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The impact of green human resources management practices on employees' green behavior: The moderating role of employee work engagement

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Abstract
Green behavior - GB, has gained prominence in attaining a sustainable environment, forming parts of ethical strategies in organizations. As a result, academics are increasingly focused on investigating the antecedents of GB, to understand the driving factors of this phenomenon. This research aims to explore the impact of GHRM practices on the GB of employees, and the mediating role of GPC between GHRM, EGB and the moderating role of EWE on the GPC-EGB in Saudi Arabia. Inclusion of data via questionnaire was used in various Saudi companies, where responses of employees were given within a range of 213. The hypotheses were tested using SmartPLS. The findings showed that GTD, GPM, and GCM make significant contributions to GPC. Nonetheless, GRS had no noticeable relationship with GPC. GPC revealed a mediated impact of GTD, GPM, and GCM on green behavior of employees with no mediation between GRS and EGB. The correlation between GPC and EGB also occurs through EWE as insignificant. To be sustainable and productive green practices should be employed. GHRM ought to promote awareness amongst employees; sustainability aims to boost friendly attitudes.

Keywords: Green human resource management practices, green psychological climate, employees' behavior, employee work engagement

Introduction
Environmental issues like pollution and global warming have become urgent matters that demand immediate action to protect natural systems and human well-being. Many nations are responding by emphasizing their roles in addressing these changes. Governments and NGOs worldwide are pushing for policies and regulations to mitigate environmental degradation's effects on ecosystems and communities (Zahrani, 2024) [64].

Of these nation, Saudi Arabia, in particular, plays a significant role by prioritizing sustainable development as a core aspect of its Vision 2030 agenda, which sets sustainable economic practices as a key objective (Vision 2030 ANNUAL REPORT, 2024) [57].

To fully realize Vision 2030, sectors must address existing challenges by adopting sustainable business models, investing in renewable technologies, and fostering collaboration between public and private stakeholders. These efforts will help create a green ecosystem that aligns economic growth with environmental sustainability (Doghan, 2024) [18].

Businesses also have a responsibility to protect to environment as part of their social obligations. To meet this responsibility, organizations must evolve and enhance their strategies to become more eco-friendly in their operations. Continuous warnings from scientists and environmental advocates underscore the urgent need for industries to adopt environmentally protective strategies. For businesses to remain competitive, integrating environmental innovation with internal capabilities is essential (Martins *et al*, 2021) [39].

As a result for that, in the 21st century, environmental sustainability has become a priority for decision-makers, leading to innovative human resource management strategies. Employees are key to advancing green practices, and HR management is increasingly seen as vital for promoting eco-friendly behaviors, especially in research on sustainable HR practices (Ercantan & Eyupoglu, 2022) [20].

Therefore, we can safely assume that the management of human resource HRM serves as a key function, responsible in managing and training employees to enhance work performance. Hence, GHRM offers a modern alternative to traditional HRM, with practices, policies, and

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frameworks designed to foster a green culture, supporting environmental sustainability and preservation (Martins *et al*, 2021) [39]. GHRM practices can help increase employees' environmental awareness, enabling them to contribute more effectively to preserving the natural ecosystem (Yong *et al*, 2020) [60].

Thus, reflecting on GHRM is any company's strategic focus on environmental protection, urging decision makers to select processes and behaviors to foster a workplace with compliant actions to minimize a toxic work environment. In essence, GHRM involves integrating an organization's environmental administration targets as HR processes including recruitment and selecting, development and training outcomes, organization and evaluation, and rewards and recognition (Singh *et al*, 2020) [54].

Environmental concerns and pollution are widely understood to stem from human behavior. Consequently, organizations are now concentrating on their daily operations to make them less damaging to the habitat (Malik *et al*, 2020) [38].

Green behavior is essential for fostering employee retention and improving productivity in the workplace, which helps retain skilled personnel. Additionally, green practices promote environmental responsibility, offering organizations a competitive edge through sustainability (Benevene & Buonomo, 2020; Yong *et al*, 2020) [8, 60].

This paper examines the significance of GHRM in promoting Employees' Green Behavior GEB. It sets out to offer a broad look at Green Human Resource Management, its strategies for addressing environmental challenges within organizations, and its role in promoting green behaviors among employees.

By enhancing green behaviors, organizations can not only improve productivity but also strengthen their competitiveness in the business industry. Understanding these dynamics enables organizations to optimize sustainability initiatives through strategic HRM practices, contributing to broader corporate environmental goals.

As GHRM gains global attention, studies investigating its practices and outcomes in Saudia Arabia are evidently scarce. The lack of such investigation leads to an unanswered question of its prevalence and effectiveness of GHRM in fostering GEB in this context. This also adds two further elements for investigation of the psychological factor GPC, serving in a mediating role and the EWE taking on a moderating role in the examination of GEB. Such an investigation is justified in a relatively underexplored region that lacks theoretical and empirical gaps in this field.

According to Mahdy *et al*, (2023) [37] while Middle Eastern countries have received attention on the topic of GHRM, developing nations have displayed even greater engagement. Among them, Pakistan leads with the highest level of interest, accounting for 20% of global involvement, followed by India at 12%, and Malaysia and China, each contributing 11%. Saudi Arabia represents only 2% of the interest within some of Middle Eastern countries.

To address the gap in the literature, this research focus on the significance of GHRM practices relative to green employee conduct GEB through the hypothesis of this paper and the regulating effect of Employee Work Engagement EWE. The following research questions are also addressed in the study:
RQ1: Does GHRM practices impact EGB through GPC?
RQ2: If so, Does EWE mediate the connection between GPC and EGB?

This paper adds a valued dimension by enhancing the understanding of GHR practices and its effect on Employee Green Behavior EGB, emphasizing its role and effect on a green psychological climate in work engagement.

GHRM is a primary concept still in its early stages, with limited focus on evaluating the outcomes of its practices in fostering a green organizational approach. Additionally, research on GHRM lacks comprehensive theoretical, methodological, and empirical systematization (Benevene & Buonomo, 2020; Yong *et al*, 2020) [8, 60].

Hence, a conceptual model enhances the green management field by integrating work engagement as a key factor. A distinctive feature of this study is its use of EWE as moderator to clarify the mechanism driving the relationship between GPC and EGB. Furthermore, research on GHRM practices, a growing area in human resource management studies, by exploring factors that promote EGB with the revolution of sustainability.

This research aims to connect the gap between theory and practice; therefore, a logical contraption is providing insights into how organizations can effectively harness GHRM to foster employees who are not only engaged but invested in environmental sustainability. In doing so, it offers valuable guidance for HR professionals seeking to create a dynamic and eco-friendly workplace culture. Furthermore, it contributes to future research by expanding the understanding of how GRM practices, GPC, and workers engagement can impact employee's green behavior and organization productivity. The study provides insights into enhancing sustainability by leveraging green human resources management strategies. Subsequent sections will explore the theoretical framework (SET and AMO), a literature review, results, discussion, implications, and conclusions.

Theoretical underpinning
Social exchange theory
The Social Exchange Theory SET, is a comprehensive framework that incorporating multiple social science fields, comprising management, social psychology, and anthropology. Rather than being a single, unified theory, it is more accurately described being a collection of connected conceptual models (Cropanzano *et al*, 2017) [16]. Developed over the 20th century with contributions from early anthropologists like Malinowski and Mauss, SET explains social interactions as exchanges where people provide resources or support with the expectation of a return, either directly or indirectly.

The theory suggests that these interactions generate a sense of obligation, where each participant feels a duty to reciprocate the other's support or effort. SET is built on the idea that these exchanges are interdependent: one person's actions influence and are influenced by the other's actions, which reinforces mutual expectations over time. This sense of reciprocity fosters trust and ongoing cooperation, which is fundamental in both personal relationships and professional environments, where cooperation and interdependence are essential for organizational success (Cropanzano & Mitchell, 2005) [17]. In the lens of workplace and management, SET suggests that positive actions from managers, with recognition, will result in encouragement of employees to respond with increased productivity and good behaviors. Thus, fostering stronger workplace relationships

and organizational cohesion, which fall in line with the Social Exchange Theory. There are many studies that have used this as a grand theory to support their research in the field of GHRM. Behavioral studies suggest that organizational training, seen through the parameters of SET, strongly impacts employees, leading them to feel obligated to their organization. Employees are inclined to respond positively based on how much they believe the organization has invested in them (Amrutha & Geetha, 2021) [5]. Other study illustrates that when employees feel their environmentally friendly efforts are appreciated, their engagement and sustainable behaviors increase, allying with the core principles of Social Exchange Theory (Weber & Kassab, 2024) [58].

In this study the theory of social exchange is used to support the conceptual model. In the context of SET, GHRM practices refer to green hiring, training, output management and compensation that green practices use in enhancing environmental sustainability. This in turn can be seen as an organization's positive actions delivered to employees. Thus, organizations that implement GHRM principles usually foster a supportive atmosphere about green projects. Employees then feel obligated to return the favors by adopting green practices. This implies that a GPC is the employees' view of the environmental work-related values and rules. When there is a good green psychological climate, employees become conscious of an employers' dedication to sustainability thus being encouraged to reciprocate by adopting green practices. Workplace engagement is characterized by vigor, dedication, and interest in tasks. In SET terms, enhanced work engagement can be a form of reciprocation, where employees go above in their roles, reflecting their green behaviors. Thus, the effects of GHRM can be amplified and highlight green employee behaviors resulting from a strong green psychological climate and high work engagement.

AMO Ability- Motivation- Opportunity theory

The Ability- Motivation- Opportunity - AMO framework is built on foundational psychological concepts: Motivation, which drives behavior; Ability, referring to the skills and capacities needed to carry out a behavior; and Opportunity, encompassing the situational and contextual factors that influence the ability to perform the behavior (Hughes, 2007) [31]. Other studies also explained the three concepts whereby Ability is defined as physiological and cognitive features of people that can enable individuals to succeed in completing tasks. Motivation can be described as impulse, energy and power to support behavior. Opportunity includes contextual and environmental factors beyond the immediate control of an individual, referring to the sphere of forces around an individual and his work in which the successful or unsuccessful performance of these tasks is made possible or impossibility. Together, these three dimensions, capability, incentive, and opportunity interact to support effective performance (Bos-Nehles *et al*, 2023) [10]. This theory originating from Vroom's work, the AMO framework was further developed by Blumberg and Pringle. While subsequently it was applied in studies by Bailey and Applebaum (Faisal, 2023) [21]. Achieving this green agenda requires strong support from human resource practices. This is based on the AMO theory, suggesting employees' work performance relies on having the elements including capability, motivation, and opportunities to help meet

organizational targets (Yong *et al*, 2020) [60]. The theory is now widely applied in analyzing the implementation of GHRM (Pham *et al*, 2020; Yong *et al*, 2020; Yu *et al*, 2020) [43, 60, 61]. The ability aspect of the theory will be dealt with by green training the employees to be competent and skilled in undertaking their duties in environments that are friendly to the environment. GPM and GCM origin from internal motivation and, therefore, have a positive impact on an employee to the psychological side. This helps to create the green psychological climate and make them have more involvement in the workplace. This, in turn, is expected to encourage green employee behavior. Finally, the Opportunity dimension will be supported through green policies and regulations implemented by the human resources management department. The next section will cover the literature review of the constructions with the hypothesis, and the conceptual model.

Literature review and hypothesis
GHRM practices and GPC

Human resource management is a huge consideration responsible for longevity of the organization. Green practices have essential roles on how the organizations address the green climate through various techniques (Anwar *et al*, 2022) [7]. One of the essential environmental practices of the organization is GHR practice. This term encompasses green recruitment, green training, green performance evaluations, green rewards (Shah SMA *et al*., 2021) [52]. GHRM, a form of Sustainable HRM, centers on addressing environmental issues. Its goals include enhancing environmental performance, reducing waste, and building competitive advantages. This approach relies on ongoing improvement, innovation, and full alignment between environmental and organizational goals and strategies (Coelho *et al*, 2024) [15].

The subdimensions of GHRM relevant to this study include Green Recruitment and Selection GRS, Green Training and Development GTD, Green Performance Management GPM, and Green Compensation Management GCM. GRS refers to the selection and hiring of individuals whose skills, insight, and approaches compliment an organization's environmental management practices. This supports effective environmental management by bringing in employees who already value sustainability and have the skills to support environmental goals. The employees' active involvement in eco-friendly policies and initiatives is key to achieving organizational sustainability. Where job seekers often like companies that reflect their own values (Jamil *et al*, 2023) [32].

Green training occurs post hiring where sustainable training has been recognized as essential for overcoming personal barriers to pro-environmental behaviors; to encouraging their implementation in the workplace. This training yields a two-benefit for both organizations such as adopting best practices and enhancing environmental performance and employees, providing individual recognition that motivates environmentally friendly actions (Pinzone *et al*, 2019) [44]. Earlier studies leaned towards the comprehensive improvement of employees' behavior, attitudes, skills, and expertise can hinder cooperative efforts toward environmental initiatives unless sustainable training and development is provided, highlighting the importance of this factor. Previous research also found that green training contributed to preparing versatile, skilled employees by

enhancing the knowledge, skills, and competencies essential for innovation, ultimately boosting organizational performance (Yafi *et al*, 2021) [59].

GPM and appraisal involve a system for measuring employees' performance specifically related to their roles and activities in environmental management (Saeed *et al*, 2019) [47]. In fostering a culture focused on environmental performance, performance evaluations for employees incorporate environment-related criteria. Green performance assessments play a crucial role as a method of evaluating employees in reaching environmental goals; based on eco-friendly standards (Haldorai *et al*, 2022) [25].

Green compensation refers to financial incentives given to employees based on their success in meeting environmental goals, reducing harmful environmental impacts in their work, or demonstrating green awareness, attitudes, and behaviors that support environmental sustainability (Zhang H & Sun, 2021) [67].

There are numerus studies that emphasize GHRM and its relationship with many variables globally; like China and numerous other countries whose goals follow a sustainable outlook. One study explores what drives employee green advocacy, suggesting that green HR practices boost employees' self-esteem, leading to motivation to promote environmental initiatives. This effect indicates a stronger correlation when employees experience support by their organization. This is noted in findings from 135 employees and HR leaders where green advocacy was supported, with practical and theoretical insights offered to help organizations foster environmental advocacy (Cheng *et al*, 2022) [13]. Alternatively, other study emphasizes the relationship of GHRMP with organization citizenship behavior. Green HR practices showed a significant positive association with both collective and individual Organizational Citizenship Behavior for the environment OCB behavior for the work environment (Luu, 2019) [36]. In addition, a study in Portugal looked at the relationship between GHRM practices and personal organization fit. The observed correlation patterns directed that, there exists a strong, positive connotations among all GHRM practices and individual organization fit (Cesário *et al*, 2022) [11].

Looking in the context of this study, there are some studies in Saudi Arabia that do emphasize the role of GHRM. One study examined the mediating role of GHRM within an organization environmental culture and environmental sustainability and organization environmental culture and environmental performance the finding presented has a positive impact for GHRM as a mediator (Doghan *et al*, 2022) [19]. In another study, by Siddique, (2024) [53] the findings indicate that green involvement, compensation, and development positively impact green environmental performance, highlighting the efficacy of these actions in maintaining consistency within the pharmaceutical sector. However, GRS did not demonstrate a significant effect.

In the contest of Psychological Green Climate PGC, it is defined as the manner in which workers view their work environment, is indeed closely connected to their work attitudes, motivation, and performance (Parker *et al*, 2003) [42]. However, literature exists to indicate the acknowledgement of how HRM impacts employee attitudes and behaviors, not only directly, but also through underlying mechanisms like sociopsychological and motivational processes (Ansari *et al*, 2021) [6].

Countries like Pakistan, China, and Iran have demonstrated

that in different sectors like health care, manufacturing and other industrial; Green HRM is favorably linked to the psychological green climate (Li W *et al*, 2023; Naz *et al*, 2023; Sabokro *et al*, 2021) [35, 41, 46]. Other studies such as in one done in Antalya by Uslu *et al*, (2023) [56] its analysis found that GRS which are elements of GHRM, play no particular role in Green Psychological Climate. In contrast, GT and GPM, and green financial gains showed significant effects on GPC.

Upon review, there has been a notable rise in publications related to GHRM, yet relatively no studies, implying a lack of research, found in Saudi Arabia that focus specifically at GHRM practice and green psychological climate GPC. Subsequently, the following hypothesis has been developed.

H1. GHRM practices have a positive and significant effect on GPC.

H1a. Green recruitment and selection GRS has a significant effect on GPC.

H1b. Green training and development GTD has a significant effect on GPC.

H1c. Green performance management GPM has a significant effect on GPC.

H1d. Green compensation management GCM has a significant effect on GPC.

GPC and Employee's Green Behavior EGB

Green behavior relates to a number of individuals' actions that are environmentally friendly (Fawehinmi *et al*, 2020) [22]. This behavior involves participating in eco-friendly practices as part of daily work tasks, contributing to a more sustainable workplace. Among the various strategies applied at an organizational level to improve their environmental output and reach sustainability goals, green behavior is a key component (Ahmed M *et al*, 2020) [3].

A study by Zhu *et al*, (2021) [68] studies examined the impact of GEB as separate component of behavior as indicated in the following study that examined two elements GEB having TGB and VGB. Task-Related Green Behavior TGB involves environmentally friendly behaviors that workers perform alongside their core duties, such as adhering to environmental standards and fulfilling specified environmental duties. It contrasts with Voluntary Green Behavior VGB which consists of self-initiated environmental actions, like using double-sided printing or encouraging coworkers to save energy, actions not specifically rewarded by formal reward systems. The result of this paper suggests that GHRM has a positive impact on (VGB), and similarly GHRM positively influences (TGB). The element of EGB actions by employees aimed at environmental responsibility focuses on the growing role of sustainability of the workplace environment. With the drive of organizations to encourage or require EGB, it has somewhat become a strategic and ethical priority. Researchers aim to understand the drivers and effects of EGB, viewing it as a multi-layered performance area influenced by individual, team, organizational, and societal factors (Zacher H *et al*, 2024) [62].

Such environmental sustainability shapes the organizational climate and serves as a key tool for helping employees navigate their work environment by clarifying acceptable behavior standards. The psychological climate develops as employees engage with the social dynamics of their organization and discuss its rules and practices (Chreif & Farmanesh, 2022) [14]. There are some studies investigated

the relationship of GPC with pro- environmental behavior, the results for studies showed this relationship is positive (Li M *et al*, 2023; Naz *et al*, 2023) [34, 41]. In addition, some studies illustrated that both GPC and EGB are personal-level constructs, making GPC arguably the most direct predictor of green behaviors, and the results of the investigation showed the relationship between GPC and GEP is significant (Sabokro *et al*, 2021; Uslu *et al*, 2023) [46, 56]. Based on these considerations, it can be debated that a PGC influences employees' green behaviors. The resulting hypothesis established in this context follows.

H2: green psychological climate has positive effect on employee's green behavior

GPC as a mediator

Studies in HRM behavioral literature propose that HRM practices can shape employee behavior through psychological mechanisms. The literature also suggests that these mechanisms like a psychological green climate and participation in green initiatives may boost employees' work performance (Hameed *et al*, 2020) [26]. Green HRM practices, including emphasizing the values of the workplace environment during hiring and training, contribute to raising individual awareness of environmental issues. Providing green training is key to developing skill levels and commitment to sustainable actions. Additionally, employees' expectations about their organization implementing green HRM policies can play a key role on their job performance (Li W *et al*, 2023) [35]. The recent study investigates the role of GPC as a mediator to improve the connection between GHRM practices and GEP. There are some studies that investigated its role as moderator and one of them results with this conclusion green psychological climate results from the social interactions among employees and plays a crucial role as a moderator in enhancing company performance, as it significantly impacts employee behavior (Chreif & Farmanesh, 2022) [14].

Study by Khan *et al*, (2019) [33]. examine its mediating role between ethical leaders and OCB with results showing that green psychological climate mediates a positive relationship between ethical leadership and Organizational Citizenship Behavior for the Environment. In addition, other studies examined its role as mediator between green human resources practices and green behavior, and the results showed that psychological green climate acts as a mediator in the relationship between green HRM practices and employees' green behavior within their roles (Li M *et al*, 2023; Li W *et al*, 2023; Naz *et al*., 2023; Sabokro *et al*., 2021) [34, 35, 41, 46]. Based on that, this research will examine the role of GPC as a mediator.

H3: green psychological climate GPC mediate the relationship between GHRM practices and employees' green behavior EGB.

Employee work engagement EWE as a moderator

Workplace engagement is a specific and distinct concept which includes cognitive, emotional, and behavioral aspects related to how individuals perform in their roles (Saks, 2006) [48]. It is a positive psychological mindset that empowers individuals to bring high energy, deep focus, and full immersion to their job (Ahmed U *et al*, 2020) [4]. The role of employee work engagement (EWE) has been explored in various studies. For example, one study examined EWE as a mediator between Green Human Resource Management (GHRM) practices and employees' green behavior. The results provide empirical evidence that work engagement mediates the role between GHRP and environmental performance (Adeel *et al*, 2022) [2]. Moreover, another study found that employee engagement balances the link between traditional human resource management practices and employee input, highlighting an indirect effect between these variables (Binti Mohd Taib Kolej Poly-Tech Mara *et al*, 2019) [9]. Furthermore, the direct and indirect bond between GHRM and employees' green behavior, mediated by EWE and environmental initiatives, have been tested, with results confirming a mediating role (Ababneh, 2021) [1]. However, in some studies, EWE has been tested as a moderator. One study has proposed the moderating role of employees work engagement between followers' self- esteem and employees' green behaviors and between the green transformational leadership with followers' self- esteem. The result showed there is a positive relationship, high employee work engagement that moderates the relationship between the variables (Zaid & Yaqub, 2024) [65]. According to Chang, (2016) [12]. Firm-level employee engagement positively regulates the outcome of customer emotions on behavioral intent at a distinct level. Nevertheless, as demonstrated by Heriyati & Seiichi Ramadhan, (2012) [30]. EWE had not moderated the employee satisfaction and employee work performance as well as retention. Since, there are view studies have examined EWE as a moderator and lack of studies have investigated its moderating role between GPC and EGB, this study will hypothesize that.

H4: EWE moderate the relationship between GPC and EGP

The Conceptual Model: The main variable in the concept of this framework is GHRM practices which are green recruitment and selection GRS, green training and development GTD, green performance management GPM, and green compensation management GCM. GPC will be a mediator, and employee work engagement EWE is moderator. This study looks at the influencing factor of these variables on green employees' behavior GEB. In addition, these hypotheses proposed in this conceptual model enhance the indirect impact of GHRM practices on GEB The next section will cover the methodology of this study.
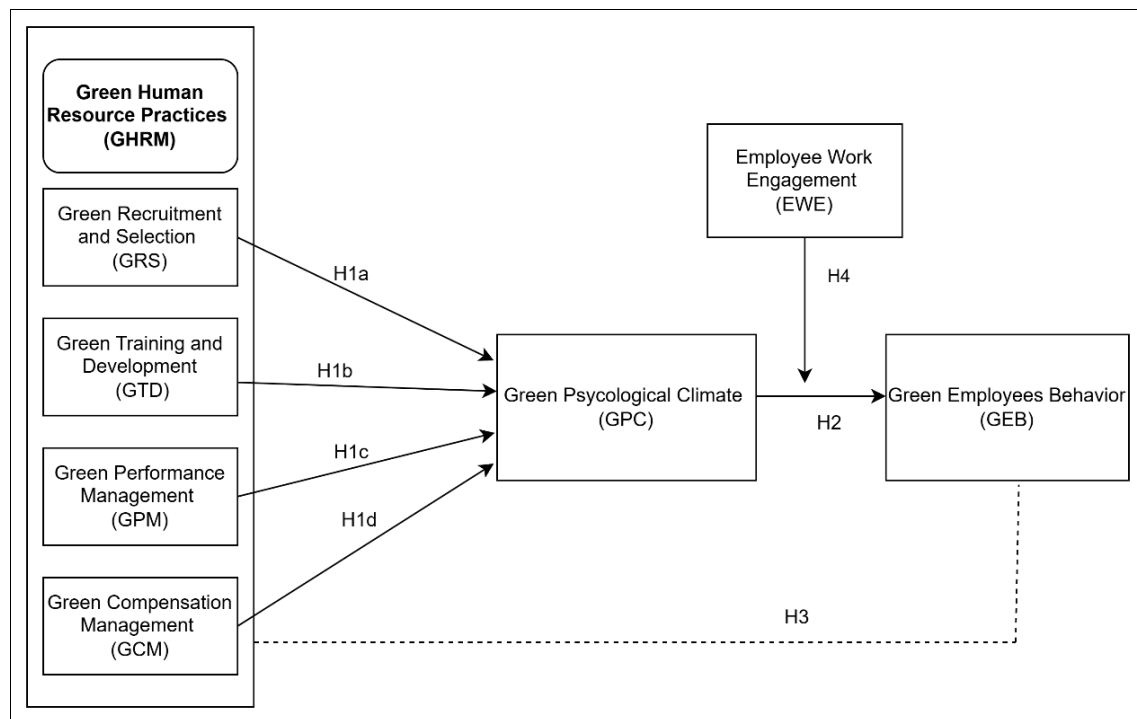
Fig 1: Conceptual model

Research Methodology

This section outlines the methodology utilized in this study, incorporating research design, measurement model, along with data collection and sampling method. In addition, ensuring the paper's reliability and validity. Thus, it offers a clear framework for how the research is carried out, justifying the chosen methods and demonstrating how they align with the study's primary goals.

Research Design and method

The philosophy of this study has been chosen to use positivism in accordance with the research purpose and objectives since it is based on a scientific approach since the data are collected regularly and examined objectively. The work's methodology is deductive. A logical approach can be used to experience the relationship between the variables, and his will in turn confirm the correlation between the variables. The methodology that has been employed in gathering the information is through a questionnaire survey in order to acquire a further insight into the effect various factors have on green behavior among the employees. The study will apply a single method of data collection via a questionnaire, and it is quantitative study hence the study choice is mono method. That could mean information is gathered within a small period of time, hence, the time frame of the study has a cross-sectional characteristic (Saunders *et al*, 2009) [49]. To fill the gap of this research, it has been carried out in Saudi Arabia, focusing on Saudi organizations from different sectors. Due to the lack of studies about GHRM practices in this country. The populace for this research are those employed in Saudi Arabia. The employees were selected as the study's population because the study looked at how they perceived the workplace culture and green HRM practices, as well as how these perceptions might affect their green behavior. Additionally, the impact of their level of job involvement on their green behavior has been investigated. Additionally, a survey questionnaire was used to give a thorough grasp of the issue.

Lastly, this research methodology emphasizes the study's validity and dependability in a consistent and methodical manner (Saunders *et al*, 2009) [49].

Measurement model

To measure the study constructs, the study used established scale items based on previous study to ensure reliability and validity as it recommended by Hair *et al*, (2021) [27]. The measurement scale is composed of two parts. The first section is descriptive, and it describes the members because it gives their demographical characteristics. The employees were selected as the study's population because the study looked at how they perceived the workplace culture and green HRM practices, as well as how these perceptions might affect their green behavior. Additionally, the impact of their level of job involvement on their green behavior has been investigated. Additionally, a survey questionnaire was used to give a thorough grasp of the issue. Lastly, this research methodology emphasizes the study's validity and reliability in a consistent and methodical manner. These scales employed in this research paper were obtained in already published research in journals of high quality. The GHRM was gauged in terms of its four sub-dimensions practices that have 2 or 3 items under each practice. The items used by (Shah M, 2019) [51]. and it was found to be reasonably reliable with (α above 0.7) and valid (factor loadings > 0.7). This paper's wording of these dimensions will be revised to allow employees to evaluate the GHRM practices in their organization. Sample items that related to GRS is "Our company has incorporated "green aware" criteria in HR staffing policy." Other samples items regarding the other GHRM practices are "The use of green criteria to evaluate performance", and "My company rewards for learning a green curriculum". In addition, to measure the mediator construct in the study which is green psychological climate GPC, there will be 5 items created by Zafar & Suseno, (2024) [63]. This measurement was selected because its validity and reliability with (factor loadings >

0.7). and (α above.07). Sample items is "Engaging in and supporting green and sustainable initiatives is important in my organization". Moreover, to measure EWE, there are 5 items. The measurement scale is created by Na-Nan *et al*, (2020) [40]. The scale has been chosen for many reasons. Initially, this scale evaluates three aspects of EWE. Furthermore, the Cronbach's alpha is above 0.7. "I am willing to perform the assigned work" is an example item from that scale. Lastly, Zhang B *et al*. (2021) [66] have employed items to test EGB. It was determined that this scale was legitimate (factor loadings > 0.7) and reasonably trustworthy (α above 0.7). Additionally, it is encouraged for staff members to assess their green practices. "I actively participate in environmental protection related training provided by the company" is an example from this scale. Following that, the author translated the scales' items into Arabic.

Data collection and sampling

To reach the stated targets, as described by Saunders *et al*, (2009) [49] data should be collected from a representative sample of the population. The technique of sampling is non-probability and depends on the nature of the study population who are the employees in Saudi Arabia. Using this technique supports answering research questions. Type of non- probability technique has been used convenience sampling which means the sample is from Saudi employees who are working in Saudi regions, and they are nearby, available, and willing to participate in filling out the questionnaire. This approach highlights the validity and reliability of the sampling while facilitating the quick and easy collection of data from a representative sample. Because social networking platforms like LinkedIn and Whatsapp are effective at gathering data quickly, the questionnaire was dispersed at random. After data collection, statistical techniques. The sample size was determined using established guidelines (Soper, 2023) [55] A small sample size (of 170) that would yield an effect at a 0.01 significance standard was computed, being four latent constructs, 25 measurable variables, medium size of effect of 0.3, and a required statistical power of 0.8. The minimum sample size was 200 but, in this research, the final sample based on 213 participants. It has sent out the questionnaire to approximately 480 workers with a cumulative amount of about 44 percent response rate, which surpasses the 30 percent advisory set by Sekaran and Bougie (2016) [50]. In order to observe ethical standards, the participants were well informed about why the study was taking place. Regarding privacy, no unnecessary personal information was collected; only essential questions were asked. To respect participants, the questionnaire was culturally sensitive and aligned with Saudi cultural norms. Additionally, the questions were translated into Arabic to ensure clarity and accessibility. The next section will present the data, results, and analysis

Data Analysis & Results

This section presents the analysis and results of the study. The primary objective was to examine the impact of GHRM practices on workers' GB. In addition, the study explored the mediating role of GPC between GHRM practices and employee green behavior EGB, while also investigating employee work engagement EWE as a moderator between

GPC and EGB. Data analysis was conducted using Smart PLS 4 and SPSS 23. This section begins with descriptive statistics. The analysis then proceeded with the interpretation of both the measurement and structural models

Descriptive Analysis: This part offers a comprehensive summary of the data regarding the participants demographic information.

Profile of participants

Table 1: Participants' Demographic information (n = 213)

Participant' details (n=213)	Classification	Frequency	Percent
Gender	Male	91	42.7%
	Female	122	57.3%
	Total	213	100.0%
Age	Less than 25	9	4.2%
	From 25-36	111	52.1%
	From 37- 45	88	41.3%
	More than 46	5	2.3%
	Total	213	100.0%
Education Level	High school	24	11.3%
	Diploma	30	14.1%
	Bachelor	115	54.0%
	Master	34	16.0%
	Doctorate	10	4.7%
	Total	213	100.0%
Working Experience	Less than 5 years	30	14.1%
	6-10 years	40	18.8%
	11-15 years	61	28.6%
	16-20 years	27	12.7%
	More than 20 years	55	25.8%
	Total	213	100.0%

The sample of the population contains of a varied group of participants from different genders, age groups, academic background, and work experience categories. The largest representation were females 57.3%, the 25-36 age group 52.1%, bachelor's degree holders 54.0%, and persons with 11-15 years of work experience 28.6%

Measurement model

In this section, focuses on the Measurement Model, which evaluates the reliability and validity of the study's constructs. This process ensures that the observed variables accurately represent the underlying theory based concepts. By assessing key indicators such as factor loadings, reliability, and validity, we confirm that the data is consistent and precise, laying a firm foundation for the subsequent structural analysis.

To assess the model fit, a Confirmatory Factor Analysis CFA was conducted using Smart PLS. The results show a strong overall fit. Key indicators, such as CFI 0.910 and SRMR 0.061, demonstrate the model's effectiveness, while the Chi-Square/df ratio 2.843 and RMSEA 0.093 suggest a reasonable fit. Although the GFI 0.790 falls slightly below the ideal threshold of 0.9, it still indicates that the model captures much of the data's structure. Overall, the model strikes a good balance between accuracy and simplicity, providing valuable insights (Hair, 2019) [27].

Table 3: Descriptive analysis of measurement scales and (VIF) - Outer model - List

Item	Mean	Std. Deviation	Outer loading	VIF
GRS1	4.74	1.553	0.862	1.681
GRS2	4.62	1.861	0.759	1.420
GRS3	4.69	1.721	0.841	1.601
GTD1	4.80	1.682	0.934	2.526
GTD2	4.77	1.639	0.951	2.526
GPM1	4.67	1.793	0.939	3.790
GPM2	4.75	1.649	0.910	2.580
GPM3	4.13	1.873	0.867	2.518
GCM1	4.29	1.766	0.934	3.698
GCM2	4.38	1.833	0.952	4.937
GCM3	4.33	1.880	0.952	4.939
GPC1	4.79	1.658	0.891	3.499
GPC2	5.00	1.402	0.927	4.520
GPC3	5.08	1.464	0.916	4.526
GPC4	5.15	1.514	0.915	4.480
GPC5	4.95	1.704	0.773	1.949
EGB1	4.94	1.605	0.884	2.530
EGB2	5.14	1.414	0.882	2.484
EGB3	5.29	1.423	0.883	2.690
EGB4	4.97	1.546	0.792	1.799
EWE1	6.08	1.052	0.892	4.698
EWE2	5.97	1.116	0.891	4.751
EWE3	6.30	0.968	0.881	3.784
EWE4	6.40	0.934	0.868	5.660
EWE5	6.40	0.914	0.879	5.844

The table above present the mean, standard deviation, outer loading values, and VIF. The results demonstrate a well-constructed measurement model with strong reliability and validity. Outer loadings, that range from 0.759 to 0.952, indicate that the items effectively measure their respective constructs, surpassing the 0.70 threshold. Mean scores, ranging from 4.13 to 6.40, show generally high ratings, with items like EWE4 and EWE5 scoring the highest. Standard deviations suggest moderate variability, indicating responses are clustered around high means. VIF values, ranging from 1.420 to 5.844, confirm minimal multicollinearity, ensuring model stability. Overall, the model provides reliable and valuable insights (Hair *et al*, 2021) [28].

Table 4: Construct validity and reliability overview

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
EGB	0.883	0.893	0.920	0.741
EWE	0.930	0.949	0.946	0.778
GCM	0.941	0.941	0.962	0.895
GPC	0.931	0.935	0.948	0.785
GPM	0.891	0.911	0.932	0.820
GRS	0.761	0.776	0.862	0.676
GTD	0.875	0.888	0.941	0.888

The table above summarizes the reliability and validity indicators for the variables analyzed in the research. These metrics evaluate the internal consistency, reliability, and convergent validity of the constructs. All constructs demonstrate acceptable reliability and validity. GCM, GPC, and GTD show the highest reliability and validity, with strong internal consistency (Cronbach's alpha > 0.9), high composite reliability (rho_c > 0.94), and excellent convergent validity (AVE > 0.78). EGB, EWE, and GPM

also exhibit strong metrics, meeting all thresholds. GRS has the lowest scores (Cronbach's alpha = 0.761, rho_c = 0.862, AVE = 0.676) but still meets acceptable levels, though it may benefit from refinement to enhance its cohesion and reliability (Hair *et al*, 2021) [28].

Table 5: Fornell larcker criterion & Discriminant validity Heterotrait-monotrait ratio (HTMT)

Construc	EGB	EWE	GCM	GPC	GPM	GRS	GTD
EGB	0.861	0.413 h	0.720 h	0.811 h	0.773 h	0.718 h	0.731 h
EWE	0.388	0.882	0.167 h	0.367 h	0.264 h	0.166 h	0.174 h
GCM	0.659	0.165	0.946	0.810 h	0.933 h	0.788 h	0.895 h
GPC	0.740	0.353	0.758	0.886	0.846 h	0.731 h	0.832 h
GPM	0.693	0.260	0.852	0.784	0.906	0.88 h	0.944 h
GRS	0.599	0.149	0.677	0.617	0.689	0.822	0.912 h
GTD	0.647	0.171	0.814	0.755	0.840	0.754	0.942

The table above describe Fornell-Larcker criterion and Heterotrait-Monotrait Ratio (HTMT) which are methods to measure discriminant validity to ensuring that different constructs in a model are distinct.

- **Fornell-Larcker Criterion:** Square root of AVE in all instances has been greater than the correlations of the latent variables. The diagonal values (square roots of AVE) are greater than the off-diagonal correlations, suggesting good discriminant validity for the constructs in the table (Fornell & Larcker, 1981) [23].
- **HTMT:** values in the table generally indicate good discriminant validity for most constructs, as most figures are below the recommended threshold of 0.85 or 0.90. This suggests that the constructs are distinct and not overly correlated. While some values (e.g., GCM-GPM at 0.933) are slightly higher, they still remain within acceptable limits, indicating that the constructs are related but not redundant. Overall, the HTMT analysis enforces the constructs in the model measure unique concepts, ensuring strong discriminant validity (Franke and Sarstedt, 2019; Rasoolimanesh, 2022) [24, 45].

Structural model

The tables below display the result of the structural model analysis conducted in this research. Following the guidelines of Hair *et al*. (2019) [27], a bootstrapping procedure with 10, 000 iterations was used to produce the reported results. Therefore, the subsequent table provides a detailed summary of these structural model findings.

Tabe 6: R-Square Analysis Report

Construct	R-square	R-square adjusted
EGB	0.566	0.560
GPC	0.660	0.653

The table above presents the R-square and adjusted R-square values for the dependent variables analyzed in the study. These metrics point towards the percent of variance in each dependent variable explained by the independent variables in the model. the GPC model explains 66.0% of the variance (R-squared = 0.660), outperforming the EGB model, which explains 56.6% (R-squared = 0.566). Both models have similar adjusted R-squared values (0.653 for GPC and 0.560 for EGB), indicating they are well-specified with minimal overfitting. The GPC model demonstrates stronger explanatory power and better predictive potential

(Henseler *et al*, 2009) [29].

Table 7: Collinearity Statistics (VIF)- Inner model- List and Pathe coefficients

Path	Path coefficients	P values	VIF	Results
EWE -> EGB	0.161	0.003	1.729	Supported
GCM -> GPC	0.236	0.021	4.187	Supported
GPC -> EGB	0.686	0.000	1.154	Supported
GPM -> GPC	0.367	0.000	4.789	Supported
GRS -> GPC	0.029	0.670	2.396	Not supported
GTD -> GPC	0.232	0.007	4.580	Supported
EWE x GPC -> EGB	0.017	0.708	1.540	Not supported

Therefore, the analysis showed that several key factors positively influenced EGB. Employee work engagement EWE, Green compensation management GCM, Green psychological climate GPC, GPM, and green development and training GTD all had effects on EGB or GPC, with p-values below 0.05, indicating statistical significance.

Specifically, GPC was found to strongly influence EGB, with a very low p-value (0.000), confirming its strong impact. The Variance Inflation Factors VIF values for these paths were within acceptable limits, suggesting no issues with multicollinearity. However, the green recruitment and selection GRS did not significantly impact GPC (p-value = 0.670), and the interaction between EWE and GPC did not significantly affect EGB (p-value = 0.708). Overall, the results support the favorable impact of GHRM practices on fostering GB in employees, with most relationships showing strong statistical support (Hair *et al*, 2019)[27].

The table below presents the total indirect role connecting the subdimensions of GHRM and EGB. It shows that significant indirect effects: GCM → EGB, GPM → EGB, GTD → EGB, all with p-values below 0.05. Non-significant indirect effect: GRS → EGB, with a p-value of 0. 671.These results suggest that GHRM practices such as GCM, performance management, and training indirectly influence employee green behavior, likely through the mediator GPC, while GRS do not show a significant indirect effect.

Table 8: Total indirect

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
GCM -> EGB	0.162	0.161	0.071	2.280	0.023
GPM -> EGB	0.252	0.251	0.066	3.814	0.000
GRS -> EGB	0.020	0.026	0.047	0.425	0.671
GTD -> EGB	0.159	0.154	0.060	2.653	0.008

The next section is a discussion section interpreting the research findings in relative to the paper's objectives and existing literature. It highlights the significance of Green Human Resource Management (GHRM) practices in promoting employee green behavior.

Discussion
An increase in GPC was positively correlated to the GHRM practices such GTD, GPM, and GCM. Nonetheless, GRS was not related to GPC. This is why that was the only one that was rejected from the hypothesis H1a which stated that the relationship between GRS and GPC would not be found; H1b, H1c, and H1d are supported. This finding agrees with the result of the research curried out by Uslu *et al*, (2023) [56]. The positive interrelation between GHRM practices demonstrated in (GTD, GPM, and GCM) and GPC is also on the line with the finding found by (Li W *et al*, 2023; Naz *et al*, 2023; Sabokro *et al*, 2021) [35, 41, 46]. On the other hand, they do not ride laurels with the results of this research on the correlation between GRS and GPC.

In this respect, the unsubstantiated correlation between the GRS practices used by businesses and the green psychological environment can be explained by the fact that the effective green management principles are instrumental in developing the former among the members of the organization. Recruitment and selection are the only HRM practice that functions before a candidate becomes an employee within the organization. Study by Siddique, (2024) [53] supported this context by reporting that green involvement, financial gains and rewards, and training positively influence green environmental performance, highlighting the impact of these practices in promoting sustainability within the pharmaceutical sector. However, there was no discernible benefit to the greenness of the hiring and selection process.

The outcomes of the study indicated positive correlation between GPC and EGB. refers to employees' collective view that the organization's environmental policies and practices support sustainability and promote green values (Khan *et al*, 2019) [33]. According to Parker *et al*., (2003) [42]. this view is substantially influencing employee behavior. This signifies that the extent to which a worker perceives workplace support sustainability the employee green behavior will be affected. The psychological climate is built when employees can interact with their social environment in the organization and give their perception to rules and practices of the organization and that leads to positive impact on behavior by employees towards environment. Moreover, the acceptance of H2 is proved with studies by (Sabokro *et al*, 2021; Uslu *et al*, 2023) [46, 56].

In that regard, the interrelation between GHRM and green behavior among the employees was permeated by the influence of the Green Psychological Climate (GPC). Results depicted statistically that GPC is a complementary mediator in the mediated effects of the dimensions, GTD, GPM and GCM of the GHRM practices. The strong interconnection of the GPC as the measure of mediation is compatible with the study of (Li et M al, 2023; W. Li *et al*, 2023; Naz *et al*, 2023; Sabokro *et al*, 2021) [34, 35, 41, 46]. Nonetheless, they do not match the finding concerning the GRS. Hence. H3a is rejected and H3b, Hb3c and Hb3d are accepted.

These findings prove employee work engagement (EWE) serves as a moderating variable connecting the GPC and EGB. The findings show that this moderating influence is not statistically meaningful, implying that EWE does not make much influence on GPC-GB relationship among employees. Thus, H4 has been rejected. This is the distinctive feature of this study because not many studies have found this relationship between these variables. The rejection of this hypothesis is on the line with the result found by Heriyati & Seiichi Ramadhan (2012) [30] which

indicate that EWE had unsignificant relations to the connection between employee satisfaction and employee work output as well as retention. Thus, the implications and limitations of the study will be discussed.

Contribution & Limitations and Conclusion
Theoretical contribution

As the conceptual framework of the research contributes to the literature in various ways. First, expanding the understanding of GHR practices role on the GPC, which in its turn influences the EGB. The framework emphasizes on GHRM's ability to boost employee productivity and organizational success through EGB. Second. According to the discussed model, the link between GHRM practices and the green behavior of an employee use the construction of GPC as a mediator. However, the empirical findings indicate the support for the conditional indirect effect over GCM, GPM, and GTD, but not through GRS.Thus, the GPC mediates this association was not generally supported for all GHR practices. Moreover, the hypothesis concerning the moderated role of employee work engagement EWE was rejected. The discovery sharpens current theory and leaves one implying that further research should be done to examine potential alternative moderators or contextual issues that might be able to explain this dynamic further. In order to promote green practices inside businesses, this idea is predicated on the significance of fostering GHRM behavior and improving GPE. By understanding how GHRM practices impact green behavior, how GPC mediates it firms may better align their practices with sustainability viewpoints. It presents a tangible framework between GHRM practices and GPC. It can help by determining the factors that enhance rate of green behaviors that are essential towards sustainability of resources.

Practical contribution

Green practices become as essential in each organization because the sustainability is social responsivity. Therefore, GHRM practices, GPC, employee green behavior, and employees work engagement must be consider in the organizations to save the resources, enhance employee's productivity, achieve organization success by obtaining the goal of sustainability. Hence, HRM department should prioritize green practices by promoting sustainability awareness, assessing employees' environmental training needs, and setting clear green targets. It should establish evaluation criteria that reward employees for participating in green learning programs and demonstrating eco-friendly behavior. Additionally, the department should encourage innovative ideas related to environmental practices and foster a supportive organizational culture focused on sustainability. Effective communication of green goals and recognition of green achievements will further enhance employee engagement and commitment to sustainability. GHRM should implement all of these practices to create a sustainable, green organization.

Conclusion and future study

Environmental damage is increasing, and commercial groups may play a significant part in addressing this global issue. Human resource management that is environmentally friendly by encouraging more amiable conduct among employees, GHRM may raise environmental awareness and responsibility for workers both at work and in their personal life. The investigation revealed that GTD, GPM and GCM have a positive effect on the GPC leading to highly significant influence on EGB. GPC is a competent mediator between these two GHRM practices and EGB. Also, the GPC to EGB relationship is not moderated by EWE. In general, the research demonstrates the effectiveness of GHRM strategies to foster sustainable employee behavior in organizations. Like any study, this research has some limitations with the first being the reliance on self-reported data, which can present bias or inaccuracies. Participants may have provided responses they believed were socially acceptable or struggled to accurately remember their behaviors and attitudes. Therefore, we recommend that future research use other methods for data collection like observation methods. Second limitation is the time horizon of the study is cross- section. Thus, future studies may adopt a longitudinal approach to gauge changes in environmental behavior over time, allowing for a clearer understanding of how these behaviors improve progressively. In addition, this research was conducted in Saudi Arabia, making it difficult to generalize the findings in other countries.

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