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Green Human Resource Management and Environmental Performance: The Mediating Role of Employee Commitment and the Contingent Effect of Organizational Culture

Usman Abdullahi[1,2*], Khadeem Ali Dhahi Al-Amrani[3], Ahmad Martadha Mohamed[2], Mohamad Sukeri Khalid[2], Hassan Dauda Yahaya[4]

[1]Nigeria Police Academy, Wudil, P.M.B. 3474, Kano State; uabdullahi171@gmail.com (U.A.).
[2]School of Government, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah Darul Aman, Malaysia.
[3]Faculty of Business, Sohar University, Sultanate of Oman.
[4]Mai Idris Alooma Polytechnic Geidam, Damaturu, Yobe State, Nigeria.

Abstract. Organizations are increasingly implementing Green Human Resource Management (GHRM) practices to enhance Environmental Performance (ENVP) in response to growing sustainability demands. However, the pathways through which GHRM impacts ENVP, particularly the mediating role of Employee Commitment (EMPC) and the moderating effect of Organizational Culture (ORGC), remain insufficiently explored. This study employs a quantitative approach, collecting data from 348 valid responses through convenience sampling in Oman's service sector. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze direct, mediating, and moderating effects within the proposed framework. The results reveal that GHRM practices positively impact ENVP both directly and indirectly through EMPC. Employees' commitment mediates this relationship by converting organizational sustainability strategies into tangible outcomes such as resource conservation and waste reduction. Additionally, ORGC moderates the GHRM-ENVP relationship, with supportive cultures amplifying the impact of GHRM practices on sustainability goals. This study underscores the strategic importance of integrating GHRM practices with a supportive culture to achieve superior environmental outcomes. By bridging theoretical gaps, it provides insights for policymakers and leaders to embed EMPC and ORGC into sustainability frameworks, aligning organizational practices with global environmental objectives.

Keywords: Employee commitment, Environmental performance, Green human resource management, Oman, Organizational culture, Sustainability,

1. INTRODUCTION

Environmental and sustainable development concerns have become increasingly significant, particularly in advanced nations (Aboramadan, 2022). Since the Industrial Revolution, these concerns have increased because of rising ecological degradation, habitat loss, and severe pollution (Akhtar et al., 2020). Governments and NGOs worldwide are now promoting regulations aimed at mitigating the negative impacts of industrial activities on natural resources and society (Cao et al., 2021). There is growing recognition that businesses must balance economic goals with ecological well-being through sustainable actions. Given the harmful effects of industrial production on the environment, many businesses have adopted laws and guidelines to curb resource depletion and lessen the societal impact of business activities (Chaudhary, 2020; Dumont et al., 2017). In the realm of green management, green human resource management (GHRM) has emerged as a specialized branch of HRM, focusing on the effective implementation of green initiatives within organizations (Sethi et al., 2023). In the middle of global climate change pressures, GHRM practices are evolving rapidly, with many countries beginning to integrate these practices to improve organizational environmental performance. This paper presents a robust framework and model to explore recent trends in GHRM, fostering a green organizational culture that enhances both environmental performance (ENVP) and employee commitment to environmental sustainability. Such a framework is a valuable resource for futurists and foresight practitioners tasked with navigating the complexities of the 21st-century. GHRM encapsulates an organization's commitment to environmental responsibility and spans a range of HRM activities, including eco-friendly approaches in recruitment, selection, training, performance appraisal, compensation, and rewards (Dingra & Padmavathy, 2019). These practices emphasize the fragility of ecosystems and consider the ecological impact of corporate economic activities (Bag & Pretorius, 2022; Hooi, 2020; Lasrado & Zakaria, 2020).

Conversely, environmental performance (ENVP) refers to how effectively an organization manages its impact on the environment, which may include outcomes such as reduced hazardous effluents, emissions, greenhouse gases, solid waste, and fewer environmental crises, depending on the industry (Aktar et al., 2024). Previous studies suggest that such efforts can enhance firm performance by reducing costs. Environmentally friendly practices also offer financial savings by minimizing waste and energy consumption, making them appealing to environmentally conscious clients (Kim et al., 2019), as well as improving return on equity and return on assets. Interestingly, the financial impact of ENVP is more pronounced in industries that are relatively dirty and less proactive, compared to cleaner, more proactive sectors. Financial gains can be achieved by enhancing revenue through product quality improvements, broader market access, and stronger corporate brand image, while cost reductions can be realized through decreased resource waste and fewer environmental incidents. In addition, ENVP may lead to increased customer satisfaction and loyalty, resulting in financial benefits. Research has also demonstrated that ENVP contributes to cost competitiveness and offers a competitive advantage through differentiation. Furthermore, ENVP can be strengthened by adhering to ISO-14001 standards, an environmental management system that emphasizes close coordination. Despite its significance, this relationship remains

* Correspondence: uabdullahi171@gmail.com

underexplored in the literature. This study aims to fill this gap by examining the impact of GHRM practices on ENVP (Ahmad et al., 2023). Ansari et al. (2021) defined ENVP as a commitment to environmental protection and a proactive approach to caring for the environment. GHRM practices contribute to an eco-friendlier environment by enhancing operational efficiencies and fostering employee commitment to environmental initiatives. These practices help cultivate environmentally conscious employees, or "green employees," who actively support ENVP goals (Jhamb et al., 2022; Shafaei et al., 2020).

Another key construct integrated into this study alongside GHRM is employee commitment (EMPC), a vital factor in defining ENVP. While evidence exists linking GHRM practices to EMPC across various regions, recent literature highlights conceptual gaps in fully understanding this relationship. GHRM practices contribute to building or enhancing EMPC, where employees perceive that their organization is genuinely dedicated to environmental protection throughout its operations. As a result, employees actively contribute to the organization's green initiatives through their commitment and engagement. EMPC can be defined as the desire to remain a part of an organization, the willingness to exert substantial effort on its behalf, and the alignment with the organization's values and goals. EMPC is crucial due to its direct influence on outcomes like ENVP. A strong level of EMPC allows employees to see an alignment between their work and personal values, which deepens their connection to their roles and to the organization. Both scholars and organizational leaders are increasingly interested in understanding the impact of EMPC on ENVP. Organizations are often driven by the goal of maximizing profits, which leads them to carefully assess the costs and benefits of investing in environmental initiatives. GHRM practices involve the implementation of HRM strategies that promote resource conservation and environmental responsibility, with the aim of enhancing employee morale and satisfaction. In today's context, employees tend to be more committed and content with organizations that actively promote green initiatives. However, there is limited literature on the effects of EMPC on ENVP. Moreover, EMPC serves as a mediating force, ensuring that GHRM practices translate into tangible environmental outcomes by fostering sustainable behaviors at all organizational levels (Sarfo et al., 2024).

In the context of transforming employee commitment into environmental performance, several scholars suggested that organizational culture (ORGC) plays a crucial role. Research indicates a significant positive association between ORGC and ENVP, implying that organizations that cultivate a culture of environmental awareness are more likely to leverage the full potential of GHRM, driving higher environmental performance, and contributing to national sustainability goals (Kuo et al., 2022a). Studies have emphasized that adopting eco-friendly practices throughout an organization cultivates an ORGC by shaping employee behavior. ORGC, defined by its guiding values and principles, includes sustainable organizational practices (Afum et al., 2020). This culture develops as employees incorporate sustainability into their daily routines, focusing more on sustainability than profit and working to minimize the organization's environmental impact. This study addresses this gap by examining how GHRM practices influence ENVP mediated by employee commitment and the contingent role of organizational culture. Understanding these relationships is essential for organizations aiming to achieve sustainability goals while navigating economic and cultural complexities (Fawehinmi et al., 2020).

In addition, in Oman, the government has begun promoting the use of green products among both organizations and citizens. Oman places significant importance on environmental sustainability, as demonstrated by its national strategies, such as Oman Vision 2040, and its commitment to achieving Net Zero by 2050. The Vision 2040 strategy emphasizes the creation of effective, balanced, and resilient ecosystems, with the protection of natural resources as a national priority (Salem et al., 2023). Oman has also launched an ambitious green hydrogen strategy and established the Oman Sustainability Centre to oversee the transition toward a green economy, contributing to economic diversification and global decarbonization efforts. However, in operations and environmental management, Oman has received comparatively little attention (Aldaas et al., 2022; Imran et al., 2023). While previous studies have largely focused on GHRM within Western or Asian contexts (Muisyo & Qin, 2021), this study offers new insights into the contingent role of organizational culture in shaping the effectiveness of GHRM practices. It emphasizes how organizational environments can either support or hinder the attainment of environmental goals (Al-Swidi et al., 2021). Additionally, the study advances the field by exploring the mediating role of employee commitment, shedding light on the psychological mechanisms through which GHRM practices lead to improved ENVP (Gyensare et al., 2024). Although many organizations are adopting GHRM practices, their success often hinges on a culture that prioritizes sustainability and a workforce committed to achieving environmental goals (S. Khan et al., 2024). Without these conditions, GHRM initiatives may fail to deliver substantial improvements in ENVP, potentially undermining broader sustainability efforts (S. Khan et al., 2024). This research significantly contributes to management literature by enhancing the understanding of the role of GHRM in improving ENVP. The findings provide actionable insights for organizations seeking to enhance their environmental outcomes through GHRM practices (Sarfo et al., 2024). This research was driven by the need to understand the contingent effect of ORGC and the mediating role of EMPC in the relationship between GHRM and ENVP. By examining these factors, this study contributes to both academic literature and practical implementation of sustainability initiatives (Ahmad et al., 2023). The findings will be relevant for businesses and policymakers as they work to align corporate practices with national and global sustainability objectives (Al-Swidi et al., 2021). Thus, the following goals of the study were set to be accomplished:

1. To look into how GHRM practices affect environmental performance.
2. To investigate how employee commitment functions as a mediator in the connection between environmental performance and GHRM practices.

3. To ascertain how company culture influences the connection between environmental performance and GHRM activities.

The conceptual framework and study assumptions are covered in the following parts, which are then followed by the methodology, findings, discussion, implications, limits, and recommendations for additional research.

2. LITERATURE REVIEW

2.1. Underpinning Theory

This study adopted the resource-based view (RBV) theory as its theoretical framework for hypothesis development. The RBV theory posits that a firm's human resources can be a key source of a sustainable competitive advantage (Gerhart & Feng, 2021). GHRM is a specialized HR domain that focuses on environmental considerations and influences organizational performance. According to RBV, organizations achieve competitive advantage by leveraging various resources, including tangible (physical assets), intangible (brand reputation, trademarks), and heterogeneous resources (unique skills and capabilities) (Barney, 2015). This theory is widely referenced in strategic human resource management (SHRM) literature, especially in the context of theoretical development and empirical studies (Priem et al., 2013). Proponents argue that competitive advantage lies within the organization, particularly in employees' skills and abilities. RBV is also used to explain how GHRM practices impact economic, ecological, and societal performance (Yong et al., 2019). According to RBV, GHRM practices can enhance employees' skills, motivation, and opportunities (through training, development, and support), which in turn can improve employee commitment to the organization. This increased commitment can then positively influence environmental performance, because committed employees are more likely to engage in and support environmental initiatives. Thus, RBV supports the idea of employee commitment as a mediator in the GHRM-ENVP relationship. Accordingly, ORGC plays a crucial role in shaping how GHRM practices are perceived and enacted within an organization (Shah et al., 2021). A culture that strongly supports environmental sustainability and values green practices can amplify the effects of GHRM on employee commitment and environmental performance. For instance, a culture that prioritizes sustainability can enhance employees alignment with GHRM practices, thereby strengthening their commitment and developing ENVP (Ahmad et al., 2023; Hooi et al., 2022). Conversely, a less supportive culture might weaken these effects. Therefore, organizational culture can serve as a moderator in the GHRM-ENVP relationship by influencing the strength and direction of the effects of GHRM on employee commitment and environmental performance.

2.2. Hypothesis Development

2.2.1. GHRM Practices and Environmental Performance

GHRM aims to encourage environmentally responsible behaviors among employees by adopting policies, practices, and systems that promote a sustainable, efficient, and socially responsible workplace (Sethi et al., 2023). In GHRM recruitment, the emphasis is on environmental protection, with organizations communicating their environmental commitments to prospective employees (Arulrajah et al., 2016). Rana & Arya (2024) highlighted that, particularly in India, there is increasing pressure to engage in eco-friendly activities such as recycling, energy conservation, and reducing carbon emissions, all of which contribute to environmental sustainability. Organizational culture plays a vital role in reinforcing GHRM practices. Roscoe et al. (2019) found a significant correlation between Green Human Resource Management (GHRM), green organizational culture, and environmental performance (ENVP) in Chinese manufacturing firms. A study suggested that GHRM embodies a company's green culture and conveys its environmental values (Mousa & Othman, 2020). One pivotal way that HRM can contribute to ENVP is through environmental training programs that align HR practices with sustainability objectives (Jhamb et al., 2022). In Brazil, Teixeira et al. (2012) investigated the relationship between green management and environmental training, finding that these elements evolve together within organizations. GHRM is accountable for advancing structures that support green activities and for training employees with the information and skills essential to enhance ENVP (Mehta & Chugan, 2015). Additionally, GHRM advocates incorporating environmental targets into performance reviews and incorporating green standards in employee assessments (Kapil, 2015). Sharma et al. (2022) established a connection between green HR practices and environmental sustainability. Although this area of research is still developing, additional investigations are necessary to ensure environmental sustainability while also considering performance aspects. Numerous organizations and sustainability-oriented agencies are increasingly implementing GHRM to enhance employees' long-term performance through collaborative efforts in environmental protection, thereby contributing to both environmental and organizational survivability (Habeeb et al., 2021; K. Sharma et al., 2023; Verma et al., 2023). GHRM also contributes to corporate sustainability by incorporating environmental policies into organizational strategy, with a focus on safety, process efficiency, and initiatives for enhancing green quality (Gill et al., 2021). Executives should consistently offer feedback to employees about their contributions to accomplishing environmental objectives, as this can enhance their knowledge, skills, and abilities. GHRM includes various HRM practices aimed at cultivating ecologically aware employees devoted to ENVP. Thus, GHRM is a collection of activities intended to promote resource sustainability, enhance ENVP, and raise employee consciousness and commitment to environmental matters.

Research has consistently reported that GHRM enhances ENV; however, the mechanisms through which GHRM activities foster organizational culture or influence ENVP remain underexplored. Previous research has demonstrated that pro-environmental HRM practices, such as recruitment, training, performance appraisals, and

incentives, are vital in establishing enablers of a green ORGC. For example, training and worker participation enhance EMPC and foster organization citizenship behavior, which significantly improves environmental performance in hotels (Anwar et al., 2020; Pham et al., 2020; Roscoe et al., 2019a). Additionally, Rizvi & Garg (2021) argued that businesses that emphasize GHRM are more likely to achieve positive outcomes. For instance, in Indian manufacturing industries, a sustainable culture has been shown to support GHRM strategies for enhancing workers' ENVP, with an environmental sustainability culture serving as a mediator. Conversely, some organizations are hesitant to include personnel in green actions, which can negatively affect ENVP (Y. Zhang et al., 2019). A significant correlation has also been identified between worker green's performance and process innovation (Xie et al., 2022). Ecological preservation generally has a positive effect on employee behavior, promoting teamwork, and creating a sense of obligation to society (Masri & Jaaron, 2017). Some researchers advocated increased awareness of GHRM to further viable organizational development, pointing out that certain large corporations have begun to integrate these practices through CSR initiatives. Approaches based on incentives and recognition related to environmental performance have also been shown to positively influence employee's willingness to participate in green projects (Kuo et al., 2022b). However, firms that overlook green initiatives tend to demonstrate lower environmental performance (ENVP). As a result, many companies now emphasize encouraging employee behavior toward environmental conservation (Masri & Jaaron, 2017). In recent years, research has increasingly concentrated on green leadership and GHRM practices, highlighting the relationship between GHRM and improved ENVP. Hameed et al. (2020) showed that individual green values can positively influence green employee behavior and citizenship behavior. Despite the increasing traction of the connection between GHRM and ENVP, limited research has directly investigated this relationship. Therefore, this paper explores how GHRM impacts ENVP through employee commitment and how organizational culture moderates this relationship. Thus, the following hypothesis is proposed:

H_1. GHRM practices have a significant positive relationship with ENVP.

2.2.2. GHRM Practices and Employee Commitment

Employee commitment (EMPC) reflects an employee's trust in an organization's environmental values, and GHRM plays a crucial role in fostering this commitment (Shoaib et al., 2021). Accordingly, employees reciprocate organizational support and GHRM practices, such as green production technologies, environmental training, and eco-friendly work environments, which encourage employees to integrate green elements into their work (Jyoti, 2019). This type of support strengthens their organizational commitment to green innovation and goals (Shoaib et al., 2021). Compensation structures linked to green performance and incentives for green innovation further enhance this commitment by aligning organizational goals with employees' values (D. Singh & Pandey, 2020). GHRM practices should be implemented with employees' organizational commitment in mind. It is important for both the organization and its employees to share similar environmental values, ensuring that employees are fully committed to their eco-oriented responsibilities. This commitment is reflected in their work processes, where they demonstrate dedication, loyalty, and professionalism focused on environmental values (Shahriari et al., 2023). Research has revealed that GHRM practices positively influence employees' organizational commitment (Rubel et al., 2021). This commitment emerges from employees' active participation in eco-friendly activities that help fulfill their social and psychological needs and sustain the environment. Several studies have confirmed the positive relationship between GHRM and organizational commitment, indicating that GHRM can foster employee dedication to environmentally oriented work processes. Because of GHRM practices, employees are more likely to successfully implement green initiatives (Ly, 2023). Furthermore, commitment derived from GHRM is associated with higher competencies, reduced operating costs, and enhanced employee engagement. Organizational commitment can be seen as a professional bond between employees and the organization, which requires incentives and motivation to achieve sustainable HR goals. It can be measured through employee identification, engagement, and loyalty to the company (Azmy, 2024). Employees who feel their environmental contributions are valued are more likely to engage in eco-friendly initiatives, which not only satisfy their social and psychological needs but also improve organizational performance (Ly, 2023; Shoaib et al., 2021). As a result, GHRM strategies not only promote environmental sustainability but also foster deeper organizational commitment by engaging employees in meaningful green activities that align with both their personal and organizational values (Ly, 2023). Thus, this study postulates the following:

H_2. GHRM practices have a significant positive influence on employee commitment.

2.2.3. Employee Commitment and Environmental Performance

One important factor influencing environmental performance in the context of GHRM is employee commitment. A large body of research supports this link by emphasizing the contribution dedicated workers make to firms' sustainability efforts. Employees are more likely to participate in pro-environmental activities including waste reduction, resource efficiency promotion, and organizational sustainability goals when they are dedicated to environmental goals (Ahmad et al., 2023; Paillé & Valéau, 2021; Saeed et al., 2018). These behaviors collectively contribute to superior environmental performance. GHRM practices, particularly those focusing on green training and development, are instrumental in fostering employee commitment to environmental initiatives. Green training enhances employees' awareness and responsibility towards environmental stewardship, instilling a sense of obligation to adopt eco-friendly practices (Paillé & Valéau, 2021). Consequently, organizations that implement effective GHRM practices cultivate a workforce that is environmentally conscious

and motivated to contribute to sustainability objectives, leading to improved environmental performance (Liu & Wu, 2022; Song et al., 2020). Additionally, a strong green culture within organizations reinforces the link between employee commitment and environmental performance. Such a culture aligns employees' personal values with organizational environmental goals, fostering deeper commitment to sustainability efforts. This alignment not only ensures compliance with green initiatives but also encourages proactive engagement in sustainability practices, driving superior environmental performance (Alfian Nugroho & Tiarapuspa, 2023; Asim Mubashir et al., 2022). The evidence suggests a clear pathway: GHRM practices foster employee commitment, which enhances pro-environmental behaviors, ultimately improving environmental performance. Thus, the following hypothesis is proposed:

H_3. Employee commitment has a significant positive influence on environmental performance.

2.2.4. Mediating Role of Employee Commitment

In the current discourse, GHRM aimed at promoting environmentally sustainable behaviors among employees, ultimately enhancing organizational environmental performance. Employee commitment plays a central role in this relationship by reflecting employees' psychological attachment and dedication to their organization's environmental objectives. GHRM practices are strategically designed to create an environmentally conscious and proactive workforce. Practices like green training programs not only raise awareness but also encourage employees to internalize and commit to sustainable practices. This heightened commitment fosters eco-friendly behaviors, such as resource conservation and waste reduction, that are essential for meeting organizational sustainability goals (Iqbal et al., 2023; Pervaiz et al., 2022; Susanto et al., 2023). Employee commitment is crucial in translating organizational GHRM initiatives into meaningful environmental outcomes, acting as a bridge between policy and practice (Ansari et al., 2021; Mohammad Ashraful et al., 2021).

The relationship between GHRM practices and environmental performance is significantly shaped by the degree of employee commitment. Committed employees are more likely to actively participate in sustainability initiatives and advocate for green practices within and beyond their organizations. These behaviors amplify the impact of GHRM practices, creating a collective organizational culture that prioritizes environmental sustainability (Hameed et al., 2020a; Jnaneswar, 2023). This dynamic is reinforced by the principles of social exchange theory, which suggest that employees reciprocate positive organizational actions, such as GHRM efforts, by demonstrating increased commitment and engaging in pro-environmental behaviors (Aykan, 2017; Hussain et al., 2019). Empirical evidence supports this interplay, showing that organizations that emphasize GHRM practices are more successful in fostering a culture of environmental responsibility. Such a culture not only strengthens employee commitment but also enhances environmental performance, as committed employees align their actions with organizational sustainability goals (Zhou et al., 2023). By implementing GHRM practices that value employee contributions to environmental initiatives, organizations can motivate employees to go beyond compliance, engaging in behaviors that yield superior environmental outcomes (Elziny, 2019; Mohammad Ashraful et al., 2021). Based on the theoretical and empirical insights, the following hypothesis is formulated:

H4. Employee commitment mediates the positive and significant relationship between GHRM practices and environmental performance.

2.2.5. Moderating role of Organizational Culture (ORGC)

The integration of GHRM practices has been widely recognized as a pivotal factor in enhancing environmental performance within organizations (Aggarwal & Agarwala, 2023; Carolina et al., 2022; Yong et al., 2019). GHRM practices have been demonstrated to positively influence environmental performance by fostering eco-friendly behaviors among employees. However, the successful implementation of GHRM practices is contingent upon the presence of a supportive organizational culture ORGC. A growing body of research suggests that ORGC plays a critical role in shaping the interpretation and execution of GHRM practices within the workplace (Aggarwal & Agarwala, 2023; Zhao et al., 2021). For instance, a culture that prioritizes environmental sustainability can amplify the benefits of GHRM practices by fostering greater employee commitment and involvement in environmental initiatives. Furthermore, empirical studies have highlighted the importance of ORGC in moderating the relationship between GHRM practices and environmental performance. Research has shown that a proactive organizational culture can enhance employees' awareness of competencies and green behaviors, thereby advancing sustainable development efforts (Setyadi et al., 2023). Additionally, green transformational leadership, a cultural dimension, has been found to moderate the relationship between GHRM practices and green creativity, underscoring the significance of culture in ensuring the success of GHRM initiatives (Hameed et al., 2022).

ORGC is relatively new in the field of HR (Al-Swidi et al., 2021), and recent studies have focused on refining its definition from the broader concept of organizational culture (Afum et al., 2020). The adoption of GHRM practices increases employee environmental awareness, thereby shaping their beliefs and values to cultivate a green culture within the organization (Roscoe et al., 2019b). This green culture can transform employee behavior and encourage the implementation of sustainable practices. When all members actively participate in green initiatives, the organization fosters a green culture that drives the success of GHRM (Rizvi & Garg, 2021). Environmentally friendly values within ORGC can enhance organizational capabilities and help translate strategies into sustainable outcomes. ORGC serves as a strategic tool for achieving not only financial performance but also ENVP goals. Moreover, HRM practices are crucial for shaping ORGC, as they focus on

employee transformation and encourage the sharing of ideas that contribute to environmental objectives. A green culture is essential for improving ENVP (Nazarian et al., 2017), and studies have suggested that green culture enables firms to enhance their competitive advantage and green performance (Muisyo & Qin, 2021). Afum et al. (2020) further examined the mediating role of green organizational culture in the relationship between green manufacturing practices and ENVP.

Although, the critical role of ORGC in supporting GHRM is well-established, the literature still lacks clarity on how ORGC can moderate the relationship between GHRM practices and environmental performance. A culture that strongly promotes environmental sustainability can strengthen the impact of GHRM by increasing employee commitment and aligning organizational goals with sustainable practices. Conversely, in the absence of a supportive culture, the positive effects of GHRM may be diminished. Therefore, this study highlights the need to explore ORGC as a moderator because it may significantly influence the success of GHRM practices in enhancing environmental performance. Thus, this study proposes that:

H_5. ORGC moderates the positive relationship between GHRM practices and environmental performance, strengthening the relationship when ORGC is high and weakening it when low.

3. METHODOLOGY

3.1. Participants and Procedures

The service sector is crucial to all economies, particularly in emerging markets (Betti et al., 2018), making it a focal point for researchers aiming to validate their frameworks. Examples include studies on sustainability in academia (Anwar et al., 2020), promoting sustainability within the hospitality industry (Umrani et al., 2020), fostering green communities that encourage sustainability, enhancing sustainability in healthcare (Aldaas et al., 2022), and supporting sustainable performance (Umrani et al., 2020). This study focuses on employees in Oman's service sector, a developing economy, to examine the interconnections among GHRM and ENVP, the mediating role of EMPC and the contingent effect of organizational culture. A questionnaire based on prior studies was used to evaluate the proposed framework. Since most employees are native Arabic speakers, it was translated into Arabic to enhance comprehension. This study focuses on employees in Oman's service sector, encompassing all managerial levels, and is chosen using a convenience sampling approach. G-power was utilized for sample size determination due to the unavailability of the sample frame (Ringle et al., 2020), consequently, the minimum number of samples required to obtain a good power level of 80% was determined to be 123. This study collected 360 surveys using Google Forms over six months, and 12 unfilled replies were excluded. Outlier tests were conducted (Mahalanobis, 1948), and 348 valid replies were obtained for analysis. The sample size was over 160, which is the minimum sample size recommended in PLS-SEM (Kock, 2018). The researchers obtained approval for the study after undergoing Omani institutional review process to meet ethical standards. Consequently, the participants were notified that the privacy of their data was ensured, as this study was solely intended for educational use. Confidentiality was assured for respondents, as the research was conducted solely for scholarly objectives.

3.2. Instruments

The study's variables were adapted based on established theories and the existing literature. The measures adopted in this work comprise section one involving the survey instrument of the study's constructs that comprised of 6 items for GHRM. The measures were founded and confirmed within the realm of a Chinese subsidiary of an Australian multinational enterprise, demonstrating robust psychometric properties (Dumont et al., 2017). ENVP was measured using 5 items adapted from (S. K. Singh et al., 2020). Furthermore, employee commitment was measured based on 8 items adapted from Ren et al. (2022) and Raineri & Paillé (2016). Organizational culture was measured using 6 items adapted from (Wang, 2019). Respondents were asked to rate each statement on a 5-point Likert scale, with 1 indicating (strongly disagree) and 5 indicating (strongly agree).

4. ANALYSIS AND FINDINGS

The proposed research used partial least squares (PLS) modeling in SmartPLS version 4 (Becker et al., 2023). It enables the examination of complex connections between observed and latent variables, and it has gained traction in social sciences and management to address the limitations of traditional statistical analysis techniques. The variance-based PLS approach strives to boost the variance explained by the outcome variable (Hair et al., 2014), thus supporting its suitability for this study. Guenther et al. (2023) noted a substantial surge in the use of this method over the past decade across diverse fields. The selection of PLS-SEM for this study was based on its applicability in dealing with a limited number of samples, complex models, abnormal data, formative measurements, and various types of research (Benitez et al., 2020). To tackle potential Common Method Bias in the collected data, thresholds suggested by Kock & Lynn (2012) and Kock (2015) were applied, assessing full collinearity among variables (refer to Table 1). Thus, a single source bias in our data appears to be minimal.

Table 1: Full collinearity.

Variables	EMPC	ENVP	GHRM	ORGC
VIF	2.556	1.610	1.412	2.400

Note: EMPC = employee commitment, ENVP = environmental performance, GHRM = green human resource management, ORGC = organizational culture

4.1. Measurement Model Evaluation

It is recommended that researchers evaluate external models to verify their dependability and validity (Hair et al., 2022). It was advised to look at the indicator loadings, composite reliability (CR), and average variance extracted (AVE) values in order to assess the outer model. By evaluating whether the items accurately reflect the construct under consideration, these metrics evaluate convergent validity. The suggested model was tested using a two-step process, in accordance with Anderson & Gerbing's (1988) methodology. Prior to evaluating the structural model to test the suggested hypotheses, the measurement model was evaluated to verify the validity and reliability of the instruments (Hair et al., 2022; Ramayah et al., 2018).

The measurement model was assessed by examining the indicator loadings, average variance extracted (AVE), and composite reliability (CR) were examined. For validity, loadings should be ≥ 0.5, 0.6, 0.7, and ideally 0.708, with AVE values ≥ 0.5 and CR values ≥ 0.7. As shown in Table 3, all AVEs exceeded 0.5, and all CRs were above 0.7, indicating acceptable and valid loadings (Hair et al., 2022). Lastly, the discriminant validity of the components was further confirmed using the heterotrait-monotrait ratio (HTMT) (Franke & Sarstedt, 2019; Henseler et al., 2015). For the tighter criterion, the HTMT values should be less than 0.85, while for the more liberal criterion, they should be less than 0.90. All HTMT values were below the more stringent cutoff of 0.85, as indicated in Table 4, so validating the discriminant validity. Overall, all conditions and requirements related to validity and reliability were met.

Table 3: Convergent Validity.

Variables	Items	Loadings	Alpha	CR-Rho-A	CR-Rho-C	AVE
Employee Commitment	EMPC1	0.774	0.906	0.911	0.924	0.604
	EMPC2	0.791				
	EMPC3	0.796				
	EMPC4	0.831				
	EMPC5	0.747				
	EMPC6	0.738				
	EMPC7	0.822				
	EMPC8	0.708				
Environmental Performance	ENVP1	0.838	0.883	0.890	0.914	0.680
	ENVP2	0.819				
	ENVP3	0.843				
	ENVP4	0.843				
	ENVP5	0.780				
Green HRM	GHRM1	0.751	0.841	0.841	0.883	0.557
	GHRM2	0.777				
	GHRM3	0.767				
	GHRM4	0.740				
	GHRM5	0.733				
	GHRM6	0.709				
Organizational Culture	ORGC1	0.851	0.914	0.916	0.936	0.745
	ORGC2	0.883				
	ORGC3	0.874				
	ORGC4	0.893				
	ORGC5	0.814				

Table 4: Discriminant Validity (HTMT).

Variables	1	2	3	4
Employee Commitment				
Environmental Performance	0.602			
Green HRM	0.571	0.505		
Org. Culture	0.538	0.482	0.400	

4.2. Structural Model Evaluation

The essential linkages that bind the hypothetical model's constructs are the focus of the structural model (Hair et al., 2014). This illustration of how different conceptions relate to one another is helpful. This study looks for evidence in favor of a proposed model. The relationship between endogenous and exogenous latent variables is explained here. The inner model was used in this study to evaluate the relationships between the variables. Similar to what was advised by (Cain et al., 2017; Hair et al., 2022), the study evaluated multivariate skewness and kurtosis. According to Mardia's (1970) multivariate skewness ($\beta = 6.445$, $p < 0.01$) and multivariate kurtosis ($\beta = 61.065$, $p < 0.01$), the data gathered did not follow a multivariate normal distribution. Thus, using a bootstrapping approach with 10,000 resamples, the authors presented path coefficients, standard errors, t-values, and p-values for the structural model in accordance with Becker et al. (2023) (Ramayah et al., 2018). Furthermore, a variety of criteria, including p-values, confidence intervals, and effect sizes, were employed in response to the criticism made by Hahn & Ang (2017) that p-values by themselves are inadequate for assessing hypothesis significance.

This study examined the direct effects of the predictors. First, GHRM was identified as a predictor of ENVP, which revealed a positive relationship ($\beta = 0.195$, $t = 4.526$, $p < 0.001$). This indicates that the developed GHRM is associated with ENVP, thereby supporting H1. Second, GHRM was found to have a positive and significant relationship with EMPC ($\beta = 0.502$, $t = 9.867$, $p < 0.001$), suggesting that effective GHRM practices enhance employee commitment, thereby supporting H2. Third, EMPC had a strong positive effect on the relationship with ENVP ($\beta = 0.249$, $t = 3.711$, $p < 0.001$), supporting H3, (See Figure 1).

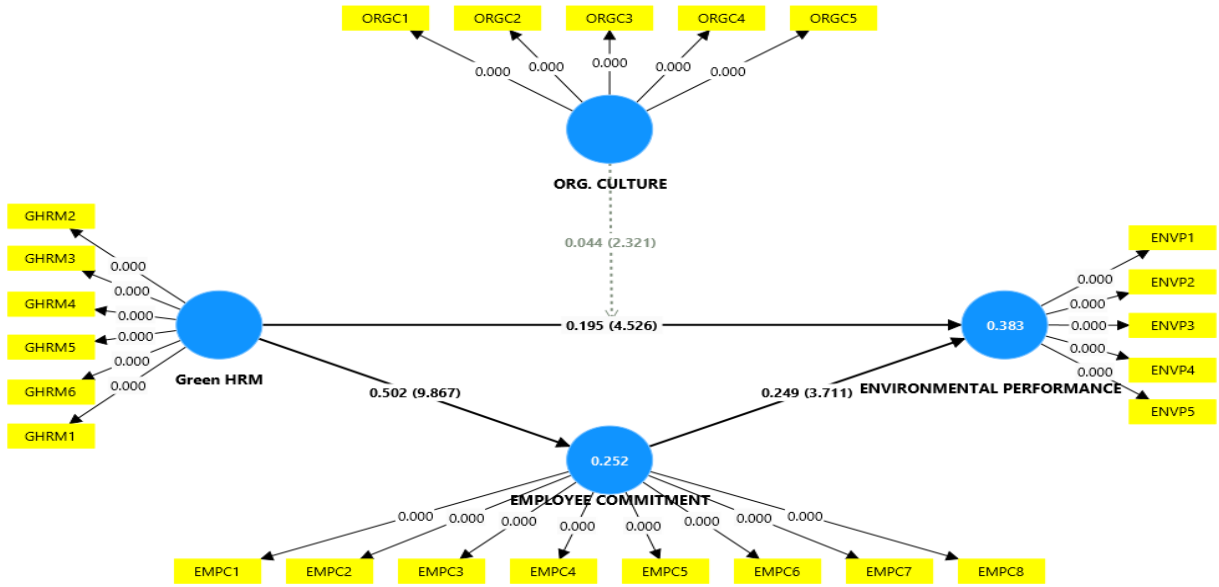

Figure 1: Structural model.

On the other hand, the indirect relationships were also examined, starting with the mediating effect; thus, EMPC showed a strong positive Mediating effect on the relationship between GHRM and ENVP ($\beta = 0.125$, $t = 3.485$, $p < 0.001$), indicating support for H4. Similarly, the moderating role of ORGC in the GHRM-ENVP nexus was also found to be positive and significant ($\beta = 0.044$, $t = 2.321$, $p = 0.011$), supporting H5. (See Table 5).

Table 5: Hypotheses testing results.

Hypo	Relationship	Std-Beta	Std-error	t-values	p-values	CI-LL	CI-UL	F2	Dec.
H1	GHRM -> ENVP	0.195	0.043	4.526	0.000	0.136	0.267	0.045	SP
H2	GHRM -> EMPC	0.502	0.051	9.867	0.000	0.401	0.579	0.337	SP
H3	EMPC -> ENVP	0.249	0.067	3.711	0.000	0.106	0.337	0.041	SP
H4	GHRM -> EMPC -> ENVP	0.125	0.036	3.485	0.000	0.063	0.174	0.016	SP
H5	ORGC x GHRM -> ENVP	0.044	0.019	2.321	0.011	0.013	0.072	0.007	SP

Note: SP=Supported, Dec=Decision, CI-LL=Lower Limit confidence interval, CI-LL=Upper limit confidence interval.

4.3. Plot Showing the Interaction Between Variables

The interaction plot depicts the major interactions (H5) suggested by Dawson (2014). Figure 2 demonstrates that when the ORGC level increases, the positive correlation between GHRM and ENVP strengthens.

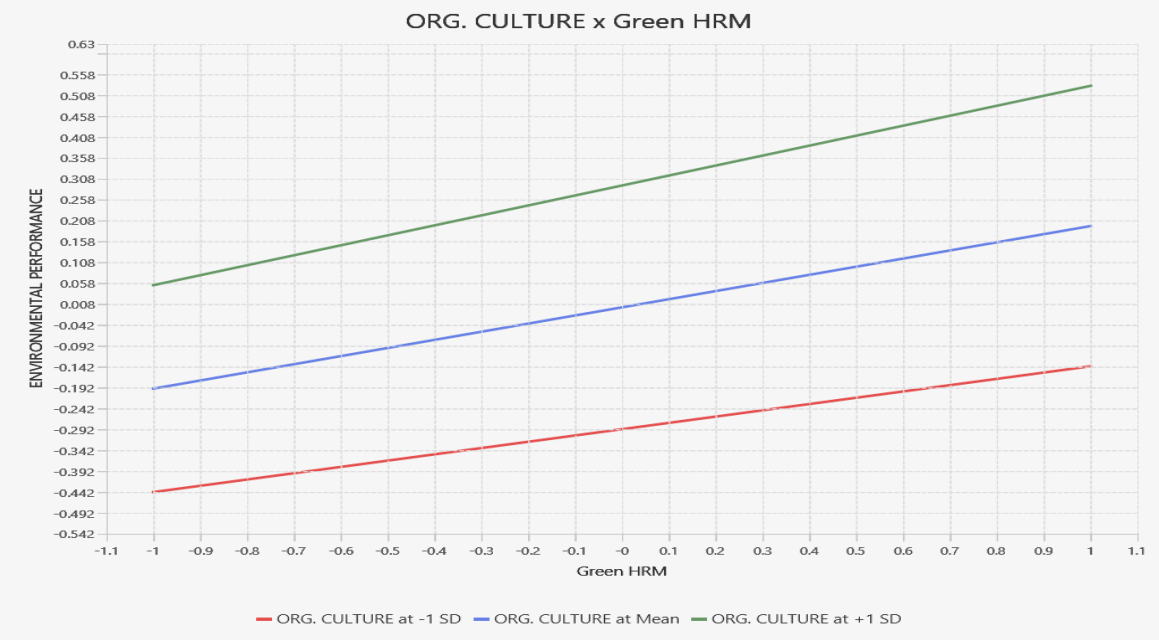

Figure 2: Interaction Plot.

4.4. Structural Model Efficiency Test

As outlined earlier, the assessment of the structural model follows a five-step process, with the remaining steps also considered. A VIF test was performed to assess lateral collinearity, revealing values ranging from 1.412 to 2.556, which are below the acceptable limit of 5 (Becker et al., 2023). Additionally, the model's R^2 values were examined to determine the in-sample predictive power, where moderate effects (0.25), weak effects (0.50), and strong effects (0.75) were used as benchmarks (Hair et al., 2019). The assessment of the structural model's quality showed that the model explains 38.3% (R^2 = 0.383) of the variance in ENVP, indicating a satisfactory predictive accuracy for the model as well as 25.2% in EMPC. (See Figure 1). The effect sizes (f^2) of the constructs in the model were assessed using Cohen's f^2 (Cohen, 1988) to illustrate the varying contributions of predictors to ENVP, Table 5. GHRM had a substantial effect on ENVP with an effect size of (f^2 = 0.045) and a strong effect on EMPC with (f^2 = 0.337). Meanwhile, EMPC had a smaller but positive effect on ENVP, with an effect size of (f^2 = 0.041).

4.5. PLS-Predict Assessment

Shmueli et al. (2019) introduced PLS-Predict, a technique using a holdout sample to predict outcomes at both item and construct levels. They implemented a 10-fold cross-validation process to assess predictive relevance, noting that when differences between PLS and linear model (LM) predictions (PLS-LM) are consistently small, it indicates strong predictive power. Larger differences suggest that predictive relevance cannot be confirmed, whereas mostly lower PLS errors suggest moderate predictive ability, and a minority of lower PLS errors indicate weak predictive capability. As demonstrated in Table 6, where the PLS model's errors are generally lower than those of the LM model, it can be concluded that the model in this study possesses a stronger level of predictive accuracy.

Table 6: PLS-Predict (PLS-LM).

Items	Q^2predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM
EMPC1	0.144	0.000	0.840	-0.840
EMPC2	0.198	0.664	0.764	-0.100
EMPC3	0.155	0.720	0.848	-0.128
EMPC4	0.169	0.681	0.835	-0.154
EMPC5	0.130	0.713	0.797	-0.084
EMPC6	0.132	0.708	0.793	-0.085
EMPC7	0.124	0.701	0.844	-0.143
EMPC8	0.107	0.000	0.799	-0.799
ENVP1	0.278	0.866	0.919	-0.053
ENVP2	0.227	0.984	1.008	-0.024
ENVP3	0.209	1.016	1.022	-0.006
ENVP4	0.210	1.026	1.032	-0.006
ENVP5	0.157	1.107	1.108	-0.001

5. DISCUSSIONS AND IMPLICATIONS

The findings of this study illuminate the intricate relationships between Green Human Resource Management (GHRM), employee commitment, and environmental performance, while also considering the moderating role of organizational culture. The empirical results indicate that GHRM practices significantly influence both employee commitment and environmental performance, underscoring the importance of

integrating sustainability into human resource strategies. Specifically, the direct effect of GHRM on environmental performance (H1) is supported by a standardized beta of 0.195, indicating a positive relationship that is statistically significant ($p < 0.001$). This aligns with previous research that emphasizes the role of GHRM in fostering environmentally responsible behaviors among employees (Hameed et al., 2020b; Rubel et al., 2021). Moreover, the mediating role of employee commitment (H4) is evidenced by a standardized beta of 0.125, suggesting that GHRM not only directly impacts environmental performance but also enhances employee commitment, which in turn positively affects environmental performance (H3, $\beta = 0.249$). This finding corroborates the assertion that GHRM practices can cultivate a psychological climate conducive to environmental commitment, thereby enhancing overall organizational performance (Jnaneswar, 2023; Yuan et al., 2024). The significant relationship between GHRM and employee commitment (H2, $\beta = 0.502$) further supports the notion that when organizations adopt GHRM practices, they foster a sense of belonging and commitment among employees, which is crucial for achieving sustainability goals (Khan et al., 2022; Sidique et al., 2023).

The contingent effect of organizational culture on the relationship between GHRM and environmental performance (H5) reveals that the organizational context plays a critical role in shaping the effectiveness of GHRM initiatives. The positive standardized beta of 0.044 indicates that a supportive organizational culture enhances the impact of GHRM on environmental performance. This finding is consistent with the literature suggesting that organizational culture significantly influences employee behavior and commitment, thereby affecting overall performance (Iskandar & Anggraeni, 2018; Soomro & Shah, 2019). A culture that prioritizes sustainability can amplify the effects of GHRM, leading to improved environmental outcomes.

5.1. Theoretical Implications

From a theoretical perspective, this study contributes to the existing body of knowledge by integrating the concepts of GHRM, employee commitment, and organizational culture within a single framework. It extends the understanding of how GHRM practices can be leveraged to enhance not only employee commitment but also environmental performance, thereby addressing a critical gap in the literature. The mediating role of employee commitment aligns with resource-based theory, which posits that employees are more likely to engage in positive behaviors when they perceive that their organization values their contributions (Yuesti & Adnyana, 2022).

5.2. Practical and Managerial Implications

The findings of this research have significant implications for practitioners and policymakers. Organizations aiming to enhance their environmental performance should consider the strategic implementation of GHRM practices. This includes training programs that emphasize sustainability, performance management systems that reward environmentally friendly behaviors, and initiatives that foster employee engagement in green practices (Uslu et al., 2023; Yuan et al., 2024). By aligning GHRM with organizational goals related to sustainability, companies can cultivate a workforce that is not only committed to the organization but also motivated to contribute to environmental initiatives. Furthermore, the role of organizational culture cannot be overlooked. Leaders should strive to create a culture that supports sustainability and encourages employee participation in green initiatives. This can be achieved through transparent communication about the organization's environmental goals, recognition of employee contributions to sustainability, and fostering a sense of community around environmental efforts (Pinzone et al., 2016; S. Zhang et al., 2021). By doing so, organizations can enhance the effectiveness of their GHRM practices and achieve better environmental outcomes.

6. CONCLUSIONS, LIMITATIONS, AND SCOPE FOR FUTURE RESEARCH

In conclusion, this study establishes a robust framework linking GHRM, employee commitment, and environmental performance, with organizational culture serving as a critical moderator. The empirical evidence supports the notion that GHRM practices can significantly enhance employee commitment, which in turn positively influences environmental performance. However, the study is not without limitations. The cross-sectional nature of the research limits the ability to draw causal inferences, and the sample may not be representative of all industries or geographical contexts. Future research should consider longitudinal studies to better understand the dynamics of these relationships over time and explore the impact of different organizational cultures on GHRM effectiveness across various sectors. Additionally, future studies could investigate the specific GHRM practices that are most effective in fostering employee commitment and environmental performance, as well as the potential barriers organizations face in implementing these practices. Exploring the role of leadership styles in promoting GHRM and employee commitment could also provide valuable insights for organizations seeking to enhance their sustainability initiatives.

Data availability statement:

The data supporting the findings of this study are available upon reasonable request by contacting the corresponding author, UA.

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