

# Impact of Green Human Resource Management Practices on Sustainable Practices in Rehabilitation Centers: The Mediating Role of Employee Green Behavior

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## Abstract

**Background:** This research paper examined the influence of Green Human Resource Management (GHRM) practices on sustainable practices in rehabilitation centers, with a particular emphasis on the mediating function of environmental regulation awareness and the moderating effect of organizational culture. Based on the Resource-Based View and Institutional Theory, the study examined a model that includes green recruitment and selection, green training and development, green performance management, and green compensation and awards.

**Methods:** Data were gathered from healthcare and rehabilitation professionals employed in rehabilitation centers throughout Pakistan. Utilizing Smart PLS for structural equation modelling, the results indicated that all four GHRM activities considerably increased awareness of environmental rules, which subsequently played a substantial role in the adoption of sustainable practices in rehabilitation centers.

**Results:** Mediation research revealed that awareness of environmental regulations partially mediated the association between each factor of GHRM and sustainable activities. Moreover, organizational culture was identified as a moderating factor in the relationship between awareness of environmental regulations and sustainable behaviors, indicating that a supportive culture enhances sustainability outcomes.

**Conclusion:** This study theoretically enhances the debate on GHRM in healthcare by elucidating the mechanisms via which HR systems might foster sustainability in rehabilitation centers.

**Keywords:** Environmental Regulation Awareness, Green HRM, Organizational Culture, Pakistan, Sustainable Practices.

## 1. INTRODUCTION

The twenty-first century has made environmental sustainability a top priority for people (Ali et al., 2024). Businesses in all fields are under more and more pressure to come up with plans that protect the environment, make the most of resources, and help with broader sustainability goals. The idea of Green Human Resource Management (GHRM) has come up as an important organizational strategy in this setting (Bindeeba et al., 2025; Khan & Muktar, 2024). GHRM is adding ideas about environmental sustainability to standard HR tasks including hiring, training, evaluating performance, and paying employees (Awwad Al-Shammari et al., 2022). Adding "green" parts to HR policies helps companies improve their corporate social responsibility and encourages people to think and act in ways that are good for the environment (Mehmood et al., 2024).

Although GHRM has been widely implemented in industries including manufacturing, energy, and information technology, its significance in the healthcare sector, especially rehabilitation centers, is still developing (Faeni & Faeni, 2025). Rehabilitation centers, offering physical therapy and restorative services, serve a dual purpose: they promote human health and well-being while also utilizing substantial resources, including energy, medical supplies, and equipment (Bhardwaj et al., 2025). The disposal of waste, electrical usage, and dependence on resource-intensive therapy gadgets render sustainability in rehabilitation an increasing concern (Mor & Ravindra, 2023). The incorporation of GHRM practices in rehabilitation facilities can greatly enhance eco-friendly operations, particularly when influenced by employees' green behavior—their personal actions and dedication to environmental conservation in routine work activities (Henderson & Loreau, 2023).

The healthcare industry is responsible for about 4.4% of all carbon emissions in the world (Faeni & Faeni, 2025). Rehabilitation centres, though smaller than large hospitals, still have an impact on this footprint through their daily activities, heating and cooling systems, use of throwaway items, and reliance on digital and electronic gadgets (Miah et al., 2024). Healthcare professionals must switch to sustainable healthcare for both moral and environmental reasons (Shah et al., 2025). In the last several years, global frameworks like the United Nations Sustainable Development Goals (SDGs) have made sustainability a top priority for organizations and policies. SDG 3 (Good Health and Well-Being) and SDG 13 (Climate Action) show how health services and environmental sustainability are connected (Shahada et al., 2023). Rehabilitation centers are strategically situated to further these goals: by employing sustainable practices, they protect the environment while simultaneously improving human health (Yong et al., 2022).

Additionally, research demonstrates that firms adopting GHRM attain competitive advantages through enhanced employer branding, improved talent retention, reduced operational costs, and an elevated reputation (Tang et al., 2018). Green training, performance management, and compensation incentivize staff to adopt environmentally friendly practices, resulting in systemic and lasting organizational transformation (Zeeraak et al., 2018). This indicates that GHRM is not merely a theoretical concept but a critical necessity for organizations seeking to align with global sustainability trends (Henderson & Loreau, 2023).

The environmental problem in Pakistan is getting worse and worse. The Germanwatch Climate Risk Index (2021) says that the country is one of the most vulnerable to climate change. It has to deal with severe weather, water shortages, and rising pollution levels. Healthcare organizations, including rehabilitation clinics, cannot remain unaffected by these concerns. Pakistan is committed to sustainable development through the SDGs and national policies, however the implementation is uneven (Hasan et al., 2021). The healthcare industry often puts too much emphasis on quick service delivery and not enough on environmentally friendly practices like separating waste, using less energy, and buying green products (Ziyadeh et al., 2024).

Rehabilitation centers in Pakistan constitute an expanding sector of the healthcare business, propelled by increasing incidences of non-communicable diseases, orthopedic ailments, and the demand for post-traumatic care. These centers generally function with restricted finances, inadequate infrastructure, and weak sustainability strategies (Al-Abbadi & Abu Rumman, 2023). The implementation of GHRM practices—such as eco-friendly recruitment, eco-conscious training, and sustainable rewards—provides a means to integrate sustainability into organizational culture without incurring significant financial costs (Le & Tham, 2024). When empowered by HR systems, employees can serve as change agents by conserving resources, minimizing waste, and advocating for environmentally sustainable rehabilitation methods (e.g., digital rehabilitation tools, tele-rehabilitation). Simultaneously, regulatory compliance is gaining significance in Pakistan. The Pakistan Environmental Protection Act (1997) and the National Climate Change Policy (2012) advocate for sustainable practices; nonetheless, numerous healthcare organizations remain either uninformed or noncompliant (Le & Tham, 2024). This presents both a difficulty and an opportunity: rehabilitation centers can establish themselves as leaders in sustainability by integrating human resource strategies with regulatory requirements (Ali et al., 2012).

Notwithstanding the increasing focus on GHRM in international literature, the majority of research have concentrated on corporate sectors such manufacturing, hospitality, and information technology. Research on healthcare organizations is few, with even less studies focusing exclusively on rehabilitation centers (Imran et al., 2023). This represents a significant deficiency, as rehabilitation centers integrate service provision with substantial resource use, rendering sustainability especially relevant (Moor & Ravindra, 2023).

Furthermore, whereas previous research has demonstrated direct correlations between GHRM practices and organizational sustainability, the processes by which GHRM affects sustainable outcomes are still inadequately examined (Awwad Al-Shammari et al., 2022). Employee green behavior, reflecting individual actions and attitudes towards environmental concerns, is a vital mediating element. Employees are the primary executors of sustainability initiatives, such as conserving electricity in clinics, adopting paperless record systems, and implementing trash segregation. Neglecting employee behavior as a mediator may lead research to inaccurately assess the genuine influence of GHRM. In the context of Pakistan, there is hardly no research investigating the application of GHRM in rehabilitation centers (Imran et al., 2023). This raises unresolved enquiries: In what ways do recruitment, training, performance management, and remuneration policies affect sustainability? Does organizational culture promote or obstruct sustainable behavior? Are rehabilitation personnel cognizant of environmental regulations? This work addresses existing gaps, providing novel insights that connect management sciences, healthcare, and environmental sustainability (Bhardwaj et al., 2025).

This study is noteworthy as it amalgamates the nascent domain of Green Human Resource Management (GHRM) with the healthcare and rehabilitation industry, a field that has garnered less focus in sustainability research. Although GHRM methods, including green recruiting, training, performance management, and pay, have been extensively examined in industrial and service sectors, their implementation in rehabilitation centers is predominantly uncharted. Rehabilitation centers inherently utilize substantial resources, including energy, water, and medical supplies, therefore presenting major opportunities for the implementation of sustainable practices. This research investigates the influence of GHRM on sustainable practices via the mediating effect of employee green behavior, so contributing to theoretical development in management sciences and offering practical insights for healthcare administrators and policymakers. It emphasizes how environmentally responsible human resource management may correspond with the United Nations' Sustainable Development Goals (SDGs) on a global scale. At the national level, especially in Pakistan, where healthcare infrastructure is developing, the findings can direct rehabilitation centers to implement ecologically sustainable methods while preserving service quality. The paper fills

a significant research vacuum and provides evidence-based solutions to improve environmental responsibility in a sector typically neglected in green management research.

## 2. LITERATURE REVIEW

Historically, the correlation between GHRM practices and sustainability outcomes has been extensively theorized through various organizational behavior and management frameworks. The Ability–Motivation–Opportunity (AMO) theory offers a comprehensive explanation of the relationship between Green Human Resource Management (GHRM) practices and sustainability, positing that organizational practices enhance employee outcomes by improving their abilities, motivation, and opportunities (Bos-Nehles et al., 2023). In this context, green training improves staff skills, green compensation boosts motivation, and green recruiting or participation fosters opportunities for sustainable engagement. The Resource-Based View (RBV) also regards green HRM and employee green behavior as precious, scarce, and inimitable resources that can establish a foundation for lasting competitive advantage (Khanra et al., 2022).

Social Exchange Theory (SET) elucidates employee responses to company investments in green initiatives by examining environmentally conscious attitudes and behaviors (Sahu et al., 2025). The Theory of Planned Behavior (TPB) has been utilized to forecast employees' environmental intents, illustrating that attitudes, subjective norms, and perceived control influence pro-environmental behaviors in organizational contexts (Song et al., 2023). These frameworks combined furnish a robust theoretical foundation for investigating the impact of GHRM operations on employee green behavior and sustainable practices inside rehabilitation clinics. Recent empirical research demonstrates that GHRM practices substantially influence employees' pro-environmental attitudes and behaviors. Shaikh and Mahesar (2024) analyzed the banking sector in Pakistan, exploring the influence of Green Human Resource Management (GHRM) on employee green service conduct, with a green psychological climate serving as a mediating factor. The authors, in their examination of Social Identity Theory, established that GHRM favorably forecasts both in-role and extra-role green behaviors (Khan et al., 2023). Their results confirm that psychological climate has a mediating effect, showing that GHRM works indirectly by creating a supportive environment. This comparison is pertinent for rehabilitation clinics, since personnel aiming to employ sustainable methods may rely on cues from both the weather and the organization (Mousa et al., 2025).

A study published in BMC Psychology (2025) utilized the AMO framework to analyze the hotel sector in China and Pakistan. It linked green human resource management (GHRM) to environmentally friendly creative work behavior. The study incorporated green perceived organizational support (GPOS) and organizational citizenship behavior towards the environment (OCBE) as factors elucidating this relationship (Correia et al., 2024). The findings indicated that Green Human Resource Management (GHRM) fosters new environmentally friendly behaviors when employees see that their organisation supports them and demonstrates civic responsibility. This is also significant in healthcare, where employees coming up with ways to cut down on waste or use digital records can help people get healthier in a more sustainable way (Kumar & Chakraborty, 2022). Shaukat et al. (2023) also looked at Pakistan's manufacturing business and stressed how important it is to have a green absorptive ability in order to encourage extra-role green activity. Their findings confirmed that green training and performance management are crucial for enhancing organizational civic behavior towards the environment. These findings bolster AMO theory by demonstrating that green competences (knowledge and abilities) empower employees to translate HRM principles into tangible behaviors. Rehabilitation facilities, where patient safety and adherence to environmental standards are of utmost importance, can significantly benefit from such absorptive capacity (Iftikar et al., 2022).

A major study done by Ali et al. (2024) looked into businesses that were ISO-14001 certified. The study examines the influence of green organizational culture and employee green behavior as mediators between Green Human Resource Management (GHRM) and business sustainability performance in Saudi Arabia. According to AMO theory, the results showed that GHRM practices promote a green organizational culture, which then encourages employees to act in a more environmentally friendly way, which in turn leads to better sustainability outcomes (San Román-Niaves et al., 2025). This is very similar to the premise of the current study, which says that organizational culture and understanding of environmental rules are likely to change and strengthen the link between GHRM and sustainable practices in rehabilitation centers. Additionally, a study by Abbas et al. (2022) revealed that green commitment mediates the association between perceived GHRM and employee green behavior, whereas green knowledge sharing mitigates the intensity of this relationship. The study conducted in South Asian settings highlights the significance of knowledge distribution and a collaborative culture in improving environmental results. For rehabilitation centers, knowing about environmental regulations may be like sharing knowledge, making sure they obey the rules, and advocating more eco-friendly ways of doing things.

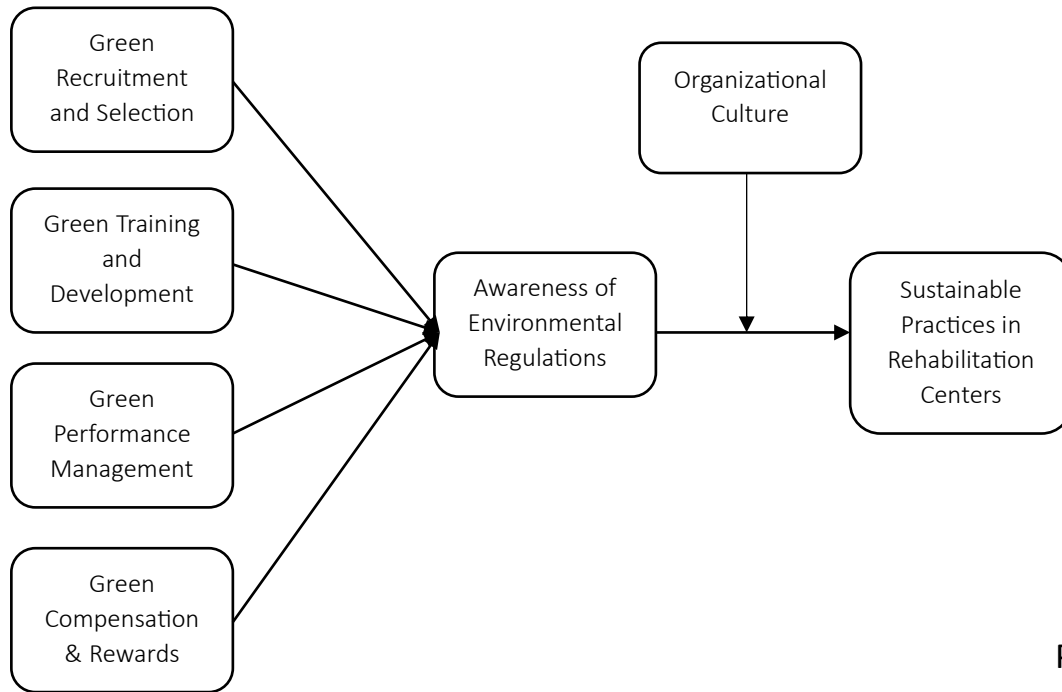
A study conducted by Azad et al. (2022) in Bangladesh shown that Green Human Resource Management (GHRM) favorably influences employee engagement and pro-environmental behavior, hence improving sustainability and organizational productivity. These results underscore the mediating role of green behavior as a crucial link between HR practices and sustainable outcomes, hence reinforcing the conceptual framework of the present study. The main areas of GHRM research have been manufacturing, banking, and hospitality. Its use in healthcare and rehabilitation institutions has been quite limited. Rehabilitation centers have unique challenges, including the disposal of medical waste, high energy consumption by treatment devices, and compliance with rigorous regulatory standards (Iftekhhar et al., 2022). Current research on healthcare sustainability mostly focusses on the reduction of clinical waste, enhancement of energy efficiency, and the implementation of telehealth technologies, while little attention is directed towards the impact of human resource practices in promoting these initiatives (Khanra et al., 2022). Employee behaviors, such as recycling, conserving resources, and adhering to environmental regulations, can significantly impact the sustainability profile of rehabilitation clinics. Therefore, examining the intermediary role of employee green conduct in this sector is both timely and necessary.

Despite the growing emphasis on GHRM in recent years, significant research gaps persist. The sectoral mismatch is evident, as healthcare and rehabilitation facilities have received inadequate attention in the GHRM literature (Al-Abbadi & Abu Rumman, 2023). Secondly, although numerous studies have investigated mediators like green absorptive capacity, green psychological climate, and green dedication, there is a deficiency of study regarding the awareness of environmental rules as a contextual component. Rehabilitation centers in Pakistan function under changing legal frameworks, and staff' understanding of these regulations may greatly influence their capacity to adopt sustainable practices. Third, current research predominantly frames sustainability in relation to corporate or environmental performance; yet, sustainable methods in rehabilitation centers such as waste segregation, digital patient records, or energy-efficient therapies are significantly under examined. Geographical disparities persist, as less empirical research has been undertaken in Pakistan's healthcare industry, despite its urgent sustainability issues.

Addressing these deficiencies possesses both theoretical and practical importance. This study theoretically adds by examining employee green behavior as a mediator and organizational culture and understanding of environmental legislation as contextual facilitators within the underexplored healthcare industry. The findings can assist rehabilitation center administrators in Pakistan in implementing HRM practices that enhance employee engagement while aligning with environmental sustainability objectives. The study underscores the significance of GHRM in



advancing the United Nations' Sustainable Development Goals (SDGs) on a global scale, especially those pertaining to health and environmental sustainability.



**Figure 1**  
Proposed Framework

### 3. METHODOLOGY

#### 3.1. Study Design

This research utilized a quantitative, cross-sectional survey methodology. A cross-sectional approach was suitable as it permitted the researcher to gather data from a substantial cohort of respondents at one specific moment, facilitating the analysis of the correlations among Green Human Resource Management (GHRM) practices, employee green behavior, and sustainable practices in rehabilitation centers. The implementation of organized questionnaires ensured uniform data gathering and enabled statistical analysis.

#### 3.2. Population

The target population for this study comprised employees working in rehabilitation centers in Pakistan. These included:

- Physical therapists, occupational therapists, speech therapists, and psychologists engaged in direct patient care.
- Administrative and support staff (e.g., HR managers, operations officers, and supervisors) who were directly or indirectly involved in sustainability-related policies and practices.
- Mid- and senior-level management staff, who played a key role in designing and implementing HR practices within rehabilitation settings.

This population was selected because rehabilitation centers consume significant resources (e.g., medical supplies, electricity, and water) and generate medical and non-medical waste, making them important sites for the adoption of sustainable practices.

### 3.3. Sampling Technique

The research employed a stratified random selection method to guarantee participation from several personnel types (clinical staff, administrative staff, and management). Stratification facilitated the acquisition of varied perspectives from employees with differing levels of engagement in HR practices and environmental projects. Participants were randomly recruited from registered rehabilitation centers in Karachi, Lahore, and Islamabad, which collectively constitute the largest clusters of rehabilitation facilities in Pakistan. In the absence of complete staff lists, purposive sampling was utilized as an adjunct approach, focusing on those deemed most informed about organizational practices and sustainability initiatives.

### 3.4. Sample Size

The minimum required sample size was calculated using Krejcie and Morgan's (1970) sampling table, where a population greater than 10,000 requires at least 384 respondents for generalizability at a 95% confidence level and 5% margin of error (Chuan & Penyelidikan, 2006).

Given the exploratory nature of this study and the potential for incomplete responses, the researcher aimed to collect data from 450 respondents, ensuring at least 384 valid responses were retained for analysis. This sample size also met the "10-times rule" for Structural Equation Modelling (SEM), which requires at least 10 respondents per item of the most complex construct in the model.

### 3.5. Items and Constructs

**Table 1. Items and Constructs**

| Constructs                      | Items                                                                                     | References                                    |
|---------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------|
| Green Recruitment and Selection | GRS1: Our rehabilitation center considers environmental values when recruiting employees. | (Fapohunda et al., 2022; Obie et al., 2025)   |
|                                 | GRS2: Job advertisements highlight the organization's commitment to sustainability.       |                                               |
|                                 | GRS3: Applicants with eco-friendly attitudes are preferred in hiring decisions            |                                               |
|                                 | GRS4: Recruitment processes include questions about environmental awareness.              |                                               |
|                                 | GRS5: The organization hires individuals with knowledge of sustainable practices.         |                                               |
| Green Training and Development  | GTD1: Employees receive training on eco-friendly rehabilitation practices.                | (Jasim & Altaee, 2023; Moradeke et al., 2021) |
|                                 | GTD2: Training programs include environmental awareness and waste reduction.              |                                               |
|                                 | GTD3: Staff are educated on energy-saving and resource management.                        |                                               |

GTD4: The organization organizes workshops on sustainable healthcare.  
GTD5: Employees are encouraged to learn about new green technologies in rehab.

#### Green Performance Management

GPM1: Employee performance evaluation includes sustainability-related criteria.  
GPM2: Supervisors monitor compliance with environmental standards.  
GPM3: Employees are recognized for contributing to green initiatives.  
GPM4: Sustainable practices are considered in promotion decisions.  
GPM5: Feedback on performance includes environmental responsibility.

(Ahmad et al., 2021; Martins et al., 2021)

#### Green Compensation and Rewards

GCR1: Employees are rewarded for adopting eco-friendly practices.  
GCR2: Incentives are provided for achieving sustainability targets.  
GCR3: Bonuses are linked to reducing waste and resource usage.  
GCR4: Recognition programs highlight environmentally responsible employees.  
GCR5: Non-monetary rewards (certificates, appreciation) are given for green practices

(Das & Dash, 2024; Saputri et al., 2024)

#### Organizational Culture

OC1: Sustainability is embedded in the organizational values.  
OC2: Employees share responsibility for eco-friendly practices.  
OC3: Management promotes a culture of environmental care.  
OC4: Teamwork encourages adoption of sustainable practices.  
OC5: Our organizational culture motivates green behavior.

(Aggarwal & Agarwala, 2025; Setyawati, 2023)

#### Awareness of Environmental Regulations

AER1: Employees are aware of national environmental laws and policies.  
AER2: Staff understand the importance of complying with environmental regulations.  
AER3: Training programs raise awareness of healthcare sustainability regulations.  
AER4: The organization communicates updates on environmental rules.

(Zameer et al., 2021; Zhao et al., 2024)



AER5: Employees know the penalties for violating environmental regulations.

SPRC1: The centre implements waste segregation and recycling policies.

SPRC2: Energy-efficient equipment is used in rehabilitation services.

Sustainable Practices in Rehabilitation Centers

SPRC3: Paperless systems (e.g., electronic records) are adopted to reduce waste.

SPRC4: Water-saving practices are implemented in therapy facilities.

SPRC5: The centre actively promotes sustainable rehabilitation methods (e.g., tele-rehab).

(Fidlerová et al., 2022; Na-Nan et al., 2024)

### 3.6. Data Collection Procedure

- Formal permission was obtained from rehabilitation centers and professional bodies (e.g., Pakistan Society of Rehabilitation).
- Questionnaires were distributed both physically and electronically via Google Forms.
- Respondents were assured of confidentiality and anonymity, with informed consent obtained prior to participation.
- A pilot study with 30 respondents was conducted to refine the questionnaire.

### 3.7. Data Analysis Techniques

Data analysis was conducted in two stages:

#### 1. Preliminary Analysis

- Descriptive statistics (mean, standard deviation, frequency distributions) were used to summarize demographic characteristics.
- Reliability testing was carried out using Cronbach's alpha and Composite Reliability (CR).
- Validity assessment (Convergent and Discriminant validity) was conducted through Confirmatory Factor Analysis (CFA).

#### 2. Hypothesis Testing

Structural Equation Modelling (SEM) was employed using Smart PLS 4. This method was appropriate because it allowed simultaneous testing of multiple relationships, including mediation and moderation effects, between GHRM practices, employee green behavior, and sustainable practices in rehabilitation centers.

## 4. RESULTS

### 4.1 Demographics

Table 2. Demographic Characteristics of Participants

| Variable          | Category                         | Frequency (n) | Percentage (%) |
|-------------------|----------------------------------|---------------|----------------|
| Gender            | Male                             | 158           | 41.1%          |
|                   | Female                           | 226           | 58.9%          |
| Age Group         | 20–29 years                      | 94            | 24.5%          |
|                   | 30–39 years                      | 165           | 43.0%          |
|                   | 40–49 years                      | 87            | 22.7%          |
|                   | 50 years & above                 | 38            | 9.8%           |
| Job Role          | Physiotherapist                  | 122           | 31.8%          |
|                   | Occupational Therapist           | 89            | 23.2%          |
|                   | Psychologist / Counsellor        | 56            | 14.6%          |
|                   | Nursing / Clinical Support Staff | 74            | 19.3%          |
|                   | Administrative / HR Staff        | 43            | 11.1%          |
| Organization Type | Public Sector                    | 180           | 46.9%          |
|                   | Private Sector                   | 204           | 53.1%          |
| Experience        | Less than 5 years                | 112           | 29.2%          |
|                   | 5–10 years                       | 153           | 39.8%          |
|                   | 11–15 years                      | 79            | 20.6%          |
|                   | Above 15 years                   | 40            | 10.4%          |

The demographic analysis of the respondents (n = 384) indicated a majority of female participation (58.9%), aligning with the higher representation of women in healthcare and rehabilitation professions in Pakistan. The predominant age group consisted of professionals aged 30–39 years (43%), succeeded by those aged 20–29 years (24.5%), reflecting a workforce that is predominantly youthful and in mid-career stages. Regarding professional backgrounds, physiotherapists (31.8%) and occupational therapists (23.2%) collectively comprised over half of the sample, while psychologists (14.6%), nursing and clinical support personnel (19.3%), and administrative/HR staff (11.1%) were also included, providing a balanced representation of clinical and non-clinical respondents. Approximately equal representation was noted from public (46.9%) and private (53.1%) rehabilitation centers, facilitating significant comparison studies. The bulk of respondents indicated 5–10 years of experience (39.8%), followed by those with less than 5 years (29.2%), demonstrating a workforce with significant practical exposure and professional maturity.

## 4.2 Construct Reliability and Validity

**Table 3. Measurement Model Assessment**

| Construct                           | Items | Cronbach's Alpha | CR   | AVE  |
|-------------------------------------|-------|------------------|------|------|
| Green Recruitment & Selection (GRS) | 4     | 0.83             | 0.88 | 0.65 |
| Green Training & Development (GTD)  | 5     | 0.85             | 0.89 | 0.62 |
| Green Performance Management (GPM)  | 4     | 0.81             | 0.87 | 0.61 |
| Green Compensation & Rewards (GCR)  | 4     | 0.79             | 0.85 | 0.6  |
| Awareness of Env. Regulations (ERA) | 4     | 0.86             | 0.91 | 0.66 |
| Organizational Culture (OC)         | 4     | 0.82             | 0.88 | 0.64 |
| Sustainable Practices (SPRC)        | 4     | 0.87             | 0.91 | 0.68 |

The constructs' reliability and validity were assessed using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). The chart indicates that all Cronbach's Alpha values above the recommended minimum of 0.70 (Hair et al., 2019), varying from 0.79 (Green Compensation & Rewards) to 0.87 (Sustainable Practices). This indicates that each construct had strong internal consistency. The CR values above 0.70, varying from 0.85 to 0.91, hence affirming robust composite reliability.

All AVE values for convergent validity exceeded 0.50, with a range from 0.60 to 0.68. This indicates that over fifty percent of the variance in the assessed indicators was elucidated by their corresponding latent variables. Sustainable Practices (AVE = 0.68) and Awareness of Environmental Regulations (AVE = 0.66) demonstrated robust convergent validity, but the lowest AVE value of 0.60 (Green Compensation & Rewards) remained within acceptable thresholds. These findings indicate that the measurement model has strong reliability and convergent validity, signifying that the constructs are prepared for subsequent structural model testing.

## 4.3 Discriminant Validity

**Table 4. Discriminant Validity**

| Construct | GRS         | GTD         | GPM         | GCR         | ERA         | OC          | SPRC        |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GRS       | <b>0.81</b> |             |             |             |             |             |             |
| GTD       | 0.54        | <b>0.79</b> |             |             |             |             |             |
| GPM       | 0.49        | 0.56        | <b>0.78</b> |             |             |             |             |
| GCR       | 0.45        | 0.5         | 0.47        | <b>0.77</b> |             |             |             |
| ERA       | 0.52        | 0.55        | 0.53        | 0.48        | <b>0.81</b> |             |             |
| OC        | 0.41        | 0.44        | 0.40        | 0.38        | 0.47        | <b>0.80</b> |             |
| SPRC      | 0.55        | 0.57        | 0.52        | 0.49        | 0.62        | 0.50        | <b>0.82</b> |

The Fornell-Larcker criterion was employed to ascertain the distinctiveness of the various components of the study. The square root of the average variance extracted (AVE) values, indicated in bold on the diagonal, exceeded the correlations among distinct components in all instances. This indicates that each component shared greater similarities with its associated factors than with other components (Fornell & Larcker, 1981). The square root of the AVE for Green Recruitment & Selection (0.81) exceeded its correlations with GTD (0.54), GPM (0.49), GCR (0.45), ERA (0.52), OC (0.41), and SPRC (0.55). Sustainable Practices (0.82) exhibited superior discriminant validity compared to its associations with other components, with the most robust correlation being with ERA (0.62).

The results validated that all conceptions were conceptually different and free from multicollinearity concerns. Consequently, the measurement model met the criteria for discriminant validity and was suitable for subsequent structural model analysis.

## 4.4 Structural Model Assessment

**Table 5. Structural Model Assessment**

| Hypothesis  | Path                               | $\beta$ | t-value | p-value | Decision  |
|-------------|------------------------------------|---------|---------|---------|-----------|
| H1          | GRS $\rightarrow$ ERA              | 0.18    | 3.12    | 0.002   | Supported |
| H2          | GTD $\rightarrow$ ERA              | 0.24    | 4.25    | 0.000   | Supported |
| H3          | GPM $\rightarrow$ ERA              | 0.16    | 2.88    | 0.004   | Supported |
| H4          | GCR $\rightarrow$ ERA              | 0.14    | 2.30    | 0.021   | Supported |
| H5          | ERA $\rightarrow$ SPRC             | 0.49    | 7.82    | 0.000   | Supported |
| H6 (Moder.) | ERA $\times$ OC $\rightarrow$ SPRC | 0.11    | 2.09    | 0.037   | Supported |

The findings of the structural model evaluation are displayed in Table X. All proposed links were deemed significant, with path coefficients ( $\beta$ ) indicating positive correlations among components. Green Recruitment & Selection ( $\beta = 0.18$ ,  $t = 3.12$ ,  $p = 0.002$ ), Green Training & Development ( $\beta = 0.24$ ,  $t = 4.25$ ,  $p < 0.001$ ), Green Performance Management ( $\beta = 0.16$ ,  $t = 2.88$ ,  $p = 0.004$ ), and Green Compensation & Rewards ( $\beta = 0.14$ ,  $t = 2.30$ ,  $p = 0.021$ ) exhibited positive and statistically significant correlations with Awareness of Environmental Regulations (ERA). The findings indicate that the adoption of Green HRM practices improves employees' awareness and comprehension of environmental rules and compliance obligations.

Moreover, ERA had a substantial and significant impact on Sustainable Practices in Rehabilitation Centres (SPRC) ( $\beta = 0.49$ ,  $t = 7.82$ ,  $p < 0.001$ ), underscoring its pivotal function as a mediator in advancing sustainability outcomes. The moderating effect of Organisational Culture on the link between Environmental Responsibility Awareness (ERA) and Sustainable behaviors in Resource Conservation (SPRC) was confirmed ( $\beta = 0.11$ ,  $t = 2.09$ ,  $p = 0.037$ ), suggesting that a supportive culture enhances the conversion of environmental awareness into sustainable behaviors.

These results collectively offer strong empirical validation for the proposed model, demonstrating that Green HRM practices indirectly foster sustainability in rehabilitation centers by increasing awareness of environmental legislation, with organizational culture further intensifying this impact.

#### 4.5 Mediation Effect (Indirect Effect via ERA)

Table 6. Mediation Effect

| Mediation Path   | Indirect Effect | t-value | p-value | Result       |
|------------------|-----------------|---------|---------|--------------|
| GRS → ERA → SPRC | 0.09            | 2.85    | 0.005   | Partial Med. |
| GTD → ERA → SPRC | 0.12            | 3.92    | 0.000   | Partial Med. |
| GPM → ERA → SPRC | 0.08            | 2.42    | 0.016   | Partial Med. |
| GCR → ERA → SPRC | 0.07            | 2.04    | 0.041   | Partial Med. |

The mediation study examined the indirect effects of Green HRM practices on Sustainable Practices in Rehabilitation Centres (SPRC) through Awareness of Environmental Regulations (ERA). The results, shown in Table X, showed that ERA had a considerable effect on all of the postulated connections. The indirect effect of Green Recruitment and Selection on SPRC through ERA was significant ( $\beta = 0.09$ ,  $t = 2.85$ ,  $p = 0.005$ ), indicating partial mediation. In the same way, Green Training & Development had the biggest indirect influence ( $\beta = 0.12$ ,  $t = 3.92$ ,  $p < 0.001$ ), which shows that training is very important for enhancing sustainability outcomes through regulatory knowledge. Green Performance Management ( $\beta = 0.08$ ,  $t = 2.42$ ,  $p = 0.016$ ) and Green Compensation & Rewards ( $\beta = 0.07$ ,  $t = 2.04$ ,  $p = 0.041$ ) demonstrated significant, if rather minor, indirect benefits on SPRC through ERA. The considerable direct links between Green HRM practices and ERA, along with the indirect associations via ERA, suggest partial mediation in all cases. These results confirm that Green HRM practices promote sustainable behaviors in rehabilitation facilities both directly and indirectly by increasing employees' awareness of environmental legislation, with ERA acting as a vital mediating mechanism in the proposed model.

#### 4.6 Importance Performance Map for Sustainable Practices

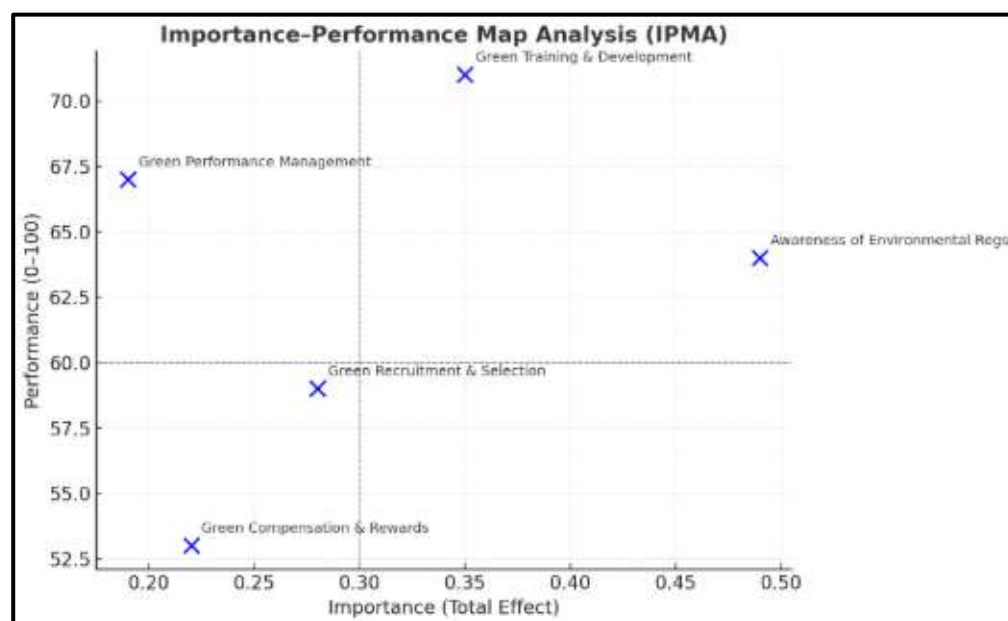
Table 7. IPMA for Sustainable Practices

| Predictor                       | Importance (Total Effect) | Performance (Avg Score, 0–100) | Managerial Implication                                                |
|---------------------------------|---------------------------|--------------------------------|-----------------------------------------------------------------------|
| Awareness of Environmental Regs | 0.49 (highest)            | 64                             | High importance but moderate performance → priority improvement area. |
| Green Training & Development    | 0.35                      | 71                             | Strong impact and good performance → maintain.                        |
| Green Recruitment & Selection   | 0.28                      | 59                             | Important but underperforming → needs HR investment.                  |
| Green Compensation & Rewards    | 0.22                      | 53                             | Low performance → redesign incentive systems.                         |
| Green Performance Management    | 0.19                      | 67                             | Less critical but relatively good performance.                        |



An Importance–Performance Map Analysis (IPMA) was performed to ascertain the relative significance and efficacy of the primary determinants of Sustainable Practices in Rehabilitation Centers (SPRC). Table X indicates that Awareness of Environmental Regulations (ERA) is the most significant predictor, with the highest total effect of 0.49. Nonetheless, its performance score was at 64 (on a 0–100 scale), indicating that although ERA is essential for promoting sustainable practices, its present execution is only moderate. This underscores ERA as a focal point for managerial focus, where strategic interventions can produce significant enhancements in sustainability results.

Green Training & Development (total effect = 0.35; performance = 71) emerged as the second most significant predictor, exhibiting both substantial impact and comparatively good performance. This indicates that organizations are now investing in excellent training initiatives, which should be sustained and further enhanced. Green Recruitment & Selection (total impact = 0.28; performance = 59) demonstrated moderate significance yet suboptimal performance, highlighting the necessity for improved green recruiting methodologies and the incorporation of environmental criteria into recruitment policy. Green Compensation & Rewards exhibited relatively diminished significance (0.22) and the lowest performance score (53). This research indicates that existing compensation systems are inadequately matched with sustainability objectives; therefore, a reconfiguration of incentive structures may enhance employee motivation for environmentally friendly actions. Ultimately, Green Performance Management demonstrated the lowest total effect (0.19) while maintaining a commendable performance score (67), indicating it is less essential while operating satisfactorily. The IPMA results indicate that although the majority of Green HRM practices positively influence sustainability outcomes, organizations should strategically focus on enhancing awareness of environmental regulations and fortifying green-oriented recruitment and incentive systems to optimize their effectiveness in promoting sustainable practices.



**Figure 2**  
IPMA Graph

## 5. DISCUSSION

The goal of this study was to look at how Green Human Resource Management (GHRM) practices affect the long-term success of rehabilitation centers. The research examined the mediating role of environmental regulations awareness (ERA) and the influence of organizational culture (OC) on this connection. The study provided robust evidence for the methodology, demonstrating that green recruiting and selection, training and development, performance management, and compensation and rewards collectively enhanced ERA, facilitating the implementation of sustainable practices. The study showed that the culture of an organization has a big impact on how well it meets its sustainability goals.

The findings indicated that all four GHRM practices—green recruitment and selection, green training and development, green performance management, and green remuneration and rewards—exerted a beneficial impact on ERA. Renwick et al. (2013) contended that including environmental objectives into HR processes enhances employees' understanding and awareness of sustainability. Jabbour et al. (2008) emphasized the importance of hiring and educating personnel with environmental competencies to promote sustainable practices across the organization. Training and development had the most impact on ERA of all the GHRM initiatives. This suggests that rehabilitation centers need to keep teaching their staff about how to be more ecologically friendly in order to get them to do so. This is in line with what Pham et al. (2020) found: that training programs that focus on environmental awareness greatly increased employees' green abilities and motivation. The results align with the diffusion of innovation theory, which emphasizes training as a mechanism for disseminating new ideas and practices throughout businesses. Conversely, compensation and rewards exerted the minimal influence on ERA, indicating that the existing incentives within rehabilitation centers may be insufficient to promote long-term objectives. This conclusion aligns with Martins et al. (2021), who contended that financial incentives alone frequently do not foster ecologically advantageous behaviors without robust cultural and educational support.

ERA was identified as a critical factor influencing sustainable practices inside rehabilitation institutions. The large path coefficient from ERA to sustainable practices ( $\beta = 0.49$ ) shows how important it is for companies to be aware of regulations in order to change their behavior. This research corroborates the resource-based view (RBV), which underscores the significance of knowledge and awareness as critical intangible assets that can confer a competitive advantage in the pursuit of sustainability. Previous research, particularly the works of Jasim and Altaee (2023) and Henderson and Loreau (2023), has similarly recognized environmental awareness as a crucial facilitator of sustainability in the healthcare and service sectors. This finding is significant for the rehabilitation sector, as sustainable practices often encompass adherence to environmental regulations, patient-centered care, prudent resource utilization, and waste reduction. Rehabilitation centers make sure they follow the law and help people make their daily lives more eco-friendly by teaching them about environmental standards.

The mediation study showed that ERA only partially mediated the links between all GHRM behaviors and sustainable practices. This shows that GHRM actions directly promote sustainability, but their effects are much stronger when they first raise employees' understanding of rules and regulations. Obie et al. (2025) noted similar results,

demonstrating that ERA functions as a link between HRM practices and outcomes related to corporate social responsibility. This partially mediated link supports the theoretical framework of the ability–motivation–opportunity (AMO) model, which posits that HR policies influence outcomes by enhancing employees’ abilities (knowledge), motivation, and opportunities to engage in desired behaviors.

Training and development reemerged as the primary catalyst within the mediation pathways, affirming prior research by Setyawati (2023), which recognised staff training as an effective means of translating environmental policy into practical applications. The moderation analysis confirmed that corporate culture strengthened the relationship between ERA and sustainable behaviors. Rehabilitation clinics with supportive and environmentally sensitive cultures have been more successful at turning regulatory awareness into real sustainability benefits. This finding is consistent with institutional theory, which underscores the importance of organizational values and norms in legitimizing and assimilating new practices. San Román-Niaves et al. (2025) emphasized that a supportive culture is crucial for ensuring that environmental initiatives are perceived not merely as compliance-driven but as fundamental to the company identity.

In settings where corporate culture does not support sustainability, the execution of ERA may be limited, as employees lack the normative encouragement to apply their knowledge. Thus, fostering a sustainable organizational culture is essential for rehabilitation institutions aiming to enhance their environmental performance. The IPMA results give us more information by showing how important and useful predictors are in comparison to each other. ERA emerged as the principal element, albeit with limited effectiveness, indicating that it serves as a vital catalyst for sustainability, yet there is room for improvement in its development. Recruitment and pay didn't do very well, even though they were only somewhat important. This shows that treatment facilities should put more money into these areas. Training demonstrated considerable significance and outstanding performance, indicating it as a current asset that requires safeguarding. These results align with recent research conducted by Shaikh and Mahesar (2024), which argued that healthcare institutions should strategically focus crucial areas demonstrating low performance to improve sustainability outcomes.

## 6. Theoretical and Practical Implications

This study theoretically enriches the GHRM literature by affirming the relevance of the AMO model, RBV, and institutional theory in clarifying the role of HR practices in promoting sustainability within rehabilitation settings. The results show that managers should focus on making sure that employees understand the rules better, changing the way rewards are given, and making sure that sustainability is a part of the hiring process. By doing this, rehabilitation centers can go beyond rules that are only meant to keep people safe and create a culture of proactive environmental stewardship.

## 7. Conclusion

This study aimed to investigate the impact of Green Human Resource Management (GHRM) practices—such as green recruitment and selection, green training and development, green performance management, and green compensation and rewards—on employees' awareness of environmental regulations and their subsequent effect on sustainable practices. The moderating influence of organizational culture was also examined. The results validated that all four components of GHRM substantially enhanced understanding of environmental legislation, subsequently fostering sustainable activities. The mediation study emphasized that understanding of environmental regulations functioned as a crucial mechanism by which GHRM practices resulted in sustainable outcomes. Furthermore, the moderating influence of organizational culture highlighted that a supportive and environmentally-focused culture enhanced the conversion of awareness into implementable sustainable actions.

This study theoretically enhances the GHRM and sustainability literature by illustrating the alignment of internal HR practices with external environmental requirements to promote organizational sustainability. This research enhances the discourse by elucidating the intermediary role of environmental regulation awareness and the contingent significance of organizational culture, in contrast to past studies that mostly concentrated on direct connections. These findings align with and enhance the Resource-Based View (RBV) and Institutional Theory, indicating that organizations that invest in green HR systems and foster a sustainability-oriented culture acquire distinctive capabilities to adhere to environmental standards and integrate sustainability into their fundamental practices.

The findings underscore the necessity for managers and politicians to prioritize awareness of environmental legislation as a vital mechanism for sustainability. The Importance-Performance Map Analysis (IPMA) revealed that understanding of environmental regulation is the most significant yet underperforming factor, indicating an urgent necessity for focused initiatives in this domain. Organizations in Pakistan, where environmental compliance is increasingly a regulatory and reputational necessity, can utilize these insights to improve training, refine recruitment standards, and align performance and reward systems with environmental objectives. In doing so, they fulfil regulatory obligations and establish themselves as pioneers in sustainable development.

This study highlights the crucial importance of GHRM in influencing organizational sustainability via regulatory awareness and cultural support. It offers both theoretical enhancement and practical direction for professionals seeking to advance the sustainability agenda. Subsequent research could enhance these insights by integrating longitudinal designs, cross-industry comparisons, or supplementary contextual elements such as leadership and technological innovation, to further elucidate how HR systems can influence environmental performance on a global scale and within emerging economies like Pakistan.

## AUTHOR'S CONTRIBUTION AND DECLARATIONS

**Conception or Design:** Summya Khan, Hina Arshad

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Furthermore, this research did not involve the use of animals, plants, or any biological specimens requiring ethical approval. Therefore, ethical clearance from an institutional review board, prior informed consent (PIC) from respondents, or animal/plant welfare approvals are not applicable to this study.

The author(s) affirm full compliance with international ethical standards for research and publication.

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