related to the influence of GHRM on voluntary green workplace behavior, both directly and indirectly through psychological mechanisms and support from the work environment. Therefore, the conceptual framework model for this study can be depicted in the diagram presented in Figure 1.

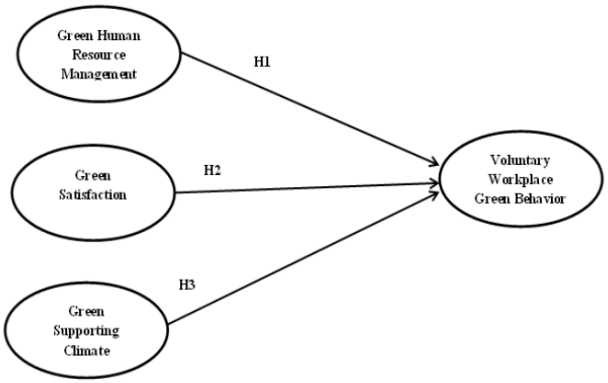

Figure 1. Research Framework Model

Source: constructed by the authors using prior research (2025).

Figure 1 presents the conceptual framework that delineates the proposed links among the primary dimensions analyzed in this study: *green human resource management*, *green satisfaction*, *green supporting climate*, and *voluntary workplace green behavior*. The paradigm identifies *voluntary workplace green behavior* as the primary outcome variable, representing workers' discretionary pro-environmental behaviors that go beyond statutory employment obligations. *Green human resource management* is defined as a systematic and leadership-oriented approach that integrates sustainability concepts into corporate policies and procedures, therefore directly affecting workers' voluntary environmentally friendly behavior (H1). *Green satisfaction* denotes workers' emotional assessment of company environmental practices and value congruence, anticipated to stimulate voluntary participation in eco-friendly behavior via favorable emotional and cognitive reactions (H2).

Furthermore, the *green supporting climate* embodies employees' collective beliefs of organizational support, norms, and resources pertaining to environmental activities, which are posited to foster a favorable social and psychological environment for *voluntary green behavior* (H3).

The paradigm emphasizes the integrative function of organizational structures, employee attitudes, and contextual support in influencing voluntary environmentally friendly behavior in the workplace, offering a solid foundation for empirical examination from a sustainability-focused business leadership viewpoint.

Data Analysis

Data analysis employed the SEM method with partial least squares modeling (PLS-SEM). Structural equation modeling is a multivariate analytical technique that combines factor analysis and regression analysis to examine relationships among variables.

In this study, PLS-SEM was used to assess both the measurement model, which evaluates the relationships between indicators (manifest variables) and their corresponding constructs (latent variables), and the structural model, which examines the relationships among latent variables (Hair et al., 2019). By using PLS-SEM, researchers can test relationships among multiple variables simultaneously. This approach is consistent with the principles of multivariate data analysis, which involves the application of statistical methods to analyze several interrelated variables representing measurements related to individuals, organizations, or situations.

RESULTS

Measurement Model Assessment

The data obtained from the research questionnaire were processed using the SmartPLS version 3.2.9 application, following the guidelines for processing. Validity and reliability tests were conducted to assess the outer model. The loading factor determines a convergent validity test and AVE. In this context, the loading factor is above 0.7, and the AVE value is 0.5. According to Hair et al. (2019), model reliability is assessed by the values of Cronbach's alpha and composite reliability (CR), both of which should be higher than 0.7. All these criteria are met, as evidenced by the results presented in Table 3 and Figure 2.

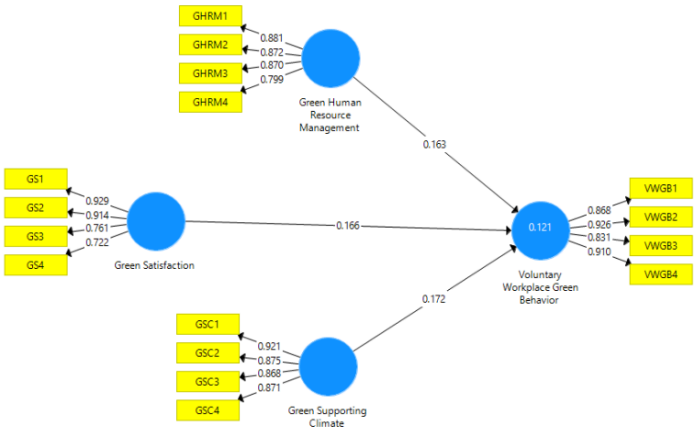

Figure 2. Measurement Model Analysis

Source: analysis results from SmartPLS software (2025).

Table 3. Measurement Model Analysis

Construct/item	Code	Outer Loadings	Cronbach's alpha	CR	AVE
Green Human Resource Management (GHRM)			0.878	0.916	0.733
Green Recruitment and Selection	GHRM1	0.881			
Green Training and Development	GHRM2	0.871			
Green Performance Management	GHRM3	0.870			
Green compensation and reward	GHRM4	0.799			
Green Satisfaction			0.861	0.902	0.699
Satisfaction with Environmental Practices	GS1	0.929			
Congruence of Individual and Organizational Environmental Values	GS2	0.913			
Participation in Sustainable Initiatives	GS3	0.761			
Satisfaction with Communication and Transparency	GS4	0.721			
Green Supporting Climate			0.907	0.934	0.781
Pro-Environmental Communication	GSC1	0.921			
Green Recognition and Awards	GSC2	0.875			
Pro-Environmental Organizational Culture	GSC3	0.868			
Green Facilities and Infrastructure	GSC4	0.870			
Voluntary Workplace Green Behavior (VWGB)			0.910	0.962	0.782
Energy Savings	VWGB1	0.868			
Waste Reduction	VWGB2	0.925			
Environmentally Friendly Transportation	VWGB3	0.830			
Promotion of Environmental Awareness	VWGB4	0.910			

Note: CR = composite reliability; AVE = average varince extracted.

Source: analysis SmartPLS software (2025).

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The analysis results show that all research constructs have excellent reliability and validity. *Green human resource management* (GHRM) recorded outer loadings above 0.90, a Cronbach's alpha of 0.878, and a CR of 0.916, indicating strong internal consistency. *Green satisfaction* was also highly reliable with an alpha of 0.861 and an AVE of 0.699, indicating consistent measurement across dimensions.

Furthermore, the *green supporting climate* recorded outer loadings above 0.90, a Cronbach's alpha of 0.907, and a CR of 0.934, indicating strong internal consistency. The best construct was *voluntary workplace green behavior* (VWGB), with an alpha of 0.910 and an AVE of 0.782, indicating a robust and consistent measurement of voluntary green behavior in the workplace.

Table 4 presents the findings of the discriminant validity evaluation using the Fornell–Larcker criteria, which assesses the degree to which each concept is empirically different from the others within the measurement model. Discriminant validity is determined by comparing the square root of the average variance extracted (AVE) for each construct with its correlations to other constructs, so confirming that each latent variable encompasses a distinct conceptual domain and validates the measurement model's adequacy.

Table 4. Discriminant Validity: Fornell-Larcker Criterion

	Green Human Resource Management (GHRM)	Green Satisfaction	Green Supporting Climate	Voluntary Workplace Green Behavior (VWGB)
Green Human Resource Management (GHRM)	0.856			
Green Satisfaction	0.128	0.836		
Green Supporting Climate	0.173	0.347	0.884	
Voluntary Workplace Green Behavior (VWGB)	0.214	0.247	0.258	0.884

Source: Analysis SmartPLS software (2025).

The results of the discriminant validity test using the Fornell–Larcker criterion show that each construct has a higher AVE square root value compared to the correlation between other variables. *Green human resource management* (0.856), *green satisfaction* (0.836), *green supporting climate* (0.884), and *voluntary workplace green behavior* (0.884) each show values that exceed their correlations with other constructs. This finding confirms that each variable in the model has good conceptual clarity and can be empirically distinguished from the others, ensuring that the discriminant validity in this study has been met.

Inner Model Measurement

The inner model measurement test in the SEM-PLS approach aims to evaluate the structural relationships between latent variables in the research model. This test includes an assessment of the coefficient of determination (R^2) to measure the independent variable's ability to explain the dependent variable, as well as the F-square value to assess the magnitude of the effect between the constructs (see Table 5).

Additionally, the path coefficient estimation and its significance level, determined through the bootstrapping procedure, also serve as a reference for determining the strength and direction of the relationship between constructs. Overall, the inner model test provides an overview of the predictive validity and structural feasibility of the developed research model.

According to Sarstedt et al. (2020), there are three categories of R-square, namely when the value is 0.19, 0.33, and 0.67, indicating weak, moderate, and strong relationships between exogenous variables and the endogenous variable, respectively. Meanwhile, Ghozali (2014) stated that when the R-squared value exceeds 0.67, the relationship between the endogenous and exogenous variables is considered strong.

Table 5. Coefficient of Determination Result R^2

Notes	*R*-Squared	*R*-Squared Adjusted
Voluntary Workplace Green Behavior (VWGB)	0.120	0.103

Note: R-squared = coefficient of determination; R-Squared Adjusted =squared corrects; R-squared for the number of predictor.

Source: Analysis SmartPLS software (2025).

Based on Table 5, the R^2 value for voluntary workplace green behavior is 0.120, and the adjusted R^2 is 0.103, which means that the independent variables in the model are only able to explain 12% of the variation in voluntary workplace green behavior, while other factors outside the model influence the rest. This value is classified as weak to moderate but still indicates a significant influence.

Table 6 presents the results of the *F*-square (f^2) effect size analysis, which assesses the magnitude of each exogenous variable's contribution to explaining the endogenous construct, *voluntary workplace green behavior*. The f^2 values indicate the extent to which *green human resource management*, *green satisfaction*, and a *green supporting climate* individually influence changes in the explained variance of *voluntary workplace green behavior*, thereby providing insight into the relative practical significance of each predictor within the structural model.

Table 6. F-Square Value

	Voluntary Workplace Green Behavior (VWGB)
Green Human Resource Management (GHRM)	0.029
Green Satisfaction	0.027
Green Supporting Climate	0.029

Source: analysis SmartPLS software (2025).

Based on the analysis results in Table 6, the *F*-square analysis indicates that the influence of each predictor variable on *voluntary workplace green behavior* falls into the category of small effects. *Green human resource management* contributed a change of 0.029, followed by *green satisfaction* with a value of 0.027, and *green supporting climate*, which also showed a value of 0.029.

These three values indicate that although these variables influence employee voluntary green behavior, the magnitude of the effect is relatively small. This finding suggests that there are other factors outside the model that may contribute more significantly to shaping voluntary green behavior in the workplace.

Hypothesis Testing

A significance test is conducted to verify the hypothesis and determine the relationship between exogenous and endogenous variables. The *p*-value comparing exogenous and endogenous variables is less than 0.05, indicating significance at the 5% level. Therefore, the exogenous variable has a significant effect on the endogenous variable. For a value more significant than 0.05, the exogenous variable does not have a significant effect on building the endogenous variable.

The results of the hypothesis test show that all relationships tested in the model have adequate statistical significance (see Table 7).

Table 7. Hypothesis Test

Hypothesis	Coefficient	Standard Deviation	*t*-count	*p*-value	Conclusion
Green Human Resource Management (GHRM >> Voluntary Workplace Green Behavior (VWGB) (H1)	0.163	0.074	2.186	0.029	**Accepted**
Green Satisfaction >> Voluntary Workplace Green Behavior (VWGB) (H2)	0.166	0.080	2.070	0.038	**Accepted**
Green Supporting Climate >> Voluntary Workplace Green Behavior (VWGB) (H3)	0.172	0.078	2.188	0.029	**Accepted**

Note: t-count = T-Statistics; p-value = probability value.
Source: analysis SmartPLS software (2025).

As shown in Table 7, *Green human resource management* has been proven to have a positive effect on *voluntary workplace green behavior*, with a coefficient of 0.163 and a *p*-value of 0.029, supporting the acceptance of the first hypothesis. *Green satisfaction* also shows a positive effect on *voluntary green behavior*, with a coefficient of 0.166 and a *p*-value of 0.038, supporting the second hypothesis. Furthermore, a *green supporting climate* has an influence coefficient of 0.172 with a *p*-value of 0.029, which confirms that a work climate that supports environmental practices significantly encourages employees' voluntary green behavior.

Overall, these findings suggest that managerial aspects, satisfaction with green practices, and support for the work environment play a significant role in shaping pro-environmental behavior that emerges voluntarily in the workplace.

DISCUSSION

The results of this study confirm that the implementation of voluntary workplace green behavior (VWGB) variables in organizations within the tourism industry is significantly influenced by three key variables: green human resource management, green satisfaction, and green climate support. Based on the results of the first hypothesis test (H1), it was found that green human resource management (GHRM) had a

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positive and significant effect on VWGB, with a coefficient value of 0.163 and a *p*-value of 0.029. The results are certainly strengthened by the effectiveness of implementing GHRM in an organization that is systematic and implemented sustainably.

The strengthening of GHRM is undoubtedly supported by an environmentally friendly recruitment system, employee training and development that considers environmental issues, a performance appraisal system oriented towards sustainable practices, and compensation that encourages eco-friendly behavior, thus encouraging employees to implement it. This finding aligns with previous studies that have detailed the high dependency of employee engagement in green initiatives on consistent GHRM implementation (Fawehinmi et al., 2020; Rubel et al., 2021). Organizations that implement this approach often provide training and career development programs that focus not only on technical skills but also on developing soft skills relevant to social and environmental issues.

The second hypothesis test (H2) confirmed that VWGB is positively and significantly influenced by the green satisfaction variable with a coefficient of 0.166 and a *p*-value of 0.038. This finding supports the notion that voluntary participation in environmentally friendly employee behaviors is closely related to job satisfaction among environmentally conscious employees. In practice, companies concerned with sustainable issues not only refer to their company policies but also involve all stakeholders in creating a more socially and ecologically responsible work environment.

The results of this study align with previous research examining aspects of green satisfaction, which found that employees encouraged to actively participate in reducing negative environmental impacts are influenced by green job satisfaction factors (Chen et al., 2015; Abdou et al., 2022). In managing a sustainable organization, it is essential to understand and integrate sustainability principles into every aspect of the organization to achieve a balance between economic, social, and environmental interests in its operations.

Furthermore, regarding the third hypothesis (H3), the findings of this study confirm that the VWGB variable is also positively and significantly influenced by a green supportive climate, as evidenced by a coefficient value of 0.172 and a *p*-value of 0.029.

These results emphasize that the green supportive climate aspect exists as organizational support for employees to implement sustainable practices in the work environment. This finding is certainly in line with previous studies by Amrutha and Geetha (2021) and Xiao et al. (2020), which suggested that a green supportive climate plays a crucial role in strengthening the relationship between organizational policies and individual behavior towards organizational sustainable practices. Organizations can enhance their overall operational performance (while at the same time enhancing the environmental and social sustainability) by creating an organization that has a green supportive climate. The improved operational performance does not only result from higher efficiency and productivity; it also enhances the organization's capacity to adapt to environmental changes and community needs.

The importance of human resources development, as well as the influence that HR practices have on sustainability performance, are two key principles of human resource management that will help the organization achieve its goals and improve performance, thereby reducing negative impacts on stakeholders and increasing organizational results.

CONCLUSIONS

Based on the research results demonstrated through structural model analysis, it is concluded that the existence of voluntary green behavior in the workplace is influenced by green human resource management, green satisfaction, and green climate-supporting factors. These results confirm that sustainable human resource management (HRM) practices within organizations significantly influence every employee to engage in green behavior in the workplace.

Effective and sustainable HRM supports both the achievement of organizational objectives and the promotion of employees' well-being, while also fostering positive impacts on the environment and society. HRM is crucial for creating a workplace environment that is both productive and inclusive. In addition, by incorporating sustainability principles into HRM strategic plans, an organization can foster a culture that promotes employee well-being, which can positively impact job satisfaction, productivity, and commitment.

Furthermore, the findings of this study theoretically contribute to the literature on organizational behavior and sustainable management in the field of human resource management, particularly in the service sector, which focuses on environmental considerations.

Furthermore, this study also emphasizes the urgency of employees' subjective views on sustainable values and practices, which play a crucial role in driving the success of an organization's green behavior program. Thus, a holistic approach that combines systemic and psychological elements is essential to designing efficient and sustainable sustainability strategies in the tourism sector.

This research has significant practical implications for firms, highlighting that the successful execution of voluntary workplace green behavior is primarily a concern for business leadership. Organizational leaders are essential in integrating sustainability principles into human resource management policies, encompassing the development of training programs that promote environmental awareness, incentive structures that acknowledge and reward eco-friendly contributions, and the establishment of work environments that foster employee engagement and transparent communication regarding environmental matters.

The results indicate that tourist sector regulators should assist company leadership by formulating context-specific green human resource management standards that align with regional attributes and the competencies of local industry stakeholders.

Future academic advancement necessitates more study to investigate leadership-related processes, including ecological leadership and individual environmental values, as mediating or moderating factors that might enhance voluntary green behavior. Broadening the geographic range and industrial setting of future investigations would augment the generalizability of the results. Ultimately, the pursuit of sustainability should regard voluntary workplace green behavior not solely as an individual obligation but as the result of a strategically managed, leadership-driven organizational framework, enabling business leaders to produce lasting environmental and societal advantages.

Notwithstanding these contributions, this research has shortcomings that require acknowledgment. The cross-sectional study methodology limits the capacity to establish causal inferences or observe changes in voluntary green behavior over time, indicating that longitudinal studies are necessary for a more comprehensive understanding of behavioral dynamics and sustainability trajectories. The model's limited explanatory power suggests that additional factors, such as leadership styles, moral norms, organizational identity, or external institutional pressures, could significantly influence voluntary green behavior but were excluded from this analysis. Third, the dependence on self-reported survey data introduces the potential for common method bias and social desirability effects, which may influence respondents' evaluations of their own environmental behavior.

The study's empirical emphasis on the travel and tourist sector in North Sumatra restricts the applicability of the results to other locations and industries, especially those with distinct regulatory frameworks or organizational cultures. Future studies should integrate multi-source data, expand regional coverage, do comparative industry analyses, and include mediating or moderating variables such as ecological leadership and personal environmental values to enhance comprehension in this domain.

Author Contributions

Conceptualization: E. D., R. A. H., M. B., S. F., D. L.; curation data: E. D., R. A. H., M. B., S. F., D. L.; formal analysis: E. D., S. F., D. L.; investigation: E. D., R. A. H., M. B.; methodology: E. D., R. A. H., M. B., S. F.; project administration: E. D., M. B., S. F.; supervision: E. D., S. F., D. L.; validation: E. D., R. A. H., M. B., S. F., D. L.; visualization: E. D., R. A. H., M. B., S. F.; writing – original draft: E. D., R. A. H., M. B., S. F., D. L.; writing – review & editing: E. D., R. A. H., M. B., S. F., D. L.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

Data Availability Statement

The data is available and can be provided on request.

Informed Consent Statement

This research has obtained ethical approval from the Sultan Agung College of Economics and the research subjects. The confidentiality of all respondents involved in this study was maintained, and written consent was obtained from each of them.

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APPENDIX

Questionnaire Form

GREEN HUMAN RESOURCE MANAGEMENT (GHRM)						
No	What is your opinion, attitude, knowledge regarding the statement below	Very Good	Good	Neutral	Poor	Very Poor
Green Recruitment and Selection						
1	Does your organization incorporate sustainability principles in employee recruitment and selection processes?					
2	To what extent do workforce recruitment practices in your organization consider environmental friendliness and social responsibility?					
Green Training and Development						
3	Are employees involved in training programs aimed at improving the organization's environmental performance?					
4	To what extent do employees contribute to energy efficiency and waste reduction in the workplace?					
Green Performance Management						
5	Does your organization encourage the use of environmentally friendly transportation in work-related activities?					
6	To what extent does the organization manage internal distribution or logistics systems with consideration for environmental impacts?					
Green compensation and reward						
7	Does your organization transparently report environmental performance policies and outcomes to employees?					
8	To what extent does the organization ensure accountability in implementing environmentally friendly HR programs?					
GREEN SATISFACTION						
Satisfaction with Environmental Practices						
1	How do you perceive the environmentally friendly policies implemented by your organization?					
2	Do the organization's environmental programs increase your job satisfaction?					
Congruence of Individual and Organizational Environmental Values						
3	Are your personal environmental values aligned with those of the organization?					
4	To what extent do you feel that your identity as an environmentally conscious individual aligns with the organizational culture?					

Participation in Sustainable Initiatives						
5	How able are you to participate in sustainability initiatives implemented by the organization?					
6	Does the opportunity to participate in sustainability programs increase your pride in working for this organization?					
Satisfaction with Communication and Transparency						
7	How do you perceive the organization's transparency in communicating environmental policies and achievements?					
8	Does transparency in environmental information increase your trust and satisfaction with the organization?					
GREEN SUPPORTING CLIMATE						
Pro-Environmental Communication						
1	Are you satisfied with the organization's communication regarding environmental issues?					
2	To what extent does communication related to environmentally friendly behavior motivate you to care more about environmental issues?					
3	Does organizational openness in discussing environmental issues enhance your satisfaction?					
Green Recognition and Awards						
4	How do you perceive the recognition or appreciation given to employees who contribute to green practices?					
5	To what extent do rewards related to environmentally friendly behavior motivate you to be more environmentally conscious?					
Pro-Environmental Organizational Culture						
6	How do you perceive an organizational culture that encourages environmentally friendly behavior in the workplace?					
7	To what extent are pro-environmental values reflected in the organization's daily activities?					
Green Facilities and Infrastructure						
8	How do you perceive the environmentally friendly facilities provided by the organization (e.g., waste management, energy-saving systems, green spaces)?					
9	To what extent does the organization's green infrastructure support your comfort and job satisfaction?					
***VOLUNTARY WORKPLACE GREEN BEHAVIOR* (VWGB)**						
Energy Savings						
1	I voluntarily turn off lights and electrical equipment that are not in use at the workplace.					
2	I make efforts to use energy efficiently even when there are no formal organizational rules.					
Waste Reduction						
3	I actively try to reduce paper use by utilizing digital technologies.					
4	I voluntarily sort waste according to its type (organic, non-organic, recyclable).					
Environmentally Friendly Transportation						
5	I make efforts to use environmentally friendly transportation (carpooling, public transport, or cycling) to commute to work.					
6	I support organizational policies that promote the use of low-emission transportation.					
Promotion of Environmental Awareness						
7	I voluntarily encourage colleagues to be more concerned about environmentally friendly practices.					
8	I actively share information about the importance of environmental protection in the workplace.					

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