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## Green threads of change: Unravelling the gendered and experienced moderators in the sustainable symphony of green HR practices and environmental responsibility

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### Abstract

This study employs a quantitative methodology to investigate the intricate relationships between Green Human Resource (HR) Practices, Green Culture, and Environmental Sustainability. The independent variable, Green HR Practices, is delineated into four components: green recruitment, green training, green reward, and green empowerment. The mediating role of Green Culture is explored in the context of two dependent variables: Proactive Organization-Centered Environmental Sustainability and Reactive Organization Eco-Centric Environmental Sustainability. Additionally, gender and experience are introduced as moderators, influencing the relationship between Green Culture and the two dimensions of Environmental Sustainability. Utilizing a purposive sampling technique, data were collected from 357 participants from industries in Pakistan. The analysis was conducted using Warp-PLS 8.0 software. The results reveal significant direct and indirect effects of Green HR Practices on both and, with Green Culture acting as a mediator. The study further unveils the moderating influence of gender and experience on the relationship between Green Culture and Environmental Sustainability. Key findings include the identification of specific Green HR Practices that significantly impact environmental outcomes. The mediating role of Green Culture elucidates the pathway through which these practices influence sustainability. The moderation effects of gender and experience underscore the nuanced nature of these relationships, emphasizing the need for tailored strategies. The study contributes to the growing literature on sustainable HR practices by offering insights into the mechanisms driving environmental sustainability within organizations. The findings have practical implications for HR practitioners, highlighting the importance of cultivating green organizational culture and considering individual differences in the implementation of sustainability initiatives.

**Keywords:** Culture gender, Environmental sustainability, Green culture, Green empowerment, Green training, Sustainable symphony.

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**Transparency:** The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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## **1. Introduction**

In recent years, a burgeoning consciousness surrounding the imperative of environmental sustainability has sparked various initiatives aimed at mitigating our ecological impact at both individual and organizational levels [1]. One noteworthy endeavor in this pursuit is the adoption of Green Human Resource practices (GHRP), which have emerged as a focal point in the discourse on sustainable development [2]. Embracing a holistic approach, GHRP entails the integration of environmental considerations into the very fabric of HR policies, processes, and activities, aligning human resource management with environmentally responsible practices. The industrial sector, while an essential catalyst for economic progress, cannot escape its stark contribution to environmental degradation [3]. As the world grapples with the pressing challenges posed by climate change, the call for organizations to embrace sustainable practices becomes increasingly resounding [4]. Notably, Pakistan's industrial landscape occupies a pivotal position in the nation's economy, yet simultaneously confronts an array of environmental quandaries, encompassing air and water pollution, waste proliferation, and natural resource depletion [5, 6]. Confronting these environmental perils demands the implementation of innovative, eco-conscious strategies that mitigate the detrimental consequences of industrial activities. In this context, Green HR practices emerge as a compelling framework, empowering organizations to harmonize their HR policies and practices with the lofty objectives of environmental sustainability. By infusing green initiatives into fundamental HR functions, ranging from recruitment and training to performance management and employee engagement, organizations can instill environmental consciousness and a sense of responsibility in their workforce [7, 8]. This convergence between HR management and ecological stewardship cultivates a formidable synergy, wherein individuals not only prosper professionally but also contribute tangibly to environmental preservation. However, while the pivotal role of green practices in the industrial sector cannot be understated, the specific impact of Green HR practices, and the mediating role of green culture, warrant deeper exploration within the context of Pakistan [9]. The significance of the study lies in the recognition that adopting environmentally friendly HR practices is not just a corporate trend but a transformative journey toward sustainability. As organizations navigate this path, the concept of a "green culture" emerges as a central mediator, reflecting the adoption and integration of eco-conscious values within the organizational fabric [10]. This green culture becomes the thread that binds together HR practices and the overarching goal of environmental responsibility. In the contemporary business landscape, the imperative for organizations to integrate green practices into their human resources strategies has become increasingly pronounced [11]. This study encapsulates the multifaceted dynamics at play in the pursuit of environmental sustainability through HR initiatives. However, the study takes a fascinating turn with the introduction of gender and experience as moderating variables. Gender dynamics and diverse professional experiences are acknowledged as influential factors that can shape and alter the relationship between green culture and environmental sustainability. This acknowledgment brings to the forefront the importance of understanding how individuals, with their unique perspectives and backgrounds, contribute to or modify the impact of green initiatives. Leveraging gender dynamics within an organizational framework can serve as a potent driver for realizing environmental sustainability through the establishment of a green culture. By acknowledging and capitalizing on the distinct perspectives and approaches that men and women bring to the forefront, companies can craft a more comprehensive and efficient sustainability strategy [12]. Research indicates that women often exhibit a heightened inclination toward environmentally conscious behaviors, and fostering a green culture that embraces and optimizes these inclinations can unlock a diverse array of inventive ideas and initiatives [13, 14]. Additionally, the implementation of gender-inclusive policies ensures that both male and female employees feel empowered to contribute to sustainability endeavors, fostering a collaborative and inclusive atmosphere. Summing up, the incorporation of gender considerations into the fabric of a green organizational culture not only aligns with principles of fairness but also augments the overall effectiveness of environmental sustainability initiatives.

Hence, this research aims to comprehensively explore the impact of green human resource (HR) practices on fostering a green culture within organizations. By examining the underlying mechanisms that connect green HR practices to the development of a sustainable organizational culture, this study seeks to uncover the pathways through which these practices contribute to environmentally responsible behaviors and attitudes among employees. Additionally, the study aims to evaluate the role of a green culture as a potential mediator in the relationship between implemented green HR practices and overall environmental sustainability outcomes. Furthermore, the research endeavors to investigate the nuanced perceptions and experiences related to environmental sustainability within organizations, specifically exploring gender-based differences. Another focal point is the examination of how professional experience levels influence the adoption of a green culture within HR initiatives, shedding light on the role of expertise in driving sustainability efforts. Lastly, the study seeks to assess the correlation between employees' gender and their active engagement in green HR initiatives, providing insights into potential gender-related patterns in environmentally conscious workplace practices.

## **2. Literature Review**

The industrial sector plays a crucial role in economic development but often poses significant challenges to environmental sustainability due to its resource-intensive operations [15]. In recent years, organizations worldwide have increasingly recognized the importance of integrating environmentally responsible practices into their human resource management strategies, known as green HR practices [16]. Green HR practices refer to the adoption of environmentally friendly policies, procedures, and initiatives that aim to minimize the negative impact of organizational activities on the environment [17, 18]. This literature review explores the existing body of knowledge on the impact of green HR practices on environmental sustainability, specifically considering the mediating role of pro-environmental behavior among employees in the industrial sector of Pakistan.

**Green HR Practices:** Green HR practices, often referred to as environmentally sustainable HR practices, are a strategic avenue through which organizations infuse ecological responsibility into their human resource management strategies. These practices encompass a diverse array of initiatives directed at advocating sustainability, curtailing environmental footprints, and cultivating an ethos of environmental awareness among employees. Such practices might entail advocating remote work to diminish commuting, implementing energy-efficient protocols within workplaces, integrating sustainability components into employee training schemes, and actively promoting waste reduction and recycling endeavors. Embracing green HR practices not only demonstrates an organizational commitment to environmental conservation but also bolsters the perception of these entities as socially conscious players. This approach not only contributes to safeguarding the environment but also bolsters the standing of organizations as ethically responsible entities [18, 19]. Several studies have highlighted the positive influence of these practices on environmental sustainability outcomes. For instance, Gilal, et al. [20] and Naz, et al. [21] found that organizations implementing green HR practices exhibited lower energy consumption and reduced waste generation, leading to improved environmental performance. Hence, green HR practices have a positive impact on environmental sustainability. The study uses following four dimensions of green HR practices: Examining how these dimensions contribute to environmental responsibility reveals the intricate threads that weave a sustainable symphony within organizational frameworks.

### *2.1. Green Recruitment*

Green recruitment, as a dimension of Green HR Practices, signifies a strategic approach to talent acquisition that places environmental consciousness at its core [22]. Organizations employing green recruitment methods seek individuals whose values align with environmental sustainability, fostering a workforce inherently committed to green principles. Research suggests that incorporating eco-friendly criteria into hiring processes not only enhances an organization's environmental responsibility but also contributes to a positive organizational culture centered around sustainability [23].

### *2.2. Green Training*

Green training initiatives represent a proactive response to the evolving landscape of environmental concerns [24]. Organizations investing in green training equip employees with the knowledge and skills necessary for sustainable practices. The literature underscores that effective green training not only cultivates a workforce aware of environmental challenges but also empowers individuals to contribute meaningfully to their resolution [25]. Moreover, such training programs foster a culture of continuous learning, aligning the workforce with evolving sustainability goals.

### *2.3. Green Reward*

The dimension of green reward emphasizes the role of incentives in promoting environmentally responsible behavior among employees. Recognizing and rewarding eco-friendly actions and initiatives creates a culture of positive reinforcement [26]. Studies suggest that green reward systems not only motivate employees to adopt sustainable practices but also contribute to increased job satisfaction and organizational commitment [27]. In essence, aligning rewards with environmental responsibility becomes a powerful catalyst for fostering a green workplace ethos.

### *2.4. Green Empowerment*

Green empowerment emerges as a transformative dimension, emphasizing the importance of empowering employees to actively contribute to environmental responsibility. Organizations embracing green empowerment provide employees with the autonomy and support to implement sustainable initiatives [28]. Research highlights that empowered employees are more likely to innovate and take ownership of sustainability goals, creating a cascading effect that amplifies the impact of green HR practices on environmental responsibility [29].

**Environmental Sustainability:** Environmental sustainability refers to the ability to maintain ecological balance and preserve natural resources for future generations [30]. Industrial organizations in Pakistan face significant challenges in achieving environmental sustainability due to limited regulatory enforcement, a lack of awareness, and insufficient emphasis on sustainable practices [31]. However, research indicates that the adoption of green HR practices can contribute to enhanced environmental sustainability. The significance of environmental sustainability cannot be overstated, as it forms the bedrock for the well-being of both our planet and the generations that will follow. At its essence, it encapsulates the conscientious and equitable utilization of natural resources, guaranteeing that present requirements are fulfilled without jeopardizing the capacity of the future to satisfy its own necessities. Embracing environmental sustainability entails the protection of ecosystems, the preservation of biodiversity, and the mitigation of the adverse consequences stemming from human activities like pollution, deforestation, and immoderate carbon emissions. In essence, the pursuit of environmental sustainability is a shared duty that transcends boundaries, cultures, and creeds, demanding a collective endeavor to conserve the planet's vitality for the generations yet to come. Gill, et al. [32] and Naz, et al. [21] found a positive relationship between the implementation of green HR practices and improved environmental performance in manufacturing firms. The study breaks down the construct of environmental sustainability into two parts, i.e., Org\_Cent and Org\_Ecct.

### *2.5. Reactive Organization-Centered Environmental Sustainability (Org\_Cent)*

The first facet of the construct "environmental sustainability" is encapsulated in the dimension of reactive organization-centered environmental sustainability (Org\_Cent). In this context, organizations respond to environmental challenges and concerns with a focus on compliance and adherence to regulatory frameworks. Reactive measures are implemented to address immediate environmental issues, ensuring that the organization meets required standards and

mitigates negative impacts. While this approach demonstrates a commitment to environmental responsibility, its emphasis lies on reactive responses rather than proactive initiatives.

#### *2.6. Proactive Organization Eco-Centric Environmental Sustainability (Org\_Ecct)*

On the other hand, the second dimension, proactive organization eco-centric environmental sustainability (Org\_Ecct), represents a more forward-thinking and anticipatory approach. Organizations embody an eco-centric mindset, actively seeking innovative and sustainable solutions to environmental challenges. Proactive initiatives extend beyond compliance, encompassing a strategic alignment with ecological principles. This dimension reflects a commitment to not only meeting environmental standards but also driving positive environmental change, with a focus on long-term ecological well-being and sustainable practices. It signifies a comprehensive and future-oriented perspective on environmental sustainability within organizational practices.

#### *2.7. Green HR Practices and Environmental Sustainability:*

Green Human Resource Management (HRM) incorporates environmental aspects into the various functions and protocols of HR. This approach spans multiple facets, such as hiring processes, professional growth opportunities, appraisal systems, staff involvement, as well as incentives and accolades [18, 33]. The integration of eco-friendly HR measures allows companies to not only aid in environmental conservation but also bolster their image as conscientious corporate citizens. Furthermore, such practices may elevate levels of employee commitment and contentment, as a workforce that values alignment with ethical and sustainable principles appreciates employers who mirror these ideals. Consequently, green HR measures can provide mutual advantages, enriching both the enterprise and the ecological sphere, while fostering an ethos of sustainability and ethical responsibility in the workplace. The implementation of green HR practices (GHRP) stems from the recognition of the crucial role that employees play in advancing an organization's green initiatives. Several studies have highlighted the positive impact of GHRP on environmental sustainability. For instance, research conducted by Kim, et al. [34] and Singh, et al. [35] found that organizations implementing green HR practices experienced reduced environmental impact and improved environmental performance. GHRP was found to positively influence employees' environmental knowledge, attitudes, and behaviors, leading to more sustainable practices. Ud Din and Ahmad [18] conducted a study on the connection between green HR practices and environmental performance in the context of Pakistan's industrial sector. The findings revealed a significant positive relationship, indicating that organizations that prioritize GHRP tend to exhibit better environmental performance. The study emphasized the importance of incorporating green initiatives into HR practices to foster sustainability in the industrial sector. Hence, this postulates the following hypothesis.

*H<sub>1</sub>: There is a positive relationship between the implementation of green HR practices and environmental sustainability efforts within organizations.*

#### *2.8. Green Culture as a Mediating Factor:*

Green culture refers to the shared values, beliefs, and behaviors within an organization that promote environmental responsibility and sustainability [36]. It acts as a mediating factor between GHRP and environmental sustainability outcomes [37]. Within organizations, the adoption of a green culture assumes a pivotal role in propelling environmental sustainability on various fronts. This cultural shift nurtures a profound and unwavering dedication to conscientious practices and deliberate decision-making that harmonizes with ecological health. By infusing eco-conscious values across the entire spectrum of the organization, spanning from leadership to the workforce, a sustainability-centric culture fosters efficiency in resource utilization, reduction of waste, and the implementation of eco-friendly processes. This ethos not only reverberates externally but also internally, kindling heightened employee engagement and well-being. As staff members recognize their contributions towards a larger environmental purpose, job contentment frequently flourishes, subsequently nurturing elevated levels of productivity, innovation, and a more cohesive workplace ambiance. In essence, a green culture within organizations plays a pivotal role in guiding the trajectory towards a more sustainable tomorrow. This comprehensive paradigm transcends mere adherence to regulations, seamlessly integrating the principles of environmental stewardship into the very essence of business operations and decision-making. A strong green culture fosters employee engagement and commitment to environmentally friendly practices, reinforcing the impact of GHRP on environmental sustainability [38]. Research conducted by Rizvi and Garg [39] and Aggarwal and Agarwala [40] examined the mediating role of green culture. The studies found that green HR practices positively influenced green culture, which, in turn, enhanced environmental performance. The results highlighted the importance of cultivating a green culture within organizations to reinforce the effectiveness of GHRP in achieving environmental sustainability goals. Hence, this postulates the following hypothesis:

*H<sub>2</sub>: A green culture significantly mediates the relationship between implemented green HR practices and the achievement of environmental sustainability goals.*

#### *2.9. Gender as a Moderator*

Gender plays a crucial role as a moderator in the intricate relationship between green culture and environmental sustainability within organizational frameworks [41]. This dynamic interplay recognizes the diverse perspectives and experiences that individuals of different genders bring to the table. The moderator effect of gender implies that the impact of a green culture on environmental sustainability is not uniform across male and female cohorts. It delves into the nuanced ways in which gender dynamics shape the perception, adoption, and efficacy of sustainable practices within the workplace.

Understanding these gender-specific nuances is essential for tailoring green HR initiatives to be more inclusive and effective [42]. For instance, the study may reveal variations in the level of environmental consciousness, participation in eco-friendly programs, or adherence to sustainable practices based on gender. By identifying and acknowledging these gender-related influences, organizations can craft targeted strategies that bridge gender gaps, fostering a more holistic and equitable approach to environmental sustainability within their workforce and broader corporate culture. Hence, this postulates the following hypothesis:

*H<sub>3</sub>: Gender moderates the relationship between green culture and environmental sustainability, with distinct patterns for male and female employees.*

**2.10. Experience as a Moderator**

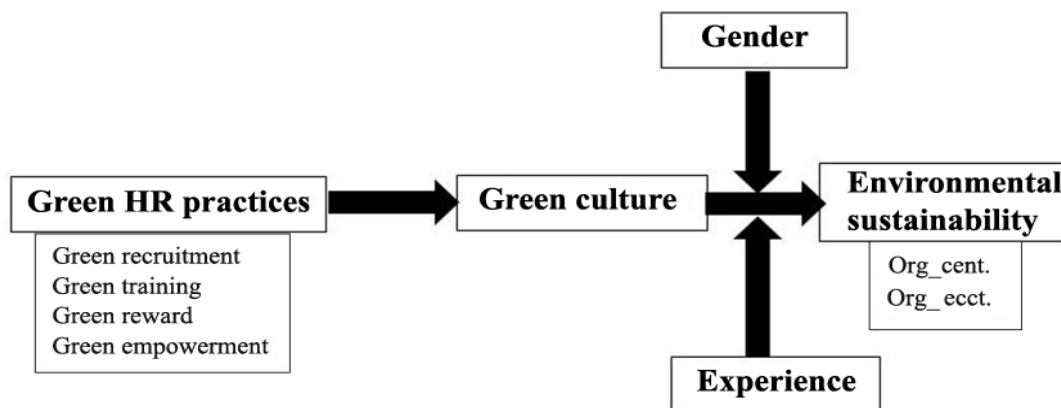
Professional experience emerges as a significant moderator in the intricate relationship between green culture and environmental sustainability within organizational contexts. The depth of an individual's professional background serves as a lens through which the assimilation and impact of green culture unfold. Experienced professionals often bring a wealth of industry knowledge and insights, influencing their understanding and engagement with sustainability practices. This moderating role implies that the effectiveness of green culture in driving environmental sustainability is not universally consistent across varying experience levels. The study of experience as a moderator delves into how tenure, job roles, and diverse professional backgrounds can shape the way employees perceive and contribute to sustainable initiatives. It also explores the potential for seasoned professionals to act as change agents, leveraging their accumulated expertise to champion and implement environmentally conscious practices within their organizations. Recognizing these nuances allows for the development of targeted strategies that harness the strengths of experienced individuals while addressing potential barriers, thereby fostering a more resilient and sustainable corporate culture. Hence, the following hypothesis is proposed:

*H<sub>4</sub>: Professional experience moderates the impact of green culture on environmental sustainability, with varying degrees of influence based on experience levels.*

**2.11. The Industrial Sector of Pakistan and Environmental Sustainability:**

Pakistan is a developing country. Its industry has been developing since its birth in 1947. Ninety percent of Pakistan's industry comprises SMEs, including manufacturing, trading, and service SMEs [43]. The industrial sector holds considerable importance in Pakistan's economy, yet its expansion has given rise to apprehensions regarding its impact on the environment. As industries expand to address the needs of a growing population and economy, the central challenge revolves around harmonizing economic growth with ecological conservation. Recognizing these challenges, there is an increasing emphasis on integrating principles of environmental sustainability into Pakistan's industrial framework. This involves fostering cleaner production methods, optimizing energy utilization, reducing waste generation, and embracing environmentally friendly technologies. Notably, governmental regulations and initiatives are being introduced to uphold environmental standards and encourage industries to mitigate their environmental impact. Collaborative approaches involving industry stakeholders, governmental bodies, and civil society are being pursued to ensure that industrial expansion aligns with the long-term preservation of the environment, safeguarding Pakistan's natural assets, and securing a healthier future for its citizens. Pakistan's industrial sector faces numerous environmental challenges, including air and water pollution, waste generation, and natural resource depletion [5]. The sector contributes significantly to the country's economy, making it essential to address its environmental impact [44]. Research specific to Pakistan's industrial sector regarding the impact of GHRP and the mediating role of green culture is limited.

**2.12. Research Framework**



**Figure 1.**  
Research framework.

The Figure 1 depicts research frame work model that outlines a process in which 'Green HR practices' encompassing recruitment, training, rewards, and empowerment are proposed to foster the cultivation of a green culture within an

organization. This culture, in conjunction with factors such as gender and experience, is seen as exerting an influence on the organization's degree of 'environmental sustainability.

### 3. Methodology

#### 3.1. Research Design

This study adopts a quantitative research design to analyze the impact of green human resource (HR) practices on environmental sustainability through the formation of a sustainable culture within Pakistani industries.

#### 3.2. Sample and Unit of Analysis

The sample size comprises 357 industries in Pakistan, serving as the unit of analysis. This approach ensures statistical significance and representativeness when examining the research questions.

#### 3.3. Sampling Technique

Purposive sampling is employed, focusing on industries committed to green HR practices. This intentional selection ensures a targeted investigation into the influence of such practices on organizational sustainability.

#### 3.4. Research Instrument

The research instrument is adapted from established studies, guaranteeing reliability and validity in capturing variables related to green HR practices, organizational culture, and environmental sustainability. The adaptation is specifically tailored to the Pakistani industrial context.

#### 3.5. Operationalization of Variables

Green HR practices are operationalized using a total of fifteen items, derived from the work of Ren, et al. [45] comprising four items for green recruitment, three for green training, five for green empowerment, and three for green reward. The variable environmental sustainability is operationalized with seventeen items sourced from the work of Tosti-Kharas, et al. [46]. Additionally, the mediating variable, green culture, is operationalized using six items from the research conducted by Wang [47].

#### 3.6. Data Collection

Responses from participants, including HR professionals and managerial staff of Pakistani industries, are recorded using a five-point Likert scale. This captures their perceptions and attitudes toward the measured variables.

#### 3.7. Quantitative Analysis

Data collected through surveys undergoes quantitative analysis techniques using Warp-PLS 8.0 software, enabling a rigorous examination of the relationships between green HR practices, green culture, and environmental sustainability in the context of Pakistani industries. Structural Equation Modelling (SEM) has been used for the analysis. SEM is a statistical technique that combines factor analysis and multiple regression to analyze complex relationships among variables. It goes beyond traditional statistical methods by simultaneously examining the measurement and structural models, offering a comprehensive understanding of intricate relationships. Many of the researchers use this latest technique for complex analysis.

### 4. Results and Discussion

The results of the structural equation modeling (SEM) analysis reveal insightful patterns in the relationships among various constructs. Here are the results.

**Table 1.**  
Composite reliability coefficients.

Recruit	Training	Reward	Empower	Grn_clt.	Org_cen.	Org_ecc.
0.845	0.766	0.771	0.81	0.831	0.819	0.875
Cronbach's alpha coefficients						
Recruit	Training	Reward	Empower	Grn_clt	Org_cen.	Org_ecc.
0.752	0.543	0.553	0.686	0.72	0.669	0.806
Average variances extracted						
Recruit	Training	Reward	Empower	Grn_clt.	Org_cen.	Org_ecc.
0.584	0.532	0.53	0.519	0.563	0.602	0.64

The Table 1 shows reliability statistics. The composite reliability coefficients reveal the internal consistency of the measurement model for various constructs. For instance, the recruitment variable demonstrates a high level of reliability with a composite reliability coefficient of 0.845, while training, reward, and empowerment exhibit good reliability with coefficients of 0.766, 0.771, and 0.81, respectively. Similarly, Green Culture (grn\_clt) shows strong reliability (0.831), and both Organization-Centered Environmental Sustainability (Org\_cen) and Eco-Centered Organization Environmental Sustainability (Org\_Ecc) demonstrate good reliability with coefficients of 0.819 and 0.875, respectively. Cronbach's alpha

coefficients provide further insights into the internal consistency of the measurement model. While recruitment, empowerment, and green culture exhibit good internal consistency with alpha values of 0.752, 0.686, and 0.72, respectively, training, reward, and Organization-Centered Environmental Sustainability show slightly lower but still acceptable levels with coefficients of 0.543, 0.553, and 0.669. Eco-Centered Organization Environmental Sustainability stands out with a strong alpha coefficient of 0.806, indicating good internal consistency. The average variances extracted shed light on the proportion of variance explained by the indicators of each construct. Notably, Green Culture, Organization-Centered Environmental Sustainability, and Eco-Centered Organization Environmental Sustainability explain 56.3%, 60.2%, and 64% of their respective variances, underscoring the robustness of the measurement model. Overall, these assessments affirm the reliability and validity of the measurement model, providing a solid foundation for interpreting the structural equation modeling results.

**Table 2.**  
Full collinearity VIFs.

Recruit	Training	Reward	Empower	Grn_clt.	Org_cen.	Org_ecc.
2.241	2.279	2.229	2.111	1.912	1.783	3.174
Gender	Expr.	Gender*	Expr*Gr	00	00	00
1.117	2.469	1.04	1.134	00	00	00

Note: \* indicates an interaction involving the "Gender" with other variables.

Table 2 presents Variance Inflation Factors (VIFs) assessing multicollinearity among the variables in the analysis. For the Green HR Practices, the VIFs indicate moderate levels of multicollinearity, with values ranging from 1.912 for Green Culture (grn\_clt) to 2.279 for training. These values are generally below the commonly accepted threshold of 10, suggesting that collinearity concerns are not substantial. Notably, Eco-Centered Organization Environmental Sustainability (Org\_Ecc) stands out with a VIF of 3.174, which is slightly higher but still below a critical level. The second section introduces VIFs for gender and experience, with values of 1.117 and 2.469, respectively. These values indicate low to moderate levels of multicollinearity, suggesting that the inclusion of gender and experience in the analysis does not raise significant collinearity concerns. Overall, the VIFs show how correlated predictors might affect the accuracy of regression coefficients. In this case, the value shows that the model has generally acceptable level of multicollinearity.

**Table 3.**  
P values of the constructs.

Variables	Recruit	Training	Reward	Empower	Grn_clt.	Gender*	Expr*Gr
Grn_clt	0.024	<0.001	<0.001	0.003	00	00	00
Org_cen	00	00	00	00	<0.001	0.003	0.03
Org_ecc	00	00	00	00	<0.001	0.002	0.041

Note: \* indicates the significant relationship between the variables.

Table 3 shows the p values of the constructs. The presented p-values in the structural equation model analysis offer crucial insights into the significance of relationships between different constructs. For Green Culture (grn\_clt), the p-values for its path coefficients with recruitment, training, reward, and empowerment are 0.024, <0.001, <0.001, and 0.003, respectively. These p values indicate a highly significant statistical association, suggesting that the observed connections are not likely to be random. Turning to the environmental sustainability dimensions, Organization-Centered Environmental Sustainability (Org\_cen) exhibits p-values of 0.003 and 0.03 for the interaction terms with gender\* and expr\*gr, respectively. These values suggest statistically significant moderating effects, indicating that the relationships between Organization-Centered Environmental Sustainability and Green Culture may be influenced by gender and the interaction between experience and Green Culture. In the same way, Eco-Centered Organization Environmental Sustainability (Org\_Ecc) has p-values of 0.002 and 0.041 for its interaction terms with gender\* and expr\*gr, respectively, indicating that these interactions play a role in influencing the relationship between Eco-Centered Organization Environmental Sustainability and Green Culture.

**Table 4.**  
R-squared coefficients of the model.

Recruit	Training	Reward	Empower	Grn_clt.	Org_cen.	Org_ecc.
00	00	00	00	0.285	0.375	0.519
Adjusted R-squared coefficients						
Recruit	Training	Reward	Empower	Grn_clt	Org_cen	Org_ecc
00	00	00	00	0.275	0.368	0.514
Q-squared coefficients						
Recruit	Training	Reward	Empower	Grn_clt	Org_cen	Org_ecc
00	00	00	00	0.249	0.356	0.479

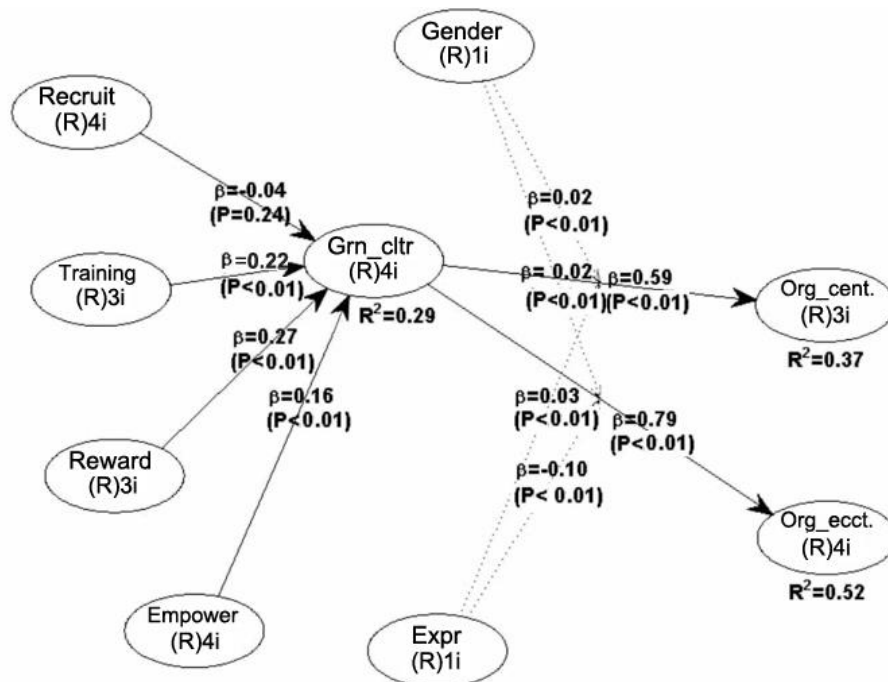
The Table 4 shows that the model's explanatory power is evident through R-squared and adjusted R-squared coefficients, with 51.9% of the variance in Green Culture elucidated. Q-squared coefficients, which predict 47.9% of the variance in Eco-Centered Organization Environmental Sustainability, show the predictive relevance of the model.

**Table 5.**  
Path coefficients.

Variables	Recruit	Training	Reward	Empower	Grn_clt.	Gender*	Expr*Gr
Grn_clt.	-0.042	0.224	0.272	0.16	<b>00</b>	<b>00</b>	<b>00</b>
Org_cen.	00	00	00	00	0.595	0.024	0.033
Org_ecc.	00	00	00	00	0.789	0.017	0.103

Note: \* indicates the significant relationship between the variables.

The **Table 5** shows the results of path coefficients. Notably, Green Culture (grn\_clt) exhibits nuanced associations with different dimensions of Green HR Practices. While it demonstrates a negative path coefficient with recruitment (-0.042), indicating a decrease in recruitment efforts, it concurrently displays positive coefficients with training (0.224), reward (0.272), and empowerment (0.16), signifying an augmentation in these facets as Green Culture strengthens. Furthermore, Organization-Centered Environmental Sustainability (Org\_cen) and Eco-Centered Organization Environmental Sustainability (Org\_Ecc) are positively linked to Green Culture, illustrating their coevolution. Additionally, the interactions of gender and experience influence these relationships, serving as moderators in the context of Green Culture and Environmental Sustainability dimensions. The statistical significance of path coefficients underscores the robustness of these relationships. The results of the mediation analysis reveal nuanced dynamics in the relationship between Green HR Practices and Environmental Sustainability, shedding light on the indirect and total effects mediated by Organization-Centered Environmental Sustainability (Org\_cen) and Eco-Centered Organization Environmental Sustainability (Org\_Ecc). Indirect effects for paths with two segments demonstrate that both Org\_cen and Org\_Ecc play mediating roles, with negative impacts on recruitment and positive impacts on training, reward, and empowerment. The statistical significance of p-values underscores the reliability of these mediating effects. Sums of indirect effects collectively highlight the cumulative influence of Org\_cen and Org\_Ecc, emphasizing their joint contribution to mediating the relationship between Green HR Practices and Environmental Sustainability. Total effects, encompassing both direct and indirect impacts, further emphasize the intricate dynamics. Green Culture, despite its direct negative impact on recruitment, exhibits positive total effects on training, reward, and empowerment, indicating that the adverse effect on recruitment is mitigated by the mediating role of environmental sustainability dimensions. These findings underscore the importance of considering specific facets of environmental sustainability in understanding the comprehensive impact of Green HR Practices on organizational outcomes. Summing up, the SEM outcomes portray a coherent narrative of the interplay between Green HR Practices, Green Culture, and Environmental Sustainability, accentuating the roles of moderators and affirming the model's reliability and predictive capacity.



**Figure 2.**  
Structural model output.

**Figure 2** presents a detailed overview of various HR practices, such as recruitment, training, reward, and empowerment that positively influence green culture within an organization. This green culture significantly impacts both the core (organizational centrality) and unique (organizational eccentricity) aspects of an organization. The figure also shows that individual characteristics like gender and experience directly affect green culture and, subsequently, organizational outcomes. Additionally, the figure illustrates the strength of these relationships through standardized regression coefficients



(beta values) and their significance (p-values). Furthermore, the R-squared values included in the diagram indicate the percentage of variance in green culture, organizational centrality, and eccentricity that the model successfully explains.

## 5. Discussion and Conclusion

The obtained results from the structural equation modeling (SEM) analysis provide a comprehensive view of the intricate relationships among Green HR Practices, Green Culture, and Environmental Sustainability dimensions. These findings offer valuable insights into the dynamics of organizational practices aimed at environmental sustainability and the role of cultural and HR factors. The negative path coefficient between Green Culture and recruitment suggests an intriguing aspect of sustainability practices. It implies that as organizations strengthen their Green Culture, there might be a reduction in traditional recruitment efforts. This could indicate a shift towards internal development and a focus on cultivating an environmentally conscious workforce rather than seeking external talent. On the positive side, the positive path coefficients associated with training, reward, and empowerment under Green Culture indicate that organizations emphasizing environmental values are concurrently investing in employee development, recognition, and empowerment. This aligns with the broader understanding that fostering a green organizational culture involves not only environmental practices but also a holistic approach to employee well-being and development. The positive relationships between Green Culture and the two dimensions of Environmental Sustainability (Organization-Centered and Eco-Centered) highlight the role of culture as a driving force behind sustainable organizational practices. This emphasizes the importance of ingraining environmental values into the organizational fabric to enhance sustainability efforts comprehensively. The moderation effects of gender and experience in the relationship between Green Culture and Environmental Sustainability dimensions add a layer of complexity to the findings. This implies that the impact of Green Culture on sustainability outcomes might vary based on gender and experience levels. Further exploration into these moderation effects could unveil nuanced strategies for tailoring sustainability initiatives to different demographic groups within the organization.

### 5.1. Limitations

This study has several limitations that warrant consideration. Firstly, the use of purposive sampling, common in qualitative research, may restrict the generalizability of findings to a broader population within the industries of Pakistan. Employing a more diverse sampling strategy could enhance the external validity of the results. Additionally, the cross-sectional design employed in this quantitative methodology may limit the establishment of causal relationships. A shift towards a longitudinal design could provide insights into the temporal dynamics of the relationships between green HR practices, green culture, and environmental sustainability. The study is confined to industries in Pakistan, potentially limiting the applicability of findings to other cultural and industrial contexts. Future research could benefit from a comparative approach across multiple countries or regions to offer a more comprehensive understanding of the relationships under investigation. Furthermore, the reliance on self-reported data may introduce biases, such as common method bias and social desirability. To address this, future research could incorporate objective measures or multiple data sources for validation.

### 5.2. Future Recommendations

Several recommendations emerge for future research in this domain. Firstly, adopting a longitudinal design would enable the establishment of causality and a nuanced understanding of how changes in green HR practices impact the development of green culture and, subsequently, environmental sustainability over time. Diversifying the sampling techniques, including random sampling, and ensuring representation across various industry sectors within Pakistan could enhance the generalizability of findings. Comparative studies across different countries or regions would contribute to understanding the cultural nuances influencing the relationships between green HR practices, green culture, and environmental sustainability. Combining quantitative data with qualitative insights through a mixed-methods approach could provide a more comprehensive understanding of the intricate mechanisms at play. Incorporating objective measures of environmental sustainability and green culture, such as energy consumption data or independent audits, could enhance the reliability of the results. Industry-specific investigations, acknowledging the unique challenges and opportunities each sector faces, would provide valuable insights. Lastly, incorporating perspectives from various stakeholders, including employees, managers, and external environmental experts, could enrich the research by offering a more comprehensive view of the impact of green HR practices on environmental sustainability within the industries of Pakistan.

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